SOE 8: Focus Session: Models of War and Conflict

Time: Tuesday 9:30–11:00 Location: H 0110

Invited Talk SOE 8.1 Tue 9:30 H 0110

The distribution and dynamics of war sizes — •Aaron Clauset[1,2], Lars-Erik Cederman[3], and Kristian Gleditsch[4,5] — [1]University of Colorado, Boulder, USA — [2]Santa Fe Institute, USA — [3]ETH Zurich, Switzerland — [4]University of Essex, UK — [5]Center for the Study of Civil War, Norway

The severity of international wars over the past 200 years robustly follows a power-law distribution, a pattern first observed by L.F. Richardson in the 1940s. It remains unknown, however, what socio-political mechanisms produce this behavior, to what degree the underlying processes are non-stationary, and whether the more frequent civil wars follow fundamentally different rules.

We present a novel analysis of a worldwide database of civil war severities since World War II and show that a conflict's severity generically evolves according to a multiplicative random walk whose length is governed by a decreasing cessation probability. For civil wars, the walk's origin and limits are constrained by population, which leads to non-power-law behavior in the upper tail. When these limit is removed—analogous to an international conflict in which war spreads like a contagion—Richardson's power-law returns. A simple non-parametric model with these features alone confirms these qualitative results and robustly reproduces the large-scale statistical patterns in civil wars worldwide.

Invited Talk SOE 8.2 Tue 10:00 H 0110

Modeling Wars and Terrorism: From particles to people — •Neil Johnson — Physics Dept., University of Miami, Florida, U.S.A.

I attempt to bridge the gap between simple particle-like models which have been recently used by mathematical scientists to describe the kinetics of insurgent conflicts and terrorist activity and the complex reality of real-world scenarios in which social, cultural and behavioral aspects play a crucial role in the underlying decision-making at the level of both individuals and groups. Using empirical data from a wide variety of modern insurgent conflicts and terrorist events, I attempt to describe the evolution – and possible turning points – of such collective human engagement in terms of the heterogeneity of the actors, and the bounded rationality under which each decision is made. This work builds upon our earlier efforts [1,2].

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[1] Juan Camilo Bohorquez et al. Nature 462, 911 (2009); Neil Johnson et al. Science 333, 81 (2011); Zhenyuan Zhao et al. Phys. Rev. Lett. 103, 148701 (2009); Blazej Ruszczycki et al. Eur. Phys. Jour. 72, 289 (2009)

[2] Neil F. Johnson, "Escalation, timing and severity of insurgent and terrorist events: Toward a unified theory of future threats" arXiv:1109.2076

SOE 8.3 Tue 10:30 H 0110

Spatio-Temporal Dynamics of Violence in Jerusalem — •Karsten Donnay[1], Dirk Helbing[1], Dan Miodownik[2], and Ravi Bhavnani[3] — [1]Sociology, Modeling and Simulation, ETH Zurich, Switzerland — [2]Department of Political Science, Hebrew University of Jerusalem, Israel — [3]Graduate Institute of International and Development Studies, Geneva, Switzerland

Studies of conflict severity and timing have featured prominently in Nature [1] and Science [2]; employing techniques adopted from Physics these studies underscore the importance of quantitative approaches for the understanding of conflicts at large. The case analyzed here, the city of Jerusalem, is arguably among the most contested urban spaces in the world. After a sharp decline in violence following the end of the second Intifada in 2004, increasing tensions between Israeli security forces and both Palestinian and Ultra-Orthodox residents have led to a steady increase of violence in recent years. While the literature on Jerusalem is extensive, patterns of violence in the city have not been studied in detail. Our analysis of a rich data set of violent events for the period 2001-2009 reveals clear differences in inter-group violence dynamics, spatial/temporal clustering and severity between the Intifada and post-Intifada period. We can further isolate hot spots of violence and lend support to the argument that both retaliatory dynamics and the symbolic significance of certain parts of Jerusalem play an important role in defining when and where violence ensues. References: [1] JC Bohorquez et al. Nature 462: 911-914 (2009) [2] N Johnson et al. Science 333: 81-84 (2011)