The Role of Influence Operations in a Counterinsurgency Battle
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Introduction

The aim of this paper is to extend a recent "war of attrition" model for counterinsurgency (Kress & Szechtman, 2008) to include the impact on the war of the use of influence operations for popular support and defections from the insurgency. This effort was completed, in part, for the U.S. Air Force Research Laboratory at Wright-Patterson Air Force Base (Contract No. FA8650-04-D-6405 TO 25 and TO 33).

Background

In what is known as the beginning of operations research, Lanchester (1914) presented a mathematical model of a war of attrition in which soldiers on both sides of the war are killed in proportion to the numbers and fighting effectiveness of the enemy soldiers. Lanchester's model was extended by Deitchman (1962) to guerilla warfare or insurgency, for those cases in which the insurgent soldier hides among civilians. In Deitchman's model, a counterinsurgent soldier's random likelihood of successfully targeting an insurgent is the same as the ratio of soldiers to civilians.

Nagl (2005), in a comparison of two counterinsurgent conflicts, described verbally the role of public support and defections in counterinsurgent warfare. He argued that public support for the insurgency improves the fighting effectiveness of insurgents by providing hiding places, logistical support, intelligence, finances, and new recruits. Public support for counterinsurgents and recent insurgent defections improve the fighting effectiveness of counterinsurgents by providing critical intelligence and new recruits.

Artelli & Deckro (2006) used system dynamics to model a Lanchester war of attrition. They modeled public support as influencing the acceptable level of civilian casualties to inform counterinsurgent planning. Kress & Szechtman (2009) extended the Lanchester and Deitchman models to include a role for intelligence about insurgent locations in diminishing civilian casualties, which they represent as driving recruitment to the insurgent side.

Kress & Szechtman modeled intelligence as a continuous parameter representing the proportion of accurate intelligence reports about insurgent locations. With perfect accuracy, their model reduces to the Lanchester model; with random accuracy it reduces to the Deitchman model. Key parameters in their model include the fighting effectiveness of each side, intelligence, and an insurgency recruitment parameter that is linear in the number of civilian casualties in the broader population.

Kress & Szechtman assumed for simplicity that recruitment to the insurgency was not ideological but only in anger over civilian deaths. They also excluded non-kinetic factors other than intelligence from their model. Nevertheless, they ended their paper

acknowledging the role of "soft" actions (reconstruction, civil-support, and propaganda) for improving popular support and thus intelligence.

In this paper, I present a system dynamics model that incorporates Nagl's verbally expressed insights regarding the importance of popular support and insurgent defections in a counterinsurgency. This model is an extension of Kress & Szechtman's model and represents influence operations messaging as having an effect on the quality of intelligence, recruitment and defections. In addition, popular support and defections are modeled using contagion equations (Sterman, 2000) in competition, in that individuals who have changed constituencies may be recruited to campaign for their new side.

The Model

The Five Model Sectors

The model presented here has five sectors: Competitive Contagion (Popular Support), Recruitment and Defections, Quality of Intelligence, War of Attrition, and Collateral Damage. In this section I will describe the model, broadly indicating how the sectors interact and the places where influence operations might play a role. Figure 1 displays a role for influence operations (IFO) across most of these sectors in a counterinsurgency battle.

In the Competitive Contagion Sector, individuals representing popular support for the insurgents and counterinsurgents attempt to influence each other to join their constituency. Next, in the Recruitment and Defections Sector, the extent of popular support affects whether people can be recruited to fight. These recruitment efforts can be enhanced or diminished with influence.

In the Intelligence Sector, the extent of popular support affects people's willingness to provide useful intelligence for the war effort. Also, in both the Recruitment and Defections and the Intelligence Sectors, fighters can be influenced to defect and supply valuable intelligence about the group from which they defected. This intelligence improves the fighting effectiveness of the side that recruited the defector, supporting that side in the War of Attrition Sector.

In addition, fighting effectiveness can be affected by influence efforts to disrupt or support group functioning. Another impact of the quality of intelligence is on reduced civilian casualties, in the Collateral Damage Sector. Finally, the extent of civilian casualties increases popular support and recruitment for the insurgency while improvements in civil life can increase support for the counterinsurgency, if highlighted by influence efforts.
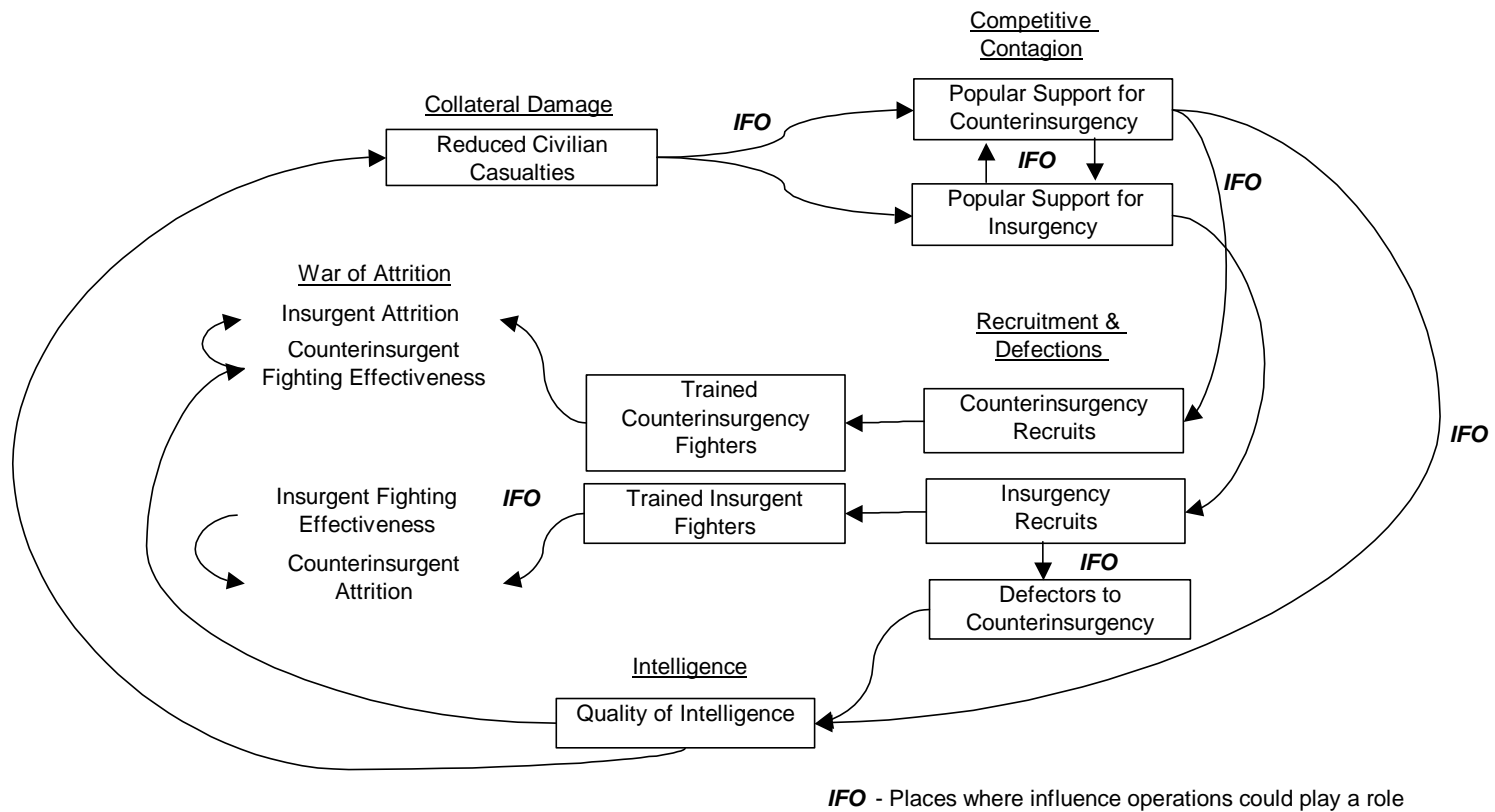
Collateral Damage

Reduced Civilian
Casualties

IFO

Competitive
Contagion

Popular Support for
Counterinsurgency

IFO

Popular Support for
Insurgency

IFO

IFO

War of Attrition

Insurgent Attrition

Counterinsurgent
Fighting Effectiveness

Recruitment &
Defections

Trained
Counterinsurgency
Fighters

Counterinsurgency
Recruits

Insurgent Fighting
Effectiveness

IFO

Trained Insurgent
Fighters

Insurgency
Recruits

Counterinsurgent
Attrition

IFO

Defectors to
Counterinsurgency

Intelligence

Quality of Intelligence

IFO

IFO - Places where influence operations could play a role

Figure 1. Applications of Influence Operations to a Counterinsurgency Battle as Modeled in Five Sectors

Next I will describe each of the five sectors of the model. While all numbers used to parameterize this model are notional, some parameters have orders of magnitude reminiscent of what is being reported in open source media for the counterinsurgency battle in Afghanistan.

The Competitive Contagion Sector

Figure 2 displays the structure of the Competitive Contagion sector of the model. In this sector, individuals in the broader civilian population campaign for their constituency, supporting either the counterinsurgency or the insurgency. Mathematically, this is an implementation of a simplified form of contagion model, according to the analogy that a word-of-mouth sharing of a political commitment is transmitted from individual to individual. Unlike the illness metaphor, however, there is no incubation time that moves people from a state of being exposed to infectious and there is no automatic recovery time after the illness. Also, unlike the illness metaphor, there is a competition for individuals, so this sector is entitled Competitive Contagion.

Because of the near symmetry of the structure for the two constituencies, I will describe it from the point of view of a counterinsurgency and then point out any discrepancies regarding the insurgent side.

First, there is a baseline number of supporters for both sides of the war. For the model, I assume notionally a region of population 1,000,000 with 80% in support of the counterinsurgents and 20% in support of the insurgents. In the case of Afghanistan, one news outlet reports a figure of 20% as popular support for the Taliban in the province of Kandahar, a province that shares its majority Pashtun ethnicity with the Taliban.[1] Kandahar province is reported on Wikipedia to have a population of approximately 900,000.[2] For the country as a whole, a recent poll suggests popular support for the Taliban is at 4%.[3]

Second, some of the people on each side campaign for popular support. Some fraction of the population in support of the counterinsurgency may be willing to talk formally or informally to neighbors and friends who might be inclined to support the insurgents. These are the campaigners. The extent to which fear dominates such conversations will limit the number of such campaigners. Notionally, I assumed one in ten thousand would be willing to do such campaigning for either side.

Third, campaigners target other individuals in the population. Notionally, I assumed campaigners on either side would contact 40 people each week. Some proportion of those contacted by counterinsurgents will indeed be supporters of the

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[1] A number quoted by a Canadian Brigadier General in an article on Canada.com from February 19, 2009; http://www.canada.com/news/Taliban+tactics+destroy+Afghan+support+government/1302732/story.html
[2] Kandahar Province. Downloaded from Wikipedia on 3/17/09. . http://en.wikipedia.org/wiki/Kandahar_Province
[3] A poll commissioned by ABC/BBC/ARD (the third a German television station) found popular support for the Taliban to be at 4% according to a BBC article on February 9, 2009, downloaded 3/17/09 from http://www.bbc.co.uk/pressoffice/pressreleases/stories/2009/02_february/09/afghanistan.shtml

insurgency. That number may be the fraction of insurgents in the population (if they are randomly targeted) or, with good information, all those contacted may represent appropriate people to campaign. In analogy with Kress & Szechtman's effect of intelligence on targeting in the war of attrition, this sector includes an effect of intelligence on targeting for campaigning. With good intelligence everyone contacted is a good target, otherwise the contacts are distributed according to the relative proportion in the population. Unlike the war of attrition, however, there are little or no recruitment costs to bringing the campaign to someone who already agrees.

Finally, the campaign message may or may not elicit a change of side. Depending on the effectiveness of the campaign message, some proportion of those people will be persuaded to support the counterinsurgency. Notionally, I assumed that 3% of people would respond to the message on either side.

The insurgency side of this sector is exactly the same as the counterinsurgency side, with the one exception that there is an impact of civilian casualties that adds to the effectiveness of the persuasive message for insurgent support.
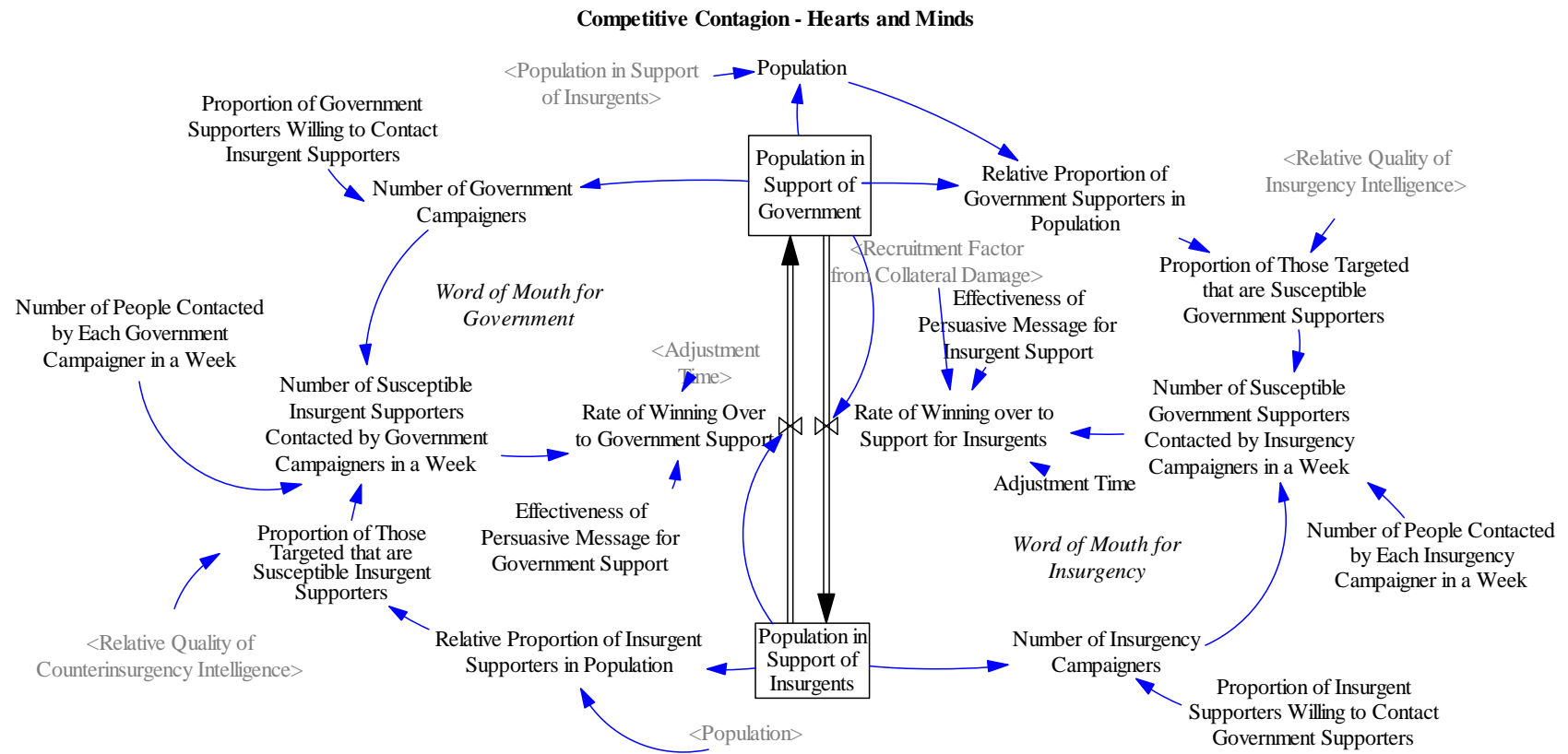
Competitive Contagion - Hearts and Minds

Figure 2. The structure of the Competitive Contagion sector.

The Recruitment and Defections Sector

The Recruitment Sector shows people in support of each side of the battle getting recruited as fighters and then leaving or getting trained. In addition to members of the local population being recruited to each side, there are foreign fighters brought in to support the counterinsurgency. There are also defections from both the counterinsurgent side and the trained insurgent fighters. Finally, consistent with the Kress & Szechtman model, the civilian casualties spur recruitment from among insurgent supporters into the group of insurgent fighters.

There are a certain number of fighters on each side. Initial numbers for the stocks in this model are notional but based on degrees of magnitude in open source media. The international coalition and the local Afghan National Army constitute the counterinsurgent fighters. I used the notional numbers of 60,000 for the foreign force and 80,000 for the local force. NATO's International Security Assistance Force (ISAF) "placemat" lists figures for troops in the Coalition in Afghanistan of 61,960.[4] As countries are changing their contributions, these numbers will change. According to the same NATO website, the Afghanistan National Army is said to have 82,780 fighters and is recruiting to 134,000 by the end of 2011, a net recruitment rate of about 25,000 per year.

To aggregate the counterinsurgent fighters in a single force, I assumed a training time period for the foreign and local fighters. According to Wikipedia, the US is providing a two-month basic combat training to Afghan fighters. Since it is not clear how many are trained in each such session, I assumed a notional number of 750 new trained counterinsurgent fighters per week (250 foreign and 500 local). The number of trained fighters increases with recruitment but is reduced by the attrition rates of the war.

I selected 10,000 as a notional number for the number of insurgent fighters in the model. An article in the NY Times from late 2007 put the Taliban at 10,000 with 2-3,000 full time fighters.[5]

Recruitment rates increase linearly in response to civilian casualties. As in Kress & Szechtman, for every civilian lost a specific number of recruits sign up. In this model, a memory of past losses is a factor that drives recruitment. Recruits are assumed in this paper to join the insurgency for ideological reasons in addition to joining in response to the recent deaths among non-militants. The relative contributions from these two factors are completely notional. I assumed that one out of a thousand people in the population in support of the insurgency joins the insurgency each week and that 25 people from that same population join each week for every 1,000 civilians killed in recent memory.

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[4] Downloaded on 3/18/09 from http://www.nato.int/isaf/docu/epub/pdf/isaf_placemat.pdf.
[5] Rodhde, David, "Foreign Fighters of Harsher Bent Bolster Taliban", *The New York Times*, October 30, 2007. Downloaded on 3/18/09 from
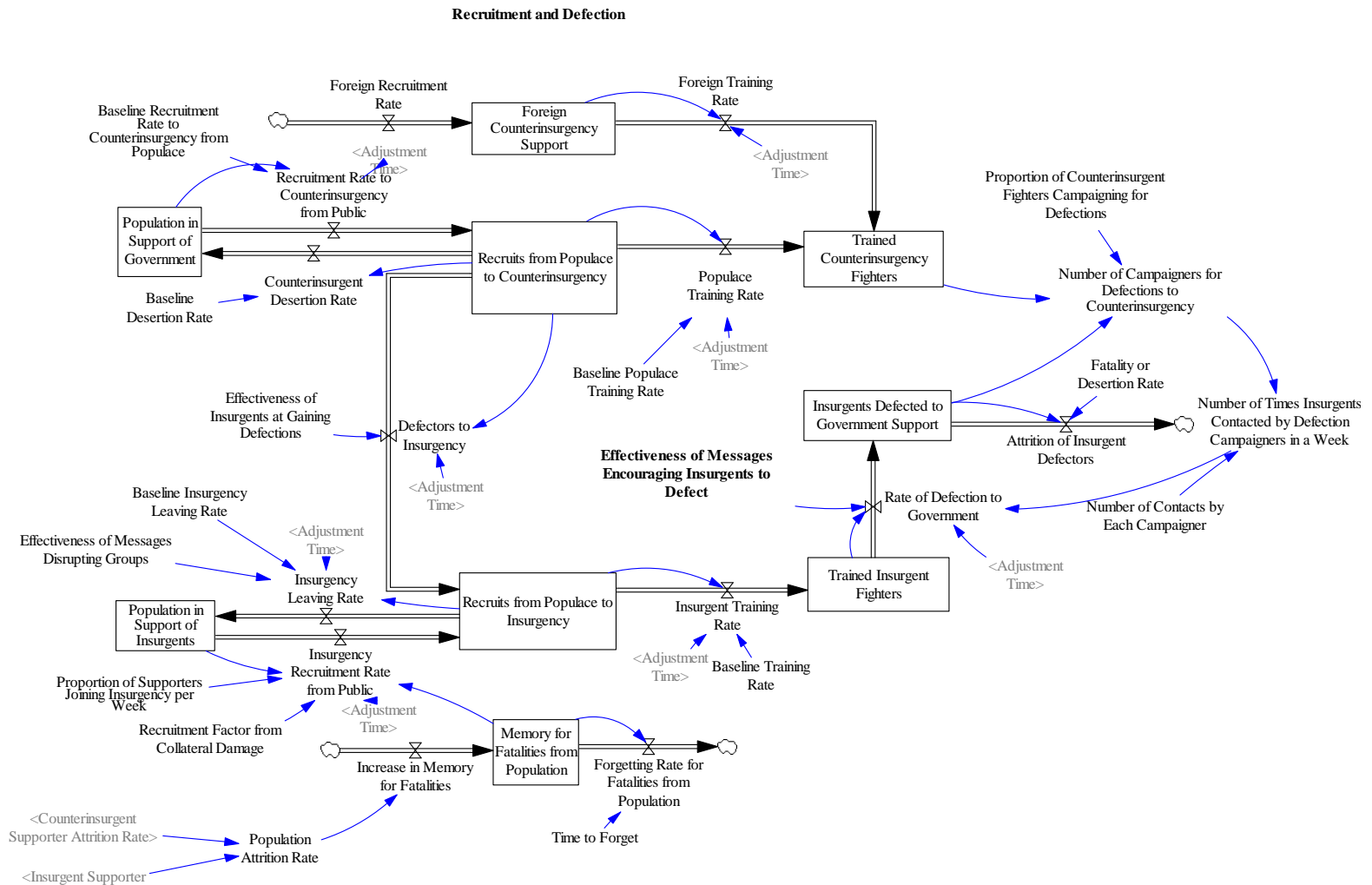http://www.nytimes.com/2007/10/30/world/asia/30afghan.html?_r=1&hp

Recruitment and Defection

Figure 3. The structure of the Recruitment and Defections sector.

Defections are also included in the model as impacting the quality of intelligence regarding the locations of militants and other operational support. Defectors from the insurgency are persuaded to defect by counterinsurgent fighters and other defectors. In addition, there are losses to this group whether due to attrition in battle or loss of motivation to fight. Finally defectors are included as campaigners for new recruits to the counterinsurgency.

The Quality of Intelligence Sector

Figure 4 depicts how the quality of intelligence improves with popular support and defections in line with insights from Nagl (2005). The function relating these variables is unknown and assumed to be linear for this model. The intelligence gleaned from these sources improves targeting of insurgents and reduces collateral damage. For this model the quality of intelligence is assumed to be 0.6 initially, since that is the relative proportion of insurgents lost to civilians lost. Civilian casualties are at about 2,000 each year according to an article in the Weekly Standard,[6] while Taliban casualties are difficult to find out but have been estimated at from 10-30 times the Coalition casualty rates. Since the Coalition deaths are at about 300 per year, we can assume 3000 to 9000 Taliban deaths per year. If we assume 3000 Taliban to 2000 civilians, then the intelligence is about 60% accurate for targeting.

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[6]Downloaded 3/19/09 from
http://www.weeklystandard.com/Content/Public/Articles/000/000/016/274efbdb.asp?pg=1
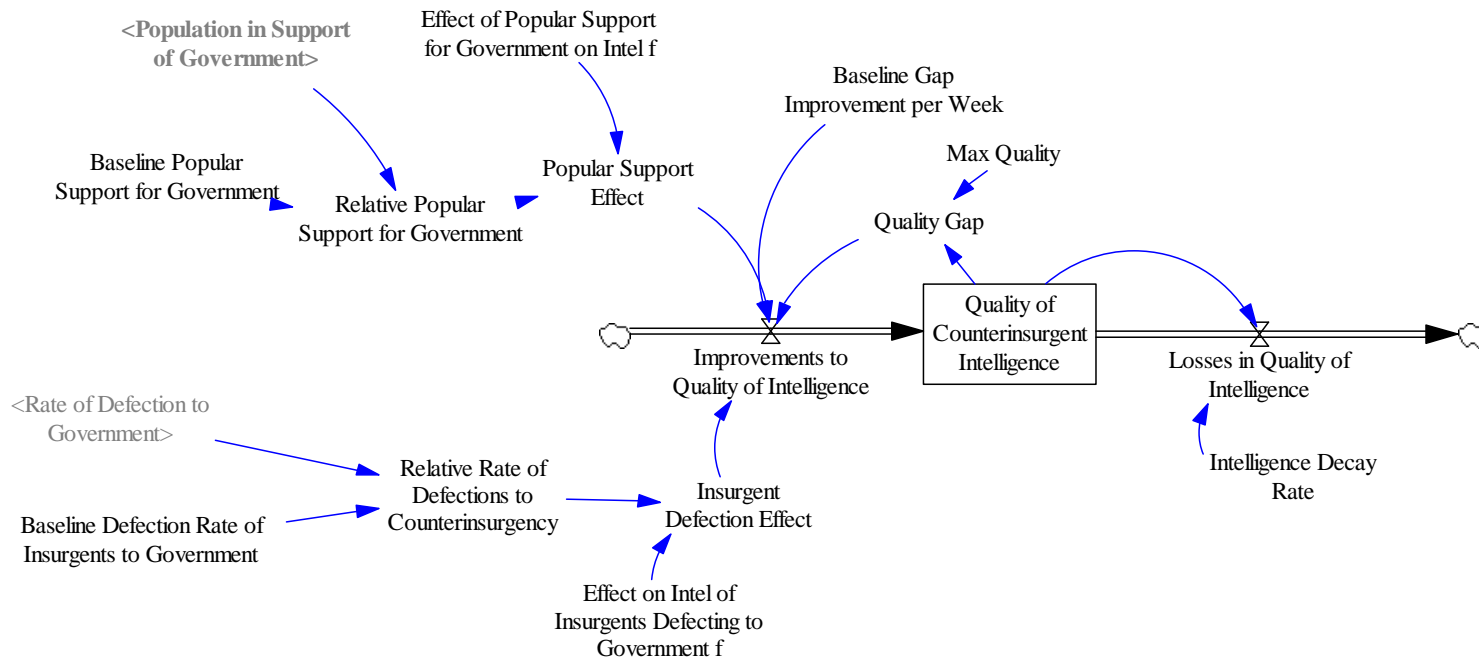
Quality of Intelligence

Figure 4. The Quality of Intelligence Sector.

War of attrition

As shown in Figure 5, the War of Attrition sector is a representation of Kress & Szechtman's model, in which fighters are lost according to Lanchester's (1914) equations and intelligence affects the number of insurgent fighters lost relative to losses from the civilian population. The unintended civilian casualties are in the Collateral Damage sector and their impact on recruitment is in the Recruitment and Defections sector. Like Kress & Szechtman, I'm assuming that the insurgents have no difficulty locating counter-insurgents.

Beyond Kress & Szechtman, popular support is assumed to improve fighting effectiveness for both sides (through recruitment, intelligence, and logistical support) and to provide hiding places for insurgents.

Notionally, I'm assuming that the effect of popular support for insurgents on their fighting effectiveness is linear. Similarly, I'm assuming that counterinsurgency intelligence quality, a function of popular support for the government, has a similar direct effect on fighting effectiveness.

The Collateral Damage Sector

The unintended fatalities in the population are a function of the fighting intensity of the counterinsurgents and the proportion lost from the population (itself a function of intelligence). As shown in Figure 6, in the Collateral Damage sector, when such civilian casualties occur, the variables representing supporters for the counterinsurgency and insurgency are depleted in proportion to their numbers. It is possible that insurgent supporters are more likely to be hiding insurgent fighters than the rest of the populace, and thus more at risk of getting caught in the crossfire. Nevertheless, for this model, I have assumed that the unintended fatalities that accumulate as the model runs are proportionately distributed across the two groups.
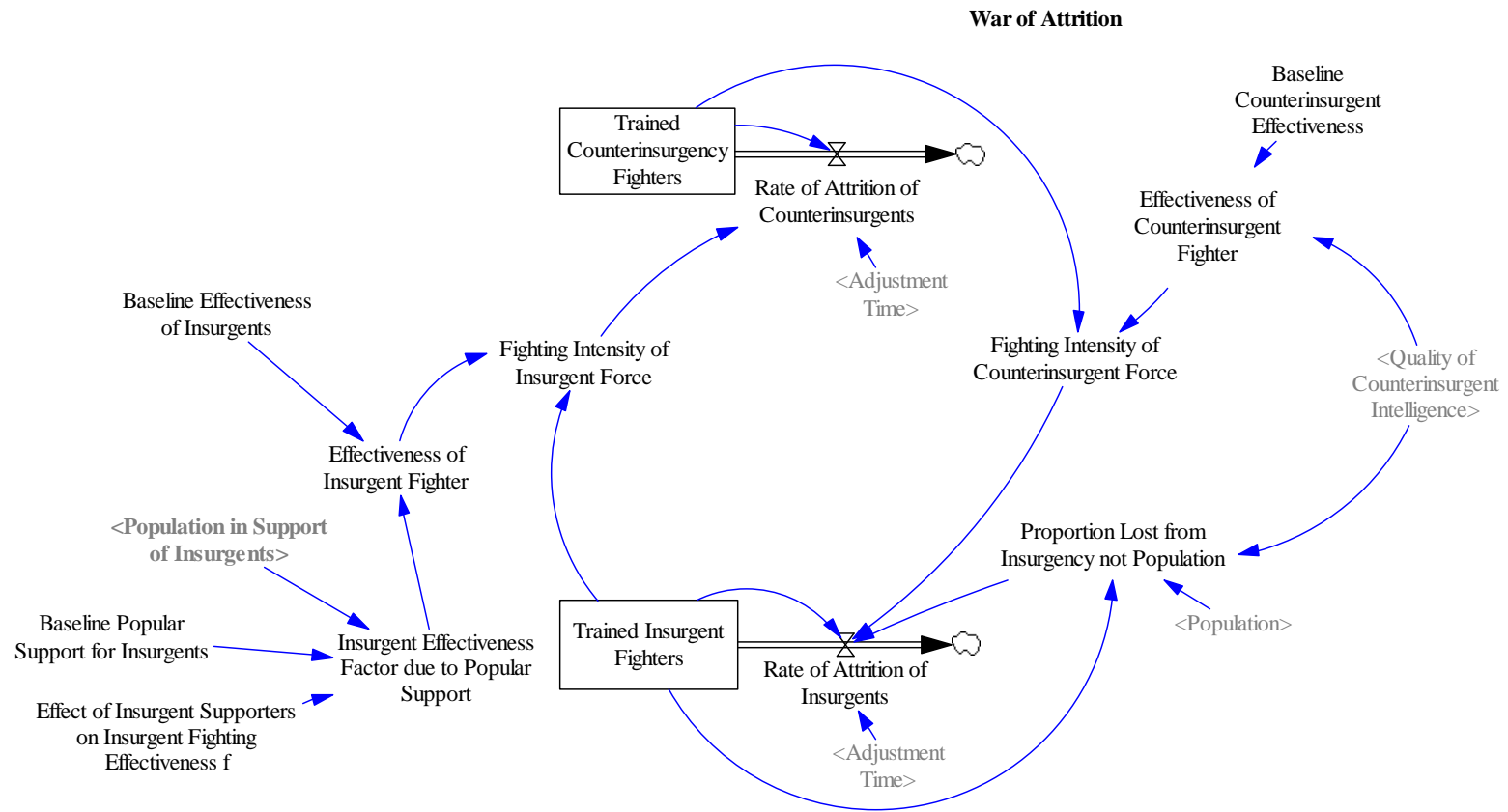
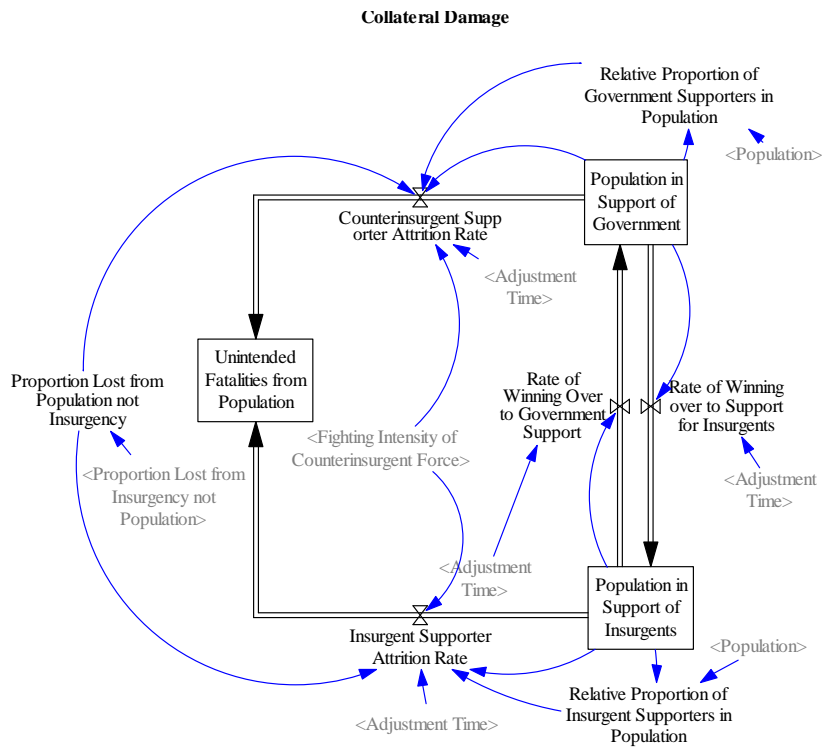**Figure 5. The structure of the War of Attrition sector.**

Collateral Damage

Relative Proportion of
Government Supporters in
Population

<Population>

Population in
Support of
Government

Counterinsurgent Supp
orter Attrition Rate

<Adjustment
Time>

Proportion Lost from
Population not
Insurgency

Unintended
Fatalities from
Population

Rate of
Winning Over
to Government
Support

Rate of Winning
over to Support
for Insurgents

<Fighting Intensity of
Counterinsurgent Force>

<Adjustment
Time>

<Proportion Lost from
Insurgency not
Population>

<Adjustment
Time>

Population in
Support of
Insurgents

Insurgent Supporter
Attrition Rate

<Population>

Relative Proportion of
Insurgent Supporters in
Population

<Adjustment Time>

Figure 6. The structure of the Collateral Damage Sector

Model Policy Tests and Results

Two influence operations policies were tested in this model to see their impact on intelligence, recruiting and ultimately the length of the battle. The first test, Popular Support Messaging, was to investigate the impact of improving messaging quality for popular support by a factor of 10. The second test, Defection Messaging, was to investigate the impact of improving message quality encouraging defections by a factor of 10. These were both compared to a baseline run of the model.

Impact of Two Policies on Popular Support

As shown in Figure 7, and as expected, an improvement in messaging for popular support for the counterinsurgency improves that support from baseline and improves it relative to the impact of defection messaging. Since the population is losing members through civilian casualties and recruitment into the fight, the overall size of the civilian populace is declining in the baseline scenario.
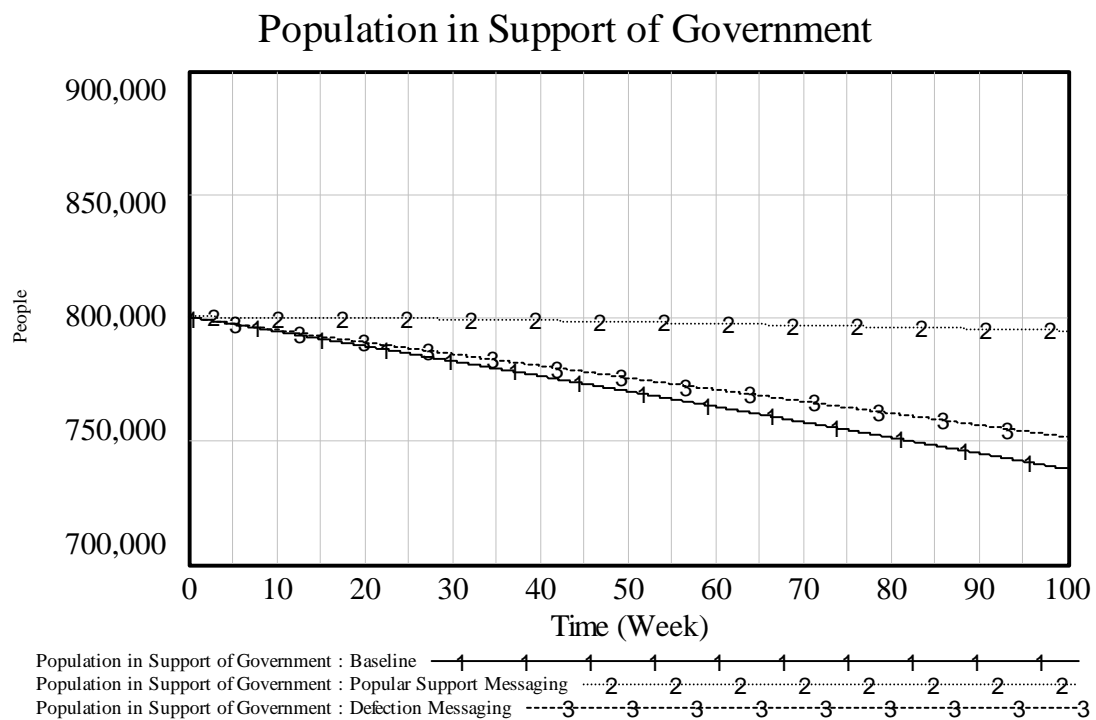
Population in Support of Government

Figure 7. Popular Support for Counterinsurgency and Insurgency a) at baseline; b) with popular support messaging; and c) with defection messaging.

Similarly, as shown in Figure 8, an improvement in defection messaging impacts defections but popular support does not, relative to baseline figures.
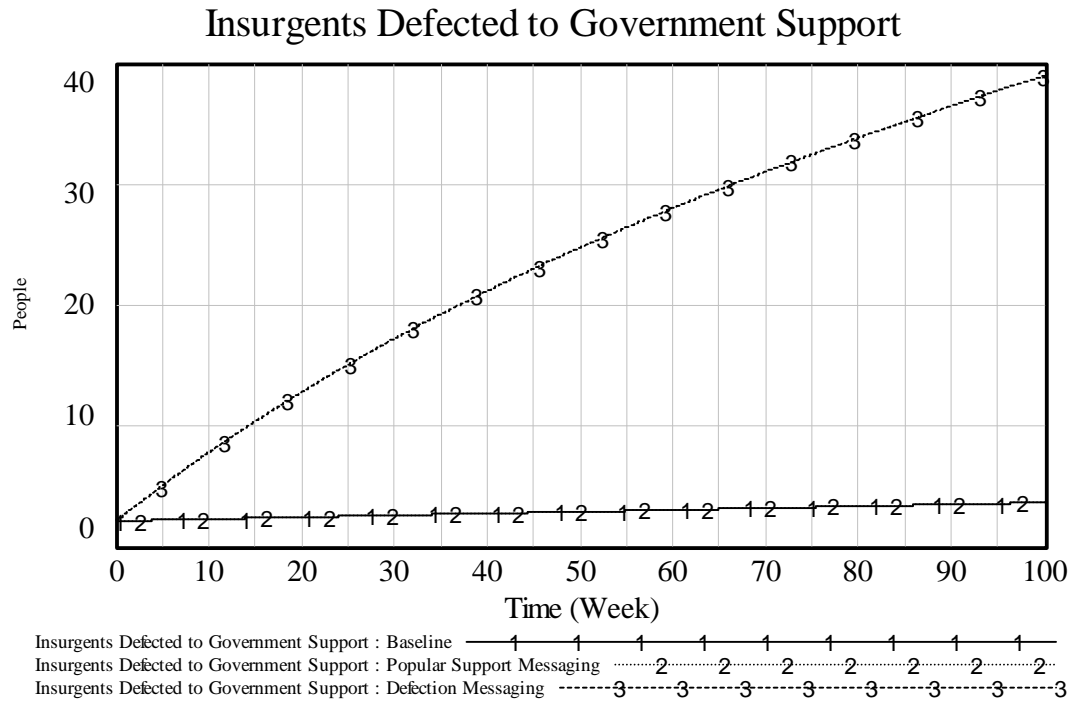

Insurgents Defected to Government Support

Figure 8. Insurgents defecting to counterinsurgency with a) defection messaging and b) with either popular support messaging or at baseline.

Figure 9 displays the impact on quality of counterinsurgent intelligence of each of these policies. Defection messaging has a greater impact on quality of intelligence than does popular support messaging.

Quality of Counterinsurgent Intelligence
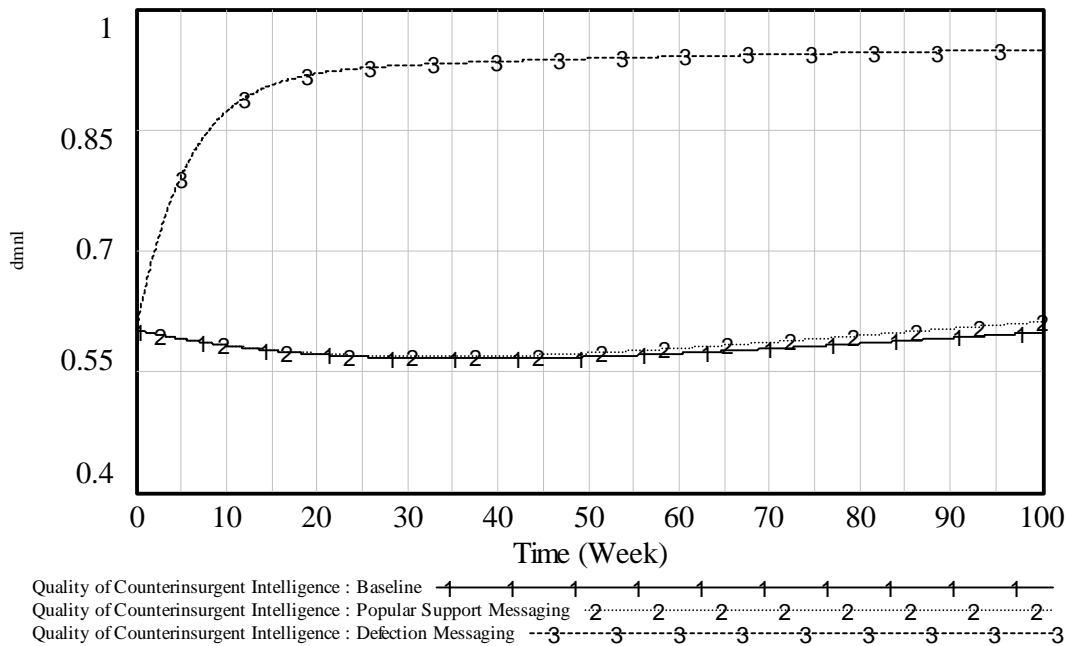
Figure 9. Quality of counterinsurgent intelligence a) at baseline; b) with popular support messaging; and c) with defection messaging.

Figure 10 shows that defections have no direct impact on the effectiveness of the insurgent fighter, but the loss of popular support does. In addition, Figure 11 shows that recruitment is more affected by defection messaging than by popular support, presumably because of the reductions in collateral damage from improved intelligence, in support of Kress & Szechtman's thesis. The reductions in collateral damage are shown in Figure 12 and do show defection messaging having more of an impact than popular support messaging.
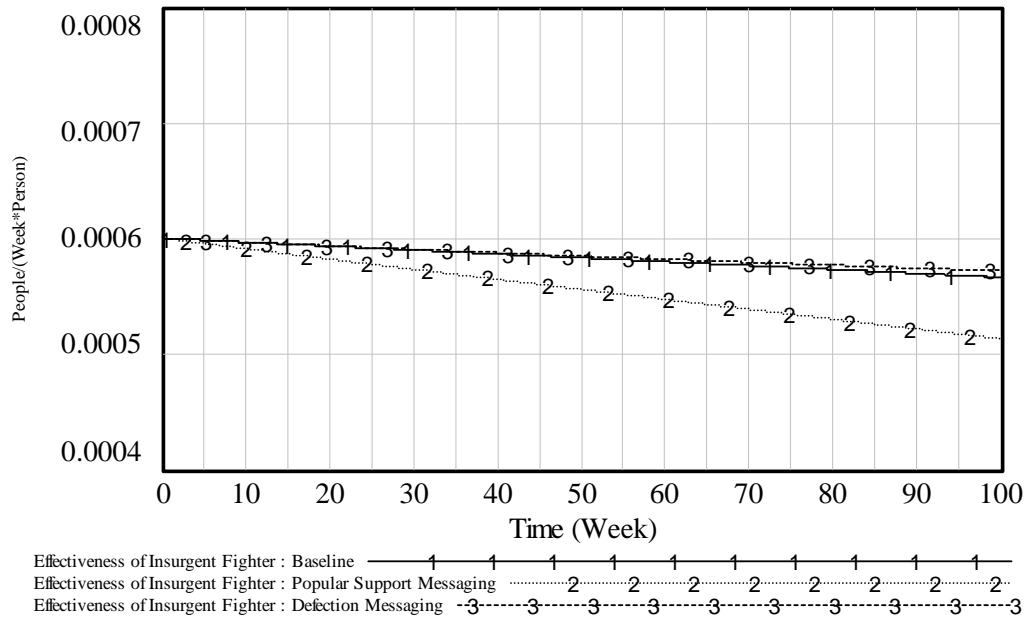
Effectiveness of Insurgent Fighter

Figure 10. The effectiveness of the insurgent fighter a) at baseline; b) with popular support messaging; and c) with defection messaging.
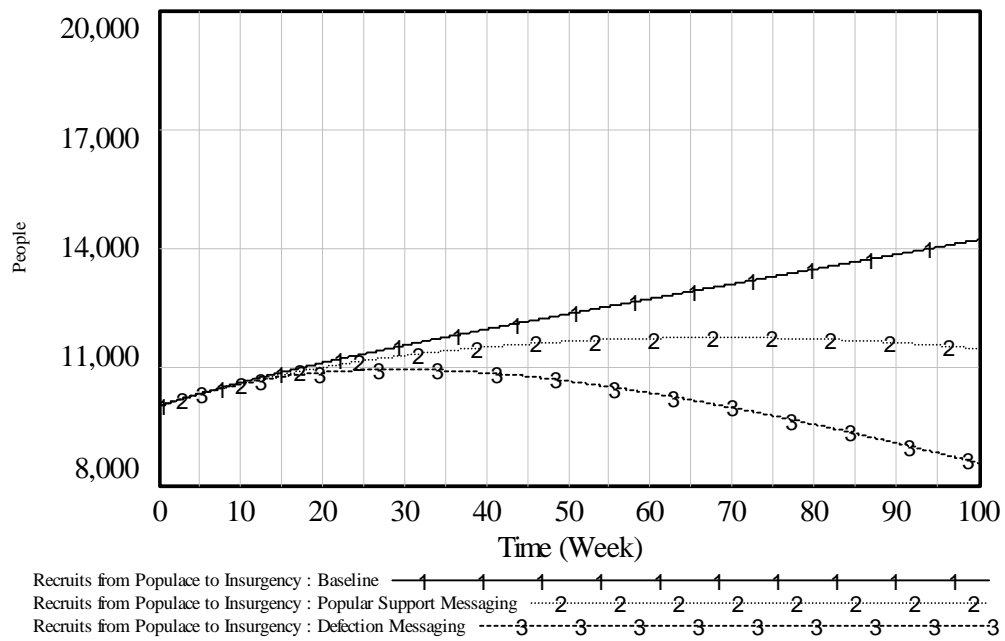
Recruits from Populace to Insurgency

Figure 11. Recruits to the Insurgency a) at baseline; b) with popular support messaging; and c) with defection messaging.
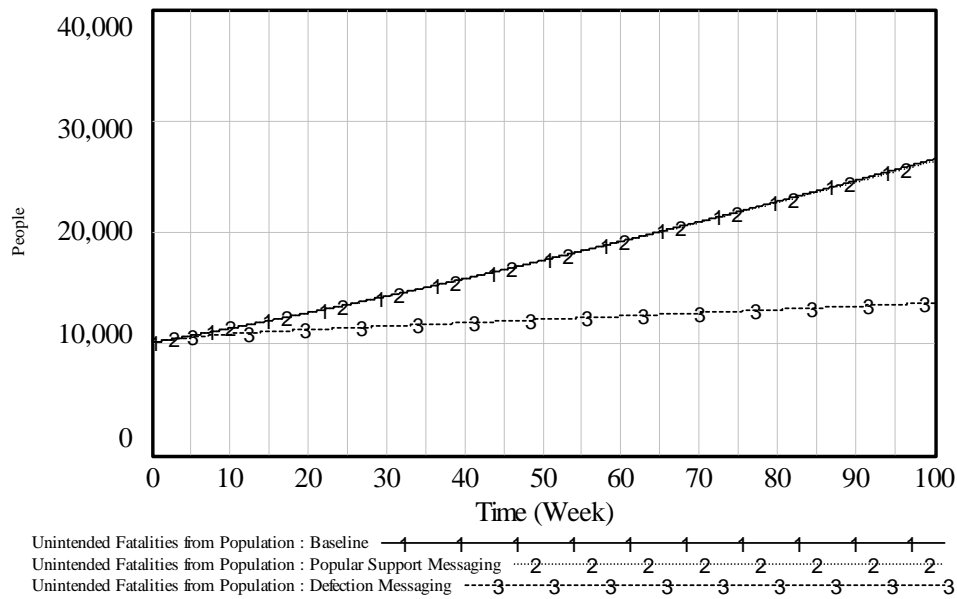
Unintended Fatalities from Population

Figure 12. Unintended civilian casualties a) at baseline or with popular support messaging and b) with defection messaging.

A critical question is whether any these impacts alter the course of the war. The two messaging efforts had no impact on the number of counterinsurgency fighters. However, the insurgent attrition results, for this model with all its caveats of notional numbers and conjectured effect functions, are shown in Figure 13. It appears that effective defection messaging can reduce the length of the war.
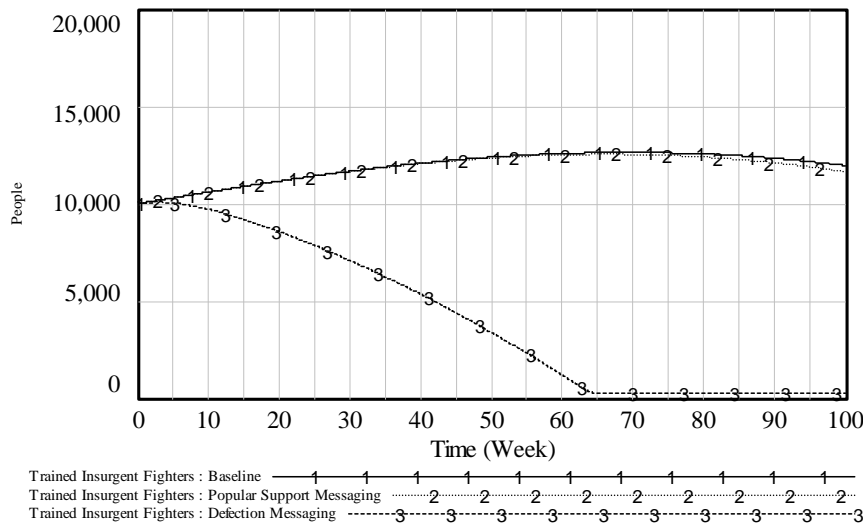
Trained Insurgent Fighters

Figure 13. Trained insurgent fighters a) at baseline; b) with popular support messaging and c) with defection messaging.

Discussion

The model incorporates many assumptions about structure and parameterization, and especially effect functions, all of which represent gaps in knowledge about the impacts of influence operations on a war of attrition. Nevertheless, as a proof of concept, this model represents an interesting way to test the impact of influence operations relative to a baseline case and to compare alternative tactics for influence operations.

Two messaging policies were compared, but the results of such comparisons will depend heavily on model parameterization and the formulation of effect functions. Still, a model such as this one can be used in principle to inform policy development by making assumptions transparent and by clarifying causal links. For instance, popular support messaging can reduce the effectiveness of insurgent fighters and their ability to recruit. Alternatively, defection messaging can help to recruit defectors and glean intelligence for targeting that could limit civilian casualties and reduce insurgent recruitment, thus bringing the war to an earlier close.

In summary, the model incorporates the impacts of influence operations on the battle for popular support and the willingness of those who already support the counterinsurgency to campaign for their cause within the broader populace, to share intelligence information, and to sign up to fight. In addition, the model incorporates the impact of messaging to persuade insurgents to defect and share intelligence and messaging to disrupt the effectiveness of their fight.

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