Modeling the Complexity of the Terrorism/Counter-Terrorism Struggle: Mathematics of the “Hearts and Minds”

Chris Arney, Department of Mathematics, United States Military Academy, West Point, NY, USA
Zachary Silvis, United States Military Academy, West Point, NY, USA
Matthew Thielen, United States Military Academy, West Point, NY, USA
Jeff Yao, United States Military Academy, West Point, NY, USA

ABSTRACT

The United States armed forces could be considered the world’s most powerful military force. However, in modern conflicts, techniques of asymmetric warfare (terrorism) wreak havoc on the inflexible, regardless of technological or numerical advantage. In order to be more effective, the US military must improve its counter-terrorism (CT) capabilities and flexibility. In this light, the authors model the terrorism-counter-terrorism (T-CT) struggle with a detailed and complex mathematical model and analyze the model’s components of leadership, promotion, recruitment, resources, operational techniques, cooperation, logistics, security, intelligence, science, and psychology in the T-CT struggle, with the goal of informing today’s decision makers of the options available in counter-terrorism strategy.

Keywords: Combat Modeling, Counter-Insurgency, Counter-Terrorism (CT), Insurgency, Terrorism, Terrorism-Counter-Terrorism (T-CT)

INTRODUCTION

The United States (US) is the world’s leader in military expenditures, and consequently, the US military is also considered the most technologically advanced and powerful fighting force in the world. But, as is always the case when a small, unorganized force is engaged with a larger conventional force, asymmetric warfare can wreak havoc on the less flexible (Ganor, 2005; Hoffman, 2006; Horgan, 2005; Sageman, 2004). The age of modern warfare has arrived, and it hinges not upon immense armies armed with powerful weapons, but upon a lightly armed, invisible threat. Terrorism as used by insurgents is a protean force, but it has indeed seized a sizeable foothold in cells and insurgencies across the globe (Couch, 2010).

DOI: 10.4018/joris.2013070103
As Desert Storm and the 2003 invasion of Iraq have proven, the US military is more than capable of effectively prosecuting a traditional invasion. What the US military must improve upon, however, is its ability to defeat an enigmatic foe who meets it not on the battlefield or on the high seas, but in the living rooms, the schools, and the hearts and minds of ordinary people. Many of these engagements are now called hybrid wars, because they begin with a full-spectrum conflict and then revert to a counterinsurgency (McCuen, 2008). The US military is not alone in its struggle against insurgents. There have been over 300 insurgencies since 1800, and research has shown that the growing trend is one of failure of the “incumbent” against an insurgency that may be less organized, technologically advanced, or numerous, but is powerful nonetheless (Lyall & Wilson, 2009).

In this paper, we model and analyze the terrorism-counterterrorism (T-CT) dynamic while considering such factors such as leadership, promotion, recruitment, resources, operational techniques, cooperation, logistics, security, intelligence, and psychology. We demonstrate a methodology to optimize CT strategy through allocation of resources to achieve the best CT results. Our focus is on T-CT in relation to the situation where the US and its coalition partners are the primary counterinsurgency forces in a host country involved in an insurgency primarily prosecuted by a terrorist organization. We also assume that the US government and its military forces are using the tenets of FM 3-24 (2006) and FM 3-24.2 (2009), which advocate cooperation among many government agencies and use of a full spectrum of counterinsurgency (COIN) operations. This manual calls for a multi-layered approach to win the hearts and minds of the local populace. Using the COIN approach, the US forces are stationed close to the local populace so they can perform the equivalent of armed social work. As US forces win over the local populace, secure areas and supportive peoples eventually grow, creating a positive feedback loop. Through the proper balance of CT operations, the local population refuses to help the insurgents and sides with the local government’s counterinsurgency effort. We also assume that despite an appearance of disorganization, terrorist cells actually tend to be loosely structured around a leadership configuration and many other support factors such as resource assistance, public opinion, and intellectual capacity are important to the growth and strength of terrorism.

Counter-terrorism became an integral part of United States foreign affairs on September 11, 2001, when al-Qaeda terrorists hijacked commercial airlines and used them to kill 2,995 people. The resulting focus on terrorism and counter-terrorism can be seen in the declaration of the “War on Terror” and subsequent, ongoing campaigns in Iraq and Afghanistan. One way to better understand, and eventually improve, the effect of CT measures on terrorist organizations is to model their growth and decline using known or assumed aspects of their organization. For example, most terrorist organizations operate by recruiting members from the population of their area of operations. This recruitment is often affected by the financial support for the organization, the in-country and world-wide public support of the cause, and the leadership and intellectual capabilities of the terrorist organization.

Counter-terrorism became an integral part of United States foreign affairs on September 11, 2001, when al-Qaeda terrorists hijacked commercial airlines and used them to kill 2,995 people. The resulting focus on terrorism and counter-terrorism can be seen in the declaration of the “War on Terror” and subsequent, ongoing campaigns in Iraq and Afghanistan. One way to better understand, and eventually improve, the effect of CT measures on terrorist organizations is to model their growth and decline using known or assumed aspects of their organization. For example, most terrorist organizations operate by recruiting members from the population of their area of operations. This recruitment is often affected by the financial support for the organization, the in-country and world-wide public support of the cause, and the leadership and intellectual capabilities of the terrorist organization. Facts and assumptions such as these can be used to analyze terrorist organizations and even help understand the effectiveness of various counter-terrorism policies, including the allotment of resources and aggressiveness of action in the various models of CT operations, such as direct kinetic military operations, intelligence gathering, PSYOP/information distribution, aid to the local public, logistics, and security. The detail, complexity, and flexibility of our T-CT model contribute to its value in the analysis and understanding of the T-CT struggle.

As a starting point, we use these as basic definitions (FM 3-24, 2006):

- Terrorism is as much a crime in the classic sense as murder or kidnapping, but one with political motives and a psychological component, aimed at the people watching...
Related Content

Optimal Strategies for Deteriorating Inventory Systems Under Trapezoidal Type Demand
www.igi-global.com/chapter/optimal-strategies-for-deteriorating-inventory-systems-under-trapezoidal-type-demand/198681?camid=4v1a

Information Governance Maturity Model: Should Retention Be Rethought?
www.igi-global.com/chapter/information-governance-maturity-model/214782?camid=4v1a

An Integrated Production-Supply System with Uncertain Demand, Nonlinear Lead Time and Allowable Shortages
www.igi-global.com/article/integrated-production-supply-system-uncertain/73020?camid=4v1a
Semantic Business Process Mining of SAP Transactions
www.igi-global.com/chapter/semantic-business-process-mining-sap/36579?camid=4v1a