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Population-centric Counterinsurgency as seen through the Iraq War Logs: A Preliminary Evaluation

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Abstract

Due to the perceived success of population-centric counterinsurgency (COIN) in Iraq, it has been implemented in Afghanistan as well. However, it has still not been decided conclusively whether COIN was successfully implemented by the US led coalition in Iraq. Critics argue that factors other than COIN and the surge (such as the Sons of Iraq program) also played a significant role in reducing the insurgency and violence in Iraq (Mark 2010).

This thesis examines whether COIN achieved its intended objectives in Iraq, from a grounds-up perspective. It presents metrics and hypotheses (analogous to those suggested by Kilcullen (2009)) for measuring COIN success in Iraq, assigns them relative weights, and extracts key parameters from the data using machine learning approaches. The Iraq War Logs, released by WikiLeaks,[1] are used as the data source.

The analysis demonstrates that population-centric COIN campaign did not succeed in achieving its intended goals. Even though some measurable improvements were observed in many core metrics on the ground, they were insufficient to collectively make the campaign a success. More needs to be done by the US-led coalition forces for improving the population-related activities, as they are seen to have the maximum effect on COIN success.

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[1] http://wikileaks.org/

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Chapter 1: Introduction

Population-centric counterinsurgency (COIN) has been implemented by the American Army-led coalition forces in Iraq (the erstwhile Multi-National Force–Iraq or MNF–I) in a number of phases, following the departure of Donald Rumsfeld. In coordination with the 'surge[2],' it is often credited for dramatically reducing the levels of violence and hostilities in Iraq and changing the course of the war. This was done by deploying enough troops to secure the country, particularly in large cities like Baghdad, following the conclusion of "major combat operations" (Ricks 2006).

The insurgency in Iraq could not be going much worse for the coalition forces in 2006. In spite of the presence of a substantial number of MNF-I troops, the insurgents (composed of former Baathists, Sunni militiamen, foreign Islamic Al Qa'ida affiliates, and Shi'a militias) were making the day-to-day lives of civilians difficult and dangerous. Criminal activities and sectarian Shia-Sunni violence, including Al Qa'ida suicide bombings and attacks, finally forced a rethink of strategy by the Bush administration (Kilcullen 2009).

In January 2007 the 'surge' campaign began. It was based on the long-held COIN doctrine that sufficient forces (so called "boots-on-the-ground") are needed to secure the target population (FM 3-24 2006). The number of combat troops deployed in Iraq was accordingly increased. Since COIN strategists consider population as the most important center of gravity, the ground forces are required to have a tactical approach of dispersion into small outposts amongst the people to "win their hearts and minds." So the 'surge' included changes in the deployment of troops, moving them out of the secure confines of central bases, and posting them directly in the midst of Iraqi neighborhoods. This was done to allow them to have more interactions with the local nationals and newly recruited Iraqi security forces.

Due to the perceived success of COIN in Iraq, it has been introduced in Afghanistan as well. However, the issue of whether COIN was successfully implemented by the US led coalition in Iraq has still not been decided conclusively. Critics argue that factors other

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[2] The 'surge' during the Iraq War refers to the increase in American troops, beginning in 2007, ordered by President Bush. The aim was to provide security to civilian populations in Baghdad and Al Anbar Province.

than COIN (such as the "Sons of Iraq" program) also played a significant role in reducing the insurgency and violence in Iraq (Mark 2010). The "Sons of Iraq" (SOI) program was aimed at coopting with the Sunni tribal militias. This led to a ceasefire of former Sunni insurgents with US forces, eased by generous American financial aid and the prospective opportunity to get integrated into the new Iraqi security forces. The SOI militias also turned against the more radical foreign Al Qa'ida-affiliates whose violent terrorist attacks against civilian targets were becoming increasingly unpopular. The debate about the effectiveness (and success) of COIN in Iraq has been ongoing for the past few years with no signs of either side backing down.

This thesis examines whether COIN achieved its intended objectives in Iraq, from a grounds-up perspective. A substantial amount of research already exists about COIN principles. Researchers have suggested qualitative and quantitative metrics to measure the success of COIN at a fine resolution, instead of depending on the overall statistics about civilian and coalition casualties. The research presented here uses the surrogate measures for estimating COIN success as laid out by Lt Col (Dr) David Kilcullen, one of the most prolific thinkers and writers about COIN today, for quantifying COIN success in Afghanistan. He suggests that developments in four basic elements of a counterinsurgency campaign need to be tracked: the local population, the host-nation government, the security forces and the insurgents. This thesis presents metrics and hypotheses analogous to those suggested by Kilcullen (2009) for Iraq, and assigns them relative weights based on their relevance to overall COIN success.

Since uncensored war statistics are unavailable to researchers, the collection of 391,832 United States Army significant action field reports (SIGACTs) released by WikiLeaks, also referred to as the 'Iraq War Logs,' is used as the data source. These SIGACTs were not intended for public consumption and so can be assumed to be unbiased raw data. Based on careful interpretation of the metrics and the SIGACTs, key parameters relevant to each metric are determined. They are extracted from the Iraq War Logs and aggregated using machine learning approaches to observe notable changes (if any) for the metrics, once the COIN strategy was implemented. This research design cannot ascertain which initiative (COIN or SOI) led to success in Iraq,

but it can help to evaluate whether COIN was successfully implemented, as is widely assumed.

1.1 Context

The research literature related to quantitative analysis of battlefield strategies using surrogate measures of success is very limited in scope. The main reason for this seems to be that uncensored data related to ongoing wars is usually not available to researchers in real-time. The release of the Pentagon Papers in 1971 is often compared with the WikiLeaks' Iraq War Logs. However, the two are quite different when looked closely: The Pentagon Papers were intended to be an "encyclopedic history of the Vietnam War" written by analysts, drawn from active-duty military officers, academics and civilian federal employees (Westerfield 1975). In contrast, the Iraq War Logs are composed of daily field reports filed by field military commanders to provide real-time uncensored situational awareness to the coalition military leadership. As these reports are real-time and were not intended for unclassified dissemination, they are the closest reflections of actual battlefield tactics adopted by soldiers on the ground.

1.2 David Kilcullen's Role in Today's Dominant COIN Strategies

Lt Col (Dr) David Kilcullen is one of the most prolific thinkers and writers about COIN today. He has a novel perspective on the practice and challenges related to COIN, since he is one of the rare strategists to have had real-world field experience of war theatres at both the tactical and planning levels (as an infantry company commander in the Australian Army, and as a senior adviser to General David Petraeus in 2007-08, respectively). His advisory role in the implementation of the surge has allowed him to not just author the COIN doctrine, but also attempt to put it into operation, another unique opportunity (Mark 2010). According to Kilcullen, the overall goal of COIN is to secure the civilian population, value their lives as much as those of the troops and gradually remove the support structure for the insurgents (Kilcullen 2009). He has written a chapter (called "A Guide to Action") and an Annex for the US Army's COIN

doctrine manual, FM 3-24, that have made direct contributions to the interpretation and adoption of COIN by soldiers on a day-to-day basis (FM 3-24 2006).

Based on his high profile assignments as a consultant to the US Government and military during the Iraq 'surge' campaign, and as an adviser to General Stanley McChrystal (and later Gen David Petraeus), the version of COIN recommended by Kilcullen has been dominant in the strategy adopted by the US and coalition forces in Iraq and Afghanistan. Hence this thesis evaluates COIN as defined by him to assess the success of counterinsurgency in Iraq.

1.3   Approach & Results

Statistical natural language processing-based lexicometric approaches have been used for this research. These include basic text manipulation strategies that count the number of instances of certain concepts (word tokens). The concepts are in turn decided on a case-by-case basis to evaluate the working hypotheses. The analysis is made challenging by the extensive use of acronyms in the summary section of the Significant Action reports (SIGACTs) and non-grammatical structure of entries in them. Details about the approaches are given later in the thesis.

The results show that the population-centric COIN campaign has not been successful at its intended goals in Iraq. It is also observed how the four major elements of COIN (as defined by Kilcullen (2009)), namely local population-related activities, host-nation government indicators, security situation and insurgent activities, have achieved different levels of success. The detailed analysis presented in this thesis allows the evaluation of counterinsurgency campaign as a set of individual tangible attributes. This allows future military planners to focus their efforts selectively at individual COIN elements that are found to be failing.

However, the analysis has certain limitations owing to the data source used and the original intended purpose of the SIGACTs that does not capture all the attributes of interest for such research. The results from this thesis also cannot be extrapolated to other COIN campaigns (such as Afghanistan) due to the very different nature of war there.

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1.4 Thesis Structure

This section presents the structure of the thesis:

- Chapter 2, 'Background,' presents the background research literature in areas relevant to this thesis and situates it in the research landscape. It presents the key concepts of counterinsurgency, the need for and evolution of COIN in Iraq and also the structure of the SIGACTs that form the main source of data for this thesis.

- Chapter 3, 'Research Approach,' deals with the details about the adopted research approach. It includes discussions about the source of data, data preprocessing, and the working hypotheses used to evaluate the success of COIN in Iraq. It also presents the relative weights assigned to the basic elements of counter-insurgency and the qualitative confidence measures assigned to the results.

- Chapter 4, 'Results and Conclusions,' presents the results of the analysis, along with conclusions about what they mean for COIN success in Iraq.

- Chapter 5, 'Discussion and Future Work,' presents a discussion about the wider implications of the results, significant contributions of this thesis, and potential future work.

1.5 Summary

This chapter has laid out the motivation for this thesis and the context of the research. It has also briefly presented the results and their implications for future counterinsurgency campaigns. Analyzing and measuring the success of counterinsurgency is a challenging problem, especially in a complex, multi-faceted war zone such as Iraq. However, in order to assess the strategy's effectiveness and to have the flexibility to adapt it if needed, counterinsurgency progress needs to be measured. This is the niche area that this thesis targets.

Chapter 2: Background

This chapter presents the background knowledge necessary to better understand the context of this research and its various aspects.

2.1   Counterinsurgency (COIN) Warfare

COIN operations have evolved over a long period of time and cover a wide spectrum - from the unity of effort in integrating civilian and military activities, to intelligence in counterinsurgency, developing host-nation security services and finally sustainment of logistical lines of operation (Kilcullen 2003; Metz & Millen 2004; Multi-national Force–Iraq 2006). The British in Malaya in the late 1950s (Kitson 1971; Thompson 2005), and the French in Algeria in the 1950s (Trinquier 1964) tend to form the two major historical case studies of all counterinsurgency operations. There is a consensus that these operations succeeded by establishing combat outposts in areas of a country controlled by insurgents, with the primary purpose of providing security and protecting the people (Gentile 2009). In contrast, the United States' involvement in Vietnam is considered the biggest failure of the doctrine (Race 1972; Thompson 2005).

Population-centric counterinsurgency is essentially a military operation. Its success is not determined by the number of enemy killed but by the 'shielding' of the civilian population (Galula 1964). COIN strategists consider population as the most important center of gravity and focus on protecting them even at cost to the military. This implies that in case of doubt the soldiers are advised to hold their fire unless they are absolutely sure to hit the insurgents and not have collateral casualties (Kilcullen 2006a; FM 3-24 2006).

Population-centric counterinsurgency often equals nation-building, and it requires patience on the part of the administration running the war. The soldiers need to disperse into small outposts in the middle of the settled population to "win their hearts and minds" (Kilcullen 2006b). In Afghanistan this has become the concept of 'clear, hold, and build' and the provision for basic economic needs, essential services, such as water,

electricity, sanitation, and medical care, sustainment of key social and cultural institutions, etc. (Sepp 2005)

The Commander's Initial Assessment (McChrystal 2010) laid out the core principles of COIN in more precise detail:

1. Redefining the fight: Emphasis on comprehensive counterinsurgency and not on seizing terrain or destroying enemy forces

2. Criticality of time: The insurgency is a year-round operation and requires year-round association by coalition forces with the population. The soldiers should protect the population from insurgent coercion and intimidation and devote time and resources to nurture mutual trust and cooperation.

3. Change of operational culture: As a conventional force that is poorly configured for COIN, inexperienced in local languages and culture, and subject to problems inherent with coalition forces, the US led troops usually are pre-occupied with their own protection. They should be encouraged to interact closely with the local population to shield them from insurgent violence, coercion and corruption.

4. Focus on the population: In order to better serve the population, the coalition forces should improve effectiveness through greater partnering with local security forces at every level, preparing them to take lead in security operations. They should focus resources for critical areas where vulnerable populations are most threatened. Such activities will help them gain the initiative and reverse the insurgency's momentum

These key principles embody the ethos of COIN, as interpreted (and applied) by the coalition forces, and are based on the lessons learned in Iraq. More details about the Iraq War as it progressed and how the implementation of COIN affected it, is needed to better understand why COIN was implemented there in the first place. The next section presents a brief overview of the situation.

2.2 COIN in Iraq

There has been a difference of opinion about how COIN has been implemented by the US led coalition in Iraq. The core principle of COIN is that the killing of insurgents is superseded by increased contacts and cooperation with the local population. Those who believe that the 2007 COIN surge was successful believe that it played a major role in reducing violence on the streets of Baghdad. On the other hand, critics argue that factors other than COIN need to be credited as much as COIN, especially the conclusion of a bloody sectarian civil war through the Sunni Awakening movement (or the Sons of Iraq program). The debate has raged on for the past few years with no signs of either side backing down. However, the exact version of COIN strategy has varied by region and commander, and has changed over time (Krepinevich 2007). Kahl (2007) discusses the adoption of COIN by the US in Iraq as four phases. These are summarized in the following sub-sections.

2.2.1 Phase 1: Denial

Beginning with the collapse of Saddam's regime till April 2004, the civilian advisors and Pentagon part of the Combined Joint Task Force 7 (CJTF-7) denied the presence or emergence of an insurgency in Iraq. There was no overall plan to conduct COIN operations, and commanders in different regions and at various levels, pursued engagement with the locals in their areas of responsibility and provided them security on a case-to-case basis. Overall, any use of overly aggressive pursuit of the enemy ended up alienating the Iraqi population. With mounting evidence and increase in insurgent attacks, denial began to give way, after the Fallujah and Sadr uprisings in April 2004.

2.2.2 Phase 2: Learning curve

From 2004 to the late summer of 2005, the existence and growing significance of insurgency was finally acknowledged. CJTF-7 was replaced by Multi-National Corps - Iraq (MNC-I) and Multi-National Force - Iraq (MNF-I), a COIN strategy was planned, rebuilding the Iraqi Security Forces was put on priority, and a mix of "direct, harder

approaches" and "indirect, softer approaches" was used. The bias of the strategy towards "enemy-centric/search-and-destroy/kill-capture" persisted throughout this period. In late 2005, the Iraqi population was finally acknowledged as the center of gravity and the principles of COIN were adopted by the military.

2.2.3 Phase 3: Understanding and appreciating COIN

By late 2005 the training of US troops had been changed to incorporate COIN principles, with greater emphasis on the Iraqi population and "indirect, less-kinetic COIN approaches." This was reflected in the "National Strategy for Victory in Iraq" released by the Bush administration in November 2005 that clearly states the intent to "clear, hold, and build" Iraqi population centers.

The actual implementation of these changes in Iraq depended on a number of factors. Firstly, since 2004, smaller US bases within many Iraqi cities and villages were consolidated into larger Forward Operating Bases in outlying areas, assuming that the perception of foreign occupation forces was provoking the Sunni insurgency. With a major shift towards population-centric COIN, the change of operational culture on the ground (away from large FOBs towards smaller units providing local security within the community) took longer to be realized than initially expected. Secondly, the adequate number of troops needed for effective COIN operations were denied due to political pressures on the Bush White House. This encouraged military commanders to speed up training Iraqi forces (Iraqi army and police) and let them shoulder the responsibility of providing local security in areas cleared by American forces.

The initial plan was to withdraw major US combat presence by 2007-2008 and hand over the charge to Iraqi forces. However, incompetence/lack of inspiration among the newly-trained troops led to a perceived "security vacuum," especially in Baghdad. This was accompanied by insurgents infiltrating in the army and other security forces. Violence between the Sunni insurgents and Shia militias increased and threatened to drag all of Iraq into a sectarian civil war by the spring of 2006.

2.2.4   Phase 4: Implementing COIN

The 'surge' of US troops in Iraq (January-October 2007) sent additional forces to Iraq (especially Baghdad), with a strategy to provide security to the local populations, prevent sectarian violence, and pursue nation-building in the ensuing peace. General David Petraeus, the author of the U.S. Army's Counterinsurgency Field Manual (FM 3-24 2006), was made in-charge and led to American troops distributed into smaller bases and working with Iraqi forces to provide local security.

Today Iraq has a weak and dysfunctional central government that exercises limited authority in major parts of Iraqi territory and is fragmented along ethnic, sectarian, or tribal lines. In such a situation, many subnational organizations (utilizing sectarian or ethnic ties) have grown to provide security and services to the people. The US COIN strategy has increasingly started interacting with such subnational political and security organizations. This is in accordance with the observation made by Wipfli and Metz (2008): "State-centric approach to COIN can work only with a viable partner government that is in control and is willing to make difficult decisions when needed." As the United States remains involved in counterinsurgency, it must address enduring tensions between local and national initiatives.

As the Iraq War Logs are used for analyzing the success of COIN by the US-led coalition forces in this thesis, the next section describes the key features of Significant Action Reports found in the war logs.

2.3   Significant Action Reports (SIGACTs)

Significant Action Reports (SIGACTs) are daily reports by military commanders to the central leadership of the Multi-National Force-Iraq (MNF-I). These reports include all incidents of known attacks on coalition forces, Iraqi Security Forces, the civilian population, and infrastructure. The intensity and complexity of the attacks cover a wide range.

Although the SIGACTs have become accessible to the public in the aftermath of the WikiLeaks fiasco, they are not the perfect source for understanding all aspects of the

war. SIGACTs suffer from many limitations and some key challenges need to be overcome to make sense of the voluminous Iraq War Logs. Firstly, the SIGACTs often use military jargons and non-grammatical sentence formations, as they are reports from the field commanders to the headquarters about updates related to any significant activity that has happened in the region under their purview. Such text structure makes it difficult to use any natural language parsers, such as the Stanford log-linear part-of-speech tagger (Toutanova et al. 2003) on the Iraq War Logs corpus. If this had been possible, the sentence structure could be extracted and information could be aggregated from the noun phrases used in the SIGACTs. As such, aggregation strategies based on the context of the parameter under study have to be used for each of the hypotheses being examined.

Secondly, the SIGACTs are written by soldiers during some of the most hostile battles in the Iraq War, under challenging circumstances. The fatigue of the war means that many entries in the SIGACTs are entered in incorrect boxes. Coalition troops who have joined the war only recently and are unaccustomed to submitting SIGACTs also make mistakes in entering the data. Such data cannot be used for analysis and has to be discarded at the data preprocessing stage. However, the quality of data-entry has improved as the war has progressed.

Thirdly, there seems to be a common perception among soldiers that activities such as completing SIGACTs at the end of their workday have no payback for them - this demotivates them from making extra efforts to document the incidents and the troop response in absolute detail. This leads to deterioration in the quality of field reports. Fourthly, since the senior military command is the intended audience, soldiers cannot be verbose about uncomfortable incidents in the battlefield that might go against them. As such, the SIGACTs are insufficient to make any observations about soldier behavior. In addition to the above limitations and contrary to popular perception, SIGACTs do not include complete details about criminal activities, or all deaths happening in the battlefield (Shapiro 2009). This can be due to the lack of witnesses (no coalition or Iraqi units present in the vicinity to record the activity), or the pressures of the battlefield (soldiers engaged in intense conflict situations cannot track accurate fatality rates).

The SIGACTs can nevertheless be seen as an unbiased and unadulterated account of what happened on the battlefield, since the original intent of the authors (US Army and coalition forces servicemen serving in Iraq) was not to make them available to the public. Table 2.1 describes the structure of the SIGACTs, along with a brief explanation that is necessary to better understand them.

Table 2.1 Structure of the SIGACTs

Parameter	Brief Explanation
`id`	Unique identification number for each incident
`url`	Unique identification code for each incident
`reportkey`	Unique alphanumeric key for record-keeping purposes
`date`	Date and time of the incident
`type`	Type of incident
`category`	Similar to type of incident, but with more information. Type and category are often seen in combination
`trackingnumber`	*
`title`	Title of the SIGACT (usually contains information about troops killed or wounded in action)
`summary`	Main entry that gives a short description of what happened and how.
`region`	Region where incident occurred
`attackon`	Who was attacked in the incident
`complexattack`	Whether the attack by insurgents involved sophisticated planning and execution (True/False)
`reportingunit`	Army unit filing the report
`unitname`	Army unit involved in the incident
`typeofunit`	Type of unit involved in the incident (e.g. coalition force, Iraqi Security Force, etc.)
`friendlywia`	Statistics about coalition partners, civilians, or enemies wounded in action, killed in action or detained
`friendlykia`	
`hostnationwia`	
`hostnationkia`	
`civilianwia`	
`civiliankia`	
`enemywia`	
`enemykia`	
`enemydetained`	
`mgrs`	Location of incident (Military Grid Reference System)
`latitude`	Location of incident (lat, long values)
`longitude`	
`originatorgroup`	Group where the incident report originated
`updatedbygroup`	Group that updated the incident report (For cases deemed significant by the army leadership, the incident is further investigated and the SIGACT is updated)

`ccir`	Indication whether this incident can cause outrage in the media (credible allegation that civilians have been killed)
`sigact`	*
`affiliation`	Whether the individuals involved in the incident are Enemy, Friend or Neutral
`dcolor`	Blue (coalition partners), Red (Enemy combatants), Green (Iraqi civilians), White (Civilian contractors)
`Classification`	Security classification of the SIGACT

* Note: The interpretation of parameters in the SIGACTs was done through a variety of collaborative sources, notably the Guardian DataBlog[3]. No credible explanation could be found for the missing entries in the above table. However, these were also considered irrelevant for the kind of analysis carried out in this thesis.

2.4 Summary

This chapter has presented the background literature to understand the key tenets of counterinsurgency, as interpreted for the Iraq War. It has also described why counterinsurgency had to be introduced in the Iraq War theatre, and the various phases it went through. Finally, the structure of the significant action reports has been described, along with some limitations inherent in using them.

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[3] http://www.guardian.co.uk/news/datablog+media/wikileaks

Chapter 3: Research Approach

This chapter presents the data source used for analysis and the research approach adopted to analyze the Iraq War Logs. It also details the working hypotheses used to evaluate the various metrics necessary for measuring the success of COIN.

3.1 Data Source

This thesis uses the Iraq War Logs as the primary source of data. In order to determine the exact start and end dates of the surge, the Brookings Iraq Index[4] was referred. The researchers at Brookings in turn got the number of troops from a variety of official Pentagon and Congressional documents.

As Table 3.1 shows, the US troop surge in Iraq began in January 2007 and continued till October 2007, a duration of 10 months. In order to understand the effect of the surge on the ground realities, periods of 10 months, before and after the surge, were selected to normalize the incidents by time. These three periods are referred to as 'before' (before-surge), 'during' (during-surge), and 'after' (after-surge) respectively.

Table 3.1 Coalition troop strength in Iraq

Month (end of)	Number of US troops deployed in Iraq	Phases for this research
March 2006	133000	Before the COIN Surge phase (10 months)
April 2006	132000	
May 2006	132000	
June 2006	126900	
July 2006	130000	
August 2006	138000	
September 2006	144000	
October 2006	144000	
November 2006	140000	
December 2006	140000	
January 2007	132000	**The US Troop Surge in Iraq**
February 2007	135000	

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[4] http://www.brookings.edu/saban/iraq-index.aspx

March 2007	142000	(During the COIN Surge phase; 10 months)
April 2007	146000	
May 2007	149700	
June 2007	157000	
July 2007	160000	
August 2007	162000	
September 2007	168000	
October 2007	171000	
November 2007	162000	After the COIN Surge phase (10 months)
December 2007	160000	
January 2008	157000	
February 2008	157000	
March 2008	155000	
April 2008	153000	
May 2008	150000	
June 2008	148000	
July 2008	148000	
August 2008	148000	

Source: The Brookings Iraq Index (http://www.brookings.edu/saban/iraq-index.aspx)

3.2 Data Preprocessing

In order to prepare the Iraq War Logs into usable data for the research, the single CSV file provided by WikiLeaks was sorted by chronological order. The SIGACTs corresponding to the three periods of interest (before, during and after the surge) were then extracted. Although the original data consisted of 391,832 SIGACTs, the chronological sorting and data filtering resulted in 86,522 SIGACTs from March-December 2006 (before-surge), 101,500 SIGACTs from January-October 2007 (during-surge), and 56,335 SIGACTs from November 2007-August 2008 (after-surge). The varying number of SIGACTs in the three periods under consideration cannot be extrapolated to mean anything substantial, as SIGACTs include a variety of information, ranging from actual insurgent activities to threat, to friendly fire incidents, to even criminal activities, and their number can vary for many reasons (Kilcullen 2009).

Identifying the right balance between data preprocessing and text mining is crucial to make sure that none of the useful data is thrown out. Since many of the entries were entered incorrectly (e.g. alphanumeric data submitted in a column where there should have been only numerical data), all such entries were discarded.

3.3 Approach

A number of machine learning approaches were considered for this research. Although computational linguistics present a viable methodological approach for scaling up the analysis of most large project corpuses, the extensive use of acronyms in the documents and non-grammatical structure of most entries means that natural language processing cannot be used for this research. So a lexicometric approach was finally adopted. This involved using statistical natural language processing over a large corpus using supervised and unsupervised machine learning approaches. Many text manipulation strategies were used to count the number of instances when a certain concept (word token) was used and corresponding decisions were made based on the context. These approaches are described in detail in Chapter 4, "Results and Conclusions."

3.4 Working Hypotheses: Metrics for Determining COIN Success in Iraq

COIN success is difficult to measure in a complex war environment where multiple initiatives are often implemented simultaneously. In the absence of any clear means to measure COIN success, strategic planners and policymakers find it difficult to assess what works and what does not. Any metric or indicator of success must include both national and local factors, as well as account for regional variations. Kilcullen (2009) presents a number of metrics that can be used for measuring success of COIN in Afghanistan, ranging from different aspects of governance, daily lives of the Afghans, surrogate factors for measuring troop and insurgent confidence and also the tactics adopted by the ISAF and Afghan soldiers. In building an equivalent model for measuring success of COIN in Iraq, many of these parameters are made redundant by differences

in the nature of the war in Iraq versus Afghanistan (e.g. urban versus rural warfare). In addition, many other parameters, such as prices of exotic vegetables, rates of taxation, etc. are found to be beyond the scope of analysis since this thesis restricts the data source to only the SIGACTs.

Table 3.2 lists all the factors presented by Kilcullen for the Afghan war theatre, the corresponding adapted metrics for Iraq, and then examines whether they can be measured using SIGACTs or not. As Kilcullen himself points out, these metrics are not exhaustive in any way and should not be considered as an absolute list of all the factors that can affect the success of COIN; instead they should be seen as work-in-progress.

Table 3.2 Metrics for Measuring COIN Success in Iraq

S. No.	Metrics for COIN Success in Afghanistan (Kilcullen 2009)	Metrics for COIN Success in Iraq (Adapted)	Can be measured from SIGACTs?	Comments
	Population-Related Activities			
1	Voluntary reporting incidents	Voluntary reporting incidents	Yes	It is often not clear from the SIGACTs whether a threat report is 'voluntary' or through local intelligence sources
2	IEDs reported vs. IEDs found (% of accuracy)	IEDs reported vs. IEDs found (% of accuracy)	Yes	
3	Prices for exotic vegetables	Prices for exotic vegetables	No	Not relevant from the perspective of SIGACTs
4	Transportation prices	Transportation prices	No	
5	Progress of NGO construction projects	Progress of NGO construction projects	No	
6	Influence of Taliban vs. government courts	?	No	Not sure if comparable situation existed in Iraq
7	Participation rate in programs	Participation rate in programs	No	Not relevant from the perspective of SIGACTs
8	Taxation collection (government taxation vs. insurgent taxation)	Taxation collection (government taxation vs. insurgent taxation)	No	
9	Afghan-on-Afghan violence	Iraqi-on-Iraqi violence	Yes	SIGACTs don't report all deaths
10	Rate of new business formation and loan repayment	Rate of new business formation and loan repayment	No	Not relevant from the perspective of SIGACTs
11	Rate of starting new urban construction projects	Rate of starting new urban construction projects	No	
	Host Nation Government Indicators			
12	Assassination and	Assassination and	Yes	

	kidnapping rate	kidnapping rate		
13	Civilian accessibility	Civilian accessibility	No	Not relevant from the perspective of SIGACTs
14	Where local officials sleep	Where local officials sleep	No	
15	Officials' business interests	Officials' business interests	No	
16	% of officials purchasing their positions	% of officials purchasing their positions	No	
17	Extent of budget execution	Extent of budget execution	No	
18	Capital flight	Capital flight	No	
19	Rate of anti-insurgent lashkar formation	?	No	The Sons of Iraq program can partially address this. But since it was not exactly an anti-insurgent program (rather it paid insurgents to stop hostilities with coalition soldiers), this metric is not considered
20	Public safety function by insurgent groups	Public safety function by insurgent groups	Yes	Public safety function by the coalition forces is usually well-documented and can be used with a zero-sum assumption (Insurgents' gains are the coalition forces' losses and vice-versa)
	Security Force Indicators			
21	Kill ratio (casualties inflicted vs. suffered)	Kill ratio (casualties inflicted vs. suffered)	Yes	
22	Win/loss ratio	Win/loss ratio	Yes	
23	Kill vs. wound/capture ratio	Kill vs. wound/capture ratio	Yes	
24	Detainee guilt ratio	Detainee guilt ratio	No	SIGACTs do not include follow-up details of trials to measure number of guilty detainees
25	Recruitment vs. desertion rates	Recruitment vs. desertion rates	No	Cannot be interpreted from SIGACTs
26	Proportion of ghost employees	Proportion of ghost employees	No	
27	Location at start of firefight	Location at start of firefight	No	Not always described
28	Escalation of force (EOF) Incidents vs. civilian casualties (CIVCAS)	Escalation of force (EOF) Incidents vs. civilian casualties (CIVCAS)	Yes	
29	Duration of operations	Duration of operations	No	The times of operations have been mostly censored from the
30	Night operations	Night operations	No	

				released Iraq War Logs
31	Small unit operations	Small unit operations	Yes	
32	Combined action operations	Combined action operations	Yes	
33	Dismounted operations	Dismounted operations	Yes	
34	Driving techniques in crowded areas	Driving techniques in crowded areas	No	SIGACTs not detailed enough to judge this
35	Reliance on air and artillery support	Reliance on air and artillery support	Yes	
36	Pattern-setting and telegraphing moves to the enemy	Pattern-setting and telegraphing moves to the enemy	No	
37	Possession of high-ground at dawn	?	?	
Enemy Indicators				
38	High technology inserts	High technology inserts	May be	Difficult to reliably identify incidents of high technology equipments getting seized (lack of adequate domain knowledge by author)
39	Insurgent medical health	Insurgent medical health	No	
40	Presence of specialist teams and foreign advisors	?	?	
41	Insurgent village-of-origin	?	?	Not sure if comparable situation existed in Iraq
42	First-to-fire ratio	First-to-fire ratio	Yes	
43	Price of black market weapons and ammunition	Price of black market weapons and ammunition	No	
44	Insurgent kill/capture vs. surrender ratio	Insurgent kill/capture vs. surrender ratio	Yes	
45	Mid-level insurgent casualties	Mid-level insurgent casualties	May be	Not always known at time of filing SIGACTs; Difficult to judge the position in insurgent hierarchy for the ones mentioned (lack of domain knowledge by author)

Table 3.3 presents the working hypotheses corresponding to each of the metrics identified as determinable from the SIGACTs in Table 3.2, to narrow down the scope of the data under consideration. All the hypotheses are for increasing COIN success with time; so any false results indicate failure of COIN.

Table 3.3 Working Hypotheses for Measuring COIN Success in Iraq

S. No.	Metrics for COIN Success in Iraq (Adapted)	Working Hypotheses
	Population-Related Activities	
1	Voluntary reporting incidents	Higher frequency of reporting means that the locals are starting to trust the security forces more than the insurgents ⇨ Higher frequency of reporting means more COIN success
2	IEDs reported vs. IEDs found (% of accuracy)	More IEDs found through local reporting shows local support for the coalition security forces ⇨ More IEDs found through local reporting means more COIN success
3	Iraqi-on-Iraqi violence	Iraqi-on-Iraqi violence caused by insurgent action, actions of Iraqi security forces or criminal elements, all indicate law and order situation ⇨ Less Iraqi-on-Iraqi violence means more COIN success
	Host Nation Government Indicators	
4	Assassination and kidnapping rate	If the number of assassinations and kidnappings decrease with time, it shows that the public safety is improving ⇨ Less number of assassinations and kidnappings with time indicates more COIN success
5	Public safety function by insurgent groups	Population-centric COIN depends on securing the population. Therefore if the civilians depend on insurgents for law and order maintenance, it leads to less confidence in the government ⇨ Less public safety by insurgent groups means more COIN success
	Security Force Indicators	
6	Kill ratio (casualties inflicted vs. suffered)	Higher kill ratio means more confidence and control by the security forces over an area ⇨ Higher kill ratio means more COIN success
7	Win/loss ratio	Units that consistently win (inflict more losses than they suffer) are doing better than those who consistently lose ⇨ Higher win/loss ratio means more COIN success
8	Kill vs. wound/capture ratio	Usually the ratio is 1 killed:4-5 wounded/captured; any ratio higher than this may involve extra-judicial killings ⇨ Lower kill vs. wound/capture ratio means more COIN success
9	Escalation of force (EOF) Incidents vs. civilian casualties (CIVCAS)	EOF incidents involve cases where soldiers have to open fire at suspicious individuals who appear to violate the security cordon of the convoys or the bases (Surrogate indicator of aggressive/callous attitude of soldiers) ⇨ Less EOF incidents means more COIN success
10	Small unit operations	A willingness by smaller units to conduct operations shows more confidence of defeating the enemy, if encountered ⇨ More small-unit operations means more COIN success
11	Combined action operations	If coalition forces frequently partner with local security and police forces, it shows better coordination and performance by

		all partners
		⇨ More combined action operations means more COIN success
12	Dismounted operations	If soldiers opt for more foot patrols, it shows better rapport with locals and more confidence of control over territory
		⇨ More dismounted operations means more COIN success
13	Reliance on air and artillery support	If coalition forces frequently rely on air and artillery support, it indicates lack of confidence and unwillingness to engage with the enemy
		⇨ Less frequent air and artillery support requests means more COIN success
Enemy Indicators		
14	First-to-fire ratio	Key indicator of which side controls the initiation of firefights (Surrogate indicator of better tactical initiative and situational awareness)
		⇨ Better first-to-fire ratio means more COIN success
15	Insurgent kill/capture vs. surrender ratio	A higher insurgent kill/capture vs. surrender ratio shows unwillingness of insurgents to give up their cause (Surrogate indicator for high motivation)
		⇨ Low insurgent kill/capture vs. surrender ratio means more COIN success

3.4.1 Relative Weights of the Different Counterinsurgency Metrics

Not all working hypotheses being evaluated can come out to be true or false at the same time. This necessitates assigning relative weights to the different parameters being evaluated. This is a two-tier problem: the first tier is comprised of the four basic elements of a COIN campaign as defined by Kilcullen (2009), viz. the local population, the host-nation government, the security forces and the insurgents; the second tier has the different parameters being evaluated for each of these broad categories. This thesis assigns relative weights to the four major counterinsurgency elements as shown in Table 3.4. It is followed by the explanation for why the relative weights were assigned in this order.

Table 3.4 Relative Weights assigned to the Major Counterinsurgency Elements

Element of COIN Strategy	Weight
Population-related activities	4
Host nation government indicators	3
Security force indicators	2
Enemy indicators	1

Kilcullen considers COIN to be a political (population-centric) strategy, and not military, since it is not a conventional warfare strategy. Its success is not determined by the number of enemy killed but by the 'shielding' of the civilian population (Galula 1964). So 'population-related activities' category has been assigned the maximum weightage for the purposes of this thesis.

The security of the civilian population is another major objective to remove the local nationals' reliance on insurgents for law and order problems and gradually remove the support structure for the insurgents. So 'host nation government indicators' is the next most weighted category showing how well the host nation government is integrated with its constituents.

Under COIN, the soldiers are also told to value the civilians' lives as much as their own, and to hold fire unless it is certain that there will be no collateral casualties. 'Security force indicators' dealing directly with soldier behavior is therefore the third most weighted category.

Finally, the 'enemy indicators' category is not a part of COIN implementation, but has a cause-effect relationship with it, i.e., better-equipped and healthy insurgents who consistently beat the security forces in firefights indicate that their support structure is not just intact, but flourishing. As this category may have a time lag associated with the implementation of COIN in a region, it has been assigned the least importance.

It must be noted that the particular metrics under each of these broad elements (referred to as the 'second tier' above) are all assigned equal value. This means that if a majority of metrics in a category are found to be true (false), then that category is considered to be true (false).

3.4.2 Qualitative Confidence Measures for the Results

The results obtained from the analysis of SIGACTs are constrained by a number of factors. As discussed earlier, since the SIGACTs are basically military reports concerned about activities of interest for the army, they cannot cover all aspects of the civilian government or local police. In addition, certain parameters included in the SIGACTs cannot be distinguished from those of interest for the analysis (e.g. reported threats of IEDs vs. threats of IEDs reported voluntarily by civilians). As such, qualitative

confidence measures are assigned to each of the results based on their careful interpretation. These measures show how well the parameters address the required conditions for analyzing the working hypotheses or reliability of the assumptions made in their estimation. The qualitative measures used are listed in Table 3.5 and the reasoning behind their assignment is explained with the results in the next chapter.

Table 3.5 Qualitative Confidence Measures Assigned to the Results

Qualitative Confidence Measure	Label
Low level of confidence	🔴
Moderate level of confidence	🟡
High level of confidence	🟢

3.5 Summary

This chapter has discussed the source of data, the data preprocessing methods and working hypotheses used for this thesis. The different elements of counterinsurgency presented by Kilcullen (2009) have been assigned relative weights to make it easier to interpret the meaning of mixed results. Confidence in the results is also assessed qualitatively based on the reliability of the data source and assumptions made. The working hypotheses are evaluated in the next chapter.

Chapter 4: Results and Conclusions

This chapter presents the results and conclusions from the analysis of SIGACTs from the Iraq War Logs.

4.1 Results

This section presents the results from the analysis of the metrics for the Iraq War Logs. The working hypothesis is marked as 'True,' or 'False' when the conclusions are definitive. The cases where the data does not follow a clear trend are classified as 'inconclusive' and show the limitations of the SIGACTs in revealing the overall security situation on the ground.

Initially it was intended that only cases with clear trend lines would be considered for reporting the results. However, early experiments showed that this would lead to a large number of inconclusive results for the working hypotheses. In order to get rid of such cases, the studies were extended for a further 10-month period (September 2008-June 2009), referred to as 'After-2' in the results. The cases where this needed to be done are discussed on an as-needed basis. The details of the approaches used for evaluating the hypotheses and the calculations for individual categories are provided in Appendix I.

4.1.1 Population-Related Activities

Population is the focus in population-centric COIN. Figure 4.1 describes the trends observed for the metrics in this category.
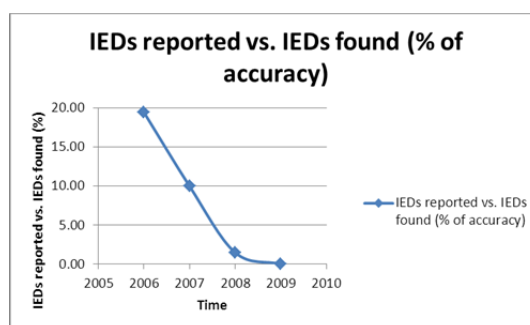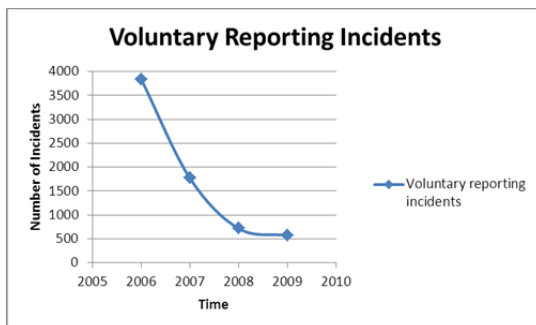
(a) Voluntary reporting Incidents   (b) IEDs reported vs. IEDs found (% of accuracy)
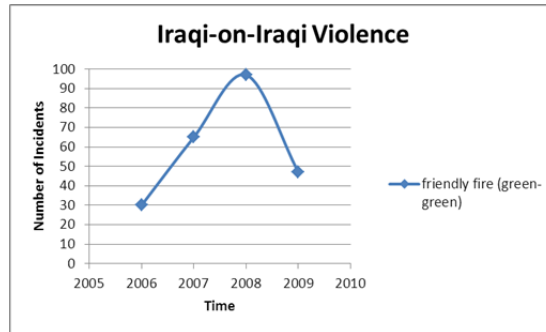
(c) Iraqi-on-Iraqi Violence

Figure 4.1 Population-related Activities

It cannot be ascertained from the SIGACTs whether a reported threat is a voluntary act by a vigilant citizen or by alert local intelligence sources. For the purpose of this evaluation, it is assumed that all reported threats are voluntary in nature, as regardless of the limitations the trends can provide an indication about the situational awareness status of the troops. In other words, more reports indicate increased cooperation with the locals, which is a pre-requisite of COIN success. Figure 4.1(a) shows that as the frequency of reporting incidents decreases continuously with time, the working hypothesis ("Higher frequency of reporting means more COIN success") is false. However, since it has been assumed that all threat reporting incidents are voluntary reporting incidents (which may very well not be the case), the confidence in this result is moderate.

For Figure 4.1(b), it has been assumed that all threat reporting incidents are those done by civilians. As the ratio of IEDs reported versus IEDs found decreases continuously with time, the working hypothesis ("More IEDs found through local reporting means more COIN success") turns out to be false. Moreover, as the data used includes known incidents where soldiers spotted IEDs themselves, the confidence in this result is moderate.

The civilian Iraqi-on-Iraqi violence cannot be measured from the SIGACTs. Nevertheless, the incidents of friendly fire where coalition troops accidentally fire on each other can be found by the `Green-Green` category. The trend for Iraqi-on-Iraqi violence is found to be going against the direction predicted by COIN for the first three periods (Figure 4.1(c)), but the number of violent incidents decreases sharply in the

'After-2' period. As the data is very sparse (only 192 cases out of more than 200,000 SIGACTs), it is difficult to make any definite assertion about the working hypothesis ("Less Iraqi-on-Iraqi violence means more COIN success").

Table 4.1 summarizes the findings for population-related activities based on the analysis. The column marked 'Confidence in Results' shows whether the results are a definite indication of the security situation on the ground, or require further explanation.

Table 4.1 Evaluation of Working Hypotheses for Population-Related Activities

S. No.	Metrics for COIN Success in Iraq (Adapted)	Observation	Working Hypothesis True/False?	Confidence in Results
1	Voluntary reporting incidents	The frequency of reporting decreases with time, meaning less COIN success	False	🟡
2	IEDs reported vs. IEDs found (% of accuracy)	The accuracy of IEDs reported vs. IEDs found decreases with time, meaning less COIN success	False	🟡
3	Iraqi-on-Iraqi violence	Iraqi-on-Iraqi violence increases with time till 2008 and has a sharp decline in 2009	Inconclusive	N/A

🔴: Low level of confidence; 🟡: Moderate level of confidence; 🟢: High level of confidence

4.1.2 Host Nation Government Indicators

One of the major conditions for 'responsible US withdrawal' from Iraq involves improving public confidence in the Iraqi government. This can happen only when development projects happen and people feel safe and secure in carrying out their day-to-day activities. Figure 4.2 presents the trends for host-nation government indicators, as deduced from the SIGACTs.
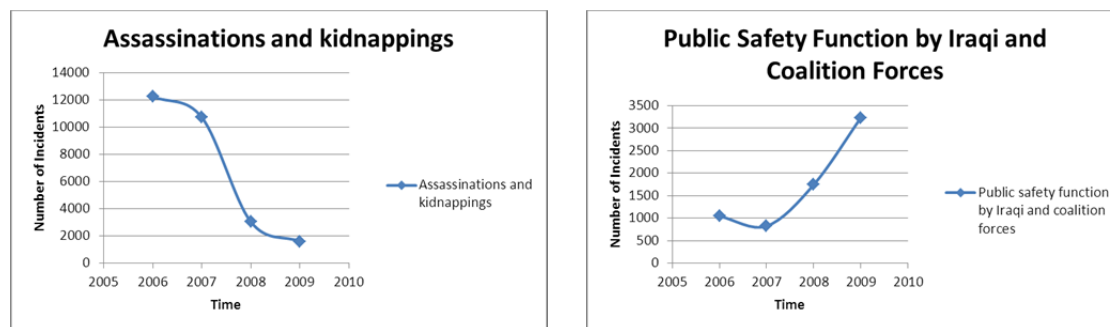
(a) Assassination and kidnapping rates (b) Public safety function by Iraqi and Coalition Forces
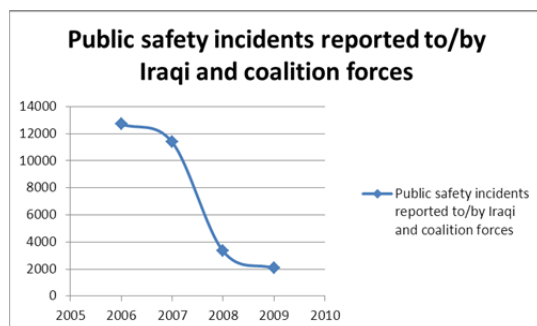
(c) Public safety incidents reported to/by Iraqi and Coalition Forces

Figure 4.2 Host Nation Government Indicators

In Figure 4.2(a), as the number of assassinations and kidnappings decrease continuously with time, the working hypothesis ("Less number of assassinations and kidnappings with time indicates more COIN success") is proven as true. The quality of data for murders and kidnappings reported is also found to be good in SIGACTs, leading to high level of confidence in the results.

With respect to the public safety function, Kilcullen (2009) asserts that if people feel unsafe under the protection of the government law and order agencies, they are tempted to assign the task to alternative actors, usually armed insurgent groups. He recommends the assessment of the number of insurgent groups carrying out day-to-day law and order functions, as such observations reflect the level of confidence by the public in the security agencies. This thesis agrees with his argument and assumes that the counter argument is also true. In other words, if the number of incidents where the law and order agencies take initiative is seen to rise with time, this shows that the public safety function is getting delivered and the need for insurgent groups to carry out the policing function should be correspondingly reduced.

SIGACTs do not report all the instances where police action takes place, but can accurately represent the cases of joint action by coalition forces and local police collaborate, that in turn indicates the trend of police action over time. In Figure 4.2(b), the public safety function by Iraqi and coalition forces increases with time; while Figure 4.2(c) shows the trend for security incidents that were reported to Iraqi and coalition forces. A decreasing trend for incidents shows that the law and order situation in areas controlled by Iraqi and coalition forces is improving. So the working hypothesis ("Less

public safety by insurgent groups means more COIN success") is proven true. The data has been collected comprehensively through a variety of type-category combinations (please see Appendix I), giving high level of confidence in the results.

Table 4.2 summarizes the findings for host nation government indicators based on the analysis.

Table 4.2 Evaluation of Working Hypotheses for Host Nation Government Indicators

S. No.	Metrics for COIN Success in Iraq (Adapted)	Observation	Working Hypothesis True/False?	Confidence in Results
1	Assassination and kidnapping rate	Assassination and kidnapping rate decreases with time, meaning more COIN success	True	🟢
2	Public safety function by insurgent groups	1. Public safety function by Iraqi and coalition forces increases with time, meaning more COIN success 2. The number of public safety incidents reported to/by Iraqi and coalition forces decrease, showing improvement in the law and order situation and consequently more COIN success	True	🟢

🔴: Low level of confidence; 🟡: Moderate level of confidence; 🟢: High level of confidence

4.1.3 Security Force Indicators

Population-centric COIN is essentially a war strategy. Any measure of its success cannot be complete without accounting for the effect that its adoption has had on the power balance between soldiers and insurgents. Figure 4.3 measures key security force indicators which have been accurately represented in the Iraq War Logs.
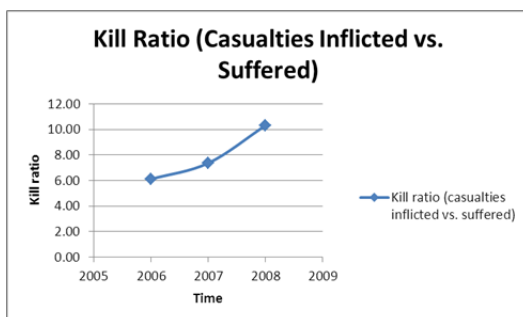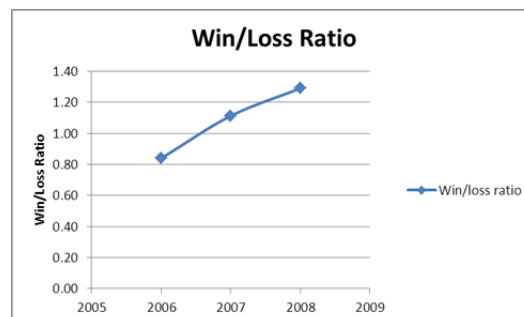
(a) Kill Ratio   *(b) Win/Loss Ratio*
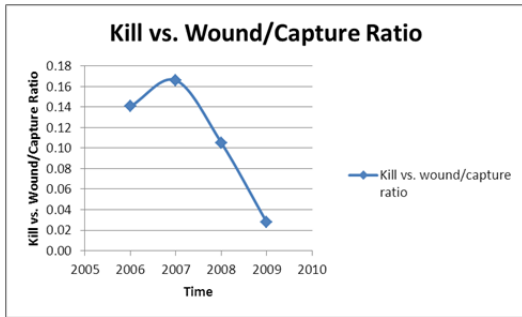
(c) Kill vs. Wound/Capture Ratio
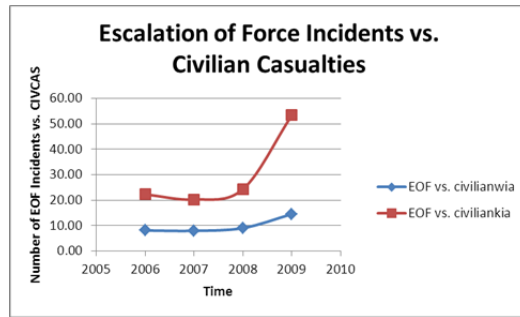
(d) EOF Incidents vs. CIVCAS
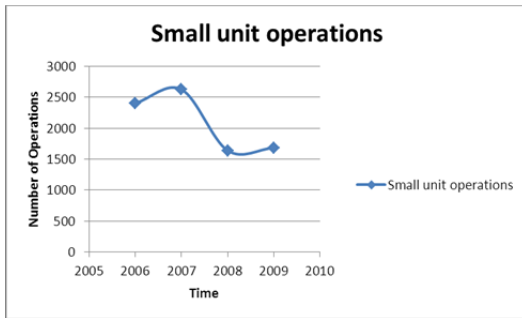
(e) Small Unit Operations
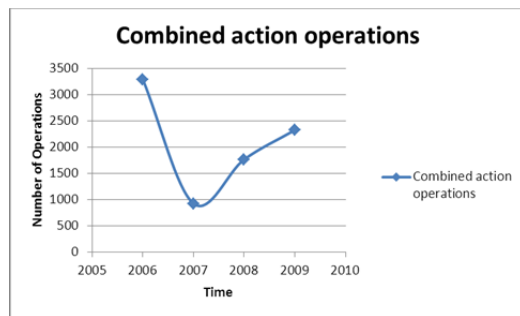
(f) Combined Action Operations
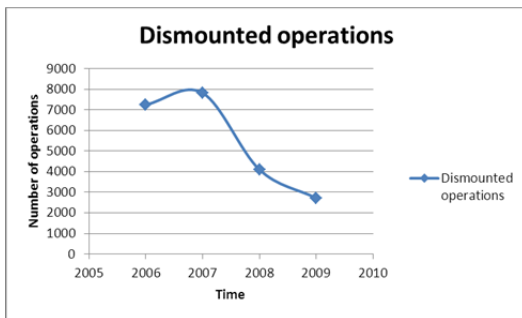
(g) Dismounted operations
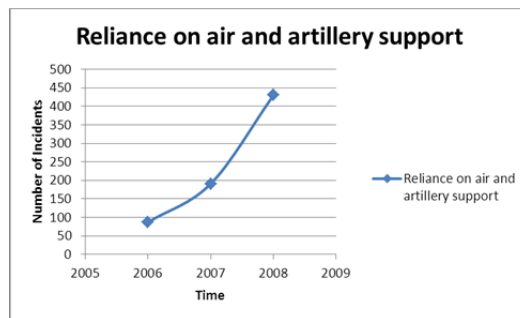
(h) Reliance on air and artillery support

Figure 4.3 Security Force Indicators

In Figure 4.3(a), the kill ratio steadily increases with time, meaning that the US-led coalition forces are inflicting more casualties on the insurgents than they are suffering. So the working hypothesis ("Higher kill ratio means more COIN success") is true. The data on friendly and enemy casualties is given priority by soldiers submitting the SIGACTs; this gives high level of confidence in the data and the results.

The win/loss ratio steadily increases with time in Figure 4.3(b), meaning that the US-led coalition forces are winning more encounters and firefights than the insurgents. So the

working hypothesis ("Higher win/loss ratio means more COIN success") is true. The data for the number of soldiers and insurgents killed or wounded in action is documented meticulously in the SIGACTs; therefore the level of confidence in the results is high.

The kill vs. wound/capture ratio for a well-functioning counterinsurgency campaign is usually 1 killed:4-5 wounded/captured (between 0.20 and 0.25), and any ratio higher than this may involve extra-judicial killings (Kilcullen 2009). Figure 4.3(c) shows that the kill vs. wound/capture ratio is inconclusive for the first three periods under study. When it is extended to a fourth period, the ratio declines steadily in 2008 and 2009, meaning that the US-led coalition forces are winning more encounters and firefights than the insurgents. A lower value for the ratio shows that the soldiers are not trigger-happy and are willing to let the captured insurgents undergo the due course of law, and be criminally prosecuted. So the working hypothesis ("Lower kill vs. wound/capture ratio means more COIN success") is true. As the ratio is always below the value suggested by Kilcullen (0.20-0.25), the level of confidence in the results is high.

The number of civilians killed or wounded in Escalation of Force (EOF) incidents decreases across the four time-periods in Figure 4.3(d), but since the number of EOF incidents also decreases, the ratio increases sharply in the fourth time period. This means that although the number of EOF incidents has decreased, the incidents have become more deadly with time. This makes the working hypothesis ("Less EOF incidents mean more COIN success") false. The EOF incidents are reported separately and there is no ambiguity in the values of `civilianwia` and `civiliankia`, so the level of confidence in the results is high.

The number of small unit operations does not show a rising trend across the first three time periods under consideration in Figure 4.3(e). Even for the fourth time period, the number of operations increases only slightly. This is against what is predicted by the working hypothesis ("More small-unit operations means more COIN success"). The incidents where small unit actions happened are isolated for the analysis, so the level of confidence in the results is high.

Figure 4.3(f) demonstrates that combined action operations decrease sharply in 2007 and then increase steadily across 2008 and 2009. Although the decline in the number of joint operations in 2007 needs further examination, the increasing trend thereafter follows the working hypothesis ("More combined action operations means more COIN success"). Moreover, the numerous type-category combinations related to combined action operations used for analysis makes the level of confidence in the results high.

Dismounted operations increase slightly in 2007 and then decrease steadily across 2008 and 2009 as shown by Figure 4.3(g). This declining trend in the last three periods goes against the working hypothesis ("More dismounted operations means more COIN success") and shows that the units are not frequently going out for patrols on foot. The level of confidence in the results is high as the estimation is done across a variety of type-category combinations (details in Appendix I).

The number of incidents where air and artillery support is relied upon, increases with time in Figure 4.3(h). This indicates that either the unit has confidence problems when engaging with insurgent groups or is overmatched by insurgents and is possibly overreaching its capabilities. It also goes against the working hypothesis ("Less frequent air and artillery support requests means more COIN success"). The level of confidence in the results is high because the data is comprehensive and all instances of air and artillery support have been identified separately in the SIGACTs.

Table 4.3 summarizes the findings for host nation government indicators based on the analysis.

Table 4.3 Evaluation of Working Hypotheses for Security Force Indicators

S. No.	Metrics for COIN Success in Iraq (Adapted)	Observation	Working Hypothesis True/False?	Confidence in Results
1	Kill ratio (casualties inflicted vs. suffered)	Kill ratio increases with time, meaning more COIN success	True	🟢
2	Win/loss ratio	Win/loss ratio increases with time, meaning more COIN success	True	🟢
3	Kill vs. wound/capture ratio	Kill vs. wound/capture ratio increases in 2007, but steadily decreases across 2008 and 2009 ⇨ More COIN success	True	🟢

4	Escalation of force (EOF) Incidents vs. civilian casualties (CIVCAS)	EOF incidents vs. CIVCAS first decreases slightly in 2007 and then increases sharply across 2008 and 2009 ⇨ Less COIN success	False	🟢
5	Small unit operations	Small unit operations first increase in 2007 and then decrease in 2008 and increase slightly in 2009 ⇨ Less COIN success	False	🟢
6	Combined action operations	Combined action operations decrease sharply in 2007 and then increase steadily across 2008 and 2009 ⇨ More COIN success	True	🟢
7	Dismounted operations	Dismounted operations increase slightly in 2007 and then decrease steadily across 2008 and 2009 ⇨ Less COIN success	False	🟢
8	Reliance on air and artillery support	Reliance on air and artillery support increases with time, meaning less COIN success	False	🟢

🔴: Low level of confidence; 🟡: Moderate level of confidence; 🟢: High level of confidence

4.1.4 Enemy Indicators

The strength of the enemy is one of the most crucial indicators of how well the COIN strategy is going. If the insurgents' strength wanes with time, this is a good sign about the success (and popularity) of the COIN campaign. Figure 4.4 evaluates this using some key parameters.
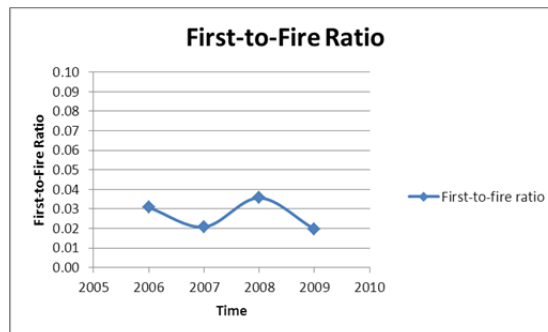
(a) First-to-fire incidents   *(b) First-to-fire ratio*
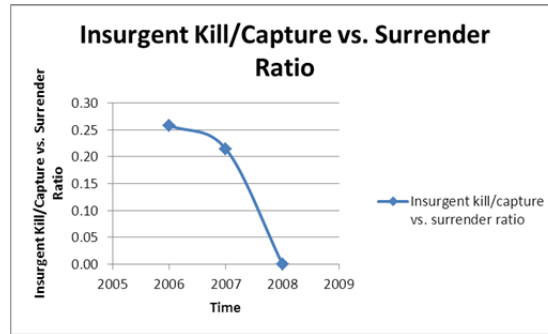
(c) Insurgent Kill/Capture vs. Surrender Ratio

Figure 4.4 Enemy Indicators

In a firefight, the side firing first shows better situational awareness and control of the initiative. According to Figure 4.4(b), the first-to-fire ratio for US-led coalition forces decreases in 2007, then increases in 2008 and again decreases in 2009 (corresponding first-to-fire incidents are shown in Figure 4.4(a)). This makes it difficult to definitively assert about the working hypothesis ("Better first-to-fire ratio means more COIN success").

In addition, if insurgents surrender themselves to the coalition forces, it indicates that they are losing morale and have accepted the situation as unwinnable. It also shows growing confidence in the law and order situation by the former insurgents, who do not fear any extra-judicial killings at the hands of coalition forces after being arrested. The insurgent kill/capture vs. surrender ratio decreases with time in Figure 4.4(c), meaning that the morale of the insurgents is low and they are unwilling to engage in fierce contests or firefights. This proves the working hypothesis ("Low insurgent kill/capture vs. surrender ratio means more COIN success"). The data about surrenders, although unavailable, has been reliably extracted from the SIGACTs (details in Appendix I); so the level of confidence in the results is high.

Table 4.4 summarizes the findings for host nation government indicators based on the analysis.

Table 4.4 Evaluation of Working Hypotheses for Enemy Indicators

S. No.	Metrics for COIN Success in Iraq (Adapted)	Observation	Working Hypothesis True/False?	Confidence in Results
1	First-to-fire ratio	First-to-fire ratio first decreases in 2007, then increases in 2008 and again decreases in 2009	Inconclusive	N/A
2	Insurgent kill/capture vs. surrender ratio	Insurgent kill/capture vs. surrender ratio decreases with time, meaning more COIN success	True	🟢

🔴: Low level of confidence; 🟡: Moderate level of confidence; 🟢: High level of confidence

4.2 Conclusions

Based on the relative weights assigned to the different elements of COIN in Table 3.4, and the evaluations presented in Tables 4.1-4.4, the final results are summarized in Table 4.5. A 'true' is considered equivalent to +1, 'false' is equivalent to -1, and 'inconclusive' is equivalent to 0.

Table 4.5 Evaluation of COIN Success in Iraq

S. No.	Metrics for COIN Success in Iraq (Adapted)	Assigned Relative Weights	Value (True=1; False=-1; Inconclusive=0)	Weighted Values
	Population-Related Activities	**4**		**-8**
1	Voluntary reporting incidents	4	-1	-4
2	IEDs reported vs. IEDs found (% of accuracy)	4	-1	-4
3	Iraqi-on-Iraqi violence	4	0	0
	Host Nation Government Indicators	**3**		**+6**
4	Assassination and kidnapping rate	3	+1	+3
5	Public safety function by insurgent groups	3	+1	+3
	Security Force Indicators	**2**		**0**
6	Kill ratio (casualties inflicted vs. suffered)	2	+1	+2
7	Win/loss ratio	2	+1	+2
8	Kill vs. wound/capture ratio	2	+1	+2
9	Escalation of force (EOF) Incidents vs. civilian casualties (CIVCAS)	2	-1	-2
10	Small unit operations	2	-1	-2
11	Combined action operations	2	+1	+2
12	Dismounted operations	2	-1	-2
13	Reliance on air and artillery support	2	-1	-2

	Enemy Indicators	1		+1
14	First-to-fire ratio	1	0	0
15	Insurgent kill/capture vs. surrender ratio	1	+1	+1
			Overall Average Weighted Value	**(-1/36) = -0.03**

As Table 4.1 and Table 4.5 show, the 'population-related activities' element has been overwhelmingly ineffective in Iraq in advancing the practices associated with a successful counterinsurgency campaign. Owing to the crucial role played by the 'bottom-up component' involving civilian outreach efforts in COIN (as defined by FM 3-24 (2006)), this category has the maximum negative effect on the overall evaluation of COIN success in Iraq. Decreases observed in the number of voluntary reporting incidents and accuracy of IEDs reported suggest either a lack of trust between the locals and the coalition forces, or insufficient efforts being made by troops towards population-related initiatives. The US-led coalition forces should pay more attention to the initiatives related directly to the population, in order to have productive association with the local nationals.

In spite of the frequent criticism of the Iraqi government by the world media[5] for its dysfunctional governance dynamics, this research breaks the myth of its ineffectiveness. In fact, Table 4.2 and Table 4.5 show that the lawlessness that was characteristic of Iraqi cities during the peak of the insurgency in 2006 has been replaced by improved law and order situation. This should not be exaggerated into believing that the law and order situation there is comparable to the levels enjoyed in western nations; however, the situation has considerably improved and the trend is encouraging and headed in the right direction.

The host nation government indicators are quite important for counterinsurgency success, as when the Iraqi people see a legitimate elected government gaining hold, they no longer need to depend on insurgent groups for the safety of their families and property. Such developments deprive the insurgents from any local support and halt their momentum. Moreover, on Iraq's long path of return to normalcy, improved economic activity can only happen in a safe environment. The US should continue to

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[5] "U.S. Commander Fears Political Stalemate in Iraq," *The New York Times*, August 30, 2010. Retrieved from https://www.nytimes.com/2010/08/30/world/middleeast/30iraq.html on April 22, 2011.

encourage increased training of Iraqi police and security forces. It should also resist from influencing the policies formulated by elected officials in Iraq, to allow them to gain the trust of their constituents.

The security force indicators are seen to cancel each other out in this research (Table 4.3 and Table 4.5), making no difference to the overall evaluation; but a closer look reveals that substantial improvements have been made in the kill and win/loss ratios, both directly related to the soldiers' usual zeal on winning firefights. Such eagerness to win every encounter with insurgents leads to heavy reliance on air and artillery support, and EOF incidents with increased civilian casualties. In the way this study has been structured, the gains made by the former two parameters, namely kill and win/loss ratios, are ironically canceled by the latter two, reliance on air and artillery support, and EOF incidents with increased CIVCAS! The results should be a wakeup call for soldiers by demonstrating the importance of holding fire and backing out from a firefight, if and when there are chances of collateral civilian casualties. Not doing so will negate any advantages that they might have gained otherwise. The army should emphasize this aspect in the counterinsurgency training given to soldiers. This will help in improving the perception of the security forces among the population, further improving the 'population-related activities' element that is currently performing badly in Iraq.

Better kill vs. wound/capture ratio is a good sign for COIN success. When insurgents perceive the handling of prisoners by soldiers as fair and non-life-threatening (no extra-judicial killings), they are more likely to surrender during a losing firefight. If this happens and insurgents get arrested instead of fighting till the end, it also saves the lives of coalition forces who might have otherwise been subjected to danger.

The increased number of combined action operations by the Iraqi and coalition forces show improved coordination and mutual trust between the local and international security forces. Successful joint missions also seem to be correlated with better law and order situation, as reflected by the 'host nation government indicators' category. On the other hand, fewer instances of small unit and dismounted operations suggest that soldiers are still not adequately confident of local intelligence to venture in unknown territory on foot and without armored support. Increased rapport with local populations

(improvement of the 'population-related activities' element) can provide the crucial impetus necessary to turn these parameters around.

Finally, the SIGACTs cannot reveal much about the 'enemy indicators' element of COIN. Out of the two parameters studied under this category (Tables 4.4 and 4.5), only one is definitively conclusive; therefore, it is difficult to assert any strong statement about the status of 'enemy indicators.' Nevertheless the decrease observed in the insurgent kill/capture rate versus the surrender/desertion rate over time indicates falling morale in the insurgent network. Since this category is a consequence of the success or failure of the other three, so progress in all the other elements of counterinsurgency can have rich dividends for making the enemies' task even more tedious.

In Table 4.5, the overall weighted average value of -0.03 shows that based on this analysis, the COIN implementation is observed to sway slightly towards failure. However, it must be noted that the approach to aggregate the results and arrive at an overall value is mainly an attempt to make sense of the multiple factors at play during a counterinsurgency campaign. As such, it is based on a simple weighted aggregation method. The weights assigned to the different categories can be considered arbitrary to the extent that 'population related activities' are not necessarily twice as important as 'security force indicators.' Nevertheless it is not just difficult, but close to impossible, to arrive at universally-accepted values of these relative weights.

In conclusion, based on the findings of this thesis, the population-centric COIN campaign, as seen through the Iraq War Logs, does not completely succeed at its intended goals in Iraq. Population-centric activities emerge as the weakest point of the overall counterinsurgency campaign in Iraq. Military commanders and policy planners should pay special attention to improving rapport with local populations, as the benefits of such associations can be multiplicative and can positively affect many other aspects of counterinsurgency, as discussed above.

Chapter 5: Discussion and Future Work

This chapter presents the implications of this research for the Iraq war and for our understanding of COIN as it is applied in Afghanistan. It also lists the contributions made by this thesis and presents some suggestions for future work to verify the results of this study.

5.1   Implications of this Research for Counterinsurgency Campaigns

This thesis has examined the theoretical underpinnings of counterinsurgency as it is applied today in Iraq, and has showed how its different elements have performed since the 'surge' happened. The results show that population-related activities require additional attention of the US-led coalition and Iraqi security forces, since they constitute the main emphasis of population-centric COIN and are not performing as well as needed. The analysis also reveals that tremendous progress has been made in the realm of host nation government indicators, and the public safety function has improved. Such efforts should be further strengthened, as law and order is crucial to allow Iraq to return to normalcy, and to enhance the quality of life of its citizens.

The security force indicators present a mixed picture. While improvement has been made in metrics such as kill ratio, win/loss ratio and combined action operations, escalation of force incidents have continued to mount. The observation that dismounted operations have been decreasing with time indicates that soldiers lack either the local intelligence networks, or the motivation, or both, to patrol on foot. All of these possibilities are alarming and require further examination. Moreover, it has been proved time and again that increased reliance on air and artillery support leads to more collateral civilian casualties and less material gains in the long-run. So the rising incidents of air and artillery support requests present a bad sign: strategic planners in the military should carefully re-examine the rules of engagement for firefights where heavy firepower is needed. The guidance given to soldiers for such situations should also be potentially revisited. Finally, this thesis cannot say much about the sophistication and support level for the enemy, owing to the limitations inherent in field

action reports. But it is clear that they no longer enjoy the same level of popularity as at the height of the insurgency in 2006.

It is evident from this thesis that existing documentation about wars can reveal interesting trends about the success of the military strategy. COIN in Iraq cannot be called a roaring success, as is generally proclaimed; however, counterinsurgency did play some role in the big picture. Kilcullen (2009) himself acknowledged the difficulty inherent in capturing the complexity of counterinsurgency campaigns through quantitative measures. The decrease in the level of violence, which has been observed since 2007, happened due to a variety of factors working together, given the complexity of the Iraq War. Afghanistan is possibly a more complicated situation and it is difficult to generalize the findings of this work to that war, without doing a similar analysis. Since this thesis has made a number of assumptions in its analysis and is limited in scope by the attributes of the data source used, further research is needed to examine the issue in adequate detail.

5.2 Contributions of this Research

The research presented here makes the following contributions to the area of international security:

1. The major contribution of this thesis has been to present the quantitative estimation of COIN through machine learning approaches using documents that are created as a natural part of any operational military action.
2. Although population-centric counterinsurgency is credited as one of the main "game-changers" that turned the trend of the war in Iraq, its actual success on the ground has not been sufficiently examined in quantitative detail in the past. This thesis addresses this void in research by providing quantitative scaffolding to previously reported qualitative research on the Iraq war by using raw data from the battlefield, in the form of SIGACTs.
3. Kilcullen (2009) presents the metrics and corresponding hypotheses for measuring COIN progress in Afghanistan. This research presents working hypotheses for Iraq analogous to those suggested for Afghanistan by Kilcullen. It also looks for evidence

in the data, which helps to validate Kilcullen's theory with actual observations and helps the readers better understand the Iraq war in the process.

4. A common criticism of the academic commentary has been that the data sources used (e.g. unclassified/declassified government documents and non-governmental agency reports) for the analysis may themselves be intentionally falsified or biased. By using the Iraq War logs, the 'unadulterated' war logs have been used for analysis. These reports offer a ground-level view of the war from the perspective of US soldiers on the battlefield. This presents an unprecedented opportunity to researchers in international security to observe and identify the trends of different aspects of COIN with time and analyze the different initiatives in Iraq at macro- and micro-levels.

5.3 Future Work

This section discusses some suggested future work that future researchers can pursue. Firstly, owing to the limitations inherent in using SIGACTs, this thesis cannot address all the metrics of COIN listed by Kilcullen (2009). Future researchers can try to use alternate data sources to address the missing pieces of information that could not be covered here. Secondly, given the large number of metrics that could not be evaluated by this thesis (30 metrics out of 45) and the small magnitude of the final average weighted value for COIN success, additional analysis is needed to validate or falsify the overall conclusions of this thesis. Thirdly, future researchers can come up with a more informed way of distinguishing between the metrics in each of the four broad categories based on their relative importance. Such a nuanced approach would lead to better estimation of COIN progress.

Finally, a lot of classified documentation is generated as a natural part of any operational military. Analyzing these documents through machine learning approaches can help deduce patterns that may not be evident to military leadership at the first instance. Researchers with access to such documentation can utilize them to see trends across time and regions. Such trends can be used as feedback to judge the effectiveness of certain military strategies and make better-informed decisions.

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Appendix I: Detailed Analysis of the SIGACTs

This appendix describes in detail the approaches used for determining each of the metrics for the Iraq War Logs, along with the raw data calculations.

I.1 Population-Related Activities

I.1.1 Voluntary reporting incidents

Since there is no separate classification of voluntary reporting incidents in the SIGACTs, they can be inferred indirectly from a combination of the 'type' and 'category' columns. For example, threat report about an ambush can come either from locals volunteering to warn the coalition forces, or from local intelligence resources. In either case, a high level of interactions and cooperation with the locals is necessary, which is a pre-requisite of COIN success. Not all of these cases can be genuine voluntary reporting instances, but they can still provide useful trend lines about how the instances vary across the three periods (before, during and after). Table I.1 presents the voluntary reporting incident counts.

Table I.1 Voluntary reporting incidents

Type (Category)	Before	During	After-1	After-2
Friendly Action (Cordon/Search)	1408	429	140	532
Threat Report (Ambush Threat)	35	33	2	0
Threat Report (Assassination Threat)	58	6	38	1
Threat Report (Attack Threat)	821	353	70	3
Threat Report (Carjacking Threat)	15	3	1	0
Threat Report (Direct Fire Threat)	21	11	1	2
Threat Report (Direct Fire)	11	6	124	1
Threat Report (IED Threat)	661	596	131	0
Threat Report (Indirect Fire Threat)	171	95	13	3
Threat Report (Intimidation Threat)	243	74	13	12
Threat Report (Intimidation)	11	7	2	0
Threat Report (Kidnapping Threat)	109	11	7	0
Threat Report (Looting Threat)	1	1	0	0
Threat Report (Murder Threat)	64	37	10	4
Threat Report (Other)	161	70	37	8
Threat Report (Raid Threat)	1	2	0	0
Threat Report (Recon Threat)	0	0	0	1

Threat Report (Sabotage Threat)	7	8	2	0
Threat Report (Safire Threat)	15	3	1	3
Threat Report (Small Arms Threat)	1	0	0	0
Threat Report (Smuggling Threat)	11	6	124	0
Threat Report (Sniper Ops Threat)	16	14	1	1
Threat Report (Theft Threat)	3	5	0	0
Voluntary reporting incidents	**3844**	**1770**	**717**	**571**

I.1.2   IEDs reported vs. IEDs found (% of accuracy)

IEDs reported are a combination of threat reports about them, as well as the voluntary turning-in of explosive remnants of war. The actual IEDs found can be determined from the `cache found/cleared` category. However, this also includes the instances where attentive soldiers spotted an IED themselves, which reduces the level of confidence in this measurement. Table I.2 presents the IEDs reported vs. IEDs found (% of accuracy).

Table I.2 IEDs reported vs. IEDs found (% of accuracy)

Type (Category)	Before	During	After-1	After-2
Threat Report (IED Threat)	661	596	131	0
Friendly Action (Explosive Remnants of War Found/Cleared)	59	33	125	308
Friendly Action (Explosive Remnants of War/Turn-in)	1228	428	874	1644
Friendly Action (Cache Found/Cleared)	2113	5509	7904	4076
IEDs reported vs. IEDs found (% of accuracy)	**19.44**	**9.98**	**1.47**	**0.00**

I.1.3   Iraqi-on-Iraqi violence

The Iraqi-on-Iraqi violence data (as measured from `Green-Green` category) is not absolute, but shows the extent to which the parameter can be evaluated from the Iraq War Logs (Table I.3).

Table I.3 Iraqi-on-Iraqi violence

Type (Category)	Before	During	After-1	After-2
Friendly Fire (Green-Green)	30	65	97	47

I.2 Host Nation Government Indicators

I.2.1 Assassination and kidnapping rate

The assassination and kidnapping rates have been properly documented using the 'Criminal Event' type and 'kidnapping' and 'murder' categories. Threat reports about assassinations are also included in the SIGACTs, but it cannot be verified how many of them were actually realized; so they have been ignored.

Table I.4 Assassination and Kidnapping Rates

Type (Category)	Before	During	After-1	After-2
Criminal Event (Kidnapping)	1180	1578	708	383
Criminal Event (Murder)	11073	9146	2331	1223
Assassinations and Kidnappings	**12253**	**10724**	**3039**	**1606**

I.2.2 Public safety function by insurgent groups

Table I.5 shows the trend of the Iraqi and coalition forces taking initiative to restore law and order in the area under their jurisdiction. More initiatives with time are a sign of increased presence amidst the civilians.

Table I.5 Public safety function by Iraqi and Coalition Forces

Type (Category)	Before	During	After-1	After-2
Friendly Action (Police Actions)	59	33	125	13
Friendly Action (Arrest)	450	763	1610	3203
Friendly Action (TCP)	448	19	2	2
Friendly Action (Vehicle Interdiction)	88	11	7	12
Public safety function by Iraqi and coalition forces	**1045**	**826**	**1744**	**3230**

Table I.6 shows the rates of security incidents that were reported to Iraqi and coalition forces. Less number of incidents with time indicates that the law and order situation in areas controlled by Iraqi and coalition forces is improving.

Table I.6 Public Safety Incidents reported to/by Iraqi and Coalition Forces

Type (Category)	Before	During	After-1	After-2
Criminal Event (Arson)	51	111	39	35
Criminal Event (Carjacking)	102	82	42	11
Criminal Event (Extortion)	6			
Criminal Event (Kidnapping)	1180	1578	708	383

Criminal Event (Looting)	19	43	8	7
Criminal Event (Mugging)	5			
Criminal Event (Murder)	11073	9146	2331	1223
Criminal Event (Other)	15	12	55	158
Criminal Event (Sabotage)	11	12	7	8
Criminal Event (Shooting)	32	37	19	83
Criminal Event (Smuggling)	32	37	19	33
Criminal Event (Theft)	186	322	102	119
Public safety incidents reported to/by Iraqi and coalition forces	**12712**	**11380**	**3330**	**2060**

I.3 Security Force Indicators

I.3.1 Kill ratio (casualties inflicted vs. suffered)

The parameters `enemykia` (number of insurgents killed in action) and `friendlykia` (number of soldiers killed in action) can be calculated from the SIGACTs.

Table I.7 Kill Ratio (Casualties Inflicted vs. Suffered)

Parameter	Before	During	After
friendlykia	692	844	253
enemykia	4232	6219	2611
Kill Ratio (Casualties Inflicted vs. Suffered)	**6.12**	**7.37**	**10.32**

I.3.2 Win/loss ratio

The win/loss ratio can be calculated by Equation I.1:

$$Win/LossRatio = \left(\frac{friendlywia + friendlykia}{enemywia + enemykia} \right)$$ Equation I.1

Table I.8 Win/Loss Ratio

Parameter	Before	During	After
friendlywia	5837	6368	2171
friendlykia	692	844	253
enemywia	1253	1810	517
enemykia	4232	6219	2611
Win/Loss Ratio	**0.84**	**1.11**	**1.29**

I.3.3 Kill vs. wound/capture ratio

The kill vs. wound/capture ratio can be calculated by Equation I.2:

$$Killvs.Wound/CaptureRatio = \left(\frac{enemykia}{enemywia + enemy \det ained} \right)$$ Equation I.2

Table I.9 presents the kill vs. wound/capture ratios for the four periods under consideration.

Table I.9 Kill vs. Wound/Capture Ratio

Parameter	Before	During	After-1	After-2
Kill vs. Wound/Capture Ratio	0.14	0.17	0.11	0.03

I.3.4   Escalation of force (EOF) Incidents vs. civilian casualties (CIVCAS)

The type-category combination `friendly action (escalation of force)` describes the instances where an EOF incident happened. The rows that had `friendly action (escalation of force)` as the type-category combination were extracted, and the values of `civilianwia` and `civiliankia` corresponding to each of these incidents were then summed together to get Table I.10.

Table I.10 Civilian Casualties for EOF Incidents in SIGACTs

EOF Incidents	`civilianwia`	`civiliankia`
Before	321	117
During	394	155
After-1	161	60
After-2	55	15

Table I.11 gives the values of the EOF vs. CIVCAS ratios.

Table I.11 EOF Incidents vs. CIVCAS

Type (Category)	Before	During	After-1	After-2
EOF vs. `civilianwia`	8.13	7.97	9.06	14.55
EOF vs. `civiliankia`	22.30	20.26	24.32	53.33

I.3.5   Small unit operations

The type-category combinations `Friendly Action (Small Unit Actions)` and `Friendly Action (Raid)` indicate how frequently coalition forces go out in small unit teams for patrol and/or raid operations. These have been aggregated to get an idea about the trend of small unit operations in Iraq.

Table I.12 Small Unit Operations

Type (Category)	Before	During	After-1	After-2
Friendly Action (Small Unit Actions)	1150	2196	169	3
Friendly Action (Raid)	1228	428	1430	1645
Friendly Action (Recon)	27	4	42	38
Small unit operations	**2405**	**2628**	**1641**	**1686**

I.3.6 Combined action operations

The type-category combinations which indicate coalition forces collaborating with local law and order agencies have been aggregated in Table I.13 to get an idea about the trend of combined action operations in Iraq.

Table I.13 Combined Action Operations

Type (Category)	Before	During	After-1	After-2
Friendly Action (Border Ops)	36	4	23	86
Friendly Action (Cordon/Search)	1408	429	140	532
Friendly Action (Police Actions)	59	33	125	13
Friendly Action (Raid)	1228	428	1430	1645
Friendly Action (Recon)	27	4	42	38
Friendly Action (TCP)	448	19	2	2
Friendly Action (Vehicle Interdiction)	88	11	7	12
Combined action operations	**3294**	**928**	**1769**	**2328**

I.3.7 Dismounted operations

The number of dismounted operations from the SIGACTs is difficult to be determined. So all the records where any occurrence of the word-root 'dismount' and its forms (e.g. 'dismounted') were extracted and aggregated. Also, other operations that show troops walking without any armored vehicles separating them from the surroundings have been included in Table I.14.

Table I.14 Dismounted Operations

Type (Category)	Before	During	After-1	After-2
`dismount\w+`	6058	7498	3510	2153
`Friendly Action (Recon)`	27	4	42	38
`Friendly Action (Surveillance)`	76	35	36	15
`Friendly Action (Confiscation)`	56	222	489	496
`Friendly Action (Patrol)`	1024	53	19	13
`Friendly Action (Movement to Contact)`	9	6	1	2
Dismounted operations	**7250**	**7818**	**4097**	**2717**

I.3.8   Reliance on air and artillery support

All instances of troop reliance on air and artillery support for carrying out their operations are derived from the relevant type-category combinations and shown in Table I.15.

Table I.15 Reliance on Air and Artillery Support

Type (Category)	Before	During	After
`Friendly Action (Close Air Support)`	10	162	371
`Friendly Action (UAV)`	57	7	34
`Friendly Action (Arty)`	20	22	25
Reliance on air and artillery support	**87**	**191**	**430**

I.4   Enemy Indicators

I.4.1   First-to-fire ratio

The categories corresponding to the Blues (coalition forces) firing first, compared to the Reds (enemies) are aggregated in Table I.16.

Table I.16 First-to-fire Ratio

Type (Category)	Before	During	After-1	After-2
Friendly Action (Attack)	524	251	83	13
Friendly Action (Deliberate Attack)	25	151	38	2
Friendly Action (Search And Attack)	2	46	80	5
Friendly Action (Sniper Ops)	169	40	33	17
Friendly Action (Other Offensive)	45	85	136	47
Friendly Action (Ambush)	15	80	9	7
Blue first-to-fire	**780**	**653**	**379**	**91**
Friendly Action (Counter Mortar Fire)	20	76	5	0
Friendly Action (Other Defensive)	348	73	41	195
Enemy Action (<Null Value>)			1	0
Enemy Action (Ambush)	44	145	11	3
Enemy Action (Assassination)	31	66	58	48
Enemy Action (Attack)	2309	2352	420	803
Enemy Action (Direct Fire)	13943	17882	6770	2043
Enemy Action (Indirect Fire)	7893	9222	2611	1261
Enemy Action (Safire)	243	962	493	226
Enemy Action (Sniper Ops)	579	663	241	63
Red first-to-fire	**25410**	**31441**	**10651**	**4642**
First-to-fire ratio (Blue/Red)	**0.03**	**0.02**	**0.04**	**0.02**

I.4.2 Insurgent kill/capture vs. surrender ratio

Insurgents surrendering voluntarily cannot be distinguished from 'enemydetained.' So all instances, where the word 'surrender' and its different forms occur have been used in the SIGACTs, are aggregated and the corresponding values are shown in Table I.17.

Table I.17 Insurgent Kill/Capture vs. Surrender Ratio

Number of individuals	before	during	after
enemywia (corresponding to surrender\w+)	2	4	0
enemykia (corresponding to surrender\w+)	6	2	0
enemydetained (corresponding to surrender\w+)	31	28	17
Insurgent Kill/Capture vs. Surrender Ratio	**0.26**	**0.21**	**0.00**

Appendix II: Iraq War Logs Aggregated Parameters

Table II.1 Type-Category Aggregate Totals from Iraq War Logs

S. No.	Type (Category)	Total	Before	During	After-1	After-2
1	Criminal Event (Arson)	236	51	111	39	35
2	Criminal Event (Carjacking)	237	102	82	42	11
3	Criminal Event (Extortion)	6	6			
4	Criminal Event (Kidnapping)	3849	1180	1578	708	383
5	Criminal Event (Looting)	77	19	43	8	7
6	Criminal Event (Mugging)	5	5			
7	Criminal Event (Murder)	23773	11073	9146	2331	1223
8	Criminal Event (Other)	240	15	12	55	158
9	Criminal Event (Sabotage)	38	11	12	7	8
10	Criminal Event (Shooting)	171	32	37	19	83
11	Criminal Event (Smuggling)	121	32	37	19	33
12	Criminal Event (Theft)	729	186	322	102	119
13	Enemy Action (<Null Value>)	190	44	145	1	
14	Enemy Action (Ambush)	203	44	145	11	3
15	Enemy Action (Assassination)	203	31	66	58	48
16	Enemy Action (Attack)	5884	2309	2352	420	803
17	Enemy Action (Direct Fire)	40638	13943	17882	6770	2043
18	Enemy Action (Indirect Fire)	20987	7893	9222	2611	1261
19	Enemy Action (Patrol)	1484	579	663	241	1
20	Enemy Action (Raid)	2			1	1
21	Enemy Action (Safire)	1924	243	962	493	226
22	Enemy Action (Sniper Ops)	1546	579	663	241	63
23	Enemy Action (Surveillance)	28429	9538	11871	7019	1
24	Explosive Hazard (<Null Value>)	1226	506	719	1	
25	Explosive Hazard (Explosive Remnants of War (ERW) Found/Cleared)	771	328	303	139	1
26	Explosive Hazard (Explosive Remnants of War (ERW)/Turn in)	582	236	164	177	5
27	Explosive Hazard (IED Explosion)	46833	16183	16771	7926	5953
28	Explosive Hazard (IED False)	1156	27	264	629	236
29	Explosive Hazard (IED Found/Cleared)	33298	9538	11871	7019	4870
30	Explosive Hazard (IED Hoax)	1741	506	719	251	265
31	Explosive Hazard (IED Pre-Detonation)	109			1	108
32	Explosive Hazard (IED Suspected)	873	328	303	139	103
33	Explosive Hazard (Mine Found/Cleared)	676	236	164	177	99
34	Explosive Hazard (Mine Strike)	290	132	62	46	50
35	Explosive Hazard (Other)	303	13	52	121	117
36	Explosive Hazard (Unexploded Ordnance)	6443	813	1701	2462	1467
37	Explosive Hazard (Unknown Explosion)	2847	1044	1038	533	232
38	Friendly Action (<Null Value>)	7623	2113	5509	1	
39	Friendly Action (Ambush)	111	15	80	9	7
40	Friendly Action (Arrest)	6026	450	763	1610	3203
41	Friendly Action (Arty)	69	20	22	25	2

42	Friendly Action (Attack)	871	524	251	83	13
43	Friendly Action (Border Ops)	149	36	4	23	86
44	Friendly Action (Breaching)	14	5	5	2	2
45	Friendly Action (Cache Found/Cleared)	19602	2113	5509	7904	4076
46	Friendly Action (Close Air Support)	555	10	162	371	12
47	Friendly Action (Confiscation)	1263	56	222	489	496
48	Friendly Action (Convoy)	3150	6	3141	2	1
49	Friendly Action (Cordon/Search)	2509	1408	429	140	532
50	Friendly Action (Counter Mortar Fire)	101	20	76	5	
51	Friendly Action (Counter Mortar Patrol)	11	5	5	1	
52	Friendly Action (Deliberate Attack)	216	25	151	38	2
53	Friendly Action (Detain)	17198	2244	7949	4529	2476
54	Friendly Action (Detention)	356	154	2	200	
55	Friendly Action (Escalation of Force)	8009	2609	3141	1459	800
56	Friendly Action (Explosive Remnants of War (ERW) Found/Cleared)	525	59	33	125	308
57	Friendly Action (Explosive Remnants of War (ERW)/Turn In)	4174	1228	428	874	1644
58	Friendly Action (Lasing)	78	27	4	42	5
59	Friendly Action (Medevac)	178	49	71	48	10
60	Friendly Action (Movement to Contact)	18	9	6	1	2
61	Friendly Action (Other Defensive)	657	348	73	41	195
62	Friendly Action (Other Offensive)	313	45	85	136	47
63	Friendly Action (Other)	719	154	244	200	121
64	Friendly Action (Patrol)	1109	1024	53	19	13
65	Friendly Action (Police Actions)	230	59	33	125	13
66	Friendly Action (Raid)	4731	1228	428	1430	1645
67	Friendly Action (Recon)	111	27	4	42	38
68	Friendly Action (Search and Attack)	133	2	46	80	5
69	Friendly Action (Small Unit Actions)	3518	1150	2196	169	3
70	Friendly Action (Sniper Ops)	259	169	40	33	17
71	Friendly Action (Surveillance)	162	76	35	36	15
72	Friendly Action (TCP)	471	448	19	2	2
73	Friendly Action (UAV)	135	57	7	34	37
74	Friendly Action (Vehicle Interdiction)	118	88	11	7	12
75	Friendly Fire (Blue-Blue)	126	49	55	20	2
76	Friendly Fire (Blue-Green)	88	26	47	10	5
77	Friendly Fire (Blue-White)	67	11	22	19	15
78	Friendly Fire (Green-Blue)	149	60	49	32	8
79	Friendly Fire (Green-Green)	239	30	65	97	47
80	Friendly Fire (Green-White)	124	6	1	82	35
81	Friendly Fire (White-Blue)	26	1	1	21	3
82	Friendly Fire (White-Green)	52	34	8	10	
83	Friendly Fire (White-White)	28	1		19	8
84	Non-Combat Event (<Null Value>)	35	28	5	1	1
85	Non-Combat Event (Accident)	3088	970	790	678	650
86	Non-Combat Event (Demonstration)	1380	347	264	357	412
87	Non-Combat Event (Equipment Failure)	765	189	216	189	171

88	Non-Combat Event (Meeting)	100	42	45	2	11
89	Non-Combat Event (Natural Disaster)	5	2	1	1	1
90	Non-Combat Event (Other)	2282	361	517	624	780
91	Non-Combat Event (Propaganda)	68	34	8	12	14
92	Non-Combat Event (Sermon)	11	1	8		2
93	Non-Combat Event (Supporting AIF)	37	28	5	3	1
94	Non-Combat Event (Supporting CF)	12	5	6	1	
95	Non-Combat Event (Tribal Feud)	158	75	41	21	21
96	None Selected (None Selected)	106	58	6	38	4
97	Other (Lasing)	1446	821	353	70	202
98	Other (Other)	1172	468	158	290	256
99	Other (Rock Throwing)	299	69	9	45	176
100	Other (Staff Estimate)	714	661	1	52	
101	Suspicious Incident (<Null Value>)	280	171	95	13	1
102	Suspicious Incident (Elicitation)	20	5	2	13	
103	Suspicious Incident (Other)	1025	245	115	90	575
104	Suspicious Incident (Repetitive Activities)	34	19	8	7	
105	Suspicious Incident (Surveillance)	84	37	26	9	12
106	Suspicious Incident (Tests of Security)	61	16	19	10	16
107	Threat Report (Ambush Threat)	70	35	33	2	
108	Threat Report (Assassination Threat)	103	58	6	38	1
109	Threat Report (Attack Threat)	1247	821	353	70	3
110	Threat Report (Carjacking Threat)	19	15	3	1	
111	Threat Report (Direct Fire Threat)	35	21	11	1	2
112	Threat Report (Direct Fire)	142	11	6	124	1
113	Threat Report (IED Threat)	1388	661	596	131	
114	Threat Report (Indirect Fire Threat)	282	171	95	13	3
115	Threat Report (Intimidation Threat)	342	243	74	13	12
116	Threat Report (Intimidation)	20	11	7	2	
117	Threat Report (Kidnapping Threat)	127	109	11	7	
118	Threat Report (Looting Threat)	2	1	1		
119	Threat Report (Murder Threat)	115	64	37	10	4
120	Threat Report (Other)	276	161	70	37	8
121	Threat Report (Raid Threat)	3	1	2		
122	Threat Report (Recon Threat)	1				1
123	Threat Report (Sabotage Threat)	17	7	8	2	
124	Threat Report (Safire Threat)	22	15	3	1	3
125	Threat Report (Small Arms Threat)	1	1			
126	Threat Report (Smuggling Threat)	141	11	6	124	
127	Threat Report (Sniper Ops Threat)	32	16	14	1	1
128	Threat Report (Theft Threat)	8	3	5		