Losing Hearts and Minds: Insurgency/Counter-Insurgency Analysis on a High-Throughput Cluster

Eric Wallace and Christopher K. Butler
UNM Department of Political Science and The Centre for the Study of Civil War, PRIO
University of New Mexico, Albuquerque, NM 87131

E-mail: ckbutler@unm.edu

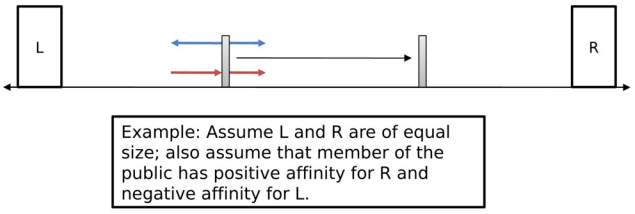
Introduction. We have simulated the effects of one-sided collective-targeted violence on a heterogeneous public. The public is assumed to have a uniform density distribution over a political space bounded by a group of the left (L) and a group of the right (R). The two groups and members of the public pull the members of the public within the political space in proportion to their density (or political clout). Members of the public can have positive (friendship), negative (enmity), or neutral affinity toward either of the two group actors (L and R). Affinity is our way of modeling the "hearts and minds" of the public. Positive affinity acts as an additional pull toward an actor; negative affinity acts as a push away from an actor. We assume that the collective-targeted violence perpetrated by one actor (here, R) engenders enmity toward that actor by members of the public who are linked to eliminated agents. Applying this mechanism to different social-network structures produces different results. Collective targeting given a complete network is clearly counterproductive. Collective targeting given a partitioned network that correlates perfectly with the political space seems to be a plausible strategy for eliminating potential opposition recruits. The effects of other social-network structures will be examined more systematically in future analysis.

Modeling and Computational Approach. In this work, we apply physical forces to political maneuvering among many actors in a mathematically rigorous way. Three forces are considered: **Gravity, charged particles,** and **drag**. **Gravity** assumes that political clout (or power) is analogous to mass. **Charged particles** assume that friendship attracts while enmity repels. These forces generate acceleration in political space (here, just a line segment), which then generates velocity and changes in position. The third force, **drag**, causes actors to slow down in proportion to their velocity. We assume that actors can be located in political space in a meaningful way. Dimensions can be thought of as political issues.

Insurgency/Counter-Insurgency Analysis. We have applied our modeling framework to study the following important question:
Under what circumstances does collective targeted violence lead to "losing the hearts and minds" of a population?

At present, there are dueling perspectives regarding the effects of this counter-insurgency (COIN) strategy. Conventional wisdom argues that collective targeting (by either government or insurgent) will lead to loss of the population's support (Galula 2006; Kalyvas 2006; FM3-24 2007), while others suggest that a collective-targeting COIN strategy can successfully defeat an insurgency (Lyall 2009; Downes 2007; Johnston 2009).

Figure 1. Basic model. Power: actors pull each other within the issue space in proportion to the political clout of the actor. Affinity: actors have a positive (friendship), negative (enmity), or neutral affinity towards the group of the right (R) and of the left (L). This force can either push or pull the actor along the issue space . Both forces are reduced over distance.



Simulation details. This model was implemented in Liberty Basic run through the Wine Emulator under Ubuntu Lucid Lynx. Additional runs were done under Windows 7 OS on 4 independent machines at CARC to validate the model. A larger Windows cluster (subset of CARC 128-node *Galles* Condor cluster) is being utilized for the next phase of the study.

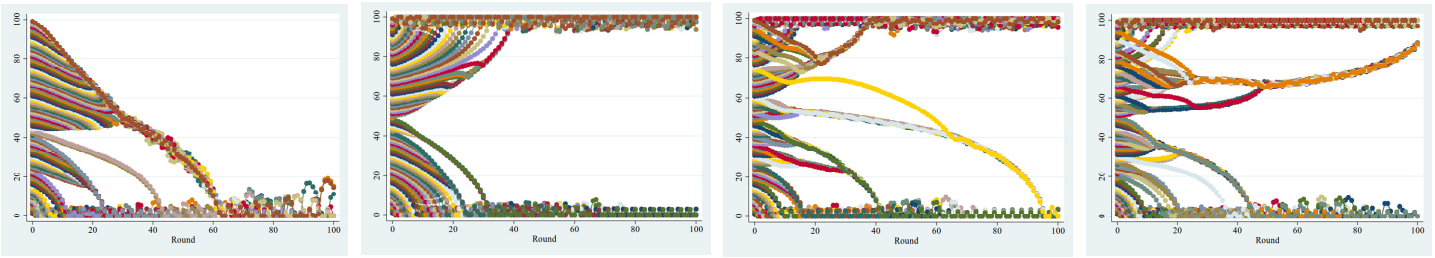
In addition to the basic model assumptions, the following initial conditions were imposed to make output comparable across runs:

- Uniform distribution of the public
- Total power of the public = power of L = power of R
- Group L (at position 0) and group R (at position 100) do not move, but members of the public do
- Initial affinity is neutral (= 0) across all pairs of actors

Mechanisms. As part of the initialization, a social network is constructed. Four social networks are being examined: **Complete** (all agents directly linked); **Partitioned** (all agents to the left of center are linked to each other, all agents to the right of center are linked to each other, and no links between agents on different sides of the political spectrum); **Small-World**, and **Random**. One run under each type of social network is presented here.

At the beginning of each run (Round 0), group R engages in collective targeting by randomly selecting members of the public to the left of center for elimination as well as reducing the power of group L. Agents were selected for elimination with a 0.10 probability in the four runs presented here. Members of the public then update their affinities toward group R: if a surviving agent is directly linked to an eliminated agent, then the surviving agent's affinity toward group R becomes −1; all other affinities remained neutral.

Each run of the simulation constituted 100 rounds of movement of the surviving members of the public. Within each round, every actor exerts force on all other actors to calculate each actor's acceleration for that round. Members of the public were constrained to stay within the 0 to 100 political space; if an agent's calculated new position put it outside of this range, the agent's position was forced to the boundary point and its velocity for that round was set to zero.



(a) (b) (c) (d)

Figure 2. The movement of members of the public following collective targeting from Group R (at position 100) under (a) complete, (b) partitioned, (c) small-world, and (d) random social networks**. y-axis**: position in political space**. x-axis**: round of simulation run.

Results. We traced the push and pull dynamics by observing how the members of the public moved in reaction to group R's use of collective targeting. We found that collective targeting is counter productive under a **complete** social network (as illustrated in Figure 2a); all members of the public shift away from (violent) group R in this condition. We also found that collective targeting may "work" under a **partitioned** social network (as illustrated in Figure 2b); the portion of the public initially sympathetic to group L shifts to group L's position but is weakened in proportion to group R's use of violence. The portion of the public initially sympathetic to group R shifts to group R's position; in relative terms, group R ends up with more support as a percentage of the (surviving) public than what it had before using violence. The movement of the public is also shown for a **small-world** social network (Figure 2c) and a **random** social network (Figure 2d) for illustrative purposes only. Further research is required to see if collective targeting has any systematic effects under these two types of social network.

References

Stathis Kalyvas. 2006. *The Logic of Violence in Civil War*. Cambridge, UK: Cambridge University Press.

Jason Lyall 2009, "Does Indiscriminate Violence Incite Insurgent Attacks? Evidence from Chechnya," Journal of Conflict Resolution, 53(3), 331-362.

United States Army. 2007. The U.S. Army/Marine Corps Counterinsurgency Field Manual (FM3-24), University of Chicago Press.

David Galula. 2006. *Counterinsurgency warfare: Theory and practice*. New York: Praeger.

Alexander B. Downes, 2007. "Draining the Sea by Filling The Graves: Investigating the Effectiveness of Indiscriminate Violence as a Counterinsurgency Strategy," Civil Wars 9(4): 420-444.

Patrick Johnston, "The Treatment of Civilians in Effective Counterinsurgency Operations" (PhD dissertation, Northwestern University 2009).