MINERVA RESEARCH SUMMARIES & RESOURCES

FALL 2014

2014 Minerva Research Summaries

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PI	Project Title	Pg #
N. Barma	Public Service Provision as Peace-building: How do Autonomous Efforts Compare to Internationally Aided Interventions?	4
L. Bettencourt	Energy and Environmental Drivers of Stress and Conflict in Multi-scale Models of Human Social Behavior	7
R. Bunker	Dark Globalization and Emerging Forms of Warfare	10
K. Carley	Multi-Source Assessment of State Stability	12
R. Chesney	Climate Change and African Political Stability	15
T. Cheung	The Evolving Relationship between Technology and National Security in China: Innovation, Defense Transformation, and China's Place in the Global Technology Order	18
N. Choucri	Explorations in Cyber International Relations	21
J. Dobson	*Centroamérica Indígena*: Land Rights and Stability in Indigenous Societies of Central American	24
H. Ellis	Identifying and countering early risk factors for violent extremism among Somali refugee communities resettled in North America	26
E. Gartzke	Deterring Complex Threats: The Effects of Asymmetry, Interdependence, and Multipolarity on International Strategy	29
M. Gelfand	The Strength of Social Norms Across Cultures: Implications for Intercultural Conflict and Cooperation	32
T. Gerber	Homeownership and Societal Stability: Assessing Causal Effects in Central Eurasia	34
L. Gerdes	Understanding Differences in Islamic Ideology in Asian Cultures	36
E. Gilmore	Forecasting Civil Conflict under Different Climate Change Scenarios	39
L. Hirschfeld	Dynamics of Sacred Values and Social Responsibilities in Governance and Conflict Management: The Interplay between Leaders, Devoted Actor Networks, General Populations, and Time	42
S. Hitlin	Moral Schemas, Cultural Conflict, and Socio-Political Action	46
A. Kruglanski	Motivation, Ideology and the Social Process in Radicalization	50
C. Lee	The Chinese Communist Party's Economic Transitions via Organizational Reform	53
D. Mares	Military Transformation and the Rise of Brazil	55
D. Matsumoto	Emotion and Intergroup Relations	57
J. McCausland	Conventional Arms Control, Contemporary Deterrence, and Stability in South Asia	59
M. McFate	Cultural Knowledge and National Security	61
D. Meyer	Quantifying Structural Transformation in China	63
P. Potter	Terrorist Alliances: Causes, Dynamics, and Consequences	66
L. Pratson	A Global Value Chain Analysis of Food Security and Food Staples for Major Energy-Exporting Nations in the Middle East and North Africa	68

PI	Project Title	Pg #
B. Prins	Political Reach, State Fragility, and the Incidence of Maritime Piracy: Explaining Piracy and Pirate Organizations, 1993-2015	71
M. Rasmussen	Who Does Not Become a Terrorist, and Why? Towards an Empirically Grounded Understanding of Individual Motivation in Violence and Non-Violence	74
J. Shapiro	Terrorism, Governance, and Development	76
H. Shrobe	METANORM: A multidisciplinary approach to the analysis and evaluation of norms and models of governance for cyberspace	79
E. Steinfeld	China's Emerging Capabilities in Energy Technology Innovation and Development	83
L. Villalón	Political Reform, Socio-Religious Change, and Stability in the African Sahel	86
J. Walsh	Natural Resources and Armed Conflict	89
M. Woodward	Finding Allies for the War of Words: Mapping the Diffusion and Influence of Counter-Radical Muslim Discourse	89
J. Wright	Autocratic Stability During Regime Crises	93
A. Zia	Strategic Response to Energy-related Security Threats in the DOD	94

Minerva Research Awards Selected in 2014

E. Berman	Deterrence with Proxies	98
J. Blaxland	Thailand's Military, the USA and China: Understanding how the Thai Military Perceives the Great Powers and Implications for the US Rebalance	100
M. Bloom	Preventing the Next Generation: Mapping the Pathways of Children's Mobilization into Violent Extremist Organizations	101
J. Busby	Complex Emergencies and Political Stability in Asia	102
J. Horgan	Understanding U.S. Muslim Converts in the Contexts of Security and Society	104
V. Hudson	Household Formation Systems, Marriage Markets, and Societal Stability and Resilience	105
P. Huth	Aiding Resilience? The Impact of Foreign Assistance on the Dynamics of Intrastate Armed Conflict	107
R. Jervis	Culture in Power Transitions: Sino-American Conflict in the 21st Century	109
S. Kosack	Understanding the Origin, Characteristics, and Implications of Mass Movements	111
M. Lieberman	Neural Bases of Persuasion & Social Influence in the U.S. and the Middle East	113
M. Macy	Tracking Critical-Mass Outbreaks in Social Contagions	115
J. Moyer	Taking Development (Im)Balance Seriously: Using New Approaches to Measure and Model State Fragility	117
L. Windsor	Political Language and Crisis: A Computational Assessment of Social Disequilibrium and Security Threats	119

Minerva-Generated Resources for Academics and Policymakers 121

Public Service Provision as Peace-building: How do Autonomous Efforts Compare to Internationally Aided Interventions?

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Research Problem: How externally-led peacebuilding interventions compare with more autonomous and domestically-motivated peace processes in achieving sustainable peace and state capacity improvements?

This research project seeks to improve both the theory and practice of how peace is achieved in post-conflict countries by disentangling the related goals of peacebuilding and statebuilding. It does so by focusing on the ability of three post-conflict states—Cambodia, Laos, and Uganda—to provide public services and resolve societal grievances at the local level.

Methodology:
Our study varies the "degree of aidedness" of peace- and state-building initiatives through case selection that enables both a cross-national comparison (Cambodia and Laos) and an intertemporal comparison (Uganda in two distinct time periods). We further enhance our analytical leverage by focusing on outcomes at the subnational and sectoral levels, where the tangible results of peace- and state-building can be best observed.

Our research design allows us to draw comparisons across towns within countries, time periods within one country, and between the three countries and two regions. Through semi-structured interviews with elites and public service providers, we are currently compiling data on the degree of aidedness in selected sectors and localities as well as on the extent to which sustainable peace and state capacity have been realized at the local level. We will also utilize existing secondary data to complement our primary research. Overall, this methodology enables us to shed light on the causal relationships between the "degree of aidedness", statebuilding, and peacebuilding.

Initial Results:
In this first year of our project, we initiated our field research and developed the conceptual framework for the project. Here we present the core conceptual framework from this paper, as a description of our main accomplishment to date.

Statebuilding and Peacebuilding as Causal Processes
Our research begins with the recognition that the terms *peacebuilding* and *statebuilding* have become overloaded with a variety of meanings. Scholarship tends to conflate these two concepts and processes. Moreover, much of the peacebuilding literature focuses on external efforts to foster sustainable peace through the building or strengthening of state institutions. This obscures the extent to which recovery efforts are driven by external actors, and conflates both the process and outcomes of those efforts.

Figure 1 is a schematic of the conventional conceptualization of statebuilding and peacebuilding by practitioners and scholars alike. It captures how peacebuilding and statebuilding are largely conflated, and both tend to be conceptualized as processes designed to move countries from a state of conflict or

fragility to one of sustainable peace (with democratic governance as part of what makes that peace sustainable). Moreover, it reflects the general assumption that both processes are undertaken by the international community rather than local actors.

The terms "statebuilding" and "peacebuilding" are conceptually unwieldy and analytically imprecise, as captured by the numerous divergent definitions of these concepts in the literature. We argue that the processes of peacebuilding and statebuilding should be analytically separated from each other, and both from democratization. Thus, we examine these two distinct post-conflict recovery processes independently to assess their impacts on two distinct outcomes: the creation of sustainable peace and a functioning state apparatus. In addition to the problematic conflation with each other, the terms statebuilding and peacebuilding refer to complex, dynamic processes, which must be unpacked if they are to be studied empirically. In order to understand the causal processes by which peacebuilding and statebuilding activities might lead to particular outcomes, we focus our attention on the inputs to the processes and their outcomes. Our proposed conceptual framework is presented in **Figure 2**.

Figure 1: The Conventional Approach

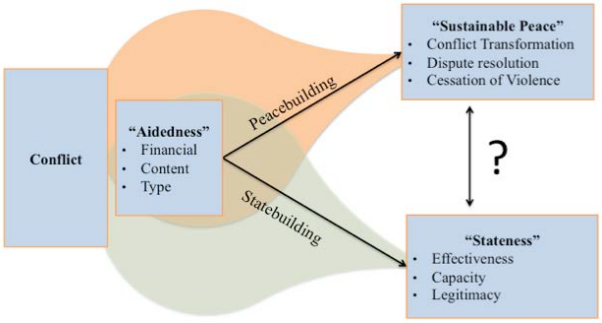

Figure 2: Our Model

This schematic captures our preliminary attempt to lend more analytical clarity to the processes of peacebuilding and statebuilding. The input on which we focus is "aidedness"—or how much and in what ways peacebuilding and statebuilding efforts are internationally aided. Though we recognize that there might be other important factors that could characterize these efforts, we are particularly interested in how internationally aided efforts compare to domestically led, autonomous recovery efforts. We also posit two sets of outcomes, which we term "stateness" and "sustainable peace," and measuring these variables at distinct points in time enables observation of change over time. By establishing a causal framework wherein the independent variable, aidedness, explains over-time variability in "stateness" and "sustainable peace," we provide greater analytical precision in assessing the effectiveness of peacebuilding and statebuilding interventions.

Anticipated Outcomes of Research:

Measuring state capacity though the provision of public services allows us to examine how peacebuilding occurs where the state interfaces with society and how closing governance gaps at the domestic level can enhance a society's resilience and ability to sustain peace. Local-level contestation often occurs around the provision of public services; thus, as we examine this element of state-building, we can analyze the extent to which ordinary grievances and local conflicts related to these services are routed to and resolved through official channels, a crucial measure of peace-building. In doing so, we expect to be able build generalized findings on the advantages and drawbacks of top-down, international peace-building interventions when compared to more bottom-up, autonomous peace processes. In turn, we will deliver a

series of policy implications of interest to the United States government and other agencies involved in national defense and the international peace-building endeavor.

Potential Impact on DoD Capabilities and Broader Implications for National Defense:
Two of our assertions have particular policy relevance: first, that it is possible—and highly likely—that peace- and state-building rest upon contrasting logics; and, second, that the degree of international involvement or "aidedness" in both of these processes might truncate outcomes in each.

Understanding the implications of these two dimensions of our study is critically important for a range of U.S. government actors, missions, and programs. By and large, most of these actors have treated peace-building and state-building as linked. In practice, U.S. policies have promoted the creation of elite settlements and policy interventions to achieve both sets of goals simultaneously. Yet because the nature of the elite settlement required to achieve a peace agreement is very different from that required to sustain peace and build state capacity in the longer term, our research has direct implications for the very foundations of U.S. policies in any post-conflict state (whether these are policies and missions organized by the defense community, State Department, USAID, or other agencies).

Publications through this Minerva research:
"Creating a Sustainable Peace? Disentangling the Processes of Statebuilding and Peacebuilding." Paper presented by Naomi Levy at the Midwest Political Science Association Meeting, April 4, Chicago 2014.

External briefings related to this Minerva research:
"Governance, Fragility, and Conflict in East Asia and the Pacific." Brief to DoD Strategic Multilayer Assessment Community PACOM Assessment Team. Presented on SMA teleconference by Naazneen Barma, June 18, 2014.

Energy and Environmental Drivers of Stress and Conflict in Multi-scale Models of Human Social Behavior

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Our main problem is concerned with the relationships between energy and environmental change and crises in human social behavior in cities. In this project we divide this central problem into four parts:

1. *The Determinants of Change in Energy Systems*
   We are at present experiencing profound change in our energy systems, motivated in part by environmental change, caused by issue of energy exploration and extraction under current technologies. We study empirical patterns of innovation and change in energy technologies and develop models to predict future trends.
2. *The link between infrastructure, energy use and social behaviors in cities*
   This is the central problem of urban planning and policy. We tackle this issue by formalizing the problem in terms of the changes individuals may undergo in larger social networks, and analyzing the enabling roles of energy and services in patterns of development and crisis.
3. *Epidemic behavior in social dynamics*
   We study how the conditions of various urban environments affect the spread of behaviors and crises in urban environments. In particular we explore the consequences of larger social connectivity in larger cities and of the role of information and communication technologies in facilitating contact and spread.
4. *Policy development from control theory.*
   We use the insights from the points above to devise ways to simplify complex policy issues using instruments of engineering theory, such as feedback control. We also formalize under what conditions this is possible, and when other types of solution must be pursued.

Methodology:
Our methodology explores the link between classical and new ideas from the social sciences, new data opportunities in nations and cities around the world, and new (mathematical) theory development. We develop models of cities in terms of interacting networks of people, organizations and infrastructure and analyze their change and evolution under different scenarios. In doing this we develop new fundamental ideas for the social fabric and dynamics of cities, and their outputs, e.g. in terms of wealth and violence, as well as their underpinning in energy and other services. This also allows us to formalize policy making in terms of tools of complex systems and of engineering theory.

Our methods are general, but data can be nation-specific. Data is typically more available in developed countries, and we explored some new datasets for the US, UK and Portugal. We have also showed how mobile devices datasets from developing nations such as Cote d'Ivoire can be used even in the absence of much in the way of official census type data.

Initial Results:
In this period of the project we continued to acquire and analyze datasets on the relationship between

energy and environmental drivers and human social behavior and develop mathematical models that connect them to the structure of human social networks and to considerations of how they may change.

We have finished and published several major articles that provide a theoretical framework for the project and characterize the spatial and environmental distribution of sources of energy change and human health at the urban level.

First the manuscript described during the previous period [1], that analyzes homicide rates in cities of Colombia, Brazil and Mexico has now appeared in print. Its main results are the general character of these statistics, which establish a baseline for identifying extraordinary events, such as waves of crime or violence.

Second, a manuscript developing a theory of cities [2], in terms of the interaction between social and infrastructural networks, establishes also the energy requirements for global cities to remain connected socially. This work was the cover of *Science* magazine on June 21, 2013.

A manuscript had now appeared [3] analyzing national and regional pattern of innovation in energy technologies and their main drivers in terms of national investments and markets. It shows that energy innovation is tied not only to national strategies to develop these technologies, but also crucially to patterns of consumption and new capacity installation.

A few other manuscripts show how social connectivity can be measured in cities, using cell phone data in three different nations [4,7]. We have also developed these ideas theoretically and shown when policies to manage infrastructure can be developed using feed-back control strategies, especially when big(ger) data is available [4].

Finally, we related the structure of urban social networks to their cities functional diversity and economic productivity [6.]. We also proposed that such ideas are a cornerstone of human socioeconomic development and discussed how they can be facilitated by technology [8].

Anticipated Outcomes of Research:
In this final period of the project we will continue to elaborate on methods to estimate the energy use of cities and its connection to their social dynamics. We are currently acquiring large data sets of building shapes and weather to generate models of energy use for many specific cities in real time. Associated methods of statistical inference and extrapolation are also being developed that we expect will allow us to treat other cities for which data is less available or accurate. We are also developing formal methods that treat urban policies about infrastructure and services in terms of feedback control theory. By the project's end date, in about one year, we will have final publications on these topics and a website estimating energy use across a large number of cities.

Potential Impact on DoD Capabilities and Broader Implications for National Defense:
The project will create new analytical tools to analyze the structure cities and nations, both in terms of their infrastructure and social networks. It emphasizes especially the differentiation of functions that tends to happen in urban social networks with city size and its connection to energy and urban services. The project is also creating ways to estimate the energy consumption for a city in real time, as it is driven by weather and climate changes, and to conceptualize and manage policies through feed-back control loops. These capabilities may be important in DOD missions related to urban areas, service provision and peace- keeping and reconstruction after conflict.

Publications through this Minerva research:

8. L. M. A. Bettencourt (2014) The Role of Technology in Social Networks, to appear in IEEE Proceedings.
7. C. Andris, L. M. A. Bettencourt (2014) Development, Information and Social Connectivity in Cote d'Ivoire. In print in *Infrastructure Complexity*. Available at: http://www.santafe.edu/media/workingpapers/13-06-023.pdf
6. L.M.A. Bettencourt, H. Samaniego, H.Youn (2014) Professional Diversity and the Productivity of Cities. Nature *Scientific Reports* **4**: 5393.
5. L.M.A. Bettencourt (2014) The Uses of Big Data in Cities, Big Data 2: 12-22.
4. M. Schläpfer, L. M. A. Bettencourt, S. Grauwin, M. Raschke, R. Claxton, Z. Smoreda, G. B. West and C. Ratti (2014) The Scaling of Human Interactions with City Size. Journal of the Royal Society Interface 11, 20130789.
3. L. M. A. Bettencourt, J. E. Trancik, J. Kaur (2013) Determinants of the Pace of Global Innovation in Energy Technologies. PLoS ONE 8(10): e67864.
2. L. M. A. Bettencourt, The Origin of Scaling in Cities, Science 340: 1438-1441 (2013).
1. A. Gomez-Lievano, H. Youn, L. M. A. Bettencourt (2012) The Statistics of Urban Scaling and Their Connection to Zipf's Law. PLoS ONE 7: e40393

While no sharable data resources have been generated in the course of this research, we are preparing a website for real time energy use of cities around the world. Here is a prototype: http://www.redfish.com/urbanmetabolism/

Students and postdocs supported by Minerva funds

There are presently two postdocs working part-time on the project. A third postdoc, who worked partially on the project, moved this June to Pennsylvania State University with an assistant professorship position (tenure-track) in Geography.

Dark Globalization and Emerging Forms of Warfare

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Goal: Determine future insurgency forms, strategic implications of these new forms, and provide practical U.S. defense policy recommendations to respond to them.

I have spent the last two years focusing on the unintended and deviant effects of globalization in the strategic environment and also within more specific areas such as the emergence and evolution of violent non-state actors, dark forms of spirituality, the rise of illicit economies, the ongoing 'criminal insurgencies' in Mexico, and new insurgency forms.

Motivation:
The basic motivation of the violent non-state actors (VNSA) engaging in insurgency is to facilitate change in state governance/become the new dominant political authority. This is typically pre-meditated in nature, however, de facto forms of insurgency also are developing.

Research Methodology:
Historical (qualitative) approach with an analysis of pre-existing terrorism (as an I&W function) and insurgency typologies by leaders in these fields of study (Including those future of insurgency projections articulated by Dr. Steve Metz, SSI, in 1993). Determining common typology themes and anomalies and then drawing upon my own subject matter expertise for analysis, interpretation, and future insurgency forms projections.

Interim Results:
The creation of a typology based on legacy and contemporary insurgency forms—to explain where we have been and where we are—prior to projecting the emergence of new insurgency forms, their strategic implications, and how to respond to them.

Anticipated Outcomes:
Legacy forms appear to be Separatist, Anarchist, Maoist/Peoples, Soviet/Cold War; Contemporary forms appear to be Radical Islamist, Liberal Democratic, Criminal (commercial variant), Plutocratic (commercial variant/issue is present non-violent manifestation/corruption of the international system only); Projected forms appear to be Blood Cultist (spiritual variant), Cyborg/Spiritual Machine (spiritual variant/but long term projection), and Chinese Authoritarianism (containment blowback potential). Some responses recommendations will be universal and some specific to an insurgency form (or theme within, say, 'commercial insurgencies').

Minerva Publications—Edited volumes:

- *Global Criminal and Sovereign Free Economies and the Demise of the Western Democracies: Dark Renaissance.* Advances in IPE Series. London: Routledge. Co-editor (1st editor with Pamela Ligouri Bunker). Awaiting Publication/Sept 2014.
    - "Editors' Note" (1st author with Pamela Ligouri Bunker);
    - "Overview: Dark Renaissance— Crime, Corruption, and Global Class Warfare" (1st author with Pamela Ligouri Bunker);
    - "Public Looting for Private Gain: Predatory Capitalism, MNCs & Global Elites, and Plutocratic Insurgency" (Author);

  - "Afterword: The 21st Century International Political Economy—Westphalian State and Middle Class Futures" (1st author with Pamela Ligouri Bunker and John P. Sullivan).
- *Violent Non-State Actors and Dark Magico-Religious Activities.* Special issue of *Journal for the Study of Radicalism* (Michigan State University Press). Awaiting Publication. Guest Editor. (Refereed Journal).
  - "Editor's Introduction: Violent Non-State Actors and Dark Magico-Religious Activities" (Author);
  - "Narcocultura and Spirituality: Narco Saints, Santa Muerte, and other Entities" (Author);
  - "A Conversation with Tony M. Kail" (Interviewer).
- *Narco-Submarines.* Leavenworth, KS: Foreign Military Studies Office, US Army Command and General Staff College. Co-editor (2nd editor with Byron Ramirez). Awaiting Publication.
- *Crime Wars and Narco Terrorism in the Americas: A Small Wars Journal—El Centro Anthology.* Co-editor (1st editor with John P. Sullivan). For Small Wars Foundation. Bloomington: iUniverse, Inc., 2014.
- *Fifth Dimensional Operations: Space-Time-Cyber Dimensionality in Conflict and War. A Terrorism Research Center Book.* Co-editor (1st editor with Charles 'Sid' Heal). For Terrorism Research Center. Bloomington: iUniverse, Inc., 2014.

Minerva Publications—Select Articles:

- "Body Cavity Bombs: fantasy or reality." *Aviation Security International.* Author. October 2014. Awaiting Publication.
- "Sniping in the Mexican Criminal Insurgency." *The Counter Terrorist.* Author. June-July 2014: 30-32, 34-38, 40-42.
- "VBIEDs in the Mexican Criminal Insurgency." *The Counter Terrorist.* Co-author. (1st author with John P. Sullivan). Vol 6., No. 6. December 2013/January 2014: 28-40.
- "Defeating Violent Nonstate Actors." *US Army War College Quarterly: Parameters*. Author. 43(4) Winter 2013-14: 57-65. [link]
- "Does the rise of virtual reality change the nature of war?" *International Relations and Security Network (ISN).* ETH Zurich. Author. 20 June 2014. [link]
- "Narco-Submarines: Drug Cartels' Innovative Technology." *Center for International Maritime Securtity (CIMSEC) Website*. Co-author (2nd author with Byron Ramirez). 2 August 2014. [link]
  - Reprinted in *The Maritime Executive*. 3 August 2014. [link]
- "Mexican Cartel Strategic Note No. 16: Recent Santa Muerte Spiritual Conflict Trends." *Small Wars Journal.* Co-author (1st author with Pamela L. Bunker). 15 January 2014. [link]
- "Mexican Cartel Strategic Note No. 17: Civil Self-Defense Groups Have Emerged in 11 Mexican States." *Small Wars Journal.* Author. 24 January 2014. [link]
- "Mexican Cartel Tactical Note #20: RPG-29 Anti-Armor Munitions." *Small Wars Journal*. Co-author (3rd author with David Kuhn and Anikh Wadhawan). 30 November 2013. Reposted on *Borderland Beat.com*, *Mexidata.info* and *Gruntsandco.com*.
- "Mexican Cartel Tactical Note #21: Cartel Unmanned Aerial Vehicles (UAVs)." *Small Wars Journal.* Author. 1 August 2014. [link]

Multi-Source Assessment of State Stability

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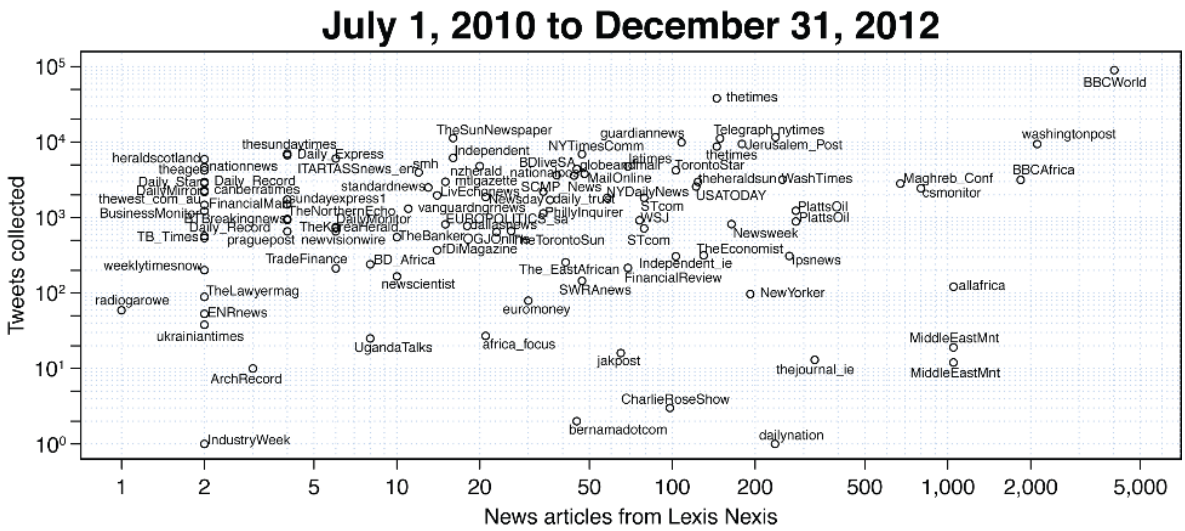
http://casos.cs.cmu.edu/projects/project.php?ID=73&Name=Minerva
Government Program Officer: Harold Hawkins, Office of Naval Research

In this research we ask, what role does the cyber-mediated environment play in state-stability? How are traditional and social media used by states and individuals to manage and understand change in this cyber-mediated environment? How can we asses and predict state stability, identify changes in what groups are at risk, and do so at scale given the vast quantity of changing data available on-line through the cyber-environment?

Social media is increasingly becoming a major source of information for populations. However, the grass-roots nature of social media is changing. The majority of news agencies, e.g., BBC, CNN and al-Jazeera use Twitter and Facebook to spread breaking news. Social media is also a major outlet for citizens to express their concerns. In the cyber-mediated environment both social media and traditional media are present and used. Further, the information carried via social media is not completely distinct from traditional media nor more timely. As more organizations and news agencies turn to the use of social media the relative impacts of social media and traditional media on social change become more complex, as does their role in governance. Despite the increase in attention to the "cyber world" and a recognition that cyberspace challenges traditional conceptions of influence, diplomacy and security, there is only a minimal ability to track this information and use it to assess or forecast societal level changes, there is a lack of a fundamental understanding of how trust is forged and broken between individuals and institutions in a computer mediated communication environment. The emerging uses of social media technologies, such as Twitter, in contrast to traditional news media, have not been fully examined within the framework of state stability. Empirical analysis is needed to identify what processes are at work in cyber-space and to understand how these processes actually effect the socio-cultural environment and so state-stability.

Methodology:
A mixed-methods, multi-modeling approach is used to support theory development, testing, and model validation. These methods include employing detailed ethnographic analysis, text-analysis in which text-mining using Latent Dirichlet Allocation techniques for topic identification, co-sign analysis for similarity among topics are used, geo-statistics, dynamic network analytics and visual analytics are used for reasoning about the extracted data. These techniques are used in a progressive and "stepped" fashion to first identify norms, the lines of balance, critical issues, and indicators of stability, balance, and trust. Then, **secondly**, we identify groups, topic foci for groups, changes in these indicators and characterize patterns of instability using geo-temporal network and visual analytics. Groups will be identified based on network structure, topic cohesion, and location using community detection technique that we expand to handle both actors and issues. And **thirdly**, a mixture of statistical approaches is used to characterize behavior, and estimate the likelihood of anomalous change.

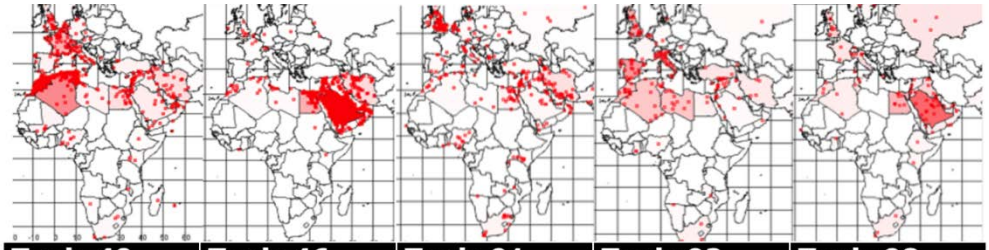
Overall – the methodological approach is designed to leverage rich ethnographic description and analysis to provide explanations and interpretations of the statistical, network and visual analytics of the geo-temporally tagged social and knowledge (topic) network data that is extracted from multiple sources. Blending qualitative and quantitative techniques supports the automated coding of media data using text-mining techniques, in-depth analysis of outliers and overall interpretation utilizing culturally informed



qualitative ethnographic assessments, and theory testing using traditional and new "big-data" statistical, network and visual analytics with particular attention to dynamic and incremental metrics for identifying critical actors, issues, messages and groups of interest. These methods are applied to mixed-source data (twitter, blogs, news, trade, geographic information, and archival ethnographic sources) encoded as a series of meta-networks linking people, groups, issues, activities, and location.

Countries: Yemen, UAE, Turkey, Tunisia, Syria, Qatar. Saudi Arabia, Oman, Morocco, Libya, Lebanon, Kuwait, Jordan, Iraq, Bahrain, Algeria Partial data: Iran, Egypt, Sudan, Palestine

Initial Results:
News agencies that dominated the discussions vis the Arab Spring have both a strong social media and traditional media presence: e.g. BBC. News agencies that dominate just twitter appear to have specialized content often in the financial area – e.g., The Sunday Times, Business Times and Trade Finance. On the other hand, those news agencies focusing on traditional media appear to be broad Middle Eastern Compendiums such as MiddleEatMnt.



Topic 40 (English)	Topic 46 (English)	Topic 91 (Arabic)	Topic 92 (Arabic)	Topic 98 (English)
social	american	Arab	Good	follow
happening	east	Spring	Peace	sporting
african	beirut	Gulf	Roses	mosh
families	jordan	Ali	Special	coast
meridien	middle	Tyrant	Possible	liam
Morocco Algeria Tunisia	Saudi Arabia Egypt	Iran Jordan	Algeria Libya Morocco Syria	Suadi Arabia Egypt

In both traditional and social media, topics vary in locality (extent to which they are only in a few countries – versus global) and persistence (extent to which they continue to occur over time versus are just in a few time slices. Topics that are persistent are more generic – such as calls to God for help, concern over the state of the country,

whereas highly temporal topics include sporting events. Concepts that are highly localized include discussions of specific leaders, whereas more global topics are more general such as general concern over impact of change on families. We will be looking at whether the movement of topic groups from the local-temporal to the general-persistence is a single of unrest.

We developed new high-speed algorithms for rapid calculation of shortest path metrics for streaming data. Scalability is achieved through: a) a two part algorithm that splits the calculation into convergence and aggregation; and b) using joint calculation of partial results for multiple metrics. Demonstrated performance boost on standard data sets and showed that the change in speed calculation is approximately linear in the number of new links.

Anticipated Outcomes of Research:
This research lays the groundwork for a state stability modeling system that is reusable, easily instantiable from empirical open source data, and adaptable to different socio-cultural environments. The techniques and findings pioneered in this work will support all-source data-collection and analysis efforts engaged in for operational needs. This research is expected to lead to a new operationally relevant predictive metrics for assessing the impact of individuals, groups and messages in media on state instability; operationally relevant metrics for assessing trust, state stability, and alliance and changes in these factors; and will support the development and testing of a new media informed theory of state stability.

Potential Impact on DoD Capabilities and Broader Implications for National Defense:
The metrics for key indicators, social-topic network models and associated tools developed in this project will provide the DoD with a core operational capability to enhance predictive modeling for regime change, assess social and traditional media data, and assess changes in trust, stability and alliance. The tools and methods developed here, particularly those for capturing, visualizing, analyzing, and fusing information from social media and traditional media are of immediate value to joint HA/DR operations, public-relations operations, irregular warfare operations, intelligence efforts, and IO operations.

Publications through this Minerva research:

- Carley, Pfeffer, Liu & Morstatter (2014, forthcoming). Embassies Burning: Toward a Near Real Time Assessment of Social Media Using Geo-Temporal Dynamic Network Analytics. In: *Social Network Analysis and Mining*.
- Bloom and Walsh, 2014 accepted, A Qualitative Sentiment Analysis of Foreign Fighters in Syria (in progress working with Shaun Walsh) Accepted for Presentation, Conference: Society for Terrorism, Research, Paper September 18, 2014.

Sharable data resources to be generated:
Resources are described at "*Multi-Source Assessment for State Stability*" on page 122.

- Meta-Networks connecting actors, topics, locations, and organizations (high dimensional networks) for each of 11 countries for the Arab Spring based *newspaper* data, by month.
- Meta-Networks connecting senders, topics, and locations (high dimensional networks) for each of 11 countries for the Arab Spring based *twitter* data, by month.

Curricula or teaching exercises generated in the course of this research

- New modules on network analysis and on simulating at-risk groups taught in classes at CMU.
- New metrics for assessing trust and identifying topic groups given high dimensional data.
- CASOS Summer Institute at CMU from 2014–2018 in June with training on new metrics.

Climate Change and African Political Stability

Bobby Chesney, University of Texas at Austin

Climate vulnerability: **Josh Busby**, University of Texas at Austin
Clionadh Raleigh, University of Sussex
Climate-conflict: **Cullen Hendrix**, University of Denver
Idean Salehyan, University of North Texas
Constitutional design and conflict management:
Alan Kuperman, University of Texas at Austin
Governance: **Ashley Moran**, University of Texas at Austin
Disaster response: **Jennifer Bussell**, University of California-Berkeley
Urban resilience: **Robert Wilson**, University of Texas at Austin
International aid: **Catherine Weaver**, University of Texas at Austin
Mike Findley, University of Texas at Austin
Michael Tierney, College of William and Mary
J. Timmons Roberts, Brown University
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Government Program Officer: Micheline Strand, Army Research Office
Government POC: Lisa Troyer, Army Research Office
http://www.strausscenter.org/ccaps

The Climate Change and African Political Stability Program (CCAPS) analyzes how climate change, conflict, governance, and aid intersect to impact African and international security. The program works in three main areas to address the following questions:

- *Climate change and conflict:* Where and how does climate change pose threats to stability in Africa? What is the spatial and temporal relationship between climate change vulnerability and patterns of conflict? Where, when, and how could climate-related events disrupt Africa's security and development?
- *Governance:* What is the role of government institutions in mitigating or aggravating the effects of climate change on political stability in Africa? How could political institutions buffer against conflict and other impacts of climate shocks? What is the capacity of African countries to respond to disasters?
- *International aid:* How effective are foreign aid interventions in helping African countries adapt to climate change? How can aid be effectively coordinated and implemented to contribute to crisis prevention and adaptation and reduce the need for global assistance?

Methodology:
The program conducts quantitative analysis, GIS mapping, case studies, and field interviews to identify where and how climate change could pose threats to state stability, to define strategies for building accountable and effective governance, and to assess global development aid responses in Africa.

Initial Results:
The program has advanced tools for assessing climate security vulnerability in Africa by developing a new model mapping subnational vulnerability to climate change, developing a new regional climate projection model for Africa, conducting real-time conflict tracking continent-wide in Africa, and developing a new framework for identifying varied types of complex emergencies. Program case studies have produced new comparative research on the impact of constitutional design, democracy assistance,

urban resilience, and disaster preparedness on building government capacity to respond to climate-related and other stressors in Africa. The program released online mapping platforms that enable researchers and policymakers to visualize program data on climate security vulnerability, conflict, governance, and aid interventions, providing the most comprehensive view yet of climate change and security in Africa.

Anticipated Outcomes of Research:
The program's research aims to give policymakers—as well as strategic, theater-strategic, and operational level military officers and their civilian counterparts—data and tools to address the security consequences of climate change.

Potential Impact on DoD Capabilities and Broader Implications for National Defense:
CCAPS aims to provide the Department of Defense and the wider U.S. Government with practical guidance on how to mitigate and respond to the security consequences of climate change in Africa. First, by identifying how climate change could trigger natural or man-made disasters and undermine state stability, program research could enable policymakers to act early, when the costs of taking decisive action are lower. Second, the program is identifying the strategies most likely to build state capacity and forestall state collapse; where state collapse has already occurred, the program identifies strategies to reduce violence, provide humanitarian aid, and foster political stability and good governance. Third, the program is evaluating the capacity of bilateral and multilateral efforts to reduce African countries' vulnerability to climate change. If domestic institutions and international aid efforts are more effective, the result should be fewer crises and, as a result, fewer calls for the U.S. military to take on the burdens of disaster response, peacemaking, peacekeeping, and post-conflict reconstruction.

Publications through this Minerva research:
In the last year, the program released new research on near-term climate projections, integrated assessments of current and future climate insecurity, national disaster response capacity, urban resilience, food security, complex emergencies, and emerging conflict trends. The full range of CCAPS publications identifying chronically insecure regions, climate-conflict trends, and strategies for national and international response, as well as the program's data codebooks, user guides, course modules, and conference reports, are available at www.strausscenter.org/ccaps/publications.

Sharable data resources to be generated:
More details can be found at "*Climate Change and African Political Stability Resources*" on page 123.

- *Mapping tool:* The mapping tool allows users to visualize data on climate change vulnerability, conflict, and aid in Africa.
- *Thematic dashboards:* Dashboards combine mapping, trends analysis, tabular data, and data downloads for a comprehensive view of each thematic area of CCAPS research. CCAPS dashboards on conflict, climate security, and aid are available at www.strausscenter.org/ccaps/mappingtool.
- *Datasets:* All datasets and model outputs are available at www.strausscenter.org/ccaps/data.
    - *Climate security vulnerability model* identifies the locations of chronic vulnerability to climate security concerns in Africa.
    - *Armed Conflict Location and Event Dataset* tracks the actions of opposition groups, governments, and militias across Africa from 1997 to 2014. The real-time conflict data are released weekly for 30 high-risk African countries and monthly for the entire continent.
    - *Social Conflict in Africa Database* includes georeferenced data from 1990 to 2012 on protests, riots, strikes, coups, communal violence, and other types of social unrest.

- *Malawi Geocoded and Climate Aid Dataset* includes data on all active development aid projects in Malawi, from all donors in all sectors from 1996 to 2011.
- *Sub-national African Education and Infrastructure Access Data* compiles data on education, water access, and other infrastructure data at the first administrative district level.

New curricula or teaching exercises

Designed for use in military education institutes, CCAPS course modules provide background material, scenarios, and exploratory questions on issues related to climate change and national security, conflict management, disaster response, and the sociopolitical impacts of climate change. Course modules are available for download at www.strausscenter.org/ccaps/publications.

CCAPS has also developed and taught seven graduate and two undergraduate courses on climate change and security, disaster response, urban resilience, governance challenges in Africa, international adaptation aid, the sociopolitical impacts of climate change, and using GIS in social science research.

Outreach to government communities

CCAPS researchers regularly provide briefings on climate change vulnerability, climate and conflict links, conflict trends, and intervention strategies for U.S. and other government officials. In the last year, program researchers briefed U.S. Government officials from the Joint Staff, National Geospatial-Intelligence Agency, Office of the Secretary of Defense, Political Instability Task Force, U.S. Africa Command, U.S. Agency for International Development, U.S. Army Intelligence Directorate, U.S. Army Corps of Engineers, and U.S. Special Operations Command. This year program researchers also briefed officials from the African Union, FOI Swedish Defense Research Agency, Global Military Advisory Council on Climate Change, and World Bank.

Students and postdocs trained

Through applied coursework and research positions on the program, CCAPS has engaged 204 students in CCAPS research at the University of Texas at Austin and partner institutions. These students have served as research assistants, database coders, field researchers, predoctoral fellows, and course participants. Students have also collaborated with CCAPS faculty researchers to author and co-author 96 publications and papers based on their CCAPS work. CCAPS has supported 16 doctoral students, and those who have graduated have since taken on teaching roles at universities (e.g., an assistant professor at the University of North Denver) and received post-doctoral fellowships (e.g., a postdoctoral research fellowship at the University of the Witwatersrand), while other graduate students have also taken on teaching roles (e.g., at West Point) and undertaken roles focused on their areas of CCAPS research at organizations in the U.S. (including the World Resources Institute, Brookings Institution, and Development Gateway) and abroad (for example, through a Fulbright Foreign Scholarship).

The Evolving Relationship between Technology and National Security in China: Innovation, Defense Transformation, and China's Place in the Global Technology Order

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Government Program Officer: Micheline Strand, U.S. Army Research Office
http://igcc.ucsd.edu/research/technology-and-security/innovation-and-technology-in-china/

This project examines China's drive to become a world-class technological power, especially in the defense and dual-use sectors, and understanding the implications for the United States and the rest of the world. A central research question is what are the key sources of innovation and barriers that will shape China's technological development trajectory? The project looks at a diverse number of areas from the roles and relationship between the state and market, China's place in the global technology order, governance regimes and incentive mechanisms, the different elements of the innovation eco-system, and the inter-relationship of the civilian and defense economies.

Methodology

This project is organized into six research topics: 1) annual assessments of the reform and modernization of critical sectors in China's defense and dual-use science, technology, and industrial (STI) base; 2) comparing China's approach to technology development, defense industrialization and forging of a dual-use base with peer competitors and latecomers; 3) analysis of the political economy of China's defense science and technology (S&T) and technological rise; 4) China's technological development and implications for U.S. and international technology trade policies; 5) the nature of the structures, processes and leaderships of the Chinese civilian and defense S&T systems, and 6) historical influences on contemporary Chinese grand strategic thinking on S&T.

Initial Results

This project has yielded numerous findings; a representative selection is listed below. For further details, please reach out to the researchers.

1. Identified and explained the role of key organizations in guiding the development of major strategic S&T projects.
2. Mapped out China's strategy and eco-system for advanced technological and industrial imitation.
3. Developed a rigorous inter-disciplinary framework for defining and understanding innovation, especially defense innovation.
4. Developed an analytical framework to compare innovation capabilities in high-tech industries in China and the United States through a survey administered to industry, academia and government experts, and tested in the integrated circuit design, electric vehicles, and biopharmaceutical sectors.
5. Developed a sophisticated framework for understanding China's defense research, development, and acquisition system and examining this through a series of case studies.
6. Assessed the historical influences on contemporary Chinese grand strategic thinking to understand the relationship of S&T development to national security from the 16th century to the present day.
7. Conducted an in-depth analysis of China's human talent base development in S&T, considering impacts on defense, education, science, engineering and cyber sectors.

8. Continued building a relational database on Chinese S&T actors and programs. Information collected to date covers more than 1,600 S&T organizations, 4,552 Chinese corporations, 4,370 individuals, 400 S&T projects, 317 S&T conferences, 190 publications and 610 universities.

Notable findings and contributions

The project has developed a nuanced typology of innovation that distinguishes eight different types of innovation beginning from simple duplication and ending with high-end breakthrough innovation. This framework offers a far greater degree of specificity and sophistication than was previously available to understand what is meant by innovation. According to this typology, much of what China, nationally and within the defense domain, is doing can be defined as advanced imitation, crossover innovation, and incremental innovation, although it is gradually making progress higher up the innovation ladder to architectural forms of innovation.

Another contribution of this project has been to offer a detailed understanding of how China is able to take advantage of foreign technology transfers to develop its domestic technology capabilities. The project identifies and explains the Introduce, Digest, Absorb, and Re-innovate (IDAR) strategy and maps out a sprawling industrial economy of policies, organizations, and processes that China has built up to assimilate these foreign technological advancements to turn them into Chinese products and processes in a relatively short period of time. Understanding this IDAR strategy provides important new insights into how China is able to catch up technologically much quicker than has been previously thought by analysts.

Anticipated Outcomes of Research

This research project is intended to better understand the drivers, challenges, and approaches that China faces in its intensifying efforts to become a global science and technology champion, especially in the defense realm. A key anticipated outcome is to establish a new field of study in Chinese security and technology that has not previously existed, which brings together other disciplines and emphasizes the importance of mainstream social science methodological approaches. In order to achieve this outcome, the project is producing the foundational research that is required and attracting and training a new generation of scholars and policy analysts to cooperate in this area.

Potential Impact on DoD Capabilities and Broader Implications for National Defense

The impact of this project for DOD capabilities and U.S. national defense interests are two-fold: 1) it will provide rigorous analysis and new data on one of the most important long-term challenges to U.S. national security, which is China's military technological rise; 2) the project will cultivate a new generation of scholars and policy analysts knowledgeable on Chinese security and technology issues. In an era of economic and fiscal constraints, having greater understanding of China's technological development will help policy makers make more effective use of limited resources.

Recent Publications through this Minerva Research

- Cheung, Tai Ming. *Forging China's Military Might: A New Framework for Assessing Innovation*. Johns Hopkins University Press, (2014).
- Pollpeter, Kevin (ed.), "Getting to Innovation, Assessing China's Defense Research, Development, and Acquisition System." 2014 Research Briefs, IGCC, January 2014.
- Pollpeter, Kevin, "China's Space Robotic Arm Programs," *SITC News Analysis*, October 2013.
- Cheung, Tai Ming, and Bates Gill. "Trade Versus Security: How Countries Balance Technology Transfers with China," *Journal of East Asian Studies* 13, No. 3 (Sept.–Dec. 2013).
- Bräuner, Oliver. "Is Europe Feeding the Dragon? EU Transfers of Militarily Relevant Technologies to China," *Journal of East Asian Studies* 13, No. 3 (Sept.–Dec. 2013).

- Evron, Yoram. "Between Beijing and Washington: Israel's Technology Transfers to China," *Journal of East Asian Studies* 13, No. 3 (Sept.–Dec. 2013).
- Marukawa, Tomoo. "Japan's High-Technology Trade with China and Its Export Control," *Journal of East Asian Studies* 13, No. 3 (Sept.–Dec. 2013).
- "Comparing U.S. and Chinese Approaches to Science, Technology, and Innovation (STI) Policy Decision-making," SITC Research Briefs, December 2013.
- Cheung, Tai Ming (ed.) "Rich Region, Strong States: The Political Economy of Security in Asia." SITC-NWC Policy Briefs, 2013.
- Cheung, Tai Ming (ed.) "The Chinese Defense Economy Takes Off: Sector-By-Sector Assessments and the Role of Military End-Users." 2013 Research Briefs (IGCC-SITC, 2013).

Students and postdocs trained

- Three students recently graduated with their master's degrees and are seeking positions in private industry, research organizations or have been accepted into a doctoral program.
- Five former graduates, fellows, and researchers from previous years accepted positions at major corporations including Nielson, Qualcomm, Missing Link Security, and CENTRA Technology and tenure track positions at Indiana University.
- One postdoc moved on to become an Assistant Research Scientist at the University of California, San Diego, and another became a post-doc at Harvard University.

New curricula and teaching exercises generated

- Annual IGCC Study of Innovation and Technology in China 2014 Summer Training Workshop on "The Relationship Between National Security and Technology in China", August 3-8, 2014, U.C. San Diego.
- Masters' level course on "Rise of China: Security and Technology" UC San Diego, School of International Relations and Pacific Studies, by Dr. Tai Ming Cheung.
- Hosted conference on "Comparing Defense Innovation in the U.S., China, Russia, and India" in August 2013 in Washington, DC targeting government, industry, and academic communities.

Sharable Data Resources to be Generated

See "*Chinese S&T – Relational Database Analysis System*" on page 123.

Data relating to Chinese science, technology and innovation issues, including organizational structures, processes and leadership will be available to the scholarly community via a quantitative relational database.

Data relating to the Chinese security political economy, technological development and the implications for technology trade policies, and organizational structures, processes and leadership will be available to the broader scholarly community via a quantitative relational database. Additionally, translated Chinese newspapers and journals will be available via another searchable database and we will continue to publish new analyses through our weekly bulletin.

Explorations in Cyber International Relations

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Co-PI: **Venkatesh Narayanamurti**, Harvard Kennedy School
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http://belfercenter.ksg.harvard.edu/project/67/explorations_in_cyber_international_relations.html
Government Program Officer: Erin Fitzgerald, Office of the Secretary of Defense

In international relations, the traditional approaches to theory and research, practice, and policy were derived from experiences in the 19th and 20th centuries. But cyberspace, shaped by human ingenuity, is a venue for social interaction, an environment for social communication, and an enabler of new mechanisms for power and leverage. Cyberspace creates new conditions—problems and opportunities—for which there are no clear precedents in human history. Already we recognize new patterns of conflict and contention, and concepts such as cyberwar, cybersecurity, and cyber-attack are in circulation, buttressed by considerable evidence of cyber espionage and cybercrime.

Research Problem:
The research problem is this: distinct features of cyberspace—such as time, scope, space, permeation, ubiquity, participation and attribution—challenge traditional modes of inquiry in international relations and create limit their utility. The interdisciplinary MIT-Harvard ECIR research project explores various facets of cyber international relations, including its implications for power and politics, conflict and war. Our primary *mission* and principal goal is to increase the capacity of the nation to address the policy challenges of the cyber domain. Our research is intended to influence today's policy makers with the best thinking about issues and opportunities, and to train tomorrow's policy makers to be effective in understanding choice and consequence in cyber matters.

Accordingly, the ECIR *vision* is to create an integrated knowledge domain of international relations in the cyber age, that is (a) multidisciplinary, theory-driven, technically and empirically; (b) clarifies threats and opportunities in cyberspace for national security, welfare, and influence;(c) provides analytical tools for understanding and managing transformation and change; and (d) attracts and educates generations of researchers, scholars, and analysts for international relations in the new cyber age.

Methodology:
By necessity, we draw upon a diverse set of methods, theories, and tools—from social sciences, international studies, policy and risk analysis, communication studies, economics, management, computer science, and law—to explore utility of existing methods and to develop new techniques. These include:

- *Domain Representation* – Integrating Empirically Cyberspace and International Relations
- *Data Development and Empirical Analysis*: to focus on and analyze actors, actions and impacts
- *Dynamic Modeling, Simulation, and Policy Analysis:* to provide tools for analysis and policy.
- *Cross-School Participation* of Harvard faculty and research fellows and MIT affiliates
- *Create new cyber system and cyber policy courseware*, case studies, scripting, and delivery

Developing New Methods and Applications

(1) Created a *domain structure matrix* as a tool for empirical investigations
(2) Developed model and methods to analyze the combined *cyber-IR system*
(3) Designed *control point analysis* to identify actors, actions, outcomes at key decision points
(4) Developed *automated taxonomy methods* to create new of cyber-knowledge
(5) Created Web-based system of joint cyber-IR knowledge with new ontology, data base, etc.

Extending Existing Methods

(1) Extended *resilient mechanism design* (i.e., reverse game theory) for cyber agreements
(2) Extended automated applications of *alternative algorithms* for taxonomy on cyber security
(3) Engaged in multi methods analysis of cyber conflict
(4) Completed field work on *private authority* in cyber management and governance,
(5) Explored *malware* and markets for *malware.*

Results:

The ECIR Project has: (a) Constructed an empirically based *method to integrate cyberspace and international relations,* anchored in the layers of the internet and the levels of international relations; (b) Demonstrated value of *control point analysis* with strategic and policy relevance (c) Identified *empirical patterns* of *internet control* by different actors (countries like China, and firms, like Google) (d) Developed new system and applications of automated knowledge generated from large scale collections (e) Generated new empirical evidence of the power of *private authority* in management of cyberspace, (f) Created and delivered robust *cyber-IR courseware* and exercises on cyber policy and management (g) (h) Encouraged interdisciplinary discussion of cyber policy issues; (i) Identified new issues of law and regulation as potential control points (j) Achieved frequent publication in widely read and popular media.

Research Outcomes:

We developed the theories and methods that *combine cyberspace and international relations into one integrated model* and created a new knowledge field with an increased capacity to:

- Project systemic effects of international behavior in cyberspace;
- Construct protocols and tools for cyber and real world analysis that enable better warning and alerts; as well as protocols for negotiating agreements on cyberspace and
- Identify issues more conducive to such agreements; suggested normative approaches and collaborative mechanisms for cyber defense;
- Develop robust principles for Internet governance;
- Construct models of cyber conflict escalation and integrate soft power approaches to defense; Help influence policy makers with the "best thinking" and to train tomorrow's policy makers for effective choice in cyber matters.

Potential Impact on DoD Capabilities and Broader Implications for National Defense:

New tools are now available to (a) construct robust understanding of emergent dynamics surrounding the Internet and cyberspace, (b) anticipate, track, and clarify cyber threats, and (c) understand and manage worldwide cyber transformation. This helps to: (d) construct methods with "hands on" use; (e) provide foundations for 21st C. international relations and (f) support analyses for U.S. Grand Strategy.

Future World

The unexpected speed with which the cyber domain continues to change has accelerated our appreciation for the new and evolving research and policy imperatives.

1. Understanding and managing threats to critical infrastructure has not been fully appreciated until recently. It is imperative to make the transition from policy to practice and implementation.
2. Cyber conflict and uses of intrusive tools require immediate attention. The growth and increasing complexity of intrusive methods, instruments, and damages cannot be ignored. Needed are (i) metal level metrics (ii) integrated cyber conflict data bases (iii) mechanisms that measure the intensity of conflict.

3. Also unexpected is the development of contentions over cyber governance. What must be done now is to use the control point analysis tool we developed to identify the critical points for sensitive points in the cyber domain, and secure control over its governance.

Sharable data resources generated

- *Cyber System for Strategy and Decision (CSSD)*—Second generation of MIT's Global System for Sustainable Development spanning the Cyber-IR domain Ontology-based and curated evolving knowledge data base consisting or tagged searchable abstracts with links to source.
- *Cybersecurity Wiki*—Harvard's Berkman Center for Internet & Society (with Science, Technology, and Public Policy Program) http://h2odev.law.harvard.edu/playlists/633
- *ECIR Data Dashboard*—designed to provide scholars, policymakers, IT professionals, and other stakeholders with a comprehensive set of data on national-level cyber security, information technology, and demographic data. (See http://coin.mit.edu:8080/Dashboard).
- *Computational Taxonomy Generation System*—to extract taxonomies or ontologies from large scale data base systems of journals. Tested and applied to "cybersecurity" and "cyberspace".

Courses and Materials

- *Cybersecurity Model Curriculum*—Harvard's Berkman Center's tool providing resources with various elements of the course plans and "drag and drop" to create customizable syllabi.
- *Cyber Politics in International Relations*—MIT Political Science with participation from Computer Science and Management (on line)
- *International Relations Theory in the Cyber Age*—MIT Political Science (on line)
- *J-Term Course*—Harvard with all supporting materials.

Publications through this Minerva research:

Books:

- Choucri, Nazli 2012. *Cyberpolitics in International Relations.* Cambridge, MA: MIT Press
- Choucri, Nazli, *et al*. Edited volume. *Explorations in Cyber Politics for the Cyber Age*, for consideration by MIT Press, in draft
- Choucri, Nazli and David D. Clark**.** *The Co-Evolution Dilemma: International Relations in the Cyber Age***,** in preparation.

Articles, other Publications, and Solicited Book: See Publication List
Publications List at http://ecir.mit.edu.

Centroamérica Indígena: Land Rights and Stability in Indigenous Societies of Central American

Jerome E. Dobson, dobson@ku.edu
American Geographical Society and University of Kansas
Peter H. Herlihy, University of Kansas
Government Program Officer: Micheline Strand, Army Research Office
Government POC: Lisa Troyer, Army Research Office
http://www.prmapping.res.ku.edu/CA_Indigena.html

Research problems: What land and territorial use factors cause indigenous communities to be unstable, stable, or resilient enough to remain stable even under duress?

Some 57,000 unaccompanied alien children (UACs) came to the U. S. in 2014 seeking refuge from violence, poverty, and deprivations in Central America (CA). UAC migrations are extreme indicators of instability, which we were already in place to study. We emphasize indigenous communities and focus on secure land ownership and territorial sovereignty. All suffer similar stresses (social and political discrimination, land dispossession, extreme poverty, and narco-trafficking)—how is it that some are thriving, protecting lands, managing natural resources, and maintaining cultural identities while others are not?

We hypothesize that certain factors (state-sponsored environmental conservation, tourism, local autonomy, and certain types of land use and land cover) may promote stability and resilience. Conversely, other factors (an active colonization front, certain commercial activities, and certain land/property ownership regimes) may promote instability. We work in concert with governments, indigenous federations, international organizations, and non-governmental organizations; and our research has direct applications to current crises faced by all of them.

Methodology

Our study area covers all seven CA countries, with Honduras as our initial operating base. Our methodology works at two different geographic scales. At the regional (coarse) scale, we cover all 1,500 *municipios*, serving as the administrative and political units for spatial analysis, first to identify the approximately 900 *indigenous* municipalities by language and other cultural variables. We employ publicly-available geographic and statistical information using geographic information systems (GIS). Ultimately we will produce a data-intensive model for assessing the influence of each geographic factor. At the local (fine) scale, we investigate selected jurisdictions. Using the methods and techniques of human geography and cartography, we employ participatory research mapping (PRM) to engage indigenous populations directly in mapping their own resources and recording local knowledge.

Initial Results

- We established formal agreements\contracts with governments, NGOs, and indigenous federations to conduct collaborative research and collectively address relevant issues.
- We established an office (*Mesa Geográfica Indígena)* at UNPFM in Tegucigalpa where we have two indigenous university students working with KU postdoc, graduate students, and faculty.
- We produced innovative "transparent digital maps" that already are used by indigenous, government, and nongovernmental authorities. This pioneering use of ArcGIS and ArcGIS Online helps answer the project's main research questions, while facilitating interaction with and understanding of indigenous populations. We are incorporating remotely-sensed imagery to create a product that is frequently updated automatically.

- We participated in an indigenous conference to resolve a violent conflict between two indigenous populations (Miskitu and Tawahka) who were competing for land resources on their common but undefined border. At the end, we asked participants to define stability and express their own values regarding factors influencing resilience. The excellent results will be further tested, enhanced by other groups, and incorporated into our model.
- We signed an agreement to study the Katainasta *Concejo Territorial*, a new land ownership category which combines several villages into a single unit. The category itself is so new and untried that it's attracting great attention. Thus, we'll be working in close collaboration with the World Bank, United Nations, MASTA, FITH, UPNFM, Mopawi, and Katainasta. Mapping communal land ownership is quite different from privately owned land. Communal ownership is actually a collection of land use rights, thus mapping land uses and locations for hunting, fishing, gathering wild eggs, cutting timber, etc.

Anticipated Outcomes of Research

We will develop digital cartographic and statistical assessments of land tenures and land uses and the related administrative, judicial, and legal powers. We will assess land stability and determine both the pressures derived from governance, resource use, and other salient factors. We aim to (a) produce reliable, multi-scale (coarse to fine) digital geographic data, maps, and analyses using up to 20 different variables; (b) develop a "land stability index"; and (c) document, digitally map, and rate the diverse territorial jurisdictions of indigenous municipalities.

Impact on DoD Capabilities and Broader Implications for National Defense

This research will provide new baseline information to support USG decision-making. DoD will gain new understandings to improve conduct of activities mutually approved by USG and CA governments. DoD will benefit from the openly-reported research and geographic information and a greatly improved cadre of regional experts. Our purpose is to improve U. S. understanding of CA lands and peoples and, thereby, to reduce misunderstanding, provide a knowledge foundation for resolution of conflicts, and improve humanitarian assistance in case of natural disasters, technological accidents, terrorist acts, and wars.

Research outputs

- Herlihy, Peter H. 2014. "Central America," in *Handbook of Latin American Studies* 69:29-41.
- Results in digital formats, including original maps and unpublished data and data descriptions, are available online.

Government and NGO outreach

NGOs:

- CEASPA [Panamá]
- German/Honduran Governments Project (PROTEP)
- Instituto Geográfico Nacional in Honduras
- Instituto Geográfico Nacional "Tommy Guardia" in Panamá
- Mopawi [Honduras]
- United Nations Development Program in Honduras
- World Bank-Honduran Property Program PATH II

Indigenous organizations:

- Indigenous Concejo Territorial Katainasta
- Miskitu Indigenous Federation (MASTA)
- Tawahka Indigenous Federation (FITH)
- Confederation of Autochthonous Peoples of Honduras (CONPAH)

Universities:

- Nacional Autónoma de Honduras
- Universidad Nacional Pedagógica Francisco Morazán
- Universidad de Panamá

Identifying and countering early risk factors for violent extremism among Somali refugee communities resettled in North America

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Government Program Officer: Martin Kruger, Office of Naval Research

Research problem: Collect and analyze information on the ways in which openness to violent extremism takes hold in a diaspora community within North America.

As refugees continue to resettle in communities around the world, understanding what factors promote or prevent violent extremism among refugees will be critical to policy and programs targeting national security. Somalis have been one of the largest refugee groups to arrive in the U.S. every year over the past decade[1]. In 2010, 14 Somali-American youth from Minneapolis were indicted for supporting Al-Shabaab[2]; in total, more than 24 Somali youth were suspected of having joined the terrorist organization[3]. The risk that Somali youth who join Al-Shabaab could return to the U.S. as trained terrorists with the aim of carrying out a "jihad" against American civilians is a major national security concern. While recruitment of Somali youth into a terrorist organization is new and particularly threatening to U.S. security, it fits a larger pattern of 'home-grown' terrorism present in Europe[4]. 'Home-grown' terrorism refers to citizens or residents of non-Muslim countries becoming radicalized, or adopting increasingly extreme views regarding Islam and religious justifications for violence, culminating in the willingness to support, use or facilitate fear or violence in order to effect societal change[5]. The empirical identification of early risk markers for communities becoming more open to violent extremism is urgently needed. Prospective longitudinal data on attitudes towards violent extremism within key communities, however, is virtually absent from the field, in part due to the significant challenges of assessing sensitive information within communities that may be distrustful and difficult to enter into.

Methodology

The objective of our research is to collect and analyze information on the ways in which openness to violent extremism takes hold in a diaspora community within North America. In particular, we seek a greater understanding of how structural disadvantage and social bonds predict openness to violent extremism among Somali refugee youth ages 18-30 over the course of one year. We expect that trauma/perceived injustice and weak social bonds will predict later openness to violent extremism, and that weakened social bonds will mediate the effect of structural disadvantage/adversity on openness to violent extremism. We will further explore the role of mental health, gender and geographical location in openness to violent extremism, and through qualitative data seek to understand participant's perspectives on adversity, social bonds, community social control and attitudes towards violent extremism.

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[1] Reference ORR 2010. (Contact team members for full references.)
[2] Reference FBI 2010
[3] Reference Elliot 2009
[4] Reference Sageman 2008
[5] Reference Precht, 2007

We will pursue the above objectives through a longitudinal mixed-methods interview design that builds on our long-standing research collaboration with the Somali community. First we will conduct a series of quantitative interviews to explore the study hypotheses. Each participant will complete two standardized interviews separated by one year. Following these interviews a sub-set of participants will be asked to participate in an in-depth qualitative interview designed to explore mechanisms of the relationships identified in the larger quantitative data. Data collection will take place in four Somali communities in North America that are diverse in size and characteristics: New England (Massachusetts), Minnesota, Maine, and Ontario, Canada (n = 440, 110/per community). Since our original proposal, we have leveraged additional funding through a grant from the National Institute of Justice that has allowed us to increase the scope of our project from three communities to four (adding Lewiston, ME), and from a sample size of 330 to 440. This increased sample size and additional community will further facilitate our overall goals and objectives through increasing statistical power and providing us with additional information about differences in geographically distinct communities.

Initial Results

The major accomplishment this past year was the completion of Time 1 data collection in each of the four communities. We exceeded our goal of 440 participants, with a total of 465 Somali-Americans interviewed. In addition, we established our community leadership team in all study sites. See **Table 1** and **Table 2** at the end of this report for descriptive information pertaining to our study sample and key variables.

Anticipated Outcomes of Research

We anticipate providing empirical evidence of specific *modifiable* indicators related to changes in openness to violent extremism. Empirical validation of a model that can be used to explain the mechanisms that lead youth to be more or less vulnerable to potential recruitment into terrorist organizations would provide concrete, data-driven and evidence-led direction for prevention and intervention.

Potential Impact on DoD Capabilities and Broader Implications for National Defense

The 2011 National Security Strategy places significant emphasis on the importance of recognizing the diversity of race, region, faith and culture in our country and how strategic alliances need to place *communities* at the forefront of a smart and effective counter-terrorism toolbox. Our research goals are consistent with national security efforts to pursue comprehensive engagement by building meaningful alliances with our greatest assets in preventing the development of terrorism.

The Somali community resettled in North America is a critical resource available to law-enforcement personnel in stopping the flow of resettled Somali youth to al-Shabaab. Somali communities resettled in North America perceive high levels of discrimination and disrespect from both the mainstream society and, to some extent, law enforcement officers. These experiences may be undermining efforts to build partnerships with communities and to engage communities as partners in countering violence. Somali communities resettled in North America demonstrate a remarkable willingness to engage in dialogue about the issues they face and to share their concerns and opinions. We suggest that partnerships built on respect and equality can yield high levels of engagement and that, in turn, prevention and intervention efforts will be greatly enhanced by the “ideas, values, energy, creativity, and resilience” of the Somali communities in North America.

Publications through this Minerva research

We have developed and made available community, military and policy briefs focused on: 1) findings related to risk and protective factors and relevant policy/practice implications and 2) community resilience building and strategies for engagement and ongoing partnership. We will continue to disseminate these policy briefs to stakeholders including the communities we are working with, military personnel, local law enforcement, federal law enforcement, and policy-makers.

Table 1: Demographics *(n = 465)*

Variable	M(SD)	%
Age	21.38 (2.99)	
Years in U.S.	12.69 (6.05)	
Years in this location	11.33 (6.04)	
% Female		37.4
% Bantu		8.1
% refugee		57.9
% lived with mother growing up		45.3
% lived with both parents growing up		41.4
% single		90.5
% currently in school		64.5
% currently employed		48.6

.

Table 2: ***Correlations, Overall sample*** (n = 394; sample includes Boston, Portland, Minneapolis, and Toronto)

	1	2	3	4	5	6	7	8	9	10	11	12
1. Radicalism	1											
2. Trauma	.100*	1										
3. Everyday discrimination	.161**	.349**	1									
4. Lifetime discrimination	.011	.383**	.468**	1								
5. Social Cohesion	-.108*	-.196**	-.129*	-.107*	1							
6. Marginalization	.150**	.192**	.393**	.196**	-.149**	1						
7. General feelings of belonging	-.121*	-.183**	-.344**	-.144**	.169**	-.536**	1					
8. Attachment to U.S.	-.214**	-.100	-.162**	-.086	.117*	-.212**	.313**	1				
9. Importance of U.S.	-.180**	-.086	-.159**	-.080	.034	-.152**	.202**	.633**	1			
10. HTQ scale (like PTSD)	.064	.425**	.436**	.353**	-.147**	.494**	-.350**	-.161**	-.097	1		
11. Participant age	-.186**	.252**	-.104*	.104	.044	-.097	.084	.177**	.211**	.034	1	
22. Years in U.S.	.028	.070	.243**	.325**	.136**	.042	-.022	-.123*	-.227**	.108*	-.060	1
Mean (SD)	2.912 (1.688)	0.537 (0.733)	2.731 (1.143)	0.226 (0.218)	2.725 (0.488)	1.974 (1.027)	5.644 (1.144)	4.057 (0.936)	5.86 (1.532)	1.351 (0.457)	21.33 (2.929)	13.81 (5.764)
Range	1-7	0-4.39	1-5.89	0-0.83	1-4	1-6.78	1.22-7	1-5	1-7	1-3.64	18-30	0-24

*. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed)

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Deterring Complex Threats: The Effects of Asymmetry, Interdependence, and Multipolarity on International Strategy

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Research Problem: How new technologies, such as those in space and cyber, alter the mechanisms of deterrence, and in particular, how asymmetric capabilities, political, economic, and military linkages, and a wide-spectrum of actors influence coercive strategies.

Cross-domain deterrence (CDD) is use of threats or activity in one arena to prevent attacks in some unlike arena. One feature of CDD research is the relaxation of some assumptions about classical deterrence. Deterrence itself is about ends and about changing behaviors, but the focus of CDD research is on means and the way things are conducted.

This research attempts to address the question of when changing the means matters, and what constitutes a CDD bargaining idiom. Of particular interest is how the emergence of these new technologies influences competition in new domains and what that implies for stability in old domains, particularly the nuclear domain. Tremendous uncertainty in the current and future threat environment, together with the practical challenges of integrating diverse instruments of power across domains, makes the complexity of CDD itself a major strategic challenge.[6] It is our aim to understand the logic of CDD and its application to uncertain and ambiguous political environments.

Methodology

This project is primarily a theory construction project, and the research program proceeds in two phases. In Phase I (Years One through Three) we propose to develop rigorous and empirically grounded causal theory in the three annual modules. Our analytic decomposition into three systemic characteristics enables us to tackle the aspects of sociotechnical complexity that affect international strategy in a deliberate and disciplined way. Each module of Phase I features intensive interdisciplinary collaboration between social scientists and technology experts. In Phase II (Years Four and Five) we will then subject our analytic theories to qualitative and quantitative evaluation, computational modeling at increasing scales of complexity, and application to contemporary problems in international strategy. We believe that the best results will be produced by a multi-method approach, combining quantitative analysis, qualitative observation and workshops, formal modeling, historical case study, comparative policy (area) studies, and computational simulations.

This process essentially involves continuous interaction between emerging theoretical concepts and the empirical material which informs and constrains it: theoretical intuitions guide the researcher's engagement with knowledgeable informants and historical case material, which in turn prompts further

[6] Lewis 2010, Manzo 2012, Nacht 2010, Creedon 2011, Gerson 2009

refinement of theory as the researcher encounters empirical surprises and discrepancies. This cycle is iterated deliberately until theoretical concepts become stabilized and further empirical exposure becomes redundant to the articulation of theory.[7]

Initial Results

In our first year, we have made considerable progress towards advancing a robust theory of CDD, building on detailed investigations into the empirical manifestation and theoretical logic of strategic interactions in the cyber domain. Our theory of CDD centers on the assessment that CDD comes into its own when dealing with limited reactions and responses. We see that when one side lacks higher order, it tries to shape bargaining paths with its available means. Political and economic competition leads to technological specialization and interdependence, which gives rise to new means for aggression, and in some cases, substitutes for existing means. Meeting like with unlike means seems to matter when there are limitations to what kinds of signals a political entity can show. In an asymmetric environment, we might see that aggression works through public infrastructure not just private arsenals.
We have observed that increased technological and political-economic creates ambiguity. One hypothesis about complexity is that it increases the probability of escalation and it also magnifies the threat of something being left to chance. The counter hypothesis that complexity decreases probability of escalation precisely because it magnifies the threat of something being left to chance. Alternatively, we can see this as a continuum of intensity, where there are few moves with clear—and clearly bad—consequences as compared with many moves with ambiguous consequences.

Complexity gives rise to asymmetric vulnerability: if there is asymmetric vulnerability, then CDD is part of the bargaining for strategic equilibrium. How, then, should we think about asymmetric vulnerability? There is the assumption that because the US has more, it has more to lose. But, with CDD, one can win in one domain in order to win in another domain. For example, if there is asymmetric vulnerability in space, then a political conflict in space could end in space without having to bring in nuclear weapons; if there is symmetric vulnerability, then catastrophe is more likely and it would be hard to imagine that a conflict in space would end in space without the use of nuclear weapons. Vulnerability and catastrophic capabilities matter.

As part of our theory construction, we have been able to build typologies of asymmetry, interdependence, and multi-polarity as it relates to information infrastructures, as shown in Table 3.

[7] On methodology for "grounded theory" see Glaser and Strauss 1967, Lincoln and Guba 1985, Agar 1996, Charmaz 2006. For application of these ideas in political science see Breetz 2013, Friedrichs and Kratochwil 2009. The recursive interaction between theory and data is sometimes called "the hermeneutic cycle" following Heidegger 1962.

Table 3: Information Infrastructure Typology

Features of information infrastructure…	**…that make it an attractive target in war…**	**…also reduce the political incentives for starting a war in the first place**
Indirect control [*asymmetry*]	Low-cost disruption and first mover advantages	[*inform*] Decreased probability of success: Limited attacks signal limited resolve, while consequential attacks stiffen a capable opponent's resolve to defend and retaliate
Complex linkages [*interdependence*]	Offense dominance and systemic paralysis	[*constrain*] Increased warfighting costs: Operational coordination, negative externalities, opportunity costs of lost civ/mil complements
Many participants [*multi-polarity*]	Access to diverse valuable targets and plausible deniability	[*transform*] Increased benefits of status quo: Shared interest in preserving the value of efficient transactions and public goods

Anticipated Outcomes of Research

We seek to develop an analytically rigorous, empirically grounded, and policy relevant theory of deterrence in an era of complex asymmetric threats, interdependent domains, and numerous competitors. We intend to illustrate how new technologies, particularly in in cyber and space, increase tactical means and possible combinations of threat capabilities. We will explore these questions and publish articles in highly reputed academic journals. We will hold our inaugural conference in La Jolla in November 2014, which will yield a series of papers to be edited into a field-defining book on cross-domain deterrence. We will also produce an additional book that explains the mechanics and utility of cross-domain deterrence. This book will look deeply into how cross-domain deterrence works at micro and macro levels, and it will include empirical comparative case-based research. The literature we produce will define academic and policy thinking on cross-domain deterrence.

Potential Impact on DoD Capabilities and Broader Implications for National Defense

In asking these questions, we can assess how to make the US a skillful beneficiary of cross-domain deterrence theory and practice. One goal is to learn how to reinforce deterrence across domains, and to make sure that the US is not a victim of the skill of others.

Publications through this Minerva research

- Gartzke E and Lindsay J. 2014. *Cross-Domain Deterrence: Strategy in an Era of Technological Complexity*. (In Progress)
- Gartzke E. 2013. "The Myth of Cyber War: Bringing War in Cyberspace Back Down to Earth." *International Security* 38, (2): 41-73.
- Gartzke E. 2013. "Fear and War in Cyberspace." *Lawfare: Hard National Security Choices Blog*.
- Gartzke E. 2014. "Making Sense of Cyberwar." Policy Brief, Belfer Center for Science and International Affairs, Harvard Kennedy School.
- Gartzke E. 2014. "An Apology for Numbers in the Study of National Security...if an apology is really necessary." H-Diple/ISSF (2): 77-90. (Published)

The Strength of Social Norms Across Cultures: Implications for Intercultural Conflict and Cooperation

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Research problem: Examine if and how the vast cultural differences underlying reactions to norm violations are realized at the level of brain mechanisms.

Humans are unique among all species in their ability to develop, maintain, and enforce social norms. It is likely, then, that humans have evolved cognitive and affective neuro-mechanisms to be able to detect norm violations very quickly which affords punishment of violators and enforcement of the social order. Despite this fundamental aspect of human nature, however, there has been surprisingly little research on how norm violation processes are supported at the neurobiological level. While there has been neurobiological research on how humans react to violations of task-related expectations in non-social domains, research on neurobiological processes related to social norm violations is only in its infancy and, moreover, there has been a dearth of research on cross-cultural variation in the neurobiology of social norms. Thus, at present, we know little about how vast cultural differences underlying reactions to norm violations are realized at the level of brain mechanisms. This lack of any cultural neuroscience research on social norms represents a large limitation on our current understanding of group identities, cultural norms, and belief systems. Using EEG technology, this research is addressing this deficit by investigating such questions as:

- How to develop new measures of detection of social norm violations at the neurobiological level?
- Which cultures, individuals, and situations show stronger neurobiological reactions to norm-violating events?
- How are neurobiological processes underlying social norms violations related to behavioral processes, including implicit and explicit attitudes, self-control, cooperation, and other behaviors?
- Do neurobiological indices of social norm violation mediate cultural differences in social behaviors?
- How can research on the neurobiological basis of social norms help to improve intercultural interactions?

Methodology:
Our project is employing EEG, surveys, and behavioral measurements across cultures in order to understand the neuropsychological foundations of social norm violations and their behavioral correlates. We developed a new EEG paradigm to investigate reactions to social norm violations wherein participants in the U.S. and China were asked to judge whether certain behavior are appropriate or on across numerous situations. (e.g., “Michael is in the library. He is studying.” versus “Michael is in the library. He is shouting.”) There were 34 behaviors, each of which was embedded in three different kinds of situations: appropriate, weakly inappropriate, and strongly inappropriate. Participants were asked to judge the level of appropriateness of behaviors in situations and their electro-cortical responses were recorded during throughout the task. In addition, we asked participants to engage in a series of behavior tasks and to respond to survey measurements (e.g. semantic congruency task, stroop task, a dictator game, creativity task, and measures of tightness-looseness, ethnocentrism, self-control, among others) to test the relationship between the neurology basis of norm violation detection and other attitudes and behaviors.

Initial Results:
In Year 1, we collected EEG data from China and US. Our initial results show that:

- Compared with the non-violation condition, strong and weak violations induced a greater N400 (300-450 ms) and late negative shift (600-1000 ms) in the *central* and *parietal* regions for Chinese and US subjects.
- Chinese subjects show a clear *frontal* N400 and late negative shift involved in differentiating between strong/weak and non-violation only whereas US subjects did not evidence N400 in frontal areas, illustrating cultural specificity in the reactions to social norms violations.
- Frontal N400 and late component correlated with a series of behavior and attitudinal measurements, including tightness-looseness, social economic status, ethnocentrism, self-control, fairness decisions, and behavioral performance in the stroop task. Creativity responses are currently being coded.

Anticipated Outcomes and Broad Implications for National Defense:
This is one of the first studies to illustrate evidence of cultural differences in neural activity of detecting social norm violations and the behavioral correlates of such neurological differences. It broadens cross-cultural psychology to include neuroscience methods, and broadens neuroscience to include culture. More generally, it contributes to the growing field of cultural neuroscience, and advances scientific contributions regarding the mutual constitution of culture, social norms, and the brain.

Social norms, though omnipresent in our everyday lives, are highly implicit. Recent social neuroscience research has provided compelling evidence that neural indicators of attitudes can predict meaningful social behaviors above and beyond self-report measures. Thus, this research has the potential to facilitate the development of theoretical models and measures with improved predictive power. It also has the potential to make important scientific breakthroughs regarding the mutual constitution of culture, mind, and brain.

We will focus on outreach to the DOD community to enhance its capabilities through providing: (a) Tools to assess the strength of social norms across cultures; (b) An understanding of the behavioral correlates of such measures; (c) policy recommendations for how to manage clashes of moralities and improve intercultural interactions; (d), mechanisms to promote the spread of positive beliefs of Western countries though diverse communities; (e) a cadre of interdisciplinary young scientists available to study drivers and dynamics of social norms in the future; and (f) crucial input into training for the military, diplomats, policy makers, managers, immigrants, and travelers alike.

Homeownership and Societal Stability: Assessing Causal Effects in Central Eurasia

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Research problem: Understand whether, how, and why homeownership and other aspects of housing affect societal stability in semi-authoritarian contexts.

The US government promotes homeownership at home and abroad based on the proposition that homeownership promotes societal stability by improving living conditions, inducing respect for private property, and creating better citizens. However, there is little theoretical basis and scant evidence for these purported effects. To rectify this gap in scientific understanding of the effects of housing on stability, we have developed core hypotheses specifying how different aspects of ownership might affect the proximate causes of instability: political grievances, social grievances, civic norms, and ideology. Our hypotheses disentangle the discrete components of "ownership" that are often bundled together including other aspects of housing status (quantity and quality of housing) that could affect the outcomes of interest independently of ownership. Other hypotheses how these relationships vary within and across countries depending on macro-level variables such as political regime, social climate, social structure, and culture.

Methodology:
We test our hypotheses empirically using original focus group and survey data we are collecting in four semi-authoritarian countries: Azerbaijan, Kyrgyzstan, Russia, and Ukraine. These countries are uniquely suited for testing whether housing has causal effects on societal stability for the following reasons. First, they face elevated risk of experiencing various forms of instability. Second, they experienced a quasi-experimental distribution of homeownership as a result of Soviet-era housing distribution policies, post-Soviet housing privatization, and failed housing markets since the Soviet collapse. Third, property rights that in Western contexts are usually bundled together under "ownership" are often dispersed in these countries, producing a rare opportunity to test hypotheses about which specific aspects of ownership matter for which outcomes related to societal stability. Finally, variations in macro-conditions across these four study countries permit us to test hypotheses about macro-micro linkages.

We plan to conduct two waves of surveys with the same respondents (i.e. a two-wave panel survey), each preceded by focus group interviews. Each country's survey sample will consist 2400 respondents, including a nationally representative sample of 1600 respondents ages 18-49, plus the following oversamples of 800 to let us test specific hypotheses: internally displaced persons in Azerbaijan, residents of regions that have experienced ethnic violence in the last three years in Kyrgyzstan, residents of regions with high concentrations of Muslims in Russia, and mortgagors in Ukraine. To carry out this major data collection, we are collaborating with teams of international researchers (one from each country) with experience carrying out survey and focus group research on related topics.

We will analyze the data we collect using advanced statistical techniques. First, we test whether each theoretically important component of housing status is exogenously distributed. Second, we will use structural equation modeling to develop precise measures of our theoretical constructs and distinguish direct from indirect effects of the different components of housing status. Third, to deal with potential endogeneity and identify causal effects, we will use techniques such as instrumental variable estimation, propensity score estimation with sensitivity analysis, and difference-in-differences estimates.

Initial Results:
To date we have conducted 18 focus groups (6 in Kyrgyzstan, 4 in all other countries). Findings include:

- Housing is a source of grievances in all four countries, but the aspects of housing status that matter most vary across the region. In Russia and Ukraine, major concerns are housing autonomy for nuclear families and housing comfort and quality. In Azerbaijan and Kyrgyzstan, chief concerns were of the capacity of families to provide housing and land for each son, and access to basic utilities. Housing affordability is a major concern in all countries, and it drives labor migration, especially from Azerbaijan and Kyrgyzstan to Russia.
- Respondents in all countries viewed their governments as corrupt and failing to create the conditions under which families could meet their housing needs. Those in the more authoritarian countries (Russia and Azerbaijan) had greatest expectations of the state versus markets as being responsible for providing housing. Kyrgyz and Ukrainians were most open to markets and in particular mortgages as a possible path to housing mobility.
- Respondents in the more patriarchal societies (Azerbaijan and Kyrgyzstan) viewed housing as a major source of male discontent and familial and societal dysfunction. Women are expected to move into homes owned by their husbands or husbands' families. Non-normative gender arrangements, especially when women own property, is widely frowned upon.
- Discussion of housing provoked social grievances, especially in Russia and Kyrgyzstan, where migrants and ethnic minorities were seen as competing for scarce housing and land.
- There was widespread hostility toward the United States' foreign policy, which is seen as arrogant, self-interested, and meddling. However, there was admiration for American institutions, economic and technological achievements, and high standard of living. Russians and Ukrainians were most interested in discussing the US; whereas Azeris and Kyrgyz viewed the US as remote.

Anticipated Outcomes of Research:
This study will produce a major advance in basic knowledge about how housing affects core attitudes and behaviors within populations residing in semi-authoritarian contexts, and how macro-level factors shape the individual-level relationships. Both the qualitative and quantitative data collected during the project will be made publicly available, so other researchers will be able to conduct their own analyses of housing issues, political attitudes, and behaviors in the four countries covered by the study. The results will help policymakers to better target homeownership promotion policies in semi-authoritarian societies so as to maximize their benefits for US national security interests.

Potential Impact on DoD Capabilities and Broader Implications for National Defense:
As a result of the study, leaders in the DoD and other branches of government will potentially have improved capability of anticipating eruptions of societal instability and conflict in semi-authoritarian countries, particularly those in Eastern Europe, the Caucasus, and Central Asia. Military planners will understand the longer-term consequences of military actions that affect housing and gain insight into whether constructing housing and/or promoting ownership can help counter-insurgency campaigns.

Publications and sharable data resources through this Minerva research:

- PONARS Policy Memo: "Theme and Variation: Views of the United States in Four Former Soviet Union Countries"
- Additional resources described at "*Transcripts of focus groups on housing and factors affecting societal stability*" on page 136.

Understanding Differences in Islamic Ideology in Asian Cultures

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This project emphasizes the methodologies underlying studies of Islamist ideology and other clandestine networks, with a special emphasis on networks that occur in Asia. The project seeks to understand the difficult fit between formal network methods and opaque data on hidden populations.

The project utilizes the methods of network science and includes new derivations designed to meet the specific context of clandestine subject matter. For example, a paper on organizational learning among members of the Abu Sayyaf Group used a modification of snowball sampling to collect original open source data on kidnappings in the Philippines, and then subjected this data to re-wiring, a technique which holds the structure of the network constant while shuffling the identities of the specific agents involved in interactions, in order to simulate random organizational behavior. Simulations were then compared to observed data via paired t-tests.

The paper on data transformation utilized several different variations on network projection. Simulated data were transformed according to six different project techniques, including the Median Additive Projection Process (MAPP), an original data transformation algorithm designed to meet the specific theoretical assumptions of clandestine organizations. Measures of centrality derived from each projection were then compared using Spearman's Rho, a correlation statistic designed to function with rank-ordered data. Similar approaches informed the other projects discussed below.

Results:
According to the results of the Abu Sayyaf research, the individuals involved in kidnapping performed no different from random in terms of a proxy variable measuring organizational learning, suggesting that the Abu Sayyaf Group lacks a strategic long-term vision of the future. These results generally support the conclusion that the 'organization' is better described as a collection of loosely aligned bandits than as a well-defined Islamist group. Moreover, this research suggests that it is imperative to collect data at the individual level, not just the organizational level, because this study uncovered wide variance in existing datasets' conceptualization of the Abu Sayyaf Group's role in organized violence.

The data transformation project provides evidence demonstrating that data manipulations, which are often necessary to allow the use of traditional network measures, can have a deterministic effect on analytic conclusions. Specifically, the six projections produced divergent characterizations of individual nodes' importance, as measured by degree, closeness, and betweenness centralities. Degree proved to be the most stable of these measures, but when results were limited to the assessment of "key" nodes, none of the measures of centrality proved robust. Different projection techniques cause different nodes to become most central. This finding suggests that analysts seeking to decapitate dark networks must carefully consider how to process data after collection, but before analysis. Using the wrong data transformation technique can cause analysts to incorrectly label the most influential agents in a clandestine organization.

The project on error in networks demonstrates that there are four types of network errors, which can appear in 15 possible combinations (see Table 4). Generally speaking, the inclusion of superfluous nodes

and links appears to be more problematic than the exclusion of missing nodes and links. This finding may have implications for studies of big data, because early results suggest that efforts to include more and more data in an assessment may cause errors rather than resolve them. However, the test datasets were not sufficiently large to firmly support this conclusion; additional research on larger datasets is necessary.

Table 4: Combinatorial Types of Error in Networks

1	N+			
2	N-			
3	L+			
4	L-			
5	N+	N-		
6	N+	L+		
7	N+	L-		
8	N-	L+		
9	N-	L-		
10	L+	L-		
11	N+	N-	L+	
12	N+	N-	L-	
13	N+	L+	L-	
14	N-	L+	L-	
15	N+	N-	L+	L-

N+: Node addition, N-: Node deletion, L+: Link addition, L-: Link deletion

The project on anti-fragility offers a new network-level measurement of resistance to disruption. Unlike existing approaches, which rely on distance, this approach considers the structural redundancy of nodes. Initial tests show that the measure performs as expected; it provides normalized network-level measurements that capture structural traits omitted from density, transitivity (clustering coefficient), and fragmentation—measures that typically serve to estimate the robustness of networks.

The project to infer hidden relationships based on geographic co-location has demonstrated proof of concept. The process of inference, which determines each agent's Potential Path Area (PPA)—the full collection of locations that they could have visited—based on observed geographic locations and assumptions about velocity, serves as a means to probabilistically infer relationships among people. The likelihood of interaction is determined based on the extent of overlap between agents' PPAs. If agents' PPAs do not intersect, the probability of interaction is 0. If agents' PPAs are identical, the probability of interaction is 1. If agents' PPAs partially overlap, the probability ranges between 0 and 1, and the likelihood increases with the size of the overlap. The approach has been refined to allow analysts to restrict the physical space within which interactions can take place, by for example excluding seaborne interactions for agents known to be based on land. Additional research is required to determine the scalability of the collection approach and to determine how networks uncovered via this approach differ from those collected via other means.

Research Outcomes

This body of research has produced a pair of peer-reviewed publications. Additional pieces are currently under consideration, and an edited volume featuring these and other methodological developments in the study of dark networks is forthcoming. The geography project and the error project will mature into useable software tools.

Potential Impact on DoD Capabilities and Broader Implications for National Defense:

- The *Philippines* project demonstrates the limits of data collection at the organizational level and suggests that researchers need to collect data at the agent level in order to advance our understanding of violent non-state actors. This project also suggests that the Abu Sayyaf Group should be handled primarily by law enforcement and intelligence agencies, as the group is not a strategic-level threat meriting a military response.
- The *data transformation* project suggests that analysts must carefully consider the treatment of data when utilizing network method, as variations in approach determine the selection of key nodes. A theoretically invalid approach may cause analysts to target suboptimal agents. The paper offers a partial resolution to this issue by offering a data projection technique designed to meet the specific theoretical assumptions of clandestine networks, such as criminal syndicates and terror groups.
- The project on *anti-fragility* provides a new measure to estimate the susceptibility of networks to disruption. If applied to violent groups, this new measure can quantify the likely network-level effects of intervention strategies.
- The project on *error in networks* has the potential to provide a tool that identifies the error threshold beyond which the results of an analysis no longer hold. Implementing this approach on dark networks, which are typified by incomplete and inaccurate data, may allow analysts to caveat their conclusions to reflect sensitivity to data errors.
- The project to *infer relationships from geographic co-location* has the potential to uncover hidden relationships from contemporary sources of social media, such as geo-tagged Tweets.

Publications through this Minerva research:

- Gerdes, L.M. et al. (2014), "Assessing the Abu Sayyaf Group's Strategic and Learning Capacities," *Studies in Conflict and Terrorism*, Vol. 37, No. 3, p. 267-293.
- Gerdes, L.M. (2014), "MAPPing Dark Networks: A data transformation method to study clandestine organizations," *Network Science*, available on CJO 2014 doi:10.1017/nws.2014.8.

Sharable data resources:

This research has produced agent-level data on members of the Abu Sayyaf Group involved in kidnapping. Learn more on page 136.

Curricula and other teaching exercises

In addition to featuring Minerva research-generated error tolerance tools, anti-fragility measurements, and Abu Sayyaf data in upper-level undergraduate courses. As Minerva Chair at the United States Military Academy I also co-created an undergraduate minor in Network Science and led student-centered research trips to Singapore, Malaysia, and Vietnam.

Forecasting Civil Conflict under Different Climate Change Scenarios

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Government Program Officer: Micheline Strand, Army Research Office
Government POC: Lisa Troyer, Army Research Office

We aim to generate estimates of the likely onset, duration and termination of future violent conflict events, such as armed civil conflict, under a range of alternative socioeconomic and climate change scenarios to the end of century. To achieve this goal, we are engaging in the following four interrelated research activities:

1. Development of a simulation approach that generates probabilistic forecasts of conflict;
2. Development and extension of socioeconomic and climate change scenarios;
3. Empirical modeling of the indirect relationships between physical impacts of climate change, socioeconomic variables and conflict; and,
4. Case studies investigations of the influence of climate change on stability and conflict.

Methodology

First, we estimate the historical effects of variables related to conflict. We then use these models to forecast future conflict outbreak and occurrence, 2013–2100. **Figure 3** shows our simulation approach.

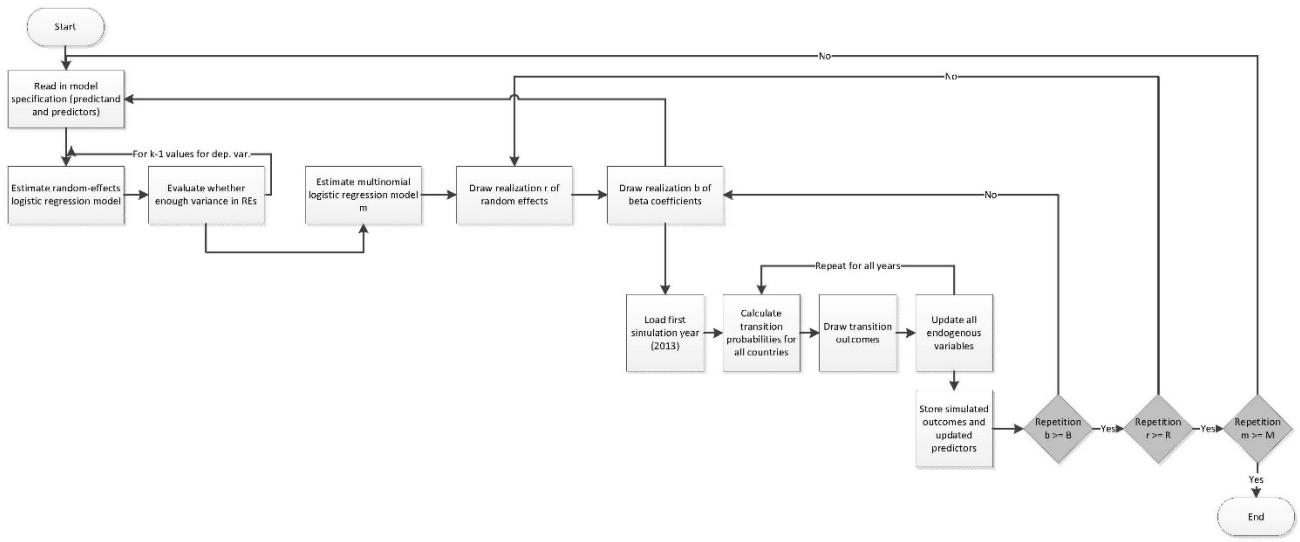


Figure 3: Simulation Approach developed by Hegre et al. (2013)[8]

[8] Hegre, H., Karlsen, J., Nygård, H. M., Strand, H., & Urdal, H. (2013). Predicting armed conflict, 2010 - 2050. International Studies Quarterly, 57(2), 250–270.

To date, we have completed a 'proof of concept' simulation, generating projections of armed conflict over the shared socioeconomic pathways (SSPs) as a function of population size and economic development. In Table 5, we summarize the SSPs, which are under development by the climate change community[9]. Previous research has identified population size and economic development as two of the most robust correlates of civil war. We extract these data from the SSPs. We employ the 2013 update of the UCDP/PRIO Armed Conflict Dataset[10, 11], which records conflicts at two levels. Minor conflicts pass 25 battle-related deaths, but have fewer than 1000 deaths in a year. Major conflicts pass the 1000 annual deaths. We ran 1,000 simulations for each of the five SSPs.

Table 5: Primary variables defined in the SSPs

Pathway	Economic Growth	Speed of Convergence	Population Growth	Education Levels	Fossil Fuel Dependency
SSP1: Sustainability	Medium-high	Medium	Low	High	Low
SSP2: Middle of the Road	Medium	Medium	Medium	Medium	Medium
SSP3: Fragmentation	Low	Low	High	Low	High
SSP4: Inequality	Medium	Low-Medium by country	Varies by country	Low - medium by country	Varies by country
SSP5: Conventional Development	High	High	Low	High	High

Initial Results: We show our preliminary results in **Figure 4**. We observe an overall decline in conflict along the SSPs with the highest proportion of conflict in the `fragmentation' scenario (SSP3). The simulations also reveal that intrastate conflicts at the end of the century are likely to cluster in central parts of Africa and Asia - hotspots of contemporary civil wars.

Anticipated Outcomes of Research

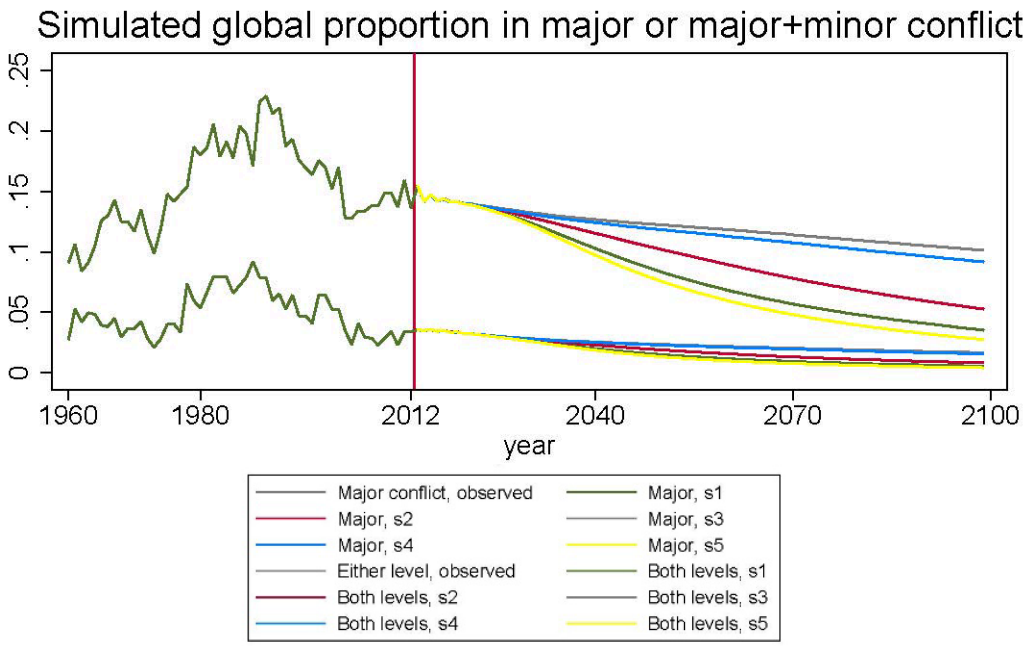
We are building a model that forecasts conflict and potentially other forms of unrest along socioeconomic and climate pathways. Specifically, we hope to incorporate new relationships of the indirect influence of the physical impacts on conflict. In the near-term, we are focusing on climate impacts through changes in agricultural productivity and food prices. These empirical efforts are being supported by a case study of the influence of agricultural and water availability on social stability in Pakistan.

[9] Nakicenovic, N., Lempert, R. J., & Janetos, A. (2013). A Framework for the Development of New Socio-economic Scenarios for Climate Change Research: Introductory Essay, Climatic Change.

[10] Gleditsch, N. P., Wallensteen, P., Eriksson, M., & Sollenberg, Margareta and Strand, H. (2002). Armed Conflict 1946-2001: A New Dataset. Journal of Peace Research, 39(5).

[11] Themnér, L., & Wallensteen, P. (2014). Armed conflict, 1946 - 2013. Journal of Peace Research, 51(4).

Figure 4 Simulated global proportion in major or major and minor conflict along the five SSPs



Potential Impact on DoD Capabilities and Broader Implications for National Defense

Quantitative efforts to evaluate the influence of climate change on civil conflict and other forms of violence through indirect pathways, such as economic growth and food prices, are relatively limited. Further, there are even more limited forecasts of how these risks may evolve over the century as a function of both climate and socioeconomic conditions. This effort fills that gap by improving the understanding of these dynamics as well as projecting the occurrence of conflict over the next few decades. These projections will aid with developing interventions and adaptations to mitigate emerging risks.

Publications through this Minerva research

- Buhaug, H., et al. 2014. *One Effect to Rule Them All? A Comment on Climate and Conflict. Climatic Change*, in press.
- Hegre, H., Buhaug, H., Calvin, K.V., Gilmore, E.A., Nordkvelle, J., Nygard, H.M., Waldhoff, S.T. (2014). "Forecasting armed conflict along the Shared Socio-Economic Pathways," Working paper, Presented at the International Studies Association, Toronto, Canada, March 25, 2014
- Gilmore, E.A., Buhaug, H., Calvin, K., Hegre, H., Steinbruner, J., Waldhoff, S. (2013). "Forecasting civil conflict under different climate change scenarios." In: *Impacts World 2013 Conference Proceedings*. Potsdam: Potsdam Institute for Climate Impact Research, pp: 408. http://www.climate-impacts-2013.org/files/wism_gilmore.pdf.

Dynamics of Sacred Values and Social Responsibilities in Governance and Conflict Management: The Interplay between Leaders, Devoted Actor Networks, General Populations, and Time

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Scott Atran, ARTIS Research; **Richard Davis**, ARTIS Research;
Doug Medin, Northwestern University; **Jeremy Ginges**, New School for Social Research
John Alderdice, University of Oxford
Adolf Tobena and **Oscar Vilarroya**, Universitat Autonoma de Barcelona
Project POC: Richard Davis, rdavis@artisresearch.com
www.valuesminerva.org (soon to come)
Government Program Officer: Benjamin Knott, Air Force Office of Scientific Research

Research focus: The dynamic relationship between ethics-based and instrumental reasoning in general and, in particular, how political and advocacy groups manage values and responsibilities over time.

Most successful political and advocacy (e.g., environmental) groups must manage strong commitment to core values with the pressing responsibilities of governance or and implementation of advocacy issues. Perceived compromise over core values can undermine popular legitimacy, but practical compromise may be necessary to ensure the economic and social welfare of the people. How, then, do such groups maintain values yet meet responsibilities over time? Ever since Max Weber first posed this question as the fundamental moral and practical challenge for anyone having "a vocation for politics," there has been relatively little systematic study or cumulative insight into a realistic answer. Although substantial work has been done on the instrumental side of decision-making, until recently there was little analysis of the values side. New studies by our multidisciplinary and multinational research team, as well as work by others, have focused on protected or "sacred" values that drive ambitions, policies and actions independently of calculated costs, risks or expected outcomes. Still, there has been little serious study of the dynamic relationship between deontological and instrumental reasoning in general and, in particular, of how political and advocacy groups manage values and responsibilities over time.

From the vantage of national and international security, few problems may be more pressing than understanding this dynamic as it relates, for example, to the future course of Israel/Palestine and the rise to power of ISIL in Syria and Iraq. As groups like ISIL, Hamas, Hizballah and others control territory they must engage with the local populations, which force them to consider how they will enforce and/or balance their values with the responsibilities of providing core functions of governance, like education, food, health and security. The theoretical and practical implications of the dynamic relationship between values and responsibilities potentially apply to a wide range of political and advocacy movements across the world, including in our own country. Accordingly, in this research we concentrate on study populations (in Palestine, Israel, Spain, Ireland, India, USA), chosen to balance pressing matters of national and international security with wider theoretical and practical understanding. We also leverage other research from our team in Lebanon, Iraq, Morocco and Panama to further our understanding.

Methodology

Our methodology involves a series of interrelated data elicitation and analysis techniques, including: (1) open and structured interviews with leaders of political and advocacy groups and committed followers and advocates, in different cultural settings and conflict zones, in order to generate and test specific hypothesis, (2) lab experiments in the USA to experimentally refine the hypotheses for testing,

(3) experimentally designed surveys to test hypotheses among different cultural populations,
(4) neuroimaging experiments to: (a) characterize the neural processes underlying group conformity in decision making, and their plasticity under leadership, (b) identify the neural markers that distinguish sacred-value conformity versus compliance to social norms., and (c) characterize the neural processes underlying the attachment to concrete markers of sacred values and their plasticity under conditions of threat. Because our sampling of leaders and committed followers and advocates will be relatively small, we will use cultural consensus modeling (CCM) to evaluate patterns of agreement and disagreement. This is a powerful tool originally developed by anthropologists in collaboration with psychologists, which allows considerably more insight than standard statistical techniques into the psychological patterning of small cultural populations up to the level of individual variation. In addition, for committed followers and advocates, we will use social network analysis to build our sample groups. In the past, we have used these techniques to successfully probe a range of theoretical issues in diverse cultural populations: from principles of natural classification and environmental management among Maya and other Native American groups, to causes of extremist violence and intractable conflict in global hotspots.

Study Stages and Responsibilities. This work progressively builds in overlapping stages: A) Participant observation and, semi-structured in-depth interviews, B) Structured interviews and psychological experiments, C) General surveys, D) Neuroimaging, E) Analyses.

Initial Results (some fieldwork funded outside Minerva, but contributes to project):
US – Responses were analyzed of 691 pro-life Americans who completed our values survey. In addition to other tasks, participants were asked to evaluate 10 controversial issues (e.g., gun rights, pro-life, etc.). Specifically, they were asked to evaluate each value for degree of fusion and sacredness, willingness to commit costly sacrifices in defense of their values in general, emotional reactions to relevant events, and fusion with various groups (e.g. Christianity, USA, etc.). The total number of SVs was correlated with both fusion with values and fusion with group. Total number of SVs was correlated with costly sacrifice, emotional reaction to relevant events, and fusion with the US. Total number of SVs, issues people were fused with, and fusion with Christianity independently and positively predicted costly sacrifice. Thus, fusion with values and fusion with groups seem to be interrelated phenomena complementary to SVs. The implication is that SVs and fusion (with values and groups) are complementary but independent contributors to costly sacrifice.

Lebanon - We interviewed 62 Lebanese (Sunni, Shia and Christian) in Beirut and Byblos (Jbeil) in a time of heightened tension owing to spillover from the Syrian civil war. Analytic measures focused on willingness to make costly sacrifices for confessional (religious) groups and sectarian values, as a function of the degree to which people perceived universal and parochial values to be morally important, and considered their personal selves “fused” with their group. Sectarian moralists who fused with their religion expressed strong willingness to support costly sacrifices for the group, whereas people who fused with their religion but moralized universal over sectarian values were least likely to support costly sacrifices. In addition, when people believed their group’s interests were at risk, fusion increased desired social distance to other groups; however, for people who did not see group interests at risk, fusion decreased desired distance.

Palestine – Field interviews of Hamas and Palestinian leaders were conducted to support analysis of twenty years of Palestinian popular support, values and violence measures. Several findings emerged. First, popular support measures demonstrate that changing environmental conditions stress the relational dynamics between Hamas and Palestinians, making Hamas regularly reframe and apply values on the ground differently. Second, and most informative, in time-series Granger-causation analyses, we found

that Palestinian support for violence against Israel is a predictor for Hamas led violence against Israel, countering the commonly held belief that Hamas is the vanguard of the Palestinian people.

Pakistanis in Spain – Our three-part study protocol is under review with the IRB. This project involving Pakistanis in Barcelona utilizes a variety of methodologies including field interviews, surveys, behavioral manipulations, and neuroimaging. The goal of the project is to understand 1) neural baseline differences between sacred vs. non-sacred values, 2) how manipulating perceptions of in-group social consensus differentially effects the social conformity of sacred vs. non-sacred values, and 3) to identify neural substructures that predict the degree of conformity as perceptions of social consensus are manipulated over sacred and non-sacred values. In order achieve these goals a protocol with three stages was designed: pre-scan field survey, intrascanner experimental manipulation, post-scan retest. The pre-scan field survey will identify which values are sacred and non-sacred for each individual along with a variety of other measures. The intrascanner experimental manipulation will have the participants view the values in an fMRI while being asked to rate their willingness to fight for each value. While still in the scanner they will be presented with false consensus feedback on the average willingness to fight for each value by other members of their group. In the post-scan stage they will be asked to re-evaluate their willingness to fight for each value, along with a variety of other measures.

Anticipated Outcomes of Research:
Common approaches to understanding and resolving resource and political conflicts often assume adversaries aspire to construe the world instrumentally, and that the chief difficulty lies in translating and standardizing instrumental frames and preferences across different cultural actors so that everyone is "on the same page." Such assumptions prevail in risk assessment and modeling by foreign aid and international development projects, and in proposals for "business-like" negotiations and "carrots and sticks" policies to deal with deep-seated cultural and political conflicts. Our anthropological fieldwork and psychological experiments relating to political and cultural conflicts suggest that distinct value frameworks constrain preferences and choices in ways not readily translatable (fungible, substitutable) across frameworks, thus defying the utilitarian logic of realpolitik. We seek to study of the dynamic relationship between deontological modes of decision making associated with SVs and instrumental modes of decision making associated practical necessities of governance and policy implementation and how political and advocacy groups manage values and responsibilities over time.

Potential Impact on DoD Capabilities and Broader Implications for National Defense
Our research ultimately aims to identify shared values and how they may be used to build relationships and encourage others in ways favorable, or at least not hostile, to our way of life. Where hostile or antagonistic values persist, then an understanding of how groups manage the tensions between responsibilities and values gives affords us possibilities for containing and, if necessary, parrying those values by leveraging responsibilities (e.g., conditioning our economic, military and other forms of foreign aid) and creating openings for value change (including from our most influential non-governmental organizations, such as our universities, multimedia, faith-based organizations, and myriad forms of peer-to-peer technical and cultural exchange). The ultimate goal of our work is to help save lives, resources and national treasure, keeping our people, our war fighters, and our potential allies out of harm's way by affording them psychological knowledge of how culturally diverse individuals and groups advance values and interests that are potentially compatible or fundamentally antagonistic to our own.

Publications Sponsored (at least in part) by Minerva research

- Argo, N. & Ginges, J. (2015). Beyond Impasse: Addressing Sacred Values in International Political Negotiations. In M. Gallucio (Ed.) *International Handbook on Negotiation and Mediation*. (Vol. XVIII) Berlin: Springer.
- Atran, S. (2014, August 5). U.S. Must Help Deal Directly With Hamas. *The New York Times*. Retrieved from http://www.nytimes.com/roomfordebate/2014/08/05/can-the-us-still-be-a-leader-in-the-middle-east/us-must-help-deal-directly-with-hamas.
- Atran, S. (2014, August 21). Incentives for War, Beyond Material Gain. *The New York Times*. Retrieved from http://www.nytimes.com/2014/08/21/opinion/incentives-for-war-beyond-material-gain.html?partner=rssnyt&emc=rss&_r=1.
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- Ginges, J., (in press). Sacred values and political life. In JP Forgas (Ed). *Social Psychology and Political Life*.
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- Jassin, K., Argo, N., Obeid, N., & Sheikh, H, & Ginges, J. (2013). Negotiating cultural conflicts over sacred values. In. K. Sycara & M.J. Gelfand (Eds.), *Springer Advances in Group Decision and Negotiation Series: Modeling Intra Cultural Collaboration and Negotiation* (MICON).
- Leidner, B., Castano, E., & Ginges, J. (2013). Perceived Outgroup Sentience Predicting Notions of Justice in Intergroup Conflict: An Investigation from Victim and Perpetrator Perspective. *Personality and Social Psychology Bulletin*, 39, 181-192. IF:2.2
- Sheikh, H., Ginges, J., & Atran, S. (2013). Sacred Values in Intergroup Conflict: Resistance to Social Influence, Temporal Discounting, and Exit Strategies. Annals of the New York Academy of Sciences, 1299, 11-24.
- Sheikh, H., Ginges, J., and Atran, S. (2013). Sacred values in the Israeli–Palestinian conflict: resistance to social influence, temporal discounting, and exit strategies. *Annals of the New York Academy of Sciences, 1299* (September 2013), 11-24.

Sharable data resources to be generated

All data and publications will be available at http://www.valuesminerva.org.

Government briefings related to this research

- UK Defense Stabilization Unit, "Countering Violent Extremism", London, December 2013.
- Defense Science Board, Office of the Secretary of Defense, "Countering Violent Extremism", Arlington, Virginia, April 2014.
- US Department of State, Bureau of International Information Programs, "Countering Violent Extremism", Arlington, Virginia, April 2014.
- US Security Coordinator for Palestine and Israel, "Palestinians and Hamas", Pentagon, July 2014.
- DoD Strategic Multilayer Assessment Team, "Countering Violent Extremism", Washington, DC, August 2014.

Moral Schemas, Cultural Conflict, and Socio-Political Action

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Rengin Firat, Istanbul University
Government Program Officer: Frederick Gregory, Army Research Office

Research Problem: Investigate the interplay of social and mental mechanisms for the relationship of moral values, group affiliation and political mobilization within a cross-cultural perspective comparing the U.S., Turkey, France, and South Korea.

Literature suggests that moral values underlie cultural contention; violations are fundamental motivators for socio-political behavior, especially violent extremism (e.g., Atran 2003; Atran, Axelrod and Davis 2007; Berns and Atran 2012; Ginges and Atran 2011). However, current knowledge still lacks an adequate understanding of the role of culture and social identities in shaping value orientations, collective beliefs, and social movements. These established models leave little room to explain observed variation in how values diffuse and change (see Hitlin and Piliavin 2004). As such, policy makers lack proper tools for understanding social unrest and devising effective strategies promoting social stability and decreasing violence.

Methodology

Our project employs a cross-cultural empirical strategy combining social scientific survey methodology with neuroscientific brain imaging techniques to reveal the role of values in social mobilization. We propose a two-phase methodology that collects large-scale survey data from the U.S., Turkey, France, and South Korea to identify important value dimensions for each culture (Phase 1), and then obtains neurological and behavioral data from the U.S. and Turkey while people respond (partnered with people who share or violate those values) to cultural conflict scenarios threatening these important values in a functional Magnetic Resonance Scanner (Phase 2).

Phase 1 survey included measures of general value orientations (Schwartz 1992; Inglehart and Baker 2000), moral foundations (Graham, Haidt and Nosek 2009), sacred values (Berns et al. 2012, Tetlock et al. 2000), locus of control (Mirowsky and Ross 1998), a novel moral groupness battery, a political/civic engagement battery derived from the General Social Survey, World Values Survey and the European Social Survey, and basic demographics. Phase 1 offers the potential for a broader understanding of the factors we are currently exploring by comparing nations that not only carry distinct religious traditions (Catholic, Protestant, Confucian/Buddhist, and Muslim) but also lie on the opposite axes of important value dimensions (like traditionalism or self-expression values).

Phase 2 capitalizes on advanced fMRI brain imaging technique to (a) explicate the mental processes underlying moral identity commitments that contribute to socio-political action ranging from passive support to active mobilization, and (b) to elucidate how culture contextualizes these processes comparing the U.S. with Turkey.

The Phase 1 (survey) and Phase 2 (fMRI study) parts of our project complement each other by first identifying important value dimensions for each culture from a larger sample pool and then creating cultural conflict situations targeting these values. This methodology allows us to bring a nuanced understanding of the ways in which moral schemas relate to social action, and more accurately frame fMRI results within a proper social scientific understanding of how moral values anchored in group identities trigger socio-political action

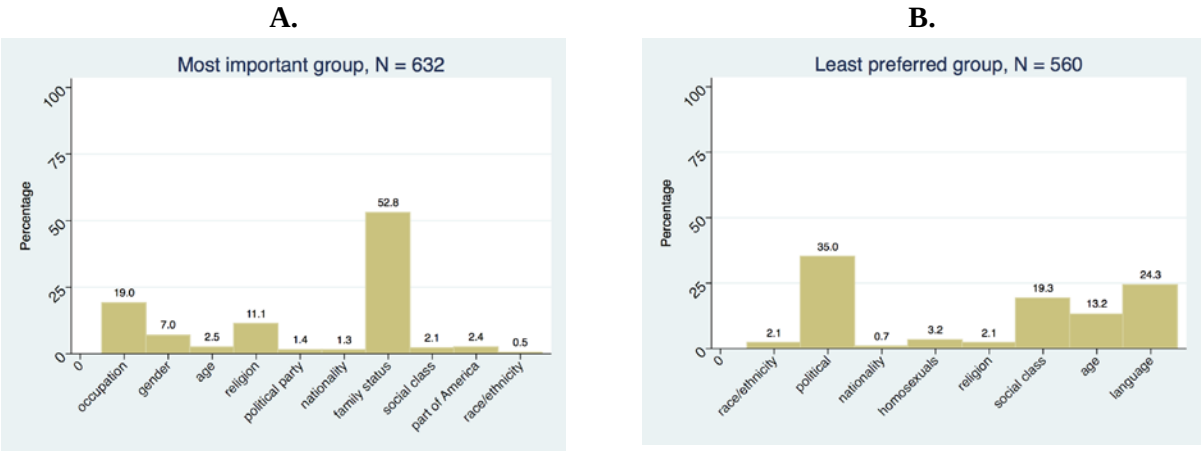

Figure 5: Most and least preferred groups

Initial Results

We have finished Phase 1 data collection in the U.S. (Iowa) and conducted initial preliminary analysis. Our sample size is 637 (average age 41 years, 71% women, 92% White, 77% with at least college degree). In our preliminary analysis, we found that a majority of our respondents (about 53%) rated their family status (e.g., being a husband or wife, mother or father, son or daughter) as their most important group (see **Figure 5A**). We also investigated the least preferred group (the most salient out-group) with the standard World Values Survey question asking the respondents to choose the group they would least prefer as neighbors. Accordingly, we found that the least preferred social group in our sample was people of a different political orientation, followed by people speaking a different language and those from a different social class (see **Figure 5B**).

Using the Schwartz value typology (Schwartz 1992), we calculated average scores for ten general value orientations of the respondents (21-item Portrait Value Questionnaire, Schwartz et al. 2001) as well as their evaluations of whether or not these values were important for their in-groups and out-groups. The most important values for our sample were benevolence and universalism (value dimensions caring for others and prioritizing their welfare), followed by self-direction (emphasizing creativity and independent thought) (see **Figure 6A**). Similarly, respondents rated these values as the most important for their in-groups; for example, 57% of the respondents rated benevolence as one of the most important values for their most important in-group (see **Figure 6B**). Moreover, respondents clearly saw a distinction between their values and the values of their least preferred group. They indicated the values that were important to them and their in-groups (like benevolence, universalism and self-direction) were not very important for their out-groups whereas values emphasizing conformity and self-enhancement (like power and security) were (see **Figure 6C**).

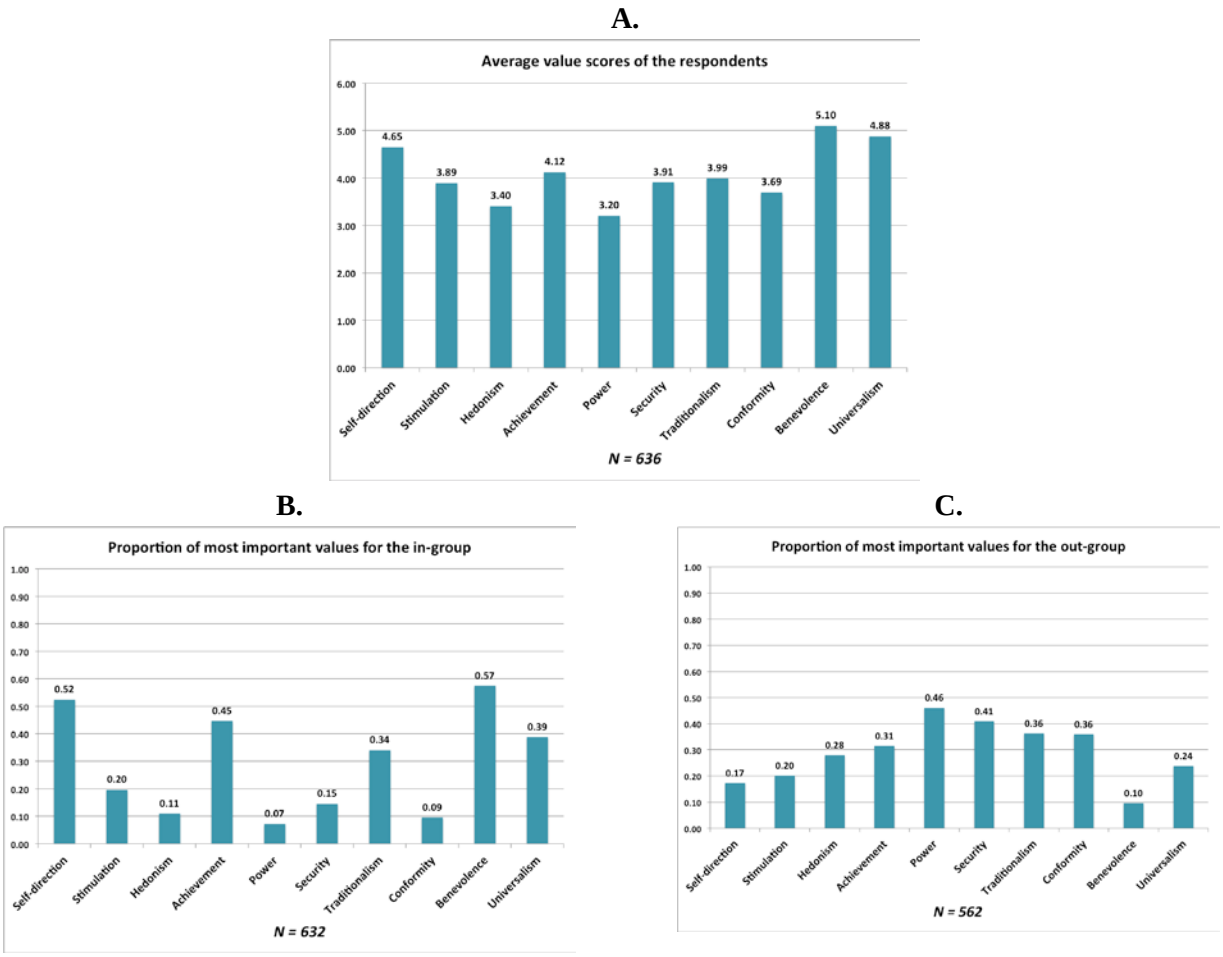

Figure 6: Important values for self, in-group and out-group.

Next, we examined whether or not individual value orientations and perceptions about most and the least important values for in- and out-groups have statistically meaningful relationships with political action/attitude outcomes. We looked at the pair-wise correlations between values and a political action scale (average of 5 items including signing a petition, boycotting, attending demonstrations, attending political rallies, and contacting politicians, alpha = 0.72, ranges from 0 to 2), and supporting pre-emptive military attacks (yes/no variable, coded 1=yes, meaning support). As can be seen in **Table 6**, giving importance to universalism and security values had the strongest correlations with increasing levels of political activism. While people with higher universalism orientation were more likely to participate in political actions, those with higher security orientation were less likely. Interestingly, one's own values and those perceived as important to in- and out-groups had strong correlations with political action. For example, rating universalism as one of the most important values for the in-group has a significant positive relationship with political activism, while rating hedonism as one of the most important values has a negative relationship. Furthermore, rating out-groups as valuing universalism has a negative association with political activism, while rating them as not valuing universalism has a positive association. These results give important preliminary insights on how Americans draw their moral maps, including perceptions of boundaries between in- and out-groups, and demonstrate that knowing this information helps partially explain political participation. Future stages will allow us to compare these moral maps with strategically chosen cultures, and perform more informed neurological studies of the potential differences and similarities between American and Muslim citizens.

Anticipated Outcomes of Research:
Our research breaks new ground by integrating cultural and biological understandings to elucidate qualitative distinctions or similarities in values and motivations and underlying mechanisms. By directly comparing South Korea, France, Turkey and the U.S., our project will provide significant insights into how culture contextualizes the construction of the significant moral groups as well as common value denominators. We expect to find that different types of values motivate distinct modes or varying degrees of political action in different cultural contexts, and in the face of different constellations of perceived social networks. Our research will not only uncover the values motivating different types of action (including impulses to violence), but also specific brain mechanisms underlying each type of action. We expect to find that brain regions that are associated with fast processing (the ventromedial prefrontal cortex and the amygdala) will be associated with active action (such as active violent) while regions related to slow cognitive control (dorsolateral prefrontal cortex) will be related to passive and non-violent actions. Furthermore, we expect to find that interactions with moral in-group and out-group members systematically influences brain system activation, which in turn shapes interactional strategies and appraisal processes.

Potential Impact on DoD Capabilities and Broader Implications for National Defense:
Our project offers a systemic comparison of how religion, cultural heritage, or East/West cultural forces shape the perception of contentious moral issues. Results from these comparisons will potentially contribute to better understanding and predicting how American messages, diplomatic communications, and inter-military contact are mediated through local cultural, moral meanings, thus shaping future communication strategies of American military.

Table 6: Pairwise Correlations between Political Action and Values

	SELF	INGROUP		OUTGROUP	
		MOST	LEAST	MOST	LEAST
Self-direction	0.17	0.12	-0.12	-0.09	0.15
Stimulation	0.07	-0.08	-0.02	-0.13	-0.05
Hedonism	-0.05	-0.16	0.09	-0.08	-0.05
Achievement	-0.03	-0.05	-0.01	0.03	-0.16
Power	-0.16	-0.07	0.02	0.19	-0.16
Security	-0.28	-0.03	-0.06	0.12	-0.10
Traditionalism	-0.22	-0.11	0.10	0.03	-0.05
Conformity	-0.24	-0.06	0.14	0.13	-0.14
Benevolence	0.04	0.12	-0.06	-0.05	0.18
Universalism	0.33	0.25	-0.16	-0.17	0.35

Note = The strongest correlations are highlighted. All highlighted correlations are significant ($p < .01$).

Motivation, Ideology and the Social Process in Radicalization

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Claudio Cioffi Revilla, George Washington University; **Andrzej Nowak**, University of Warsaw
Government Program Officer: Harold Hawkins, Office of Naval Research

Research problem: Understand radicalization as a social, cultural, and psychological process.

It is increasingly apparent that though "kinetic"/operational measures are indispensible in the global war on terror, they cannot comprise the entire solution to the problem. Like the mythical hydra that grows new heads in place of those that were chopped off so to Al Qaeda and its affiliates seem to spring new branches even if AQ core isn't what it used to be. But we have AQIM, AQAP, AQ, ISIL in Iraq/Syria, Boku Haram in Nigeria, Islamist extremists in Indonesia, Malaysia, the Philippines, Thailand, and China, as well as in Central Asia.

To understand why radical groups are appealing and how to counteract them, we need to understand radicalization as a social, cultural, and psychological process. We define radicalization as movement toward the advocacy of/engagement in activities that run counter to widely accepted norms and values, for example against the prohibition of killing uninvolved civilians. Not all those who hold radical attitudes necessarily engage in terrorism, but all who engage in terrorism are likely to hold radical attitudes, that is, attitudes that justify terrorism. Our project, therefore, is based on the premise that a viable program to combat violent extremism is to discover ways to prevent radicalization, and to reverse it where it has taken root, that is to promote effective deradicalization. This is what we aim to study in this project, and extract policy implications from our findings.

Methodology

The research project involves three major thrusts: (1) field research in five sites across Middle East-North Africa (Morocco), Europe (Northern Ireland), and South and Southeast Asia (Indonesia, Philippines, Sri Lanka), (2) computational modeling of radicalization and (3) derivation of suggestions for best practices on the level of policy. Toward accomplishing these thrusts, we have assembled a multidisciplinary team of researchers (i.e., psychologists, anthropologists, computational scientists, and policy experts). We have developed a conceptual model (i.e., Significance Quest theory; Kruglanski et al., 2014) of radicalization and deradicalization processes based on past research and theory. This will guide our data collection. However, data collection will be only partially constrained by this model, as we will also examine issues that emerge within the local contexts of our studies, and modify our model in their light if this seems indicated. Likewise, we will be carrying out computational simulations, and any emergent insights from these simulations will also contribute to further development/revision of our theoretical model. We will employ several data collection techniques in the field, including surveys, experimental studies, structured interviews, and consensus building techniques.

Initial Results:

In four sites (i.e., Northern Ireland, Philippines, Sir Lanka, Indonesia) we have obtained host-government and IRB approvals to work with community members and prisoners. One round of surveys was conducted with Moroccan community members in Casablanca and Tetouan, and a second round of data collection is currently underway. These surveys examine potential pathways to which individuals come to endorse extreme or radical ideologies. One pathway examining the individual motivations of extremists

yielded partial support for our significance quest theory of radicalization. Accordingly, analyses revealed that higher feelings of insignificance were related to increased endorsement of Islamic extremism. Importantly, feelings of insignificance had this effect by increasing participants' need to see the world in a structured, predictable way (i.e., increased need for cognitive closure), and also by shifting their focus to the ideals and goals of their in-group. An interesting finding was that this motivational pathway was apparent among respondents in Tetouan, but not those of Casablanca.

A second path model examined the structure of radical beliefs, by parsing the ideology of Islamic extremism into its various components—religious fundamentalism and support for militant jihad—and assessed how these components influenced each other. Religiosity was indirectly related to support for militant jihad through religious fundamentalism. Furthermore, perceiving Sharia law as sacred (being unwilling to compromise in regards to the implementation of Sharia law in Morocco) amplified the relationship between religiosity and religious fundamentalism. Likewise, perceptions of group exceptionalism amplified the relationship between religious fundamentalism and militant jihad. The same process model was apparent for the relationship between religiosity and anti-democratic attitudes.

Initial computational models have been created and refined. One such effort is a sensitivity analysis examining the extent to which different variables influence the probability of radicalization. Preliminary results indicate that radicalization probability is most sensitive to variations when the number of alternative triggers (e.g., collateral damage) is small ($\approx 7\pm2$). A separate effort examines the emergence of radical opinion clusters across time. Initial findings suggest that times of crises or grievances (aka insignificance) tend to polarize previously moderate agents, leading to opinion clusters at either pole of the ideological spectrum. Finally, a third effort is being undertaken to model how, after the collapse of an autocratic regime, the presence of mezzo-level structures impact whether a society transitions to democracy, turns to a new or old autocratic regime, or forms disassociated and competing clans/groups.

Anticipated Outcomes of Research

Anticipated outcomes of this research include research findings attesting to the factors that promote and those that inhibit radicalization tendencies. Based on our prior conceptual and empirical work, we are particularly interested in evidence concerning the effects on radicalization of significance quest based on perceived trampling of individuals' sacred values. Rigorous empirical demonstration of the ideological basis of radicalization in the interest of boosting individuals' sense of self-significance will make a significant contribution to the social science based understanding of radicalization and will have significant policy implications as concerns programs aimed at countering violent extremism. The initial efforts in Morocco are supportive of this effort.

Potential Impact on DoD Capabilities and Broader Implications for National Defense

Radicalization that turns into violent extremism poses a clear and present danger to national defense, whether that anti-American radicalization occurs in US territory or faraway lands. Understanding the conditions that prompt and prevent radicalization is a first step toward devising measures, programs, and policies for countering and reversing radicalization that are of first rate significance for national defense. The anticipated findings are likely to prove useful to understanding and—from an actionable perspective— systematically counteracting terrorist organizations' recruitment efforts and diverting the emotional and cognitive reasoning of potential recruits away from terrorism. In summary, the proposed work is likely to yield profound understanding of structural and psychological elements of terrorist networks of practical relevance to a broad range of national defense stakeholders.

Publications through this Minerva research

- Argo, N. & Ginges, J. (in press). Beyond impasse: Addressing sacred values in international political negotiations. In M. Gallucio (Ed.) *International Handbook on Negotiation and Mediation*. Berlin: Springer.
- Atran, S. Martyrdom's would-be myth buster. *Behavioral and Brain Sciences*, in press.
- Cioffi-Revilla, C.(2014). *Introduction to Computational Social Science: Principles and Applications*. London and Heidelberg: Springer. ISBN 978-1-4471-5660-4, DOI 10.1007/978-1-4471-5661-1. Pp. xxxiii + 320.
- Cioffi-Revilla, C. (2013). On the quality of a social simulation model: A lifecycle framework. In Bogumil Kaminski & Grzegorz Koloch (Eds.), *Advances in Social Simulation* (pp. 13-23). Heidelberg: Springer-Verlag.
- Ginges, J., (in press). Sacred values and political life. In JP Forgas (Ed). *Social Psychology and Political Life*. Berlin: Springer.
- Ginges, J. & Atran, S. Sacred values and cultural conflict (2013). In Gelfand, M. J., Chiu, C. Y., & Hong, Y. Y. (Eds.), *Advances in Culture and Psychology* (Vol. 4). New York: Oxford University Press, pp. 273-301.
- Leidner, B., Castano, E., & Ginges, J. (2013). Perceived outgroup sentience predicting notions of justice in intergroup conflict: An investigation from victim and perpetrator perspective. *Personality and Social Psychology Bulletin*, *39*, 181-192. IF:2.2
- Sheikh, H., Ginges, J., & Atran, S. (2013). Sacred values in intergroup conflict: Resistance to social influence, temporal discounting, and exit strategies. *Annals of the New York Academy of Sciences*, *1299*, 11-24.

Any external briefings related to this Minerva research (excluding academic conferences):

- April 2014, Defense Science Board, Office of the Secretary of Defense, "Countering Violent Extremism"
- April 2014, US Department of State, Bureau of International Information Programs, "Countering Violent Extremism"

The Chinese Communist Party's Economic Transitions via Organizational Reform

Charlotte Lee, charlotteplee@gmail.com
Minerva Chair, US Air Force Academy (2012–2014)
Home institution: Stanford University

Research Question: How does a ruling party maintain the relevance of its political organizations in the midst of a transition to a global market economy?

Over the past three and a half decades, the Chinese Communist Party (CCP**Error! Bookmark not defined.Error! Bookmark not defined.**) has defied expectations and remained at the helm of the nation's transition to a market economy and its integration with the global order. My book project addresses the critical question: how does a ruling party, such as the CCP, maintain the relevance of its political organizations in the midst of multiple transitions? It focuses on reforms affecting a key pillar of political authority: party control over party and government officials. Specifically, this book explains how China's ruling party has invigorated and recast a core party organization – a national network of party-managed training schools, also known as party schools — to suit China's new political economy.

Since the CCP's early years as a guerrilla army of revolutionaries, party schools have been critical for educating and training political elites and rank-and-file party cadres. After the founding of the People's Republic in 1949, a nation-wide network of these schools, numbering in the thousands, contributed to the CCP's statebuilding project by providing political education for party activists and officials. Today, party schools continue to perform these and other functions within the party. Of the 25 current leaders in the CCP Politburo (the party's highest decision-making body) five hold degrees from the Central Party School located in Beijing. Analysis of officials' career histories suggests that party schools constitute a nationwide system for screening and controlling bureaucrats' career trajectories.

Methodology:
I integrated three methods to combine both qualitative and quantitative evidence: field interviews, content analysis of documents, and regression analysis of large-N data. I conducted site visits and over 200 field interviews from 2006-2008 to build the foundation for case studies of training schools across regions and administrative levels. I also engaged in textual analysis of policy documents and training syllabi to identify changes in training content. Drawing on published and online sources, I constructed a dataset of Chinese political leaders to analyze the career profiles of central party school alumni.

Results
While the party school system has long been viewed as a "rite of passage" through which cadres receive a "finishing course" on correct ideology, under reform it has become a site for building the managerial knowledge and leadership skills demanded of central and local officials. These schools also remain a pipeline to higher office in the PRC, providing the party with an organizational means to control its human capital. In addition to strengthening China's ruling party and state, reforms of these schools have served the fiscal and political interests of local governments.

In recent decades, China's party school system has undergone dramatic reforms. Competition, out-sourcing, and budget constraints are driving schools to engage in a range of entrepreneurial activities. These activities have opened up party schools to new audiences such as local capitalists, non-CCP students, and the general public. Drawing on in-depth field research, this book shows that market-based reforms in the party school system have generated new incentives for schools to update training content for their core student base of CCP officials. Such "inner party reforms" have pushed schools to engage with domestic and international counterparts. Party schools must now compete with each other, other

party organizations, and universities in China and abroad for "training market share." Extensive content analysis of party school syllabi illuminates changes in the education received by Chinese bureaucrats: ideological training has waned somewhat but remains a significant portion of the curriculum while management content has increased substantially.

Research Outcomes

The end result has been a strengthening of education for China's officials, and, by extension, of state capacity in China. Party schools are now focused on creating the globally-oriented, market-savvy public managers demanded by the CCP as the party navigates complex economic and social transitions. At the same time, these schools are more integrated into local economies due to a variety of sideline activities. Questions remain regarding the risks accompanying these reforms. The increasingly diverse and decentralized nature of cadre education has the potential, over time, to chafe against the centralizing tendencies in the CCP-led party-state. A second risk includes the allocation, within party schools, of resources away from their primary work of training officials and toward more lucrative enterprises, with concomitant erosion of the partybuilding project.

Potential Impact on DoD Capabilities and Broader Implications for National Defense:

These findings have implications for understanding the drivers of party and state capacity in contemporary China, from the central to local levels of government, and the incentives that induce organizational change within a hierarchical ruling party. This project illuminates how market**Error! Bookmark not defined.** mechanisms now motivate political organizations of China's ruling party and argues that this "market turn" has contributed to the party's overall adaptiveness to changed conditions. This, in turn, affects US national defense insofar as heightened state capacity in China implies an ability to maintain stable rule and continue apace with investments in Chinese national defense.

Publications:

Completed book manuscript, *Training the Party: Party Adaptation and Elite Training in Reform-era China*, forthcoming Cambridge University Press.

Sharable data resources

See "*Sharable Data on Chinese Communist Party Economic Transitions*" on page 138.

- Dataset of content of CCP Party School course syllabi
- Dataset of career histories of CCP Central Party School alumni

Military Transformation and the Rise of Brazil

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Anne Clunan, Naval Postgraduate School
Harold Trinkunas, Brookings Institution
Project Manager: Ana Minvielle, aminvielle@ucsd.edu
Government Program Officer: Micheline Strand, Army Research Office

Research Problem: Examine the conditions under which states are able to benefit from the interaction of science, technology, and military innovation to emerge as important powers in the international system.

We are interested in the intersection of technological innovation and emerging powers. From a social science perspective, it is the application of science and technology innovation in particular social, political, organizational and economic settings that allows some "potential" powers to develop a greater ability to impact the international system, and thereby rise in the hierarchy of states. Technology can be thought of broadly as the application of ideas to develop real-world capabilities. In the present day, scientific innovation is closely tied to technological development, and both science and technology have fundamental impacts on societies, economies, and state capabilities, including military capabilities. However, not all technologies translate into influence and power at the international level for all states at the same time.

Our goal is to examine the conditions under which states are able to benefit from the interaction of science, technology, and military innovation to emerge as important powers in the international system. We take as a given that scientific breakthroughs may produce far reaching changes, but want to examine the nature of the changes that matter for international politics and their impact on a state‘s ability to project soft and hard power in the international sphere.

Methodology:
We use innovative social science to determine what domestic political, social, economic and organizational configurations support research, development and implementation of key technologies (nuclear and ballistic missile technology, avionics, and cyberwarfare) in potential powers that may provide states with greater influence in the international system. Research is oriented around four integrated projects that will provide insights into the nature, activities and long-term development prospects for military transformation in emerging states. Each project has its own relevant literature, will utilize distinct methodological approaches and has overlapping data requirements.

- "New Currencies of International Power" examines systemic dynamics that create opportunities for exerting influence at the international level.
- "Scientific and Technological Development and its Impact on Military Transformation" investigates how the national security definitions of dual use technologies affect cooperation between the scientific community and the military.
- "Military Transformation and Emergence as a Great Power" examines the importance of a scientific-technological-military network of sufficient connectivity and density to be capable of producing the desired output, the development of the political will or intentions to incorporate transformative military capabilities into a state‘s approach to foreign policy, and identification of how elites construct the concept of "national interest."

- "The Impact of the Science-Technology-Military Complex on International Behavior" analyzes how the specific nature of the science-technology-military complex, the process by which it is integrated into state capabilities, and its influence on state intentions affect the determination of whether the rising power adopts system-enhancing or system-disrupting behaviors internationally.

The research team is diverse in discipline and methodology and includes three important scholars who have hitherto not worked on Brazil but whose cutting edge scholarship on other countries (China, Russia and the US) and interest in extending their work to the Brazilian case augurs well for generating new insights.

Initial Results:
Desposato and his co-authors conducted survey experiments in China and Brazil, the latter funded by the Minerva grant. The paper assessed the scope of popular preferences for peace with democracies. The survey randomly varies both the hypothetical target's regime type and United Nations authorization for military action, responding to concerns that regime labels may trigger unintended value judgments about the target's legitimacy. Surprisingly, they found that respondents in both Brazil and China are significantly less likely to favor attacking a democratic opponent. At the same time, UN authorization has a much larger effect on a respondent's support for using force.

Diniz paper hypothesized that Status can be very important in non-crises, normal situations by buying time until reputation is established — especially when combined with other alternatives. Being recognized as a democracy gave Brazil a status advantage, due to expected working of informational and domestic audience-costs generation mechanisms, that, combined with then existing safeguards and commitments, bought time for a credible reputation as reliable nonproliferator to establish and for monitoring democratic consolidation. In time, reputation and domestic audience-related institutions have brought to Brazil a large manoeuvering-room in nuclear-related activities — Resende, nuclear submarines, Model Additional Protocol, Iran.

Anticipated Outcomes of Research:
Team members will produce peer-reviewed articles, book chapters, and a co-authored book by David R. Mares and Harold Trinkunas

Potential Impact on DoD Capabilities and Broader Implications for National Defense:
Brazil is one of the few countries to have mastered the complete nuclear fuel cycle: it is able to export significant nuclear technologies, yet it is also critical of the international nuclear nonproliferation regime. Brazil in the future will become a significant source of defense-related and dual use technologies, yet is generally resistant to the highly restrictive export control regimes advocated by the US. This makes it important to understand whether Brazil‘s growing capabilities will lead it to do more to reshape international regimes to match its current preferences, or whether its achievement of major power status will lead it to adopt policy preferences closer to those of the US in an effort to restrict new additions to the major powers club.

Sharable data resources to be generated*:*
20 question Facebook survey regarding attitudes about potential Brazilian foreign policy in crisis situations. This is an experiment on the nature of the democratic peace and its basis in regime type. It aims to explain citizens' willingness to use force to resolve international disputes by testing for the effects of regime type (democracy / not democracy), dispute type (nuclear, territorial and resource), and UN approval on the willingness to use force.

Emotion and Intergroup Relations

David Matsumoto, San Francisco State University, dm@sfsu.edu
Mark G. Frank, Co-PI, University at Buffalo, State University of New York
Hyisung Hwang, Co-PI, San Francisco State University
Government Program Officer: Benjamin Knott, Air Force Office of Scientific Research

Research problem: Examine the role of intergroup emotions—specifically anger, contempt, and disgust—in facilitating the build up to aggression and violence.

We test a theory of the role of specific emotions in the motivation of groups that transform angry or fearful groups into organizations of violence and hostility. We focus on the role of anger, contempt, and disgust in this transformation, and in the escalation toward violence. In Years 1-2 of this project, we tested these ideas in two studies examining the role of emotion in leading to and justifying hostile acts in ideologically-based groups through an analysis of historical archives of world leaders and leaders of ideologically-based groups justifying acts of war and hostility against other nation states or groups. Both studies demonstrated that leaders of groups that eventually committed acts of aggression expressed more anger, contempt and disgust when talking about their opponent outgroups than did leaders of groups that eventually engaged in acts of resistance. In Years 3-5, we conducted four laboratory studies in which we examined whether the elicitation of anger, contempt and disgust in members of political groups causally increased thoughts, feelings, or behaviors related to hostile or aggressive acts.

Methodology:
In all four laboratory studies, we recruited members of political groups that had a group opposed to its cause. We elicited a combination of either anger-contempt-disgust (ANCODI) or a comparison mix of emotions, and examined the resulting changes in hostile cognitions (Study 3), hostile language (Study 4), hostile behavior (Study 5), or hostile attitudes (Study 6) in relation to the opponent outgroup or a neutral outgroup.

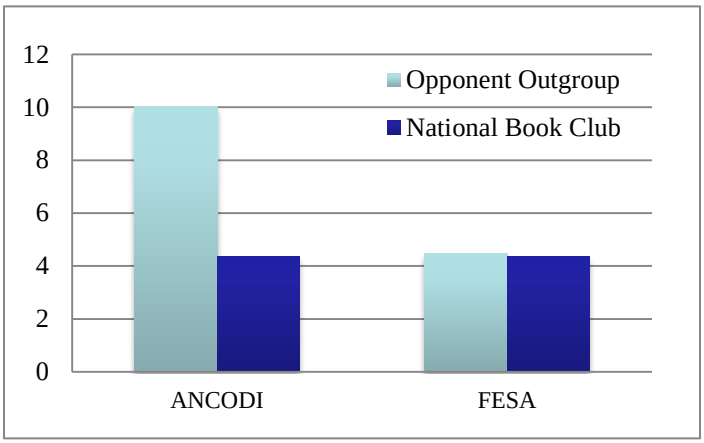

Figure 7: Comparisons of ANCODI vs. FESA

Initial Results:
The results from all four laboratory studies demonstrated that ANCODI produced more hostile cognitions, language, behavior, and attitudes against the opponent outgroups than did other negative emotions. These results complement and extend the studies from years 1 and 2 by showing a causative link to the building blocks of hostile thoughts, feelings, or actions. See **Figure 7** for an example of one of the findings.

Potential Impact on DoD Capabilities and Broader Implications for National Defense:
The results of the project provide a strong empirical basis for identifying specific emotional sentiments in language, metaphor, or other modes of communication that may be specifically related to the escalation of intergroup violence and aggression. Such findings can be combined with signal detection capabilities to allow signals intelligence efforts to narrow down huge amounts of raw intelligence into a smaller, more

manageable amounts of data for further analysis. Such monitoring can also be applied to identified sources of intelligence to provide probability profiles of aggression.

Publications through this Minerva research:

- Matsumoto, D., Hwang, H. C., & Frank, M. G. (2013). *Emotion and aggressive intergroup cognitions: The ANCODI hypothesis*. Manuscript currently submitted for publication.
- Matsumoto, D., Hwang, H. C., & Frank, M. G. (2013). *The effects of anger, contempt, and disgust on hostile language: The ANCODI hypothesis*. Manuscript currently submitted for publication.
- Frank, M. G., Matsumoto, D., & Hwang, H. C. (in press). Intergroup emotions and political violence: The ANCODI hypothesis. In Forgas, J. (ed.), *The 17th Sydney Symposium of Social Psychology*, Volume 17, 17-20 March 2014.
- Matsumoto, D., Hwang, H. C., & Frank, M. G. (2013). Emotions expressed by leaders in videos predict political aggression. *Behavioral Sciences of Terrorism and Political Aggression*, DOI:10.1080/19434472.2013.769116.
- Matsumoto, D., Hwang, H. C., & Frank, M. G. (2013). Emotional language and political aggression. *Journal of Language and Social Psychology.* Published online 7 February 2013, DOI: 10.1177/0261927X12474654.
- Matsumoto, D., Hwang, H. S., & Frank, M. G. (2012). Emotions expressed in speeches by leaders of ideologically motivated groups predict aggression. *Behavioral Sciences of Terrorism and Political Aggression.* Published online 28 August 2012, DOI: 10.1080/19434472.2012.716449.
- Matsumoto, D. & Hwang, H. C. (2012). The language of political aggression. *Journal of Language and Social Psychology*. Published online 8 October 2012, DOI: 10.1177/0261927X12460666.
- Matsumoto, D., Hwang, H. S., & Frank, M. G. (2012). The role of emotions in predicting violence. *Federal Bureau of Investigation Law Enforcement Bulletin, January,* 1-11. Quantico, VA: Federal Bureau of Investigation.
- Matsumoto, D. (in press). The role of emotion in escalating violent non-state actors to hostility. In A. Speckhard, L. Kuznar, T. Rieger, and L. Fernstermacher (eds.), *Protecting the homeland from international and domestic terrorism threats: Current multi-disciplinary perspectives on root causes, the role of ideology, and programs for counter-radicalization and disengagement.* Washington, DC: Joint Staff J3, Strategic Command Global Innovation and Strategy Center, and the Office of the Secretary of Defense Department of Development Research and Engineering.
- Matsumoto, D., Hwang, H. S., & Frank, M. G. (2010). The role of emotion in predicting violence. White paper prepared for the *Neurobiology of Political Violence: New tools, new insights*. National Institutes of Health sponsored workshop, December 2010 (Bethesda, MD).
- Matsumoto, D., Hwang, H. S., & Frank, M. G. (2010). The role of emotion in predicting violence. In Bringuel, A. J., Janowicz, J. C., Valida, A. C. and Reid, E. F. (eds.). *Terrorism research and analysis project (TRAP): A collection of thoughts, ideas, and perspectives* (pp. 231 – 258). Washington, DC: Government Printing Office.

Sharable data resources to be generated

Texts of speeches and videos from Years 1 and 2; all cognitive and behavioral data from Years 3-5.

Conventional Arms Control, Contemporary Deterrence, and Stability in South Asia

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Distinguished Visiting Professor of Research and Minerva Chairholder (2010–2014)
US Army War College Strategic Studies Institute

My research as a Minerva Chairholder has generally fallen into three categories:

1. **Contemporary approaches to conventional arms control** as an essential aspect of national security strategy.
2. **The role of deterrence in American strategic thinking and in other regions**.
   As the United States faces emerging threats such as cyber-warfare and terrorism it is important to consider how deterrence can contribute in future. This will also be critical due to the ongoing rebalancing of American military power to Asia, the emergence of China as a global power, and the continuing threat posed by North Korea.
3. **Deterrence as an aspect of American strategy towards Asia** as well as ongoing challenges with respect to **nuclear stability in South Asia**.
   The impending departure of American forces from Afghanistan at the end of 2014 will potentially cause increased stress on stability in South Asia. The growth of the Pakistan nuclear arsenal and their decision to develop/deploy tactical nuclear weapons will also have a significant impact on deterrence in the region, crisis stability, and proliferation.

Methodology has included

- Ongoing literature review.
- On-the-ground research in Pakistan and India that included lectures and interviews with senior officials as well as academic experts.
- Frequent contact with senior experts in the US government (NSC staff, OSD, State Department, etc.) as well as experts from major academic and research institutes in the U.S. and abroad.

Potential Impact on DoD Capabilities and Broader Implications for National Defense:
Throughout the current year I have coordinated closely with the Director of Conventional Arms Control, OSD Policy; Deputy Director, Office of the Assistant Secretary of State for Arms Control; the Senior Director for Pakistan, National Security Council Staff; Director, Pakistan Desk, JCS J5; and the Senior Advisor, Office of Nonproliferation and International Security, National Nuclear Security Administration. This has included periodic briefings, brain storming sessions, and updates on my research efforts.

Publications during FY 2014
The results of my effort are best described in the impact it has had for ongoing US policy development, as well as the expanded understanding of these issues as contained in the publications listed below.

1. My chapter entitled “Deterrence, the 21st Century, and the "Pivot"” will be contained in the forthcoming book *The New U.S. Strategy Towards Asia*, published by Routledge. This is due out later this year or in early 2015. This was done with a group of colleagues from the Australian National University and included experts from across Southeast Asia.
2. My chapter “Preparing for the Future: Brcko, Kabul, Baghdad, and Beyond” on Indian-US defense cooperation is contained in *U.S.-India Relationship: Cross-Sector Collaboration To Promote Sustainable Development*. This will be published by SSI and should be released by the end of 2014.

3. My paper "From Confidence Building to Crisis Management" was published in the conference proceedings—*Security of the Broader Sea Region* (Latvian Inst of International Affairs, Riga).
4. My chapter "US Pivot to the Pacific -- and Its Consequences" in the annual publication *The British Army 2014* is scheduled to be released by the end of 2014.
5. The draft "Pakistan and Tactical Nuclear Weapons -- Myth vs Reality" has been accepted to be a chapter in a book on Pakistan and nuclear weapons, scheduled for publication by the Stimson Center in Washington, DC by end of 2014.

Curricula and other teaching exercises generated

My research efforts during the current year resulted in an exercise as part of our ongoing Track 2 discussions with senior Pakistani officials focused on their nuclear program and stability in South Asia. This included organizing a workshop that was held at the Point Alpha Akademie in Germany.

With the assistance of the Army Heritage and Education Center as well as the Point Alpha Akademie I obtained and secured declassification of a portion of the American Army's actual defense plans for central Germany during the Cold War. We used these plans as part of this exercise to examine thru historical analogy the political and operational challenges posed by tactical nuclear weapons as a portion of any nation's arsenal.

FY 2014 briefings of Minerva research

- Lectured on US and NATO strategy towards Afghanistan and Pakistan at the National War College of Pakistan and Lahore University. (October 2013)
- Briefed select members of the British Ministry of Defense, Foreign Office, and select members of Parliament on ongoing research on stability in South Asia. (December 2013)
- Lectured on US-British defense cooperation at the Institute for the Study of Statecraft, London, United Kingdom. (December 2013)
- Provided lecture to the faculty of the George C. Marshall Center, Garmisch, Germany on security in South Asia and ongoing Track 2 discussions with Pakistan. (December 2013)
- Provided introductory presentation and assisted in the conduct of Track 2 discussions with senior Pakistani officials at the Point Alpha Akademie, Geisa, Germany sponsored by the National Nuclear Security Administration. (May 2014)
- Lectured on nuclear stability in South Asia at the Center for Landwarfare Studies, Forum for Security Studies, and Vivekananda International Foundation in New Delhi. (June 2014)
- Providing lectures and conducting brainstorming session with the Arms Control and Coordination Section, Nuclear Policy Directorate, and Weapons of Mass Destruction Center at NATO headquarters, Brussels Belgium at the invitation of Ambassador Doug Lute. (August 2014)
- Will serve as a member of a Track 2 team organized by the National Nuclear Security Administration (NNSA) for a workshop with senior officials in Yangon, Myanmar focused on WMD proliferation and counterproliferation policies in Southeast Asia. (September 2014)

What interactions have you had with students during your time as a Minerva Chair?

I have frequently advised students at the US Army War College on their ongoing research efforts for their thesis on areas on my expertise. In addition, I advised and assisted in direct contact with MG Cuccolo, Commandant, US Army War College and the Director for the International Fellows Program for the formulation of the first War College International Fellows (IF) alumni event. This included coordination with JCS to obtain funding for the participation of several senior retired Pakistani officers.

Cultural Knowledge and National Security

Montgomery McFate, montgomery.mcfate@usnwc.edu
Minerva Chair, Naval War College (2011–2014)

Project #1 (in progress)
Military Anthropology. This is a book that explores the nexus – both historic and current – of sociocultural knowledge and the military enterprise. The basic research question is: what can we learn from the life experience and intellectual legacies of a number of social scientists who contributed directly to military operations? How can we apply those lessons to current strategic and operational issues? This book tracks the JPME curriculum, and each chapter is grouped around a particular concept such as, military leadership, information operations, strategic objectives, and so on. I have thus far completed 7 chapters; the conclusion remains to be written, and possibly (depending on time and manuscript word count) a chapter on insurgency.

Project #2 (complete)
Social Science Goes to War: the Human Terrain System in Iraq and Afghanistan. This is an edited book that illuminates some of the actual research experiences of social scientists who conducted research in Iraq and Afghanistan for the US and ISAF forces. In addition to co-editing the book and co-authoring the introduction, I also contributed a chapter for the book, *Mind the Gap: Bridging the Academic/Military Divide*.

Project #3 (in progress)
Transcultural War. This is a book that explores what happens when two 'culturally distant' societies go to war, each having their own norms and ideas regarding the organized deployment of military force. Such transcultural wars involve certain unique psycho-social processes specific to culture contact situations. As combatants engage, they do not just fight their enemy – they also 'think' their enemy: categorizing, judging, constructing. The process of war often results in normative mismatch (e.g., the treatment of prisoners, type of weapons, and so on) with potential negative military consequences such as surprise, escalation, and 'moral injury' to combatants. Normative mismatch, in turn, may give rise to the development of symmetry between belligerents, in which they adopt each other's tactics and organizational structures.

Methodology:
The methodology for Project #1 & Project #3 is primary historical and archival. The methodology for Project #2 was field research with deployed military units in Iraq and Afghanistan; personal experience in program management; and historical/archival.

Potential Impact on DoD Capabilities and Broader Implications for National Defense:

Project #1: This project will help US government policy makers (DOD, State) understand the opportunities and pitfalls of using cultural knowledge in policy and strategy. This book is also specifically designed to be used in JPME in order to meet OPMEP guidance for the inclusion of culture into the curriculum, so might have a considerable impact on students from all branches of the services.

Project #2: This project will improve understanding about the successes and failures of the Army's Human Terrain System (which the author helped to establish), which has been to date the largest single investment the US government has made in the social sciences. The experiences of the author and of the individual social scientists who served in Iraq and Afghanistan with US military units illuminate a number of issues that are of current, on-going concern and that should be considered in the future for

similar military social science programs at the operation level, such as integration with supported units, team dynamics, bureaucratic structure, etc.

Project #3: This project will help US government policy makers (DOD, State) understand the opportunities and impediments of cross-cultural military contact, including issues such as moral injury, surprise and culturally-based deterrence.

Minerva research publications and presentations:

- *Social Science Goes to War: the Human Terrain System in Iraq and Afghanistan*, eds. Montgomery McFate and Janice Laurence, London: Hurst/New York: Oxford University Press, 2014 (forthcoming). Includes:
    - Unveiling the Human Terrain System (with Janice H. Laurence) in *Social Science Goes to War: the Human Terrain System in Iraq and Afghanistan*, eds. Montgomery McFate and Janice Laurence, Oxford: Oxford University Press, 2014
    - Mind the Gap: Bridging the Military/Academic Divide in *Social Science Goes to War: the Human Terrain System in Iraq and Afghanistan*, eds. Montgomery McFate and Janice Laurence, Oxford: Oxford University Press, 2014
- What Do Commanders Really Want to Know? US Army Human Terrain System Lessons Learned from Iraq and Afghanistan (with Robert Holliday and Britt Damon), in *The Handbook of Military Psychology*, ed. Janice Laurence and Michael Matthews. Oxford: Oxford University Press, 2012, pp. 92-113.
- Reflections on the First Four Years of the Human Terrain System (with Steve Fondacaro), *PRISM Journal*, vol. 2, no. 4, National Defense University, September 2011, pp. 63-82.
- *Transcultural War*, paper presented at the Transcultural Encounters Symposium, University of Oulu, Finland (2013)
- *US Demographics*, lecture presented to the International Students Program Orientation at the US Naval War College (2013)
- *When Cultures Collide: Normative Conflict in War*, paper presented at the European Conference on Information Warfare, Jyväskylä, Finland (2013)
- *Mind the Gap: the Academic/Military Divide*, International Security Studies Section Conference, International Studies Association, Washington, DC (2013)

Quantifying Structural Transformation in China

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Victor Shih, University of California, San Diego
Government Program Officer: Joe Myers, Army Research Office
Government POC: Lisa Troyer, Army Research Office

The procedures for leadership transitions in China seem to be increasingly institutionalized, but they are still far from transparent. We propose to exploit several features of the Chinese Communist Party (CCP) system to develop novel quantitative analysis methods for CCP leadership dynamics. In particular, the hierarchical nature of the CCP is reflected in the ranking of the political elite so, for example, the several hundred Central Committee (CC) members and alternates are ranked, although starting with the 9th National Party Congress (NPC) in 1969, only the ranks for the Politburo Standing Committee (PSC) and the alternate members have been announced. Our first goal is to develop methods to quantify changes in (partially) ranked data that apply to the dynamics of the CC.

Conflict among the political elite in China is believed to be factional, where factional ties are social relations of mutual obligation, *guanxi*, primarily observable as a consequence of common birthplace, school, or work, *i.e.*, specific types of homophily. As correlations between factional strength and political rank have already been observed, we also seek to investigate whether informal ties between the political and military élites in China affect policy and personnel outcomes. To support this analysis, another goal is to develop novel quantitative methods to measure changes in such (multi-mode) social networks.

Methodology:
Any metric on the space of permutations can be extended to give a (Hausdorff) distance between subsets of permutations. Defining these to contain permutations consistent with a partial ranking means we can construct a metric on partial rankings. We do this by composing an l^p norm with a "rank transform function" chosen to emphasize changes at the top of the ranking, and to control the effect of the size of the set being ranked.

Our approach for networks and for "thick networks" will be similar: Each can be identified as a metric space in its own right; then the Gromov-Hausdorff metric defines a distance between pairs of networks.

These methods will be applied to data recorded in a pair of datasets we are constructing: (1) A comprehensive set of biographies of Chinese élite, including CC level élite, provincial élite, as well as military élite from 1978 to the present. (2) A set of partially ranked listings for the PSC, Politburo, CC and CC alternates for the 1st through 18th National Party Congresses of the CCP.

Initial Results:
We have developed a metric (distance) on partially ranked data that encodes the importance of higher ranks. We derived an efficiently computable formula for the distance between two partial rankings and wrote code to implement it. Using the second dataset described above, **Figure 8** shows the distance between the partial ranking of the Party leadership after each NPC from the preceding one. We have compared these results with the historical record; perhaps the most obvious feature of this plot, the recently emerging 10-year periodicity in the curves, captures the increasing institutionalization of leadership transitions in China.

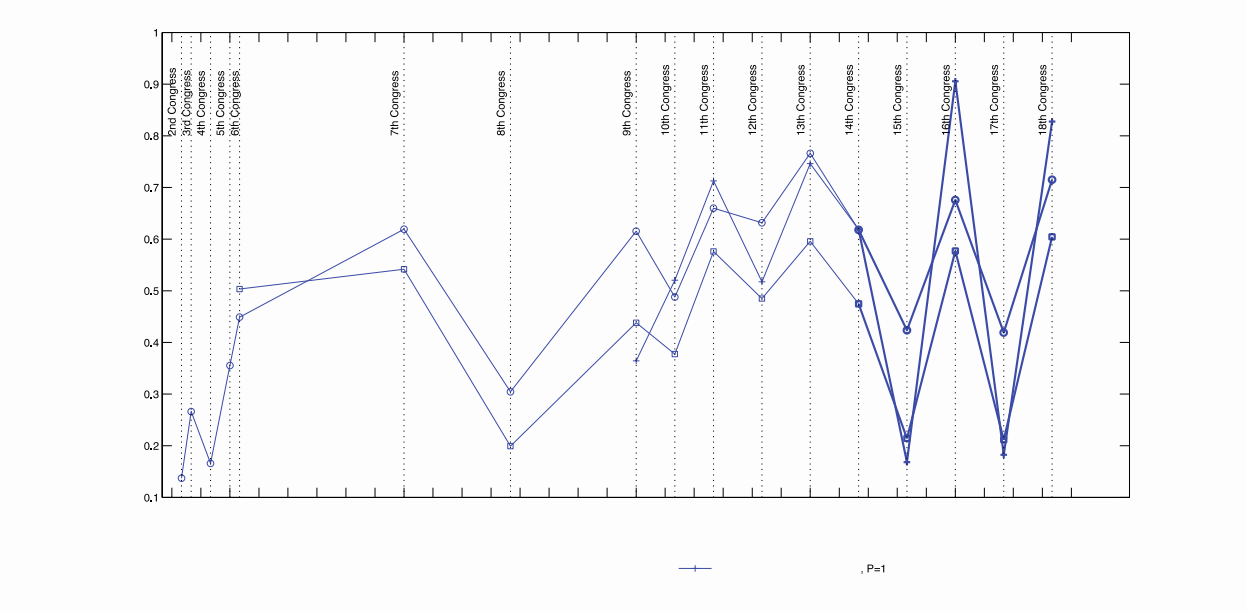

Figure 8: Distance between the partial ranking of the Party leadership after each NPC from the preceding one

We use the first data set described above to calculate how many CC members have had ties with the party secretary general (PSG) of the CCP. In **Table 7**, we calculate the share of active military officers in the CC who had various kinds of ties with the serving PSG from the 1992 14th NPC to the 2012 18th NPC. At the 14th NPC, for example, seven military officers in the CC had been born in the same province as Jiang Zemin, and an additional five officers had worked in the same city when he was a Shanghai official. An additional 4 officers served in a military region, of which Shanghai was a part (Nanjing MR) during this time. In 1992, a total of 21 officers in the CC had ties with Jiang, but by the 1997 15th NPC, 25 officers had some ties with Jiang. The percentage of CC active duty officers with ties with Jiang rose from 25% in 1992 to 27.4% in 1997. This suggests that Jiang was able to increase his influence in the military over time. When Hu Jintao took power at the 2002 16th NPC, he had ties with 43% of all active duty officers in the CC. This is not surprising given that Hu had served in many provinces, including the restive region of Tibet. Unlike Jiang, however, over his tenure, Hu Jintao was not able (or not willing) to increase the share of active duty officers with ties to him in the CC. At the 2007 17th NPC, the share of active duty officers with ties to Hu dropped to 34%. These data suggest that Hu Jintao was unable to further consolidate his control over the military during his tenure. Interestingly, there are no officers with direct work ties with Xi Jinping in the CC today. To be sure, Xi has a support network of officers who are princelings, which are not recorded here (although we are gathering this data). However, given Xi's effort to consolidate power within the military, one would expect to see that the share of active duty officers with ties with Xi to go up over his tenure.

Table 7: Inferred Ties between Active Military Officials in the CC and the PSG
(% of all CC active military officers in parentheses): 14th NPC (1992) to the 18th NPC (2012)

Active Military (254)	CC14 (64)	CC15 (69)	CC16 (70)	CC17 (65)	CC18 (59)
Birth Province	7 (10.9)	9 (13.0)	2 (2.9)	4 (6.2)	2 (3.4)
University	0 (0.0)	0 (0.0)	2 (2.9)	2 (3.1)	0 (0.0)
Work Ties	5 (7.8)	6 (8.7)	15 (21.4)	5 (7.6)	0 (0.0)
Work Ties (+MR)	9 (14)	10 (14.4)	26 (37.1)	16 (24.6)	18 (30.5)

Anticipated Outcomes of Research:
We expect to develop methods for quantifying changes in (partially) ranked data and in network data. These will apply to the analysis of the Chinese leadership and National Innovation System, but they will also be generally applicable to a broad range of structured social science data. The biographical and ranking data on CC members and local party élite will generate numerous academic articles and will be used in at least two PhD dissertations and at least one senior thesis at UCSD.

Potential Impact on DoD Capabilities and Broader Implications for National Defense:
The strengths of China's economy and military, both supported by scientific and technological capabilities on trajectories to becoming world-class, make understanding Chinese leadership crucial for US national defense planning. These data sets and analysis methods will allow the US government to make more systematic analysis of the Chinese political élite.

Publications through this Minerva research:

- O. Bucicovschi, R. W. Douglass, D. A. Meyer, M. Ram, D. Rideout and D. Song, "Analyzing social divisions using cell phone data", UCSD preprint (2013). – awarded Best Scientific Prize in the Data for Development (D4D) competition at NetMob 2013, MIT, Cambridge, MA.
- D. A. Meyer, M. Ram, G. Shaw and L. Wilke, "Circulation of the élite in the Chinese Communist Party", UCSD preprint (2014).

Sharable data resources to be generated: Details at "*Databases for Quantifying Structural Transformation in China*" on page 139.

- Partially Ranked Lists of CCPCC Members: 1st through 18th National Party Congresses
- A Biographical Database of Central Committee Members: 1978-2014
- A Biographical Database of Provincial Standing Committee members: 1978-2014

Terrorist Alliances: Causes, Dynamics, and Consequences

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Government Program Officer: Martin Kruger, Office of Naval Research

Key challenge: When and how do terrorist groups ally with one another, states, and other non-state actors?

Recent scholarship challenges the image of the individual terrorist as a "lone wolf," suggesting few terrorists truly exist in isolation. The same is true of terrorist groups. Examples from around the world suggest that alliances between terrorist groups represent the rule much more than the exception. Such alliances can enhance the capabilities of the linked groups.

Unfortunately, answering that question is difficult because there is no comprehensive, time series data on terrorist alliances, and little systematic academic work addressing their causes and consequences. But understanding these alliances is vitally important for those interested in US security and counter-terrorism strategy. Intelligence organizations around the world already attempt, at the micro-level, to networks of terrorists within groups like Al Qaeda. We believe that a clearer understanding of the relationship between organizations will also yield significant benefits for those interested in reducing the capacity of these groups to inflict harm.

Methodology:
We began our dataset construction by generating a list of all terrorist groups known to exist from 1945–present. We are now finalizing our coding of the relationships among them. We have collected data on: 1) the onset of collaboration; 2) the type of collaboration (material, training, ideological/inspirational, or intelligence); and 3) the termination of collaboration. We will then merge that into data on the activities of terrorist groups to understand the consequences of terrorist alliances for group behavior.

We have adopted a three-tiered data-collection strategy. First, we rely on publically available declassified, media, and scholarly sources to document the validity of these alliances described by prior research and identify alliances missed by prior data collection efforts. Relying primarily on open source news reports and declassified intelligence documents, we will also gather all available information on the genesis and decline of these relationships so that we can add the time series element to the data, which is entirely absent from existing studies but is crucial for any work that hopes to make causal inferences. Second, because linkages between many groups are difficult to identify and track over time, we will poll terrorism experts and generate a reliability score for each alliance relationship we identify. Third, we will conduct interviews with experts who have particular expertise in certain groups and regions.

In a parallel process, we are using use the same sources to develop brief case studies of each collaborative relationship. These case studies will both include what is known about the nature of the alliance and document the evidence that we have uncovered. The result will be a degree of transparency that is unusual in social science datasets. Qualitative analysis will further establish the motivations behind terrorist alliances, the processes that give rise to them, and the direction of the causal arrows in terms of the relationship between alliance and capability.

Implications for National Defense:
Our research speaks to issues of key concern to the defense community. First, given the demonstrated role of these networks in the spread of deadly terrorist tactics, understanding how these networks develop

is critical for knowing how to disrupt them. For example, one issue of concern today the spread of advanced improvised explosive device technologies from Iraq to Afghanistan and beyond. This research will help us to better understand how to prevent groups from forming alliances with more committed groups, helping the US government control the capability and lethality of both groups. Second, our project will be able to track changes in the behavior of alliance networks over time, such as the addition or subtraction of other groups, recruitment patterns, the selection of certain tactics, and the effects of government response on the composition of the networks. Third, and finally, our project will be the first to systematically study the disruption and breakdown of terrorist alliances.

Minerva Funded Research Products:

1. Michael Horowitz and Philip Potter "Allying to Kill: Terrorist Intergroup Cooperation and the Consequences for Lethality." *Journal of Conflict Resolution*, Forthcoming. [link]
2. Philip Potter "Terrorism In China: Growing Threats with Global Implications," *Strategic Studies Quarterly*, Forthcoming. [link]
3. Max Abrahms and Philip Potter "Understanding Indiscriminate Violence: Leadership Deficits and the Resort to Terrorism by Militant Groups," Forthcoming, *International Organization*.
4. Michael Horowitz, Evan Perkoski, and Philip Potter, "The Life-Cycle of Terrorist Tactics: Learning from the Case of Hijacking." *Working Paper*.
5. Max Abrahms and Philip Potter, "Learning Strategic Restraint." *Working Paper*.
6. Meredith Blank and Philip Potter, "United We Stand, Divided We Fall: Understanding Intergroup Cooperation in Domestic Conflict." *Working Paper*.
7. Michael Horowitz, Evan Perkoski, and Philip Potter, "Tactical Diversity in Militant Violence." *Working Paper*.

Anticipated Research Products:

1. A data set, which we will make publicly available.
2. An interactive website containing the dataset, animations of relationship formation over time, a resource bibliography, and profiles on each terrorist group alliance.
3. Additional refereed articles explaining the rise and decline of terrorist group alliances based on our analysis of the data and case studies. These articles will include:
    - A paper on the founding of terrorist alliances, based on our new dataset.
    - A methodological paper on the design of the study of terrorist alliances.
    - A paper on factors that influence the end of terrorist alliances. This paper should be of particular interest to the Department of Defense since it will explore strategies that states have used to disrupt relationships between groups and the success and failures of those various strategies
    - A book bringing together the papers described above and including in-depth case studies and network maps of the terrorist alliance universe.

Sharable data resources to be generated*:*
See "*Terrorist Alliance Database"* on page 141.

A Global Value Chain Analysis of Food Security and Food Staples for Major Energy-Exporting Nations in the Middle East and North Africa

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Government Program Officer: Micheline Strand, Army Research Office
Government POC: Lisa Troyer, Army Research Office

Research Problem: Identify the energy-exporting countries in the Middle East and North Africa (MENA) whose grain, and particularly wheat, imports are at most risk to insecurity.

Civil unrest in the Middle East and North Africa (MENA) has periodically affected oil and gas exports from the region, helping to drive global surges in fuel prices, and in turn food prices. If future food price spikes last too long, they could exacerbate social unrest in MENA that leads to regional conflict and widespread malnutrition/starvation.

Methodology:
Wheat forms a major source of the caloric needs for the peoples in this region. We are identifying and quantifying the supply chains for wheat to determine their structure, size and scope, the players involved in them, and the drivers governing their operation, including market forces, environmental change, internal politics, and external geopolitics with other nations. The analysis includes the development of a database that is integrated with GIS so that spatial information on the supply chains can be mapped and analyzed geographically. The data and supply chain models will be used in scenario analyses to identify specific risks to the supply chains and suggest prioritized defensive and/or proactive strategies to deal with problems arising from wheat shortages in MENA. If successful, our approach should provide a framework for conducting similar security analyses involving trade in commodities elsewhere in the world.

Initial Results:
- Assembled an extensive, multiyear database of attributes for each MENA country pertinent to the region's food and energy security.
- Database has been integrated into ArcGIS and a number of maps of the MENA regions have been generated, including country specific maps.
- Maps are viewable in an interactive web application, which along with the database and other project information is available to Minerva researchers and government parties via secure login to the project website.
- Exploration of existing and new schemes for ranking the food and energy security of MENA countries indicates that while neither country-centric nor trade data can be used of and by themselves to indicate the risk of a country's food/energy insecurity, a combination of the two types of data may; this hybrid approach is currently being analyzed.
- Developed models of the wheat value chain for Saudi Arabia, Egypt, UAE, Iran, Syria and Algeria.
- Four research briefs have been produced, which are available for download on the project site.
- The research brief entitled "Wheat GVC and Food Security in MENA Report" explains the global wheat industry, the industrial organization of the global value chain (GVC) for wheat, the structure of the wheat GVC in Egypt, Iran, Saudi Arabia, Syria and the UAE.
- The research brief entitled "Global Value Chain Analysis and Food Security" compares the GVC approach to understanding food security with more traditional approaches and identifies how GVC

analysis allows researchers to identify and investigate important food security challenges facing MENA, particularly the issues of governance and international trade.

- The research brief entitled "Comparing Egypt and Saudi Arabia's Wheat GVC" compares Egyptian and Saudi Arabian wheat value chains and concludes that while many issues associated with the GVCs in these countries are common elsewhere in MENA, other issues are country or sub-region specific.
- The research brief entitled "Shifting Sources of Wheat Supply for MENA Countries: the Rise of the Black Sea–UPDATED MAY 30,2014" documents how the Black Sea countries of Russia, Ukraine and Kazakhstan are playing an increasingly important role in supplying wheat to the global market, and to MENA in particular, and explores the implications of this trend for food security in MENA.
- Social network analysis (SNA) has been used in two studies examining the wheat trade relationships between MENA countries and those elsewhere in the world.
  - One of these studies identifies three MENA trading clusters, each of which is dependent on either France, the Black Sea countries, or traditional major exporters of wheat, i.e. USA, Canada and Australia, for a significant fraction of the their wheat supply.
  - The second SNA study examines the impact on MENA countries of separate wheat export bans by three of the world's largest wheat suppliers (Ukraine, Kazakhstan, and Argentina) between 2007-2009. The study shows that countries that developed and/or maintained wheat imports with the traditional major wheat exporters during the bans, principally the USA, Canada and Australia, weathered the global shortfall of wheat availability with the least shortfalls.
- A second-version model is under development for optimizing the transport of commodities from supply points to demand centers along available infrastructure (roads, rails, pipelines, etc.) for scenarios in which countries experience commodity shortages due to natural disasters and/or geopolitical conflict.

Anticipated Outcomes of Research:

- A ranking for the food security of MENA countries in terms of socioeconomic factors and available information on the structure of the supply chains for major grain imports to the MENA region;
- Detailed models of the global value chains (GVCs) for wheat for six or more MENA countries whose wheat security is identified as being at significant risk;
- Identification of points of risk within the GVCs for the key grain imports to these countries and strategic options for managing these risks.

Potential Impact on DoD Capabilities and Broader Implications for National Defense:
Through an in depth understanding of the GVCs for food staples in major energy-exporting nations in the Middle East, we will develop models not only of risks to these supply chains, but where the threats exist within the supply chains, how the supply chains might be disrupted, and what the ramifications of those disruptions might be for other nations, from those dependent on the hobbled country's energy exports to those that supply the country with food staples. Such information will aid DoD decision-making and policy efforts directed towards identifying and anticipating zones of unrest, instability and conflict, as well as allocating resources for defense efforts and humanitarian aid.

Publications through this Minerva research:

- Duke MINERVA Research Brief: Wheat Value Chains and Food Security in the Middle East and North Africa Region, August 2013- Wheat GVC and Food Security in MENA Report.
- Duke MINERVA Research Brief: Global Value Chain Analysis and Food Security.

- Duke MINERVA Research Brief: Comparing Egypt and Saudi Arabia's Wheat GVC.
- Duke MINERVA Research Brief: Shifting Sources of Wheat Supply for MENA Countries: the Rise of the Black Sea–UPDATED MAY 30, 2014.

Sharable data resources to be generated*:*
See "*Duke Minerva Data and Tools*" on page 143.

Any external briefings related to this Minerva research (excluding academic conferences):
Presentation for the 2014 Harvard Institute for Global Law and Policy Workshop in Doha, Qatar-
IGLP_Wheat GVC in MENA_Presentation

Political Reach, State Fragility, and the Incidence of Maritime Piracy: Explaining Piracy and Pirate Organizations, 1993-2015

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and **Ursula Daxecker**, University of Amsterdam
Government Program Officer: Martin Kruger, Office of Naval Research
http://brandonprins.weebly.com/maritime-piracy.html

Research on maritime piracy consists largely of case studies of countries or regions with particularly pressing piracy problems. We therefore lack systematic explanations and analyses of piracy globally and regionally speaking. In part, this problem stems from the absence of comprehensive and systematic data on pirate attacks. While several international organizations (such as the IMB) collect information on piracy incidents, no unified data source exists to date. In addition, data on incidents collected by these organizations provide almost no information on the pirates and their organizational structure.

This project pursues four objectives to alleviate the above shortcomings.

- *Provide a comprehensive and novel theoretical explanation of piracy*. Existing studies of pirate prone regions identify state capacity and economic opportunities as the main drivers of piracy. Yet, we believe that such arguments neglect the importance of geo-spatial conditions and the extent of a government's political reach. We argue that the effect of state capacity and economic opportunities on piracy is a function both of the government's ability to project power over a country's entire territory as well as certain geographic constraints faced by governments and pirates. It is therefore expected that government reach – a function of the distance between a country's capital and its coastline, or the length of a country's coastline – or simply the ungoverned area of a country — conditions the effect of other factors on piracy.
- *Evaluate these expectations systematically*. The authors are building a comprehensive database on piracy incidents that combines information from all four organizations currently engaged in data collection (IMB, IMO, ASAM, and ReCAAP). Existing data sources suffer from diverging or incompatible formats, partly overlapping data, or a lack of public access.
- *Address the lack of information on pirates and their organizational characteristics*. The project involves expert surveys in several countries identified as particularly piracy prone. To our knowledge, this is the first attempt to collect data on pirate organizations.
- *Event forecasting*. We use geo-spatial and causal modeling methods to forecast piracy events into the future, which we believe will benefit policymakers interested in identifying at-risk states and other maritime areas.

Methodology

We have begun data collection on piracy incidents. The first stage of this effort has been completed with all incidents reported by the IMB recorded and geo-coded. The next stage involves comparing the IMB data to IMO and ASAM to assess the overlap in the events coded. After that we will compare our data with ReCAAP. The dataset will be uploaded in multiple formats to the project website (currently an early version of the dataset is available on the project website) and eventually into an online database with mapping capabilities. To improve existing knowledge of pirate organizations, expert surveys on pirate groups in four countries will be conducted. Surveys include questions on pirate group location, size, ports used by the organizations, connections to insurgents and or terrorist groups, among others. The resulting

data will be uploaded into a database that is publicly accessible. Using these data, the authors have completed several papers empirically evaluating our argument on the relationship between state strength, economic opportunities, and reach for a global sample of piracy. Future research will use the theoretical model to evaluate and forecast maritime piracy in several piracy-prone regions and countries, such as Nigeria, Indonesia, and Bangladesh. These analyses will be at a more micro-level, which we hope will improve our ability to forecast piracy into the future.

Initial Results

We will elaborate on two significant findings from our research project. First, we identified two strong structural correlates of maritime piracy: state strength and economic dislocation (Daxecker et al. 2014). While researchers before had noted these associations, we were able to use better indicators as well as improved and updated data to demonstrate that these relationships hold globally. We observe that countries experiencing piracy have government fragility scores that are on average 65% higher than countries not suffering from piracy. The average fragility score for countries without piracy is 7.6. For countries with piracy, the average fragility score is 12.73. Indonesia scored a 15 in the late 1990s when piracy incidents in its waters numbered more than 50 a year on average. For the last 20 years, Somalia has been coded as near a failed state as there is in the international system. Its fragility score was 25 in 2011, and Somalia experienced 160 incidents that same year. Similarly, opportunities (or lack thereof) in the legal economy affect the prevalence of piracy. Unemployed youth (especially males) provide the foot soldiers both for insurgencies and pirate gangs. Per capita gross domestic product (current $US dollars) for countries experiencing piracy is only $5,172. The value for countries without piracy is more than three times higher at $17,753. Some of the most piracy-prone countries remain some of the poorest places on Earth. Somalia had a per capita GDP (current $US dollars) in 2009 of only $512. Nigeria was slightly higher at $1,092, while Indonesia seems comparatively wealthy at $2,349. Such poverty presents obvious challenges in combatting maritime piracy.

Second, we prepared a technical report using our IMB geo-coded data on piracy in Sub-Saharan Africa, which was the basis for a presentation given to the Strategic Multilayer Assessment program in June. We first mapped piracy incidents (see map below) in Sub-Saharan Africa from 2005-2013 and then described trends over this time period. We also look a bit more in-depth at piracy in Nigeria. We see connections between insurgency and piracy in Nigeria and model the piracy incidents at the month level to account for regional weather patterns and fluctuations in the demand for oil. Both associate with piracy in the Gulf of Guinea.

Figure: Map of Piracy in 9 Sub-Saharan African Countries, 2004-2013

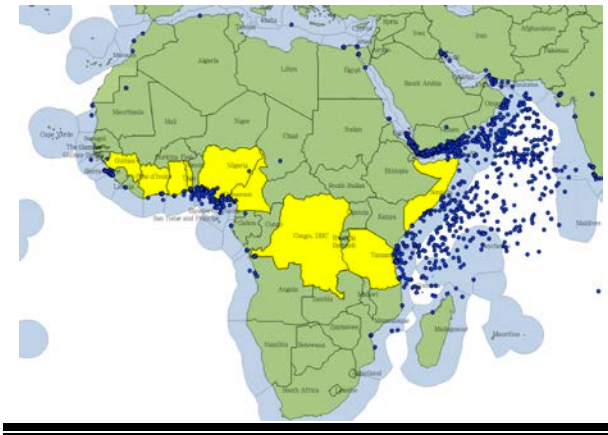

Table: Piracy Counts in 9 Sub-Saharan African Countries, 2004-2013

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Somalia	2	35	10	31	19	80	139	160	49	7
Nigeria	28	16	12	42	40	29	19	10	27	31
Ivory Coast	4	3	1	0	3	2	4	1	5	4
Guinea	5	1	4	2	0	5	6	5	3	1
Ghana	5	3	3	1	7	3	0	2	2	1
Togo	0	0	1	0	1	2	0	6	15	7
Cameroon	4	2	1	0	2	3	5	0	1	0
DRC	0	0	3	4	1	2	3	4	2	0
Tanzania	2	7	9	11	14	5	1	0	2	1

Potential Impact on DoD Capabilities and Broader Implications for National Defense:
Maritime piracy represents a post-Cold War challenge to U.S. and international security and remains underexplored. Yet understanding the incidence and evolution of maritime piracy in multiple contexts is essential for developing effective government policy and clarifying public perceptions of the pirate threat. In order to craft effective counter-piracy strategies, governments need to know where and why incidents are occurring, but also how pirate groups are organized and carry out their attacks. Improving our understanding of the determinants of piracy thus has several implications for national defense. Our research also explores both the securitization of the US relationship with Africa and other under-developed countries and connections between piracy and insurgent and terrorist groups.

Publications through this Minerva research:

- Ursula Daxecker & Brandon Prins. 2014. "The New Barbary Wars: Forecasting Maritime Piracy." Forthcoming in *Foreign Policy Analysis.*
- Ursula Daxecker, Brandon Prins, & Amanda Sanford. 2014. "Terror on the Seas: Assessing the Threat of Modern Day Piracy." *SAIS Review*, 2014. http://saisreview.org/2014/02/10/terror-on-the-seas-assessing-the-threat-of-modern-day-piracy/.
- Brandon Prins, Ursula Daxecker & Amanda Sanford. 2013. "The New Barbary Wars: Assessing the Threat of Modern Day Piracy." Howard H. Baker, Jr. Center for Public Policy, Policy Brief Series 3:13.
- Maritime Piracy Event & Location Dataset June 2014 Report: Focus on Piracy in Sub-Saharan Africa.

Sharable data resources to be generated:
See "Maritime Piracy Event and Location Datasets" on page 144 for details.

- Global Piracy Incidents Database (GPI) – Data on piracy events recorded at the incident level by event, by time, and by country.
- Mapping Pirate Organizations Database (MPO) – Survey data on pirate organizations in four or five piracy-prone countries.
- Maritime Piracy Event and Location Dataset (MPELD) – Geo-spatial coding of piracy incidents and important correlates of piracy.

Have any curricula or other teaching exercises been generated in the course of this work?
Undergraduate course on non-state actors and political violence is in development. Several of the lectures will focus on trends in, and the drivers of, maritime piracy.

Who Does Not Become a Terrorist, and Why? Towards an Empirically Grounded Understanding of Individual Motivation in Violence and Non-Violence

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Richard English, University of St. Andrews, Scotland
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Government Program Officer: Benjamin Knott, Air Force Office of Scientific Research

Key challenge: Why do individuals eschew violence?

Since the 1990s scholars have periodically conducted fieldwork among terrorists in order to understand the motivation of individuals who decide to engage in violence. The body of literature that resulted from these endeavors has been too deterministic. In every context we find many individuals who share the demographic, family, cultural, and/or socioeconomic background of those who decided to engage in terrorism, and yet refrained themselves from taking up armed militancy, even though they were sympathetic to the end goals of armed groups. The field of terrorism studies has not, until recently, attempted to look at this control group.

This project is not about terrorists, but about *supporters* of political violence. Our goal is twofold. First, we propose to study supporters of armed militancy, in order to describe the panoply of activities they are willing to undertake short of violence, and the determinants of those actions. At the same time, we aim to contribute to theory building in the field of individual radicalization by looking at a control group that has, so far, never been studied.

Methodology:
Our research design is straightforward. The research team worked on various iterations of a questionnaire of closed- and open-ended questions to be used in fieldwork. The questionnaire attempts to cover four major explanations of why individuals become radicalized, and also attempts to gauge why, in the case of terrorist supporters, that radicalization was interrupted.

At the time of writing, team members are preparing for fieldwork in Colombia, Germany, India, Indonesia, Ireland, Italy, Lebanon, Mexico, the Philippines, Scandinavia, Spain, Thailand, Turkey, and Yemen. Each case study will involve extensive interviews with ten or more activists and militants in parties and NGOs who, though sympathetic to radical causes, have chosen a path of non-violence. This research will yield over 140 life histories. Following the fieldwork, the team will meet for a workshop in which authors will discuss the findings from their interviews.

Anticipated Outcomes of Research:
This study will fill a huge gap in the literature on terrorism and counterterrorism on two counts:

1. It is generally accepted that terrorists cannot function without support from the population among which they hide. Yet that group of individuals, the terrorist supporters, has never been studied before. This project will attempt to explain for the first time why, how, and under what sociopolitical conditions, individuals will support terrorism without actually joining a terrorist group.
2. The terrorist supporters share with the terrorists a number of demographic, cultural and socioeconomic characteristics. Yet the supporters choose not to join the terrorist groups. Instead, they opt to assist and not to engage in violence. By looking at the motivation of terrorist

supporters, the research team will be able to refine the existing theoretical explanations of motivation in terrorism.

Potential Impact on DoD Capabilities and Broader Implications for National Defense:
This study, and the resulting manuscript that analyzes the main findings from systematic, cross-regional and cross-national comparisons, will broaden our knowledge base on the subject of support for violence, and thereby inform sound policymaking in the area of counter-radicalization and counter-terrorism.
In the last decade, the U.S. government has made a number of assumptions about the main determinants of violent behavior. Government policy has emphasized creating a counter-narrative to those ideologies of hate that we assume motivate the terrorists. Yet personal accounts from Ireland to Pakistan reveal that peer groups and small group dynamics are significantly more important than ideology in the making of a radical. Therefore, the results of this study have direct applicability to defense missions and national security.

Terrorism, Governance, and Development

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Research aim: Enhance understanding of how to implement governance and development policies to more efficiently (re)build social and economic order in conflict and post-conflict areas. We use new data from a range of locations to extend and test current theories and provide empirically-based findings to inform policy decisions about terrorism, governance, and development.

Methodology:
Our empirical approach is based on using game-theoretic models to generate refined predictions about specific interactions (e.g. aid and violence) that can be tested with careful attention to causal identification. Although this approach has been successful in analyzing non-violent social systems, only a small handful of researchers are bringing this powerful approach to the study of conflict. One major obstacle to employing this approach is that the highly-aggregated measures of terrorism and insurgency captured in most *existing* data do not permit researchers to quantitatively study the impact of sub-national factors, which leave scholars open to a host of ecological-inference problems. Therefore, we gather high quality research data from conflicts around the world and conduct new fieldwork. Countries studied include AFG, COL, EGY, IRQ, KEN, PAK, PHL, MEX, and VNM. New research on the Naxalite conflict in India will be added this year.

Significant Results:
- Governments (and their allies) who incur civilian casualties in their operations will face more attacks. Rebels face a symmetric reaction (causing casualties makes it harder for them to operate) in some regions but not all.
    - Afghanistan (NBER WP16152), Iraq (*American Journal of Political Science*)
    - Findings briefed to GEN McChrystal and CJCS (March 2010)
- Poor economic conditions can be negatively correlated with violence and support for militancy.
    - Regions with high unemployment have less insurgent violence: Afghanistan, Iraq, and the Philippines (*Journal of Conflict Resolution*)
    - The poor are more negative towards militant organizations, likely because they suffer more from the externalities of militant violence: Pakistan (*American Journal of Political Science*)
- Small-scale reconstruction projects are violence reducing, large-scale ones are not.
    - Iraq (*Journal of Political Economy*), Vietnam (Working Paper)
    - Findings briefed to GEN Petraeus (November 2010) and USAID (various dates)
- The design of development programs is critical. (*American Economic Review Papers & Proceedings*)
- ICT-based election monitoring displaces corruption. (*American Economic Review*)
- TGD publications have been cited in key policy documents including the June 8, 2011 House Foreign Relations Committee report, entitled, "Evaluating U.S. Foreign Assistance to Afghanistan."

Outcomes of Research:
- Thirty-four publications in peer-reviewed journals provide new research findings on conflict topics.
- Research-ready, fine-grained geospatial data on aid, economic development and political violence in six countries now available via the Empirical Studies of Conflict project's website.

- Data and metadata from the following countries are or soon will be posted on the ESOC website: AFG (2001-present), COL (1999-2011), EGY (2010-11), KEN (2007-08), IRQ (2003-present), MEX (2006-2011), PAK (1988-present), the PHL (1975-present), and VNM (1965-73).
- We have developed a standard set of questions and innovative survey methods to elicit sensitive views, such as support for armed actors. Surveys were fielded in Northern Ireland and Colombia with TGD funding and in Afghanistan, Pakistan, Palestine, and the Philippines with other funding sources.
- A refined theory of insurgency may serve as an alternative framework to previously under-specified military doctrines. The baseline model has been published in the *Journal of Political Economy*.
- Senior leaders in military and aid organizations (in the U.S. and abroad) have been introduced to new methods of evaluating the effectiveness of their policies.
- A cohort of new scholars (including a dozen tenure-track placements at leading universities) will have the theoretical tools, data, and contacts to execute fresh research.
- Practitioners have received training on how to analyze current and emerging challenges, including one workshop on using emerging ICT technologies to combat corruption and enhance governance.

Potential Impact on DoD Capabilities and Broader Implications for National Defense

Rebuilding social and economic order in conflict and post-conflict areas will remain critical tasks for the U.S. and allies who seek to defeat violent organizations and prevent new non-state threats. Minerva TGD scholars have provided research and analytical support to government organizations, including ISAF Counterinsurgent Advisory and Assistance Team (CAAT), Defense Advanced Research Projects Agency, USAID, and USIP. These engagements build the human capital for analyzing social systems within DoD.

Selected Publications (from the 34 total project publications):

- Blair, Graeme, Jason Lyall, and Kosuke Imai. "Comparing and Combining List and Endorsement Experiments: Evidence from Afghanistan." *American Journal of Political Science.* Forthcoming.
- Bahney, Benjamin W., Radha K. Iyengar, Patrick B. Johnston, Danielle F. Jung, Jacob N. Shapiro, Howard J. Shatz. 2013. "Insurgent Compensation: Evidence from Iraq." *American Economic Review Papers & Proceedings* 103:3, 518-522.
- Berman, Eli, Michael Callen, Joseph H. Felter, Jacob N. Shapiro. 2011. "Do Working Men Rebel? Unemployment and Insurgency in Afghanistan, Iraq, and the Philippines." *Journal of Conflict Resolution* 55(4): 496-528.
- Berman, Eli, Jacob N. Shapiro, and Joseph H. Felter. 2011. "Can Hearts and Minds be Bought? The Economics of Counterinsurgency in Iraq." *Journal of Political Econom*y 119:4, 766-819.
- Berman, Eli, Joseph H. Felter, Jacob N. Shapiro, and Erin Troland. 2013. "Modest, Secure, and Informed: Successful Development in Conflict Zones." *American Economic Review Papers & Proceedings* 103(3), 512-517.
- Biddle, Stephen, Jeffrey A. Friedman, and Jacob N. Shapiro. 2012. "Testing the Surge: Why did Violence Decline in Iraq in 2007?" *International Security* 37(1): 7-40.
- Blair, Graeme, C. Christine Fair, Neil Malhotra, and Jacob N. Shapiro. 2013. "Poverty and Support for Militant Politics: Evidence from Pakistan." *American Journal of Political Science* 57:1, 30-48.
- Blair, Graeme, Jason Lyall, and Kosuke Imai. 2013. "Explaining Support for Combatants in Wartime: A Survey Experiment in Afghanistan." *American Political Science Review* 107(4): 679-705.
- Callen, Michael, Mohammad Isaqzadeh, James D. Long, and Charles Sprenger. 2014. "Violence and Risk Preference: Experimental Evidence from Afghanistan." *American Economic Review* 104(1): 123-148.
- Callen, Michael, and James D. Long. "Institutional Corruption and Election Fraud: Evidence from a Field Experiment in Afghanistan" *American Economic Review.* Forthcoming.

- Condra, Luke N. and Jacob N. Shapiro. 2012. "Who Takes the Blame? The Strategic Impact of Collateral Damage." *American Journal of Political Science* 56:1,167–187.
- Crost, Benjamin, Joseph H. Felter, and Patrick B. Johnston. "Aid Under Fire: Development Projects and Civil Conflict." *American Economic Review* Forthcoming.
- Matanock, Aila M. "Governance Delegation Agreements: Shared Sovereignty as a Substitute for Limited Statehood." *Governance*. Forthcoming. [Special Issue Edited by Stephen Krasner and Thomas Risse].
- Shapiro, Jacob N. 2013. *The Terrorist's Dilemma: Managing Violent Covert Organizations*. Princeton University Press.
- Shapiro, Jacob N. and Nils B. Weidmann. "Is the Phone Mightier than the Sword? Cell Phones and Insurgent Violence in Iraq." *International Organization* Forthcoming.
- Weidmann, Nils B. and Michael Callen. 2013. "Violence and Election Fraud: Evidence from Afghanistan." *British Journal of Political Science* 43:1, 53-75.

Sharable data resources generated

Data (GIS and tabular format), publications, and working papers are available at the Empirical Studies of Conflict project's (ESOC) website. The ESOC website includes data on seven countries, including:

- 38 GIS datasets for download;
- 19 tabular datasets for download;
- 63 publications and 29 working papers;
- 58 links to external archives/datasources/data repositories relevant to ESOC countries.

External briefings related to this Minerva research (excluding academic conferences):

- ADM Mullen, CJCS (3/29/2010) and GEN McCrystal, COMISAF Afghanistan (3/26/2010). The effect of civilian casualties by ISAF and insurgents on future violence. Radha Iyengar.
- GEN McCrystal, COMISAF (5/29/2010). Insurgent mobility and implications for distribution of IO assets. Jacob Shapiro.
- MG McHale, Commanding General, USFOR-A (11/11/2010) and BG McMaster, Director of CJIATF SHAFAFIYAT (11/9/2010). Relationship between perceived stability and observed violence with implications for measurement of progress. Eli Berman.
- GEN Petraeus, COMISAF (11/17/2010). Results of CERP utilization survey in Afghanistan. Findings on efficacy of CERP in Iraq. Jacob Shapiro.
- SEAL Team 5 (5/9/2012). Dispute Adjudication in Poorly Governed Spaces. Eli Berman.
- Multiple briefings to Secretary Corazon Soliman (Cabinet Secretary, Department of Social Welfare and Development, The Philippines) and her staff by J. H. Felter.
- Testimony before the U.S. House Armed Services Committee's Subcommittee on Oversight and Investigations (7/24/2012). COL (Ret) Felter, a former U.S. Army Special Forces commander in Afghanistan and TGD PI gave his assessment about the Afghan National Security Forces capability after U.S. and NATO troop withdraw in 2014.

Students and postdocs trained

- Post-Docs (17): 12 tenure-track faculty, 1 academic research, 3 research industry, 1 research start-up.
- Graduate Students (4): 1 tenure-track faculty, 2 academic research, 1 government research.
- Research Specialists (6): 3 placed into top graduate programs, 3 in Tech or Research Industry.

METANORM: A multidisciplinary approach to the analysis and evaluation of norms and models of governance for cyberspace

Principal Investigator: **Howard Shrobe**, MIT CSAIL
Research Coordinator and POC: **Roger Hurwitz**, MIT CSAIL, rhhu@csail.mit.edu
Martha Finnemore, George Washington University; **Duncan Hollis**, Temple University
Panayotis "Pana" Yannakogeorgos, Air Force Research Institute
Government Program Officer: Martin Kruger, Office of Naval Research

While the United States, other major states and important non-state actors have acknowledged the need for norms, that is, broadly shared expectations of appropriate behavior, to support security, reliability and governance of cyberspace, few such norms have emerged. To understand this situation and possibilities for its amelioration, our project work is to

- Map the normative landscape of cyberspace and its evolution, by identifying areas which generally accepted norms address, those where norms are absent or contested, and the reasons for these differences;
- Identify and compare elements of accepted and proposed cyber norms to show how similarities and differences among them affect their emergence, development and acceptance;
- Examine the contexts in which a norm operates (or will operate) to understand how these shape its formation and implementation;
- Investigate the processes in which norms are proposed, accepted, implemented and acquire force in order to identify the actors, challenges, interests and power alignments that facilitate or block these processes;
- Develop computational methods for estimating a proposed norm's potential efficacy, acceptance and observance;
- Develop tools which can test whether described respective implementations of a norm by respective relevant actors are compatible (or interoperable) and so can support international interactions according to the norm;
- Model how security norms, together with signaling and deterrence practices, can guide or constrain the management of cyber crises and conflicts.

Methodology:
In pursuit of these goals we are currently developing typologies of cyber norms, analyzing processes and cases in which norms emerge, and doing content analyses of texts, discussions and interpretations of generally accepted and proposed norms. Reflecting in part their different disciplines, each team member brings different insights to these traditional methods. Hollis, a professor of law, seeks to typify norms according to the actors involved, the source of expectations for their behaviors, i.e., laws, professional standards, etc., the behaviors themselves and the contexts of actions. Aadya Shukla, a computer scientist specializing in informatics, is developing two tools: a) an intelligent repository for norms, drawn from international and domestic law, that will enable comparisons among them according to concerns, stakeholders and nations; and b) a framework for determining whether seemingly similar norms or implementations of the same norm by different actors refer to the same objects (are "semantically interoperable"). Both approaches can help illuminate conflicts between articulated norms and practices and suggest the many nuances of norms in cyberspace.

Finnemore, a political scientist with a focus on international institutions, is investigating A) high profile cyber incidents of the last decade and their impact on shaping expectations of appropriate behaviors by actors, and B) processes and platforms which have enable international norms to gain legitimacy.

Somewhat similarly, Hurwitz, draws on international relations studies and game theory, to investigate the strategies behind recent successes and failures of efforts by states to gain acceptance for certain cyber norms. John Mallery is developing a methodology, that draws on computational planning, to assess A) how well certain proposed norms or confidence building measure can mitigate risk of an international cyber conflict (or its escalation), and B) the feasibility of their acceptance. These assessments are based partly on content analysis of his conversations with Chinese and Russian cyber experts and recent US-Russia and US-China track 1.5 discussions. Yannakogeorgos employs content analysis on meeting transcripts, declarations, statements and other official texts to track support and opposition for existing and proposed norms at international forums on Internet governance, in the Department of Defense and ministries of defense of various US allies. He then uses his observation/ participation at some of these meetings to deepen qualitative understanding of the nuances and subtexts of the texts.

- Military Operations
  - Law of Armed Conflict (LOAC) generally
  - LOAC specifically
  - Use of Force (by States or their proxies)
  - Computer network attack (CAN)
  - Computer Network Exploitation (CNE)
  - Rules of Engagement
  - Arms Control/non-proliferation
  - Deterrence
  - Militarization of Cyberspace
- International Security (for state actors)
  - Sabotage / critical infrastructure attack
  - Subversion / disinformation
  - Political-military espionage
  - Economic & industrial espionage
  - Proxies
  - Peace time norms & Confidence and Security Building Measures (CSBMs)
- Governance and Administration
  - Models: Multi-stakeholder
  - Models: State-centric
  - Models: Other
  - Public-private partnerships
- Technological foundations
  - Coding Protocols
  - Network Protocols
  - Cryptographic standards
  - Supply chain integrity
  - Surveillance Anonymity
  - Net neutrality
  - Data retention
- Internet Freedom and Privacy
  - Information rights
  - Blocking, filtering and content control
  - Surveillance
  - Anonymity
  - Data retention
- Cybercrime
  - Unauthorized access
  - Industrial espionage
  - Piracy and intellectual property theft
  - Fraud
  - Spam
  - International Cooperation
  - Hackbacks
  - Content controls – subversion and terrorism
  - Content controls, e.g., child pornography, hate speech

Figure 9: Example Behaviors and Practices in Cyberspace Addressable by Norms

Initial Results:

Proposals of norms and efforts to gain their acceptance have tended to be responses to high profile incidents—e.g., the DDoS in Estonia (2007); Stuxnet (2010), the Snowden revelations (2013)—rather than proactive initiatives to well-known or anticipated problems. Yet these responses are limited, because most international cyber incidents generate surprisingly little public reaction in contrast to international incidents in kinetic space. Development of a consensus for a proposed norm is further limited by efforts on its behalf being played out in a variety of forums (e.g., the UN) and frameworks (e.g., multilateral, bilateral and multi-stakeholder, with many participants), a reflection of the diversity of stakeholders in a stable cyberspace. Moreover, differences in how these actors envision cyberspace influence their preferences among proposed norms and the processes for their adoption. For example, those actors who understand cyberspace as a set of technologies whose use can be regulated by the state will prefer norms that extend existing international law, while those who see it a global commons are likely to see a need for norms tailored to it and applying to non-state actors, like service providers, as well as states. In any

case, for a proposed norm to acquire legitimacy and some efficacy, relevant private sector and civil society actors as well as state actors will need to "buy" it, even when the norm is principally concerned with state behaviors.

Anticipated Outcomes of Research:
The integration of our methodologies and findings will provide means to identify needs and opportunities for constructive cyber norms, to estimate the feasibility and efficacy of a proposed norm and to suggest strategies for its sponsors to gain acceptance and effective implementation for it. Our research will also generate tools for A) comparing and testing the compatibility of seemingly similar norms and their implementations, as articulated by different state and relevant non-state actors; B) measuring the uptake and implementation of cyber security related norms by various governments, military organizations and relevant non-state actors, and C) tracking escalation, de-escalation and opportune moments for intervention and mitigation in cyber-conflicts.

Potential Impact on DoD Capabilities and Broader Implications for National Defense:
As the United States International Strategy for Cyberspace recognizes, broadly shared international norms on the use of information and communication technologies can contribute to the stability and security in cyberspace by enhancing predictability, decreasing misunderstandings of behavior and providing a basis for corrective actions when violations do occur. Our research will help defense theorist, planner and practitioner alike know how well a proposed norm can satisfy theses functions while also supporting values and interests of the United States concerning cyberspace. Our research will also provide tracking and analysis of current and proposed norms that impact on Department of Defense equities and will aid or impede its role in protecting cyberspace.

Publications through this Minerva research:

- M. Finnemore & M. Jurkovich. Getting a seat at the table: the origins of universal participation and modern multilateral conferences. *Global Governance 20 (2014)*, 361-373 (forthcoming, Sept. 2014)
- M. Finnemore, M. & H. Farrell, H. The end of hypocrisy: American foreign policy in the age of leaks. *Foreign Affairs* 92:6, Nov-Dec 2013, 22-26.
- D. Hollis. Re-Thinking the Boundaries of Law in Cyberspace: A Duty to Hack? in C. Finklestein *et al*. (eds). *Cyberwar: Law & Ethics for Virtual Conflicts.* (forthcoming, Oxford U. Press, March 2015).
    - Hollis, D. 2014 Reading Tea Leaves in Confirmation Hearings for U.S. Cyber Commander. *Opinio Juris*. March 18, 2014. http://opiniojuris.org/2014/03/18/reading-tea-leaves-confirmation-hearings-u-s-cyber-commander/
    - Hollis, DB. 2014. NETmundial, Borders in Cyberspace, and a Duty to Hack. *Opinio Juris*. April 28, 2014. http://opiniojuris.org/2014/04/28/net-mundial-borders-cyberspace-duty-hack/
    - Hollis, DB. 2014. A Post-Snowden World? Criminalizing Chinese Cyber Espionage. *Opinio Juris.* May 19, 2014. http://opiniojuris.org/2014/05/19/post-snowden-world-criminalizing-chinese-cyberespionage/
    - R. Hurwitz. Review of Thomas Rid, *Cyber war will not take place. Computing Reviews*. Nov. 11, 2013.
    - R. Hurwitz. Keeping cool: steps in avoiding conflict and escalation in cyberspace. *Georgetown Journal of International Affairs, Special Issue: International Engagement on Cyber* 3: 17-27.
- R. Hurwitz. The Play of States: Norms and Security in Cyberspace. *American Foreign Policy Interests* (forthcoming, Oct. 2014)
- P. Yannakogeorgos. Sounding the Alarm on IPv6. *Air And Space Power Journal* (forthcoming, Nov. 2014).

- P. Yannakogeorgos. Prospects for mutually assured security in cyberspace between the U.S. and China (in Mandarin) *Air and Space Power Journal* (Chinese edition, forthcoming)
- P. Yannakogeorgos. Clarifying Cyber Conflict. in A. Henschke *et al.* (eds). *Ethics and Cyberwarfare*. (forthcoming, Oxford U. Press, 2015).

Sharable data resources to be generated:

- An intelligent repository for international and domestic norms and laws for cyberspace, enabling their comparison across states, and by concerns, scope and levels of implementation. (Shukla)
- A dataset of international cyber incidents, from 2007 to present, including narrative summaries of each incident and coding according to a common template for variables of interest, such as means of attach, region, relation to kinetic events, response (Finnemore with T. Maurer and New America Foundation)

Any external briefings related to this Minerva research (excluding academic conferences):

- Finnemore will brief in mid-September 2014, select members of US Cyber Command on the development of international cyber norms.
- Hollis briefed NATO analysts, planners and government officials of NATO members on the "Future of [Cyber] Metanorms" at CyCon, the NATO sponsored conference on cyber-conflicts, Tallinn, Estonia, June 2014. He briefed members of the Council on Foreign Relations on the possibilities of "effective legal regulation of cyber threats," New York, NY, June 2014.
- Hurwitz organized a two-day briefing and workshop on cyber norms, with participation by other team members, government officials from liberal democracies, cyber-involved US military officers and policy analysts. The workshop met at MIT CSAIL, Cambridge, MA, April 7-8, 2014. See http://citizenlab.org/cybernorms2014/index.html for agenda and participants. He will brief members of the National Committee on American Foreign Policy, on the impact of interstate politics on the development of global cyber norms, in New York, Nov. 4, 2014.
- Mallery, with Adm. (ret) William Studeman and Melissa Hathaway, briefed Senator Kelly Ayotte (NH, member of Armed Services and Homeland Security committees) on cyber security and norms, December 2013. He briefed NATO's Division of Emerging Security Challenges and Office of Security on norms for cyber defense coordination, in Madrid, December 2, 2013, and in Bucharest, June 10, 2013. Mallery also briefed representatives of the American, French, Japanese and Israeli governments on the prospects for an international norm proscribing industrial espionage as part of an organizing meeting for a conference on "cyber fair play," in Pars, July 10, 2014.
- Since November 2013, Yannakogeorgos working groups at the Air Command and Staff College (Air University) and at the Baltic Defense College, on cyber norms. He also briefed at the Cybersecurity Seminar: Jakarta, Indonesia, June 23-26, 2014, and will brief Albanian military officers and government officials in Tirana, September 15-18, as part of the NPS/OSD/AFRI initiative to raise awareness of cybersecurity and norms issues among partner nations.

China's Emerging Capabilities in Energy Technology Innovation and Development

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Government Program Officer: Micheline Strand, Army Research Office
Government POC: Lisa Troyer, Army Research Office

Research Problem: Understand the exact nature of Chinese capabilities in the commercial energy technology development domain, as well as the relationship of those capabilities to technology innovation efforts conducted beyond China's borders.

Considerable debate exists in the U.S. policy community about China's purported rise as a technology innovator in the energy domain. Some experts believe China has developed world-class capabilities for energy technology innovation. Others counter that the nation—both in terms of the energy systems it is deploying domestically and the energy-related products it is exporting—is simply copying technologies absorbed from abroad. Indisputable is that for domestic deployments and global exports alike, Chinese energy technology firms are immersed in tight R&D networks with international commercial partners. What is being learned in these relationships? Who is learning? In what directions do different types of knowledge flow? What are the ramifications of such flows for the development of innovative capacity in the firms and nations involved?

These questions relate to theoretical concerns about the role of innovation in industrial development more generally. Traditionally, late industrializers such as Japan and South Korea were seen as engaging primarily in technology mimicry rather than what is generally understood as innovation. Technology was believed to follow the global product cycle, with innovation and new product rollouts taking place in advanced economies, and only late-stage cost reduction and secondary technology deployments – once the technology was fully mature – in developing economies. China's recent experience with energy technology, however, suggests that we may be observing a new form of late industrialization, one in which developing economies play a much more central role in delivering the innovations needed to bring new-to-the-world technologies to the market. Conceptually, we are pushed to reconsider the role that actual innovation is playing in late industrialization. Moreover, given the types of knowledge that Chinese firms seem to be generating (and the demand for such knowledge by advanced industrial counterparts), we are pushed to reconsider the importance of late-stage innovation surrounding technology commercialization not just for developing economies, but for advanced industrial nations as well.

Methodology:
This research has proceeded methodologically through firm-based, structured qualitative case comparisons across three energy technology domains—civilian nuclear power, solar photovoltaic cell/module fabrication, and wind turbine manufacturing. Each of these areas involves new technology development and extensive partnerships between overseas and Chinese domestic firms. The technology areas differ, however, in terms of their degree of standardization, the complexity of the systems integration tasks involved, and the degree to which China is their main global market. Interview-based qualitative data collected at the firm level is useful for explicating complex processes and extended mechanisms of causation.

Through the first phase of research, we have sought to explicate subtle patterns of knowledge creation, transfer, and dissemination – phenomena that cannot easily be identified at arms-length through measures such as patent filings, copyrights, or trademarks. This is particularly true for complex systems involving multiple firm-level participants. The most interesting data from our interviews have involved the nature of work flow, the division of labor, and the mechanisms through which coordination takes place. While we are open to and have indeed conducted large *N* survey work in our previous work, but we feel that this particular project -- with its emphasis on understanding the finer details of inter-firm coordination, capability building, and technology development processes – has been best served through in-depth qualitative interviewing.

During our first phase of research from 2012 to 2014, we conducted 107 interviews in China in the wind power and solar PV industries. An additional 117 interviews were conducted with participants in the wind and solar power-related production networks in Europe and the United States. We conducted another 67 interviews in China in the civilian nuclear power sector, with respondents spread across both Chinese indigenous and multinational firms. We conducted additional corroborative interviews with technology firms operating outside of the energy sector, as well as with public officials and academics in China.

Initial Key Findings:
Our empirical data suggest that China-based firms in the renewable energy domain – namely in wind turbine production and solar PV cell/module fabrication -- have developed a unique form of innovative manufacturing, one based on the simultaneous management of tempo, scaling, and cost reduction. This form of innovative manufacturing is centered on engineering capabilities that reside at the intersection between upstream R&D (generally conducted by foreign firms based outside China) and downstream fabrication (which generally occurs inside China). This is not simply mimicry, it does not involve only mature technologies, and it does not happen at arm's length from global competitors or partners. Instead, much of this China-based innovation is being applied to frontier technologies and new-to-the-world energy systems, even while it is also applied to mature products and product platforms. Furthermore, China-based innovative manufacturing takes place not simply within the single firm, but across firm-level boundaries in complex multinational production and R&D networks. Learning takes place in these networks, but rather than flowing unidirectionally (i.e., from foreign technology leaders to Chinese duplicators), knowledge flows multidirectionally and recursively.

For particularly complex energy technology systems, such as civilian nuclear power plants, the greatest challenges involve not new technology development, but rather systems integration. In these domains, Chinese firms have not necessarily achieved significant advances. Moreover, experience in China has helped multinational systems integrators move into new domains of IT innovation, remote sensing, data management, and industrial software development.

Anticipated Outcomes of Research:
This research aims to generate precise maps of knowledge flows and inter-firm relationships in global R&D networks surrounding advanced energy technologies. At one level, this requires detailed this also requires ethnographic analysis of learning techniques within single firms. By exploring mechanisms across networks and within single key firms, the research will illuminate how innovation is proceeding in energy technology worldwide today, how particular forms of innovative capacity are being generated in China, and how country-level institutional arrangements influence these capabilities. The research will culminate in two book-length manuscripts on the topic.

Potential Impact on DoD Capabilities and Broader Implications for National Defense:
Energy technologies, because they potentially reduce overseas reliance on energy sources and offer flexibility in the face of resource and environmental constraints, are strategic by definition. The ability to produce, deploy, operate, and improve these technologies within the U.S. business ecosystem is in the broadest sense a component of national security. Similarly, dependence on overseas suppliers for these technologies becomes a potential source of vulnerability. The proposed research, by carefully disaggregating the separate stages and skill sets associated with energy technology development, permits us to move beyond simple, binary assessments of whether the U.S. is or is not adequately meeting its national defense needs with respect to energy technology. In its emphasis on late-stage innovation surrounding commercialization, the research identifies particular weaknesses in U.S. civilian – and also potentially defense-related – high-tech manufacturing sectors.

Publications through Minerva Research:

- Deutch, John and Edward S. Steinfeld (2013). A Duel in the Sun: The Solar Photovoltaic Technology Conflict between China and the United States. *Report for the MIT Future of Solar Energy Study*. Cambridge MA, MIT.
- John Deutch and Edward S. Steinfeld, “Made in America, and Everywhere Else,” *The Wall Street Journal*, March 12, 2013.
- Metzler, Florian, and Edward S. Steinfeld (2014). "Sustaining Global Competitiveness in the Provision of Complex Products and Systems: The Case of Civilian Nuclear Power Technology" in Locke, R. and Wellhausen, R. (2014), eds. *Production in the Innovation Economy*. Cambridge, MA: MIT Press.
- Nahm, Jonas, and Edward S. Steinfeld (2014a). "Scale-up Nation: China’s Specialization in Innovative Manufacturing." *World Development* 54(0): 288-300.
- Nahm, Jonas, and Edward S. Steinfeld (2014b). "The Role of Innovative Manufacturing in High Tech Product Development: Evidence from China's Renewable Energy Sector," in Locke, R. and Wellhausen, R. (2014), eds. *Production in the Innovation Economy*. Cambridge, MA: MIT Press.
- Steinfeld, Edward S., and Troels Beltoft (2014). "Innovation Lessons from China." *MIT Sloan Management Review.* Summer issue.

Have any curricula or other teaching exercises been generated in the course of this work?
The research led to the development of a new course at Brown University on global energy technology development. The course, aimed at graduate students and advanced undergraduates, examines global patterns of knowledge flow across several domains of energy technology. The course also examines the relationship between firm-level outcomes and national energy and industrial policy.

Political Reform, Socio-Religious Change, and Stability in the African Sahel

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Government Program Officer: Benjamin Knott, Air Force Office of Scientific Research

Aim: Analyze factors affecting stability and instability in a set of six African countries—Senegal, Mauritania, Mali, Burkina Faso, Niger, and Chad—stretching across the arid Sahelian region.

The predominately Muslim countries of the Sahel are collectively among the least developed countries on earth. Historically of limited strategic significance, they have also received relatively little scholarly attention; indeed they are among the least-studied countries in Africa. Recent developments in the region, however, have placed the Sahel at the center of significant international concern. The most significant of these have been the terrorist threats posed by Al-Qaeda in the Islamic Maghreb (AQIM) and various related groups, the aftermath of the fall of the Qaddafi regime in Libya, and in March 2012 the collapse of the political system in Mali and the subsequent occupation of the northern half of that country by radical *jihadi* movements. In addition to these threats, endemic underdevelopment and significant demographic changes have magnified pressures on the states of the region. The research project focuses comparatively on factors influencing the capacity of Sahelian states to manage these pressures, and to maintain stability and ensure the social order and effective governance that serves as a bulwark against radical movements.

The research builds on an analytic framework that focuses on the interactive and reciprocal effects of political and institutional reform on social change, in an iterative process of "micro-transitions" that cumulatively build to potentially more substantial transformations in state capacity, and hence shape the prospects for stability or instability. As with virtually all of Africa, the Sahelian states were directly affected by the intense pressures for political reform in the name of "democracy" of the early 1990s. While their initial responses were quite varied, all were obliged to undertake significant liberalization, reflected primarily in reduced state capacity to shape and control social forces. As a result, in all six countries significant social transformations were set in motion, and their political systems are still being shaped by those forces. Given the large Muslim majority in the region the dynamics of religious change have been particularly important; in the era of democratization there has been a proliferation of new religious movements and voices, of varying ideologies, across the region. These new religious groups are among the key social actors shaping politics in these countries today.

Methods:
The research is being carried out in a series of stages over a three-year period, by a research team at the University of Florida comprised of the PI and three advanced Ph.D. students in Political Science with significant expertise on Africa, including students themselves from the Sahel. It builds on the PI's substantial previous research and strong network of ties in the region, on a three-year State Department-funded project focused on elections in all six countries, and on the expertise of the GRAs themselves.

The research involves multiple methods and a range of activities, including most centrally extensive fieldwork in all six of the study countries, to be carried out primarily by the GRAs under the direct supervision and close involvement of the PI. In preparation for fieldwork, the first stage of the project involved: substantial documentary research and the preparation of background papers on each country; regularly weekly seminars for the core research team that served to develop the template for a fieldwork protocol; intensive consultation with visiting specialists from key countries; a conference-workshop which brought together one key scholar from each of the study countries to comparatively examine the politics of institutional reform in terms of their effects on state resilience. Scoping trips to all six study

countries in summer 2013 prepared the groundwork for the necessary institutional affiliations and networks for field research. In June 2014 the entire research team took part in a workshop on contemporary religious dynamics in the Sahel co-organized with the Center for the Study of Religions at the Université Gaston Berger in Senegal. With the final approval of the IRB protocols, fieldwork has begun as of 1 August 2014. Two of the GRAs are now in the field, initially in Senegal and Chad, moving on to Mali, Niger and Burkina Faso over the course of the coming year. We anticipate that fieldwork by the third GRA will begin in early 2015, to include Mauritania as well as Niger and Mali.

Initial results:
While the core field research is just beginning, our preliminary work—particularly in reconsidering the initially proposed framework in light of the collapse of the state in Mali and the resulting rapid expansion of jihadi groups in that country—led to an initial observation that has been key to shaping the project as we move forward. In each of the six countries, the interactive processes of institutional reform and social change that have been carried out in the name of democratization had led to an initial grouping of the six countries into three pairs on the basis of an observed outcome on the democracy dimension. Our initial work has shown that these processes do intersect with processes of building resilient state institutions, but in complex ways that are in the end independent of the democratization outcome. Within each of our pairs, then, we have identified one country where the process appears to have strengthened state structures and another where it has not done so, despite similarities in terms of the democracy variable. Fieldwork efforts will in large part be aimed at trying to understand the processes that produce these varied results, and the variables we need to consider in trying to build a broader understanding of these processes.

Anticipated Outcomes, Resources and Products of Research:
We anticipate a number of significant outputs of both academic and policy interest from the project. These include a website focused on the region and intended to serve as a key resource for academics, policymakers, and journalists. A significant component of the website includes a major data resource with information and documentation on ten distinct dimensions of elections and electoral management in each of the six countries. This material was generated building on the State Department-funded *Trans-Saharan Elections Project* (2011–13) and further expanded and enhanced by the work of the Minerva research team.

The initial work of the research group and of visiting scholars has already produced a number of working papers, available on our website. These include:

- Eizenga, Daniel. "Managing Stability through Military and International Acclaim: The Stakes of the Malian Crisis in Chad." Series: *The Stakes of the Malian Crisis in the Sahel*. Working Paper No. 001. Dec. 2013.
- Eizenga, Daniel. "Negotiating Stability during Times of Change: The Stakes of the Malian Crisis in Burkina Faso." Series: *The Stakes of the Malian Crisis in the Sahel*. Working Paper No. 002. Dec. 2013.
- Yahaya Ibrahim, Ibrahim. "The Sahelo-Saharan Islamic Insurgency and Crisis Management in Mauritania: The Stakes of the Malian Crisis." Series: *The Stakes of the Malian Crisis in the Sahel*. Working Paper No. 003.
- Yahaya Ibrahim, Ibrahim. "The Sahelo-Saharan Islamic Insurgency and the Quest for Stability in a Troubled Neighborhood: The Stakes of the Malian Crisis in Niger." Series: *The Stakes of the Malian Crisis in the Sahel*.. Working Paper No. 004. 2014

- Bodian, Mamadou. "The Stakes of the Malian Crisis in Senegal: Political Response, Public Debate, and Institutional Resilience." Series: *The Stakes of the Malian Crisis in the Sahel*. Working Paper No. 005. 2014.
- Gondeu, Ladiba. «Notes sur la Sociologie Politique du Tchad. La Dynamique d'Integration Nationale : Depasser la Conflictualite Ethnique d'un État entre Parentheses.» Sahel Research Group Scholars in Residence Papers. Working Paper No. 006. Octobre 2013 (Version française).
- Gondeu, Ladiba. "Notes on the Political Sociology of Chad. The Dynamics of National Integration: Moving Beyond Ethnic Conflict in a State-In-Waiting." Sahel Research Group Scholars in Residence Papers. Working Paper No. 006. October 2013 (English Version).
- Ba, Oumar. "Tuareg Nationalism and Cyclical Pattern of Rebellions: How the Past and Present Explain Each Other." Sahel Research Group. Working Paper No. 007. March 2014.
- Idrissa, Abdourahmane. "In a Neighborhood on Fire: 'Security Governance' in Niger." Sahel Research Group Scholars in Residence Papers. Working Paper No. 008. June 2014.
- Sambe, Bakary. «Le Sénégal à l'Epreuve de la Crise Sahélienne: Nouvelles Dynamiques et Reconfiguration du Champ Islamique.» Sahel Research Group Scholars in Residence Papers. Working Paper No. 009.

We anticipate the publication of additional working papers, articles and book chapters; an edited volume based on our conference on institutional reform in the Sahel is in progress; and the project also includes a concluding book analyzing the prospects for stability of the Sahelian cases in light of our conceptual framework. We are confident that the most significant enduring outcome of the project will be to institutionalize an ongoing university-based research and training program focused on producing the next generation of specialists on this crucial but poorly-understood region of the world.

The team has already made a number of presentations on our findings to policy and other groups. Information on research group presentations and other related activities is available on our website.

Potential Impact on DoD Capabilities and Broader Implications for National Defense:
There are major security implications to the political stability and social harmony of the countries of the Sahel. This is evidenced by the development and significant investment in U.S. sponsored regional security arrangements now institutionalized under the "Trans-Saharan Counter-Terrorism Partnership" (TSCTP). All six countries in the proposed research project are members of the TSCTP. Beyond the immediate and significant concern with the evolving status of AQIM and its capability for establishing a solid base in the region, the fate of Sahelian countries will have major consequences for the stability of a huge swathe of West and Central Africa, with direct security implications for migration flows, economic development, illicit trafficking, and health concerns both for local people and for the broader international community.

Natural Resources and Armed Conflict

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Victor Asal, University of Albany;
Justin Conrad and **Beth E. Whitaker**, University of North Carolina at Charlotte;
Michael Findley, University of Texas at Austin; **James A. Piazza**, Pennsylvania State University
Government Program Officer: Micheline Strand, Army Research Office

Research problem: How do natural resources influence the likelihood, type, and duration of armed conflict in the developing world?

Work in political science, economics, and geography address this question but have not reached much of a consensus on the answers. We argue that one reason for this lack of progress is that most existing work has not investigated how variation in the degree and type of control that rebel groups exercise over resources influences their strategies of violence. Existing explanations of the links between resources and conflict make important assumptions about the role of control. But few develop these assumptions in any detail, and none utilize direct evidence about control in testing their hypotheses.

Initial Results
The research papers listed below have produced these preliminary findings:

Lootable Resources and Third-Party Intervention: When rebels have access to lootable resources, third parties are likely to intervene on the side of the rebels and less likely to intervene on behalf of the government. Rare-events logit and split population (mixture-cure) survival models, in conjunction with close attention to the mechanisms found in individual cases, offer support for the theoretical argument. This paper highlights the largely neglected role of economic factors in motivating intervention biased opposition groups. It further adds insights into the role of natural resources in civil wars by shifting emphasis away from domestic combatants towards the motives of outside states.

Political Exclusion, Oil, and Ethnic Armed Conflict: We theorize that rather that political exclusion and the presence of valuable natural resources interact with one another to substantially increase the likelihood of ethnic armed conflict. Using data on ethnic group political exclusion and geo-coded indicators of oil production and oil prices – the resource theorized to have the most robust effect on rebellion – we conduct a series of logistic regression analyses for the years 1946 to 2005. We find that exclusion but not oil alone increase the likelihood of conflict, while the interaction of these factors further raises the risk of war.

Rebel Finance and Civilian Victimization: Why do some rebel groups attack civilians, while others do not? One powerful explanation points to the sources of rebel finance. This paper introduces a new dataset that measures the extent to which armed groups in Africa and the Middle East exploit natural resources or rely on criminal activities to finance their violence. We find that rebels who earn income from natural resources engage in more violence against civilians, while those who rely on organized crime exercise greater restraint in their relations with non-combatants.

Anticipated Outcomes of Research:
Over the next two years, we plan to use the data and tools developed as part of this project to address these questions:

- How does control of natural resources and fundraising through criminal activities influence rebel movements' popular support and willingness to use violence against civilians?

- How do the different ways that rebels finance their activities influence their durability, use of violence, and cohesion?
- Does control of natural resources or criminal activities influence the military effectiveness of rebel organizations? Does it permit them to scale up to employ violence more effectively?
- How does the existence of natural resource influence patterns of relations between states and rebel organizations?

Potential Impact on DoD Capabilities and Broader Implications for National Defense:
Political instability and conflict in the developing world has been identified as a key security policy concern in the National Security Strategy of the United States. We know from existing research that natural resources are linked in some ways to such instability and conflict. Better understanding this link would place the United States in a stronger position to prevent conflict. In particular, understanding how control of resources influences conflict would allow the United States to identify and influence actors who control resource locations that are most likely to fuel conflict.

Publications

- Findley, Michael. G., and Marineau, Josiah F. (Forthcoming). "Lootable resources and third-party intervention into civil wars." *Conflict Management and Peace Science*.
- Conrad, Justin, James Igoe Walsh, and Beth E. Whitaker. (2014). "Rebel Finance and Civilian Victimization." Paper presented at the annual meeting of the American Political Science Association.
- Piazza, James A. (2014). "Oil, Human Rights, and Terrorism: A Test of Mediation." Paper presented at the annual meeting of the American Political Science Association.
- Asal, Victor, Michael G. Findley, James A. Piazza, and James Igoe Walsh. (2014). "Political Exclusion, Oil, and Ethnic Armed Conflict." Paper presented at the annual meeting of the International Studies Association.

Sharable data resources to be generated:
We are in the process of developing the following data resources:

- Geo-coded time-series data on location, extraction, value, and "lootability" of natural resources
- Time-series data measuring non-state civil war combatants' reliance on natural resources and crime, including type of resource, type of crime, locations of activities, and estimates of income from activities
- Dataset measuring exploitation of natural resources and criminal activity of armed groups that engage in terrorism.

External Briefings

- Funding Rebels: Resources, Crime, and Conflict in Africa. Newsletter of the Africa Research Initiative, National Intelligence University, August 2014.
- Natural Resources and Conflict. Minerva SMA Lecture Series on Africa, May 2014.
- Natural Resources and Conflict in Africa. Geostrategic Intelligence Seminar: Conflict in Africa, Defense Intelligence Agency, Washington, DC, January 2014.

Finding Allies for the War of Words: Mapping the Diffusion and Influence of Counter-Radical Muslim Discourse

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Government Program Officer: Harold Hawkins, Office of Naval Research

This project has addressed deficiencies in our understanding of counter violent extremist (CVE) Islamic discourse and praxis by tracking and analyzing publicly observable formal networks and others operating under the radar screen. Our purpose is to enhance understanding of the structure of CVE networks, the ideas on which they are based, social locations of their leaders and followers Specific issues addressed include: the social location and political environments of discourse producers and consumers; institutions and affiliations (local to transnational) that disseminate CVE messages; media used; the roles of local and global conflicts in their formulation; and Islamic sources on which CVE discourse is based.

The project's contribution is a multidimensional portrait of CVE networks across time and regions. A web portal accessing broad informational dynamics includes a CVE database and diffusion mapping.

Methodology:
The project is characterized by an integrative approach that brings together a broad range of disciplines and methods—Islamic and area studies; field research and discourse analysis; survey research; computer science and statistics—and triangulates methods to reveal patterns in CVE discourse at the local, regional, and global levels.

Results:
A complex nexus of Enlightenment concepts—democracy, nationalism, religious pluralism, human and women's rights, Islamic theological and local cultural principles—inform CVE discourse systems. Gaining a more nuanced understanding of the interaction of these concepts and related practices is essential for recognizing Muslim organizations and movements opposed to violent radicalism.

We have located CVE groups in all three regions and sixteen transnational and transregional networks not described in the existing literature. Most are associated with long established religious movements/ organizations with theological orientations ranging from Salafi to Sufi. We have shown that the level of religious tolerance or intolerance is better correlated with violence than particular theological views.

Methodological integration has yielded significant substantive findings. Multi-sited ethnography used common research protocols to facilitate understanding of similarities and differences across cases. It enabled us to track shifts in VE and CVE discourse patterns across regions. It also helped to confirm our hypothesis that the promotion of culturally specific Muslim practices is an effective mode of CVE discourse. Web mining and ethnography independently documented shifts in Islamic discourse since 2011 away from global jihad and the establishment of a global Caliphate and towards sectarianism and Sharia. Ethnography and surveys indicate substantial support for Sharia even Western Europe. Ethnographic follow up on survey findings showed that understandings of Sharia vary significantly. There is a basic distinction between those who understand Sharia as a theological concept and others who define it in juridical ways. Traditional Muslim scholars typical opt for the former, Islamists and Salafis the latter.

A substantial body of academic literature suggests that efforts by Saudi Arabia based Salafi organizations such as the Muslim World League have had a major impact on Muslim societies. However, our survey findings indicate that less than 2% of respondents fully endorse Salafi religious practices. Cross-regional ethnographic research indicates that local Muslims reject Salafi proselytization and counter it by increasing the scale and frequency of religious and events that Salafis condemn and moving them from private to public space

Outcomes:
The project has enhanced theoretical understanding of relationships between religious doctrine and violence, and factors contributing to the emergence of nonviolent movements. We have developed enhanced web mining technologies, including a visual intelligence platform (LookingGlass) to track the online presence of VE and CVE movements. These technologies examine large numbers of texts, including Twitter streams, to discern contested topics. LookingGlass tracks the geographic regions, shifting positions, and diffusion of topics and perspectives discussed by people employing this mode of online communication. The platform has multilingual capabilities and enables rapid recognition of contested topics and the networks in which they are located.

Potential Impact on DoD Capabilities and Broader Implications for National Defense:
Knowing the centers of VE and CVE discourses and their constituencies will enhance the effectiveness of US defense and security policies and programs by allowing a targeted and focused approach. The findings will enhance irregular warfare capability with respect to violent extremist movements by documenting the landscape of counter-violent discourse.

Publications through this Minerva research:
Overall, the project has produced 31 refereed journal articles, 19 non-refereed significant publications, 10 books or book chapters, 4 technical reports/white papers, and 17 referred published conference proceedings. Team members have made over 65 workshop or conference presentations and organized or had leadership roles in 8 workshops. The team has received 2 awards.

Recent publications include:

- Wang, Z., Lai M., Lu, Z., Fan, W., Davulcu, H., and Ye, J. (2014, June), Rank-One Matrix Pursuit for Matrix Completion. Proceedings of the 31st International Conference on Machine Learning (ICML), Beijing, China.
- Corman, S. R. & Hitchcock, S. D. (2014). Media use and source trust among Muslims in seven countries: Results of a large random sample survey. *Journal of Strategic Security, 6(4),* 25 - 43.
- Woodward, M, Umar, M. S., Rohmaniyah, I, & Yahya, M. (2013). Salafi Violence and Sufi Tolerance? Rethinking Conventional Wisdom. *Perspectives on Terrorism, 7(6),* 58 – 78.

Sharable data resources generated
See "*LookingGlass: A Visual Intelligence Platform for Tracking Online Social Movements*" on page 147.

Autocratic Stability During Regime Crises

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http://sites.psu.edu/dictators/
Government Program Officer: Martin Kruger, Office of Naval Research

Research Problem: Gather global data on all authoritarian regimes from 1990-2014 to examine how foreign policy influences two outcomes in the context of domestic protest in dictatorships: state-led violence and regime instability

Does foreign engagement of authoritarian governments decrease governments' willingness to use force against their citizens during times of crisis? And if so, which foreign policy tools are most effective in accomplishing this end? This research helps policy makers understand the influence of different foreign policy tools on the behavior of military and security organizations in dictatorships during periods of domestic unrest. It ellicits how foreign policy tools and domestic factors such as regime type and leadership-security ties interact to influence government repression and democratic regime change.

Methodology:
The proposed project will gather global data on all authoritarian regimes from 1990-2012 to examine how foreign policy influences two outcomes in the context of domestic protest in dictatorships: state-led violence and regime instability. The project will examine how numerous tools of foreign policy – such as economic aid, military assistance, bilateral military ties, and diplomatic exchange – influence the behavior of autocratic governments during periods of crisis. It will account for two intervening factors, autocratic regime type and leadership security ties that influence these relationships.

Potential Impact on DoD Capabilities and Broader Implications for National Defense:
This project develops a better understanding of the relationship between foreign engagement of dictatorships, state-led violence in these countries, and the potential for democratic and non-violent regime change. The databases constructed for this research will have a broad impact for research on international conflict in non-democracies; foreign relations with autocratic countries; the integration of government and rebel fighters when civil wars end; the behavior of foreign militaries after regime change; and counter-terrorism effort in autocratic countries.

Initial results
We have identified three time-varying dimensions of autocratic rule using an annual cross-country data set. We show these dimensions -- which measure the institutional autonomy of the military, the strength of the supporting political party and the level of personalism -- are orthogonal to the most commonly used measures of democracy.

Manuscripts in progress

- Geddes, Honaker, and Wright, 2014. "Measuring What You Can't See: The Latent Characteristics That Structure Autocratic Rule." Paper presented at the Annual Meetings of the American Political Science Association (August 29, 2014) Washington D.C.
- Brawner and Wright, 2014. "Introducing the Leadership Security Ties Data Base." Paper presented at the Annual Meetings of the American Political Science Association (August 30, 2014) Washington D.C.

Sharable data resources:
Two datasets are detailed at "*Latent Dimensions of Authoritarianism*" on page 149.

Strategic Response to Energy-related Security Threats in the DOD

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Saleem Ali, University of Queensland
Government Program Officer: Micheline Strand, Army Research Office
Government POC: Lisa Troyer, Army Research Office

Research project: determine *when*, *how*, and *why* the U.S. Department of Defense (DoD) has evolved new strategic priorities addressing energy and climate change.

The research proposal, as originally submitted to the Minerva program, grew from an interest in the response of the U.S. military to the interlinked, but very different, problems posed by dependence on petroleum products (or POL), and the emerging issue of climate change. Although not conventional military threats, these two issues severely complicate the practice of national defense, and raise questions about the organizational behavior, adaptability, and capacity for change of the Department of Defense. The research study was motivated by recognition of the apparently unstoppable momentum of programs related to energy and climate, and sought to assess whether these steps were taken with meaningful organizational commitment and durability of effort.

The research proposal laid out objectives: "to determine *when*, *how*, and *why* DoD evolved new strategic priorities addressing energy and climate change." In addition, the proposal aimed to "assess DoD capacity for change" and study "how the adoption of energy and climate change priorities can illustrate strengths and weaknesses in DoD organizational capacity." On a larger scale, the research was designed to contribute to "an understanding of how DoD responds to changing security conditions, and how foreign national security institutions may respond to energy-related security threats."

Methodology:
To answer these questions, a three-layer analysis was proposed: combining analysis of organizational, cultural, and strategic factors to produce a fuller understanding of how DoD is engaging on energy and climate issues, and how these efforts may play out in the future. Interviews were put into context with analysis of DoD publications, reports, policy statements, and other documents. In addition, archival research produced materials from presidential, Congressional, and other government sources that illuminated DoD policies. Data on DoD spending related to energy and climate issues was also explored.

The research study was grounded in theory across several discrete disciplines, including security studies, psychology, and organization studies. Theory framed the research questions, shaped study design, guided interview methods, and helped answer key decisions about study adaptation and modification when unexpected outcomes led to decision points. At heart, however, theory helped make sense of the mass of data accumulated during the course of the research. Different theories about organizations and security institutions helped put data points into a useful and comprehensible context, enabling the data to be mobilized into problem-oriented outcomes and new findings. In addition to investigating new questions about energy and climate security practices within DoD, the study therefore operated across disciplinary boundaries. In order to successfully integrate several bodies of theory, each of which

Figure 10: Framework for analysis

individually promised rich insights, it was necessary to develop an interdisciplinary multitheoretical framework for analysis. The framework is pictured in **Figure 10.**

This framework sets strategy at the peak of a pyramid, recognizing the primary function of strategy as high-level security practice, as well as the relatively smaller space occupied by strategic functions within the broader DoD organization. Culture, the middle layer, includes for our purposes both organizational culture theory and strategic culture theory. Culture is recognized here as embodying the medium through which security practices move, including the formation of strategy. Specific organizational characteristics are placed at the bottom, in recognition of their function as both outputs of culture and strategy, but also as guideposts for the transmission of culture and strategy. This three-layer framework enables the integration of multiple theoretical approaches, and a more refined understanding of the research problems. Rather than approaching each aspect of this pyramid independently, in a separate theoretical bubble, considering all three together permits a fuller understanding of the feedback between culture, organizational characteristics, and strategy.

Results:
Major conclusions indicate that the issue of climate change, which is at heart a story about the dangers posed by the natural world to American interests and the fulfillment of American military and defense objectives, fits neatly into DoD culture, organization, and strategy. Thus our research challenges the perception that environmental security is divorced from the high politics of military security. Rather the threat of natural disasters and resource depletion has a history of salience within the defense establishment and climate change has thus been accommodated within this cultural milieu. However, the political baggage associated with the issue of climate, however, as well as its connection to other, less popular environmental programs, delayed the acceptance and integration of climate considerations into planning and strategy.

The study also found that the impressive current programs within DoD aimed at reducing petroleum consumption must be understood in light of earlier generations of policy aimed at addressing the costs associated with POL (petroleum, oil, and lubricants). The long history of U.S. energy consumption is encapsulated to a degree by DoD, and evidence for recurring cycles of engagement and disengagement on this issue illustrates that organizational learning theory may hold useful insights in further research and development in this arena.

Outcomes of Research:
Evidence indicates that efforts to reduce petroleum consumption are triggered by crises, when a “policy window” opens and change can be implemented. However, the cycle of policy development and implementation is slower than price variability in the petroleum market: efforts to reduce consumption have been stymied in the past by falling world oil prices. When prices spike, the crisis spurs interest in addressing the problem; when prices fall, interest turns elsewhere. The policy cycle moves more slowly than oil prices. This pattern lends credibility to the efforts by the Operational Energy office to tie their efforts to military effectiveness rather than cost savings. Although interest in energy may be fleeting, DoD maintains unwavering focus on the military mission; therefore, typing energy programs to military effectiveness represents a key insight as well as an example of organizational learning.

Climate change is directly connected to the DoD mission. In addition, integrating climate considerations into military planning, strategy, and operations builds upon a long history of carefully studying the natural world. In addition, engaging with climate change as a military consideration fits with DoD culture, which contains elements of antipathy towards and a desire to control the environment. Therefore, although

climate change may seem to be a major new challenge for DoD, it integrates easily with the top two layers of our model: strategy and culture. The process of bringing climate change into the DoD organization was hampered by political factors, but it can be expected that climate will become more and more strongly integrated into DoD strategy, culture, and organization.

Potential Impact on DoD Capabilities and Broader Implications for National Defense:
The histories of energy and climate in DoD can be reviewed for learning outcomes. Although simple, these points received support from interview and archival data, indicating that they deserve closer investigation and richer description. Some key points:

(1) Consider how the issue at hand fits into DoD culture;
(2) Consider the connections between the issue and the military mission of DoD, as well as its impacts on military effectiveness;
(3) Study the organizational characteristics of DoD that relate to the issue;
(4) Consider how engagement on this issue affects DoD budgets, planning, and acquisition processes;
(5) Consider services individually.

Future Work:
Many promising avenues of future research and scholarly output were opened during the course of this research project. We anticipate publishing across a wide selection of fields in coming months, including organizational studies, security studies, environmental studies, political science, and military history. However, the nature of interdisciplinary research requires a balance between openness to ideas from multiple theoretical perspectives as well as tight focus on the questions at hand. Further steps in our particular research program include further development and refinement of the theoretical framework, application to other nations' military institutions, and a deeper investigation of historical energy-related programming in DoD. In addition, this research project sparked interest in the role of logistics in the DoD organization; this topic is currently under investigation.

Publications through this Minerva research:

- Pincus, R. 2013. United States Department of Defense and the Challenge of Climate Change. Ph.D. Dissertation, Natural Resources, The University of Vermont, Burlington, Vermont.
- Pincus, R. 2014. "Resource footprints and environmental security at DoD installations." In *Sustainable Cities and Military Installations*, Igor Linkov, ed. Springer: NATO Science for Peace and Security Series Series C: Environmental Security.
- Pincus, R. and Ali, Saleem H., eds. 2015. *Diplomacy on Ice: Energy and the Environment in the Arctic and Antarctic*. CT: Yale University Press.
- Pincus, R. 2015. "Security in the Arctic: a retreating wall." In *Diplomacy on Ice*. CT: Yale University Press.

Have any curricula or other teaching exercises been generated in the course of this work?
Two courses were taught in the course of this research project:

- Spring 2014: Environmental Security: War, Climate, and National Defense (Rebecca Pincus)
- Fall 2013: War and the Environment (Rebecca Pincus)

How many student researchers have graduated or postdocs moved on after being supported by

Minerva Research Awards Selected in 2014

PI	Research Project	Pg #
E. Berman	Deterrence with Proxies	98
J. Blaxland	Thailand's Military, the USA and China: Understanding how the Thai Military Perceives the Great Powers and Implications for the US Rebalance	100
M. Bloom	Preventing the Next Generation: Mapping the Pathways of Children's Mobilization into Violent Extremist Organizations	101
J. Busby	Complex Emergencies and Political Stability in Asia	102
J. Horgan	Understanding U.S. Muslim Converts in the Contexts of Security and Society	104
V. Hudson	Household Formation Systems, Marriage Markets, and Societal Stability and Resilience	105
P. Huth	Aiding Resilience? The Impact of Foreign Assistance on the Dynamics of Intrastate Armed Conflict	107
R. Jervis	Culture in Power Transitions: Sino-American Conflict in the 21st Century	109
S. Kosack	Understanding the Origin, Characteristics, and Implications of Mass Movements	111
M. Lieberman	Neural Bases of Persuasion & Social Influence in the U.S. and the Middle East	113
M. Macy	Tracking Critical-Mass Outbreaks in Social Contagions	115
J. Moyer	Taking Development (Im)Balance Seriously: Using New Approaches to Measure and Model State Fragility	117
L. Windsor	Political Language and Crisis: A Computational Assessment of Social Disequilibrium and Security Threats	119

Deterrence with Proxies

Eli Berman, UC San Diego, elib@ucsd.edu
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David Laitin, Stanford University; **David Lake**, UC San Diego
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The United States and its allies are shifting away from direct attacks on terrorists to a posture that projects power by inducing proxies, such as Pakistan, Afghanistan, and Yemen, to control transnational threats emanating from their own territory. Yet proxies do not put the same value on containing these threats as the United States does, creating a need for incentives—including a threat of direct military intervention—to motivate the U.S.'s desired level of effort. Conventional theories of deterrence inadequately address this strategic challenge.

Methodology:
We propose an overarching framework of dynamic deterrence in proxy relationships that builds on recent progress in understanding dynamic principal-agent relationships. In our framework, the proxy has an informational advantage in suppressing terrorism, and so can do so more cheaply than the principal, but does not share the principal's objectives. Incentives through future rewards or punishments are therefore necessary to induce proxy effort. Our framework will be informed by case study evidence from similar principal/proxy relationships in counterterrorism and counterinsurgency in Afghanistan, Iraq, and the Philippines, in which we have extensive data on the decision-making of the protagonists. We will empirically test the framework using new data from two conflicts—Israel's relationship with Hamas in suppressing terrorism from Gaza, and the Indian federal government's relationship with eight states in combatting the Maoist Naxalite insurgency.

Anticipated Outcomes of Research:
We plan to produce an empirically-validated theoretical framework that allows a comprehensive analysis of this deterrence posture. We will extend it to cover four situations decision-makers face in addressing current conflicts, including when:

1) The principal chooses to use intermediate incentives as well as threatening large military interventions;
2) The principal as well as the proxy is tempted to break an implicit agreement;
3) Terrorists act strategically in order to undermine the proxy relationship; and
4) The principal can invest in improved intelligence about the proxy's effort to reduce the need for large military interventions.

Our theoretical research will advance the literatures on principal-agent relationships and deterrence and our empirical work will lead to a deeper understanding of a broad range of interstate as well as intrastate relationships.

Potential Impact on DoD Capabilities and Broader Implications for National Defense:
If validated, a robust framework of deterrence with proxies will provide guidance on how to design diplomatic, informational, military, and economic efforts that motivate proxies to help manage emerging insurgent and terrorist threats. The same approach might apply to other transnational threats from non-state actors as well, including cyber-threats, drug trafficking, smuggling, and human trafficking.

Sharable data resources to be generated:

- The "Hamas as a Proxy in Gaza" subproject will generate a dataset on terrorist attacks on Israel, and IDF attacks within Gaza based at monthly frequency, by attack type and region of Gaza, as well as data on the political, security and economic environment, from 2007 through summer 2014.
- "The Proxy's Political Calculus" subproject will generate a set of cases, coded consistently.
- The "Suppression of Naxalites by State Governments" subproject will generate data on Naxalite attacks, suppression efforts, political strategies of Indian states, support of states by the government in Delhi.

Other anticipated research products

- Peer-reviewed publications, dissertation chapters, and a book manuscript.
- A workshop in two or more of the project years, co-hosted with the Empirical Studies of Conflict project, to present working papers and review findings.
- Many graduate students will also be trained in the course of the larger project.

Thailand's Military, the USA and China: Understanding how the Thai Military Perceives the Great Powers and Implications for the US Rebalance

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The research hypothesis is that great power influence in Thailand can be correlated largely to the sense of continuing shared interests. The key questions are: to what extent are local military elites and political figures amenable to great power influence over strategic security choices and what are the key determinants of such influence?

Methodology:
This research builds on the expertise of the principal investigator. In-principle support to collaboration has been provided by the Royal Thai Armed Forces Headquarters, through General Surapong Suvanna-adth, and Chulalongkorn University, through Dr Panitan Wattanayakorn and Professor Thitinant Pongsudhirak.

The principal investigator intends to conduct interviews with 24 senior serving and retired military personnel from across the Thai armed forces, as well as others steeped in the country's military and foreign affairs.

The project intends to include a survey drawing on a sample of approximately 1000 serving and former staff officers and junior to mid-level commanders. The survey will cover a wide range of factors affecting the mindset of the Thai military including the fluctuations of US and Chinese influence on military education.

The project also will undertake secondary and primary archival research to provide context on the culture, history, strategies and significance of external influences on Thai security choices. The curricula of key military training and educational institutions will be targeted to observe how educational trends have evolved.

Anticipated Outcomes of Research:
The results will be disseminated through a published scholarly monograph, along with briefing papers, articles, lectures and discussion forums.

Potential Impact on DoD Capabilities and Broader Implications for National Defense:
While the case of Thailand is necessarily unique, there will be many insights, with a more general application, about how senior officials in a Southeast Asian context conceptualize and respond to security challenges and opportunities emanating from the United States and China.

Deeper comprehension of the Thai military mindset will provide pointers for future strategic planning, clarifying options for engagement with countries struggling to reconcile US and Chinese security cooperation.

The study will inform strategies for engaging and influencing responses across ASEAN and beyond to the changing strategic environment.

Preventing the Next Generation: Mapping the Pathways of Children's Mobilization into Violent Extremist Organizations

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Terrorism has long been considered a "weapon of the weak." In recent years terrorists have increasingly drawn on the *weakest* members of society, notably women and children to fight. Using child operatives provides the organizations with the element of surprise as well as psychological advantages. This project assesses the growing phenomenon of children's involvement in terrorist groups. It also analyzes the different mechanisms for children's mobilization, contrasts children in VEOs with child soldiers, and briefly explores the impact that this tactic has on the soldiers facing militarized children. This research involves a 3-year enquiry into the processes whereby children are mobilized into terrorist movements.

Methodology:
The project seeks to collect and analyze primary and secondary data in order to create a model that may guide the development of a set of recommendations for multi-level, culturally appropriate models for the intervention and prevention of children engaging in violent extremism. Cases will be developed using secondary, publicly available data for Afghanistan, Pakistan, Israel/Palestine, Iraq, Syria and Somalia. For Pakistan, however, we will seek to access anonymized data on children's experiences, collected by mental health professionals involved in rehabilitation efforts by NGOs. Furthermore, we will seek to contextualize the data by conducting interviews with those same mental health professionals. We will contrast the findings with children's recruitment in other contexts (gangs, cults, and by pedophiles) as well as examining children's involvement in political violence in Africa (Boko Haram) Northern Ireland (Ogra Sein Fein) and other historical Terrorists Groups.

Anticipated Outcomes of Research:
We anticipate the development of a model of children's involvement in violent extremism as well as assessing best practices for preventing such involvement. The major outcome of the research will published articles and conference presentation leading to a book that will be published with Cornell University Press (already under contract) entitled: *Small Arms: Children and Terrorism.*

Potential Impact on DoD Capabilities and Broader Implications for National Defense:
We are increasingly seeing younger and younger operatives in the battle-space and we know that there is little comprehension about how and when children are mobilized into terrorist and violent extremist organizations. The impact on national defense cannot be understated.

Sharable data resources to be generated/workshops:
We plan to develop a comprehensive data set on children's involvement that will be shareable with DoD and other Minerva researchers.

Other anticipated research products
The project will generate literature reviews about children and conflict in a variety of settings to glean lessons learned. There will be "quick win" research summaries that will be posted to the project website. The investigators will present findings at academic conferences and publish with academic journals. Bloom and Horgan will also publish op-eds on the subject to inform the public of the research findings.

Complex Emergencies and Political Stability in Asia

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www.strausscenter.org

The Program on Complex Emergencies and Political Stability in Asia investigates how various insecurities converge to impact vulnerability, where and how these insecurities could develop into complex emergencies, and how to build government response capacity and societal resilience. The program will have a particular emphasis on how climate-related hazards such as cyclones, storms, floods, droughts, and fires could intersect with other sources of vulnerability and on-going challenges to pose broader challenges to governments and the wider region.

The program builds on the Strauss Center's Climate Change and African Political Stability (CCAPS) Program, a multi-year effort funded by the Minerva Research Initiative. This research will explore the confluence of insecurities in ten countries in South and Southeast Asia (including Bangladesh, Bhutan, Cambodia, India, Laos, Myanmar, Nepal, Pakistan, Thailand, and Vietnam), the structural vulnerabilities within these regions that affect U.S. defense and diplomacy, and the influence of these factors on formulating strategies for response. Among the questions this research will address:

- What are the diverse forces that contribute to disaster vulnerability and complex emergencies in Asia?
- What are the implications of crises—whether single events or complex emergencies—for local, national, cross-border, and regional security?
- How can investments in preparedness and prevention, supported by local and external donors, minimize the impacts of such crises and build resilience?

Methodology:
The program will engage in the following methods: (1) modeling disaster vulnerability using Geographic Information Systems, (2) coding and mapping conflict events in real-time, (3) conducting risk assessments and forecasting using geospatial analytics, (4) mapping aid flows to identify disaster response capacity, (5) conducting consultations and fieldwork to collect primary data, ground-truth conceptual tools and models, and implement case studies, and (6) designing mapping and analytical tools to facilitate use of program research in policy planning and response.

The program will apply these methods in two core research areas. First, the program will investigate how various insecurities converge to impact vulnerability in Asia, and where and how these insecurities could develop into complex emergencies. This will be achieved by examining the disaster, conflict, and governance components of complex emergencies, assessing the dynamics of each individual component and how they interact through feedback loops that form complex emergencies. Second, the program will explore the capacity of national governments and international actors to respond to disasters and complex emergencies.

Anticipated Outcomes of Research:

By providing both greater conceptual clarity and methodological rigor to the study of complex emergencies and disasters, this research program will provide actionable policy guidance about measures to prevent the emergence of complex emergencies and how to ameliorate them should they emerge. By distinguishing between kinds of complex emergencies, this work will reveal the appropriateness of different policy instruments, depending on the configuration of contributing factors.

Potential Impact on DoD Capabilities and Broader Implications for National Defense:
Understanding how different insecurities coalesce to impact vulnerability in Asia—and assessing when and how these insecurities can develop into disasters or complex emergencies—has strong implications for U.S. national security. Major displacements or unequal distribution of costs from cyclones, tsunamis, and flooding—all on the rise in parts of Asia—can potentially lead to civil unrest and, in some cases, develop into complex emergencies.

By mapping varied regional insecurities, this program will identify: the areas of chronic concern where U.S. military assets may be directed for humanitarian relief or conflict containment; the areas at risk of disasters and complex emergencies; the potential vulnerability of bases, allies, and potential adversaries; and areas where destabilization might empower extremist groups. By producing the most accurate, real-time, disaggregated, geo-referenced data on Asian political violence and its agents, program research will also allow for comparable assessments of conflict across the most high-risk states using highly curated data on which to base policy, humanitarian, and security decisions. By identifying factors that impact national capacity to build resilience, as well as the response capacity of international actors on the ground, program research will inform policy planning at national and international levels to potentially diminish the impact of future events and the need for U.S. intervention.

Sharable data resources to be generated:

- *Datasets and Modeling.* The program will develop (1) a Disaster Vulnerability Model for South and Southeast Asia, (2) a typology and modeling to identify and analyze complex emergencies, (3) a real-time, geocoded dataset of conflict across key subregions in South and Southeast Asia as part of the Armed Conflict Location and Events Dataset, and (4) a geocoded dataset of international development and humanitarian aid to mitigate disasters and complex emergencies in these subregions of South and Southeast Asia.
- *Data Dashboard and Mapping Tools.* The program will produce a Complex Emergencies Dashboard—an open source, online platform that will leverage data and analytical models produced by the Program, combined with geospatial analytics, to provide a framework for recognizing and analyzing complex emergencies in Asia to facilitate policy planning and response.

Other anticipated research products:

- *Case Studies.* The program will produce a set of case studies to inform our understanding of national capacity to prepare for and respond to disasters.
- *Workshops.* The program will host a workshop each year, convening program researchers and related academic and policy experts to explore cross-cutting issues that span several research areas under study on the program.
- *Student training.* The program will recruit and train PhD students, master's degree students, and undergraduate students at the University of Texas at Austin and its collaborating universities.

Understanding U.S. Muslim Converts in the Contexts of Security and Society

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Muslim converts play a disproportionate role (statistically over-represented) in Islamist terrorism internationally. In fact, Muslim converts are seven times more likely to radicalise than people 'born Muslim' and converts in the West are increasingly engaged in 'homegrown' domestic extremism and attacks overseas as Foreign Fighters with implications for US national security. We investigate the following primary questions:

- How can we understand and predict what leads some converts to radicalise?
- Do the radicalization processes of Muslim converts differ from those born Muslim. If so, how?
- What types of roles do Muslim converts play as domestic 'homegrown' threats and as Foreign Fighters?
- With what types of strategic and tactical threat scenarios might converts be involved?

Methodology:
We will undertake extensive ethnographic fieldwork in the US with non-radicalized and radicalized Muslim Converts to understand the range of causes and processes of Islamic conversion and convert radicalization; We will establish new large-*N* qualitative and quantitative convert datasets (using surveys and ethnographies); apply a range of analytical approaches to interrogate the convert datasets (statistical, qualitative, SNA etc.); compare and contrast radicalized and non-radicalized converts and compare and contrast these findings with the radicalization processes of those who are 'born Muslims'; develop and test the Conversion-Radicalization Continuum (CRC), an interdisciplinary theoretical framework and rigorous scientific method for understanding factors that contribute to convert radicalization; and we will use evidence-based scenario development to evaluate the range and nature of security challenges converts represent.

Anticipated Outcomes of Research:
A major contribution to the study of Islamic conversion in America through scholarly publications; new empirical insights that enhance currently incomplete understandings of religious conversion, radicalization and terrorism and publish findings in peer-reviewed journals and books; provide a range of potential practitioner and policy-focused options for governments to use for the tasking of surveillance and in the development of intervention strategies to counter violent extremism among converts.

Potential Impact on DoD Capabilities and Broader Implications for National Defense:
We will deliver a number of assessment tools, indicators and scenarios to practitioners and policy makers which will assist with the development of evidence-based approaches to threat and risk assessment; we will directly inform US national security stakeholders about the research findings throughout the project through the provision of reports, briefings in person, conferences and workshops.

Sharable data resources to be generated:
Multiple 'quick win' briefing notes; Scholarly articles; Research reports; Data for use in training materials (e.g. e-learning style vignettes; case illustrations; videos using real accounts from interviewees reconstructed with actors)

Household Formation Systems, Marriage Markets, and Societal Stability and Resilience

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http://womanstats.org

Research Problem: Examine several dimensions of household formation systems and their resulting marriage markets considered to be most strongly linked to societal stability and resilience.

Hypotheses:

- Societies that encode this primacy through household formation strategies such as patrilocality and early age of marriage for females will be less stable and less resilient than those that do not.
- Furthermore such non-resilient societies will be easily destabilized by marriage market obstructions to which they are extremely vulnerable, whether those arise by way of abnormal sex ratios, prevalent polygyny, or spiraling marriage costs. These obstructions create a standing pool of deprived young adult men with a vested interest in further destabilization of the status quo and a greater reliance on force to determine the allocation of societal standing and resources.
- In addition, the overall level of violence against women becomes a barometer of how stressed this unstable system has become over time.

Methods:
After finishing data collection on each variable of interest (listed in the Sharable Data Resources section), we propose to (a) examine their statistical association, in isolation and in interactions with each other, with existing measures of state stability and resilience on a cross-national basis. This will allow us to assess the overall correlational validity of the theoretical approach, as well as its level of cross-national generalizability.

Next, we aim to (b) complement these aggregate statistical analyses with an in-depth case study conducted in West Africa. This analysis should allow us to (c) identify which factors are more closely linked to state instability, and trace the causal processes involved. In this way, we also hope to understand and minimize the impacts of confounding or potentially contaminating contrasts across a set of varied situations.

Finally, we will (d) address the policy implications of our research; that is, it may well be that some of the most powerful means to improve state stability and resilience revolve not around large ideological efforts, such as the export of democracy, but rather around concrete, even narrow, revisions to household formation systems, such as state efforts to facilitate clearing of marriage markets.

Anticipated Outcomes of Research
Understanding the interaction of marriage markets with conflict processes will contribute to the design of effective conflict prevention, warning, and reconciliation policies. Marriage systems provide a basis for interpreting participants' motives in supporting insurgency and may prove useful in predicting broader spatial patterns, including the spread and trajectory of violence.

This case study may also recommend greater consideration of marriage market dynamics in the formulation of wartime or post-war humanitarian and development initiatives. Well-intended policies may inadvertently exacerbate marriage market pressures in ways that heighten conflict or lead to risky behaviors and abuse. On the other hand, careful humanitarian interventions may be able to discourage exploitative marriage practices or reduce the marginalization of groups that could be targeted for recruitment.

Potential Impact on DoD Capabilities and Broader Implications for National Defense

If our hypotheses are correct, the resulting insights may critically impact threat assessment and stability operations as performed by the Department of Defense. Planners who overlook the effects of household formation systems and their resulting marriage markets may find the efficacy of their strategies and tactics profoundly undermined. As a team, we intend to explore how the Department of Defense could use our research findings to improve monitoring and forecasting of societal stability and resilience, as well as to proactively craft measures designed to prevent and respond to deterioration caused by underlying dysfunction in household formation strategies and obstruction of marriage markets.

Sharable data resources to be generated

Online database of eight indicators of household formation strategy and marriage market clearing:

- Sex ratios and sex-age population structure
- Prevalence of polygyny
- Brideprice and dowry
- Age of marriage for women and men
- Patrilocality
- Prevalence of cousin marriage
- Inequity in family law, including property rights
- Legal sanction for marital and domestic violence

Other anticipated research products

- Several academic papers, and quasi-academic policy pieces
- A book manuscript
- Workshops on using the database
- Mentoring of student assistants

Aiding Resilience? The Impact of Foreign Assistance on the Dynamics of Intrastate Armed Conflict

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Co-PI: Kevin Jones
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Government Program Officer: Benjamin Knott, Air Force Office of Scientific Research

This project addresses a set of fundamental issues linking security and development: Does foreign assistance affect resilience to intrastate armed conflict—and if so, where, when, and how? Existing scholarship typically approaches those questions from a country-level perspective, often treating aid in an undifferentiated manner, examining only certain aspects of conflict, and thus remaining remote from investigating causal mechanisms that could plausibly affect the dynamics of violence. Recent studies have begun to delve into these relationships in a more nuanced manner, looking at patterns within countries and offering evidence that the scale and protection of aid matters. Yet these analyses focus on small numbers of countries, which exhibit active conflict, and specific forms of aid.

The proposed research extends the scope considerably by evaluating the association between development aid and the likelihood, escalation, severity, spread, duration, and recurrence of violence, spanning the phases before, during, and after conflict. Aid is potentially beneficial in all these phases. Prior to conflict, aid can build the capacity of state and society, improving resistance to rebel mobilization. During conflict, aid can bolster state legitimacy and civilian loyalty, subject to good governance, prosperity, and effective service provision. After conflict, aid can mitigate grievances and facilitate implementation of peace agreements. In each phase, however, a risk is that aid may fuel conflict, due to capture or graft. Or aid may have no impact on conflict, failing to reach intended targets or achieve objectives. The effects likely hinge on interactions among characteristics of aid (source, type, amount, location), the orientations and behavior of key actors (state, opposition, citizens), and the surrounding environment (state security, corruption, social demographics, inequality). Available literature has not systematically tackled these dimensions, yielding mixed findings and leaving many gaps in understanding, due to nascent theory, narrow range of analyses, methodological limitations, and inadequate data on aid—issues this project addresses directly in novel ways, to better gauge the conditional impact of development aid on intrastate armed conflict.

Methodology:
The research design combines cross-national, subnational, and micro-level empirical analysis. The results will be integrated into simulations using computational modeling, to further probe aid-conflict dynamics and "what-if" counterfactuals. A distinctive advance is to employ a sizeable array of cutting-edge disaggregated data for most of Africa as well as select Asian and Latin American countries. These geocoded data, which are due to be expanded significantly through this project, permit extensive quantitative assessment that is finer-grained spatially and temporally, plus considers notable parameters of both aid disbursements and conflict events.

The project will be implemented collaboratively by an experienced multidisciplinary team of experts assembled from several academic institutions and non-profit organizations based in the US, the UK, Switzerland, and Sweden. Large cohorts of students at several levels will receive relevant training via and contribute markedly to the research.

Anticipated Outcomes of Research:
All compiled geocoded aid data will be made available via an open-access, online, interactive information and visualization tool. Subject to resources, this resource would also incorporate the simulation architecture to facilitate gauging the implications for conflict trajectories of varying aid parameters under disparate conditions, adjustable by users. Main findings from the research will be reported in an assortment of publications (books, articles, reports, blogs, country profiles) that reach diverse audiences. Work in progress and final results will be presented at briefings in Washington, DC and Geneva and academic conferences in the US and Europe.

Potential Impact on DoD Capabilities and Broader Implications for National Defense:
The products are expected to be valuable in guiding deliberations, decisions, and actions with respect to aid and crafting related strategies of conflict avoidance, mitigation, response, and recovery in order to reduce the potential for harmful effects around the world. A primary benefit will be further insight into the geographical and temporal dynamics of intrastate armed conflict and the effectiveness of development aid and security interventions in contributing to resilience. This research is therefore germane to various actors concerned with the intersection of security and development issues, especially the Department of Defense and other US government agencies, as well as foreign (e.g., DFID, etc.) and international (e.g., World Bank, OECD, UN, etc.) institutions.

Culture in Power Transitions: Sino-American Conflict in the 21st Century

Principal Investigator: **Robert Jervis,** Columbia University
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Government Program Officer: Martin Kruger, Office of Naval Research

International relations theory posits that the emergence of a rising challenger often presages hegemonic war. The rise of China as America's chief rival and competitor in the 21st century has led to concerns that the 21st century will see increased instability and the possibility of military conflict; consequently, most analyses of the Sino-American rivalry focus on the shifting military balance of power between the two rivals. We contend that traditional "hard power" represents only one aspect of the evolving U.S.-China competition, that the battle of soft power will be an equally important contest between the two nations. Will the attraction to and promotion of Chinese culture and social-economic model succeed in undermining America's socio-cultural dominance in the world today, and thus weaken America's standing in the world? Will the soft power competition exacerbate hard power competition? We will examine how the United States and China use "culture" to advance their security interests and wage their hegemonic competition in the 21st century. The project will employ long-range historical analysis to generate qualitative case studies and qualitative and quantitative datasets of attempts by both states to use culture to achieve high-level national security ambitions.

Our qualitative case studies and quantitative analysis will identify the various system effects resulting from the American and Chinese use of soft power, focusing especially on the reactions of the rivals to both hegemonic aspirants. One of our chief goals is to distinguish those instruments that positively advance the security interests of each nation from those instruments that engender negative international repercussions in order to discern the potential systemic instability caused by the emerging Sino-American rivalry. Co-investigator Gregory Mitrovich and project consultant Victoria Hui will provide the qualitative narratives regarding the American and Chinese cases, while co-investigator Erin Jenne will oversees the CATA study that will measure quantitatively the intensity of these global reactions. Through examination of official government pronouncements, news reports, declassified diplomatic papers, and social network sites we will create datasets that will enable us to compare the discourse surrounding reactions to America's rise to power with reactions to China's current ascent. Both sets of results will be combined to produce a theoretical framework regarding the strategic implications of the cultural conflict in power transitions and provide specific policy guidance to the United States government.

Methodology:
This project will combine qualitative with quantitative analysis. The first, American case will utilize the kind of close intensive case analysis, using process-tracing and the comparative method, of responses to American soft power in the 19th and 20th centuries in Great Britain, Germany, Japan, and France and will be compared to the second case of China. This will be augmented by computer aided text analysis (CATA). In combining these methodological approaches, we aim to prevent possible investigator bias from affecting our research aims.

CATA is a revolutionary analytical technique that has gained prominence as computer-processing power has increased over the past several decades. Traditional quantitative data collection and analysis are highly labor intensive and prohibitively expensive, and rely heavily on human judgment in both data collection and processing. Validity issues may arise when human coders are required to make frequent judgments or do not have sufficient training. Computer-assisted text analysis is virtually free of the reliability and replicability problems and considerably reduces the costs of assuring validity. Assumptions embedded in the research design determine the validity of CATA methods; if the

assumptions are met in a given context, the method will produce valid results.

CATA makes it possible to analyze large amounts of text both quickly and at relatively low cost, which is especially appealing in settings where large quantities of text are available in machine-readable formats. The amount of text collected for any given purpose is often limited by text availability, and not by hardware, time, or labor costs. Units of text of interest can easily go into millions for micro-blogging services, and reach high, albeit lower, numbers for many other types of text, such as legislative speeches or newswire reports. Once the texts of interest are collected and pre-processed into formats suitable for the analysis, any number of suitable CATA techniques can be applied to them to do "document scraping." The various CATA approaches rely either on a pre-prepared instrument -- e.g. a dictionary or a classification scheme, or analyze everything "in sample."

Anticipated Outcomes of Research:
The demonstration of the capabilities of CATA will impact how international affairs are studied. The ability to examine many millions of pages of text through computer modeling will provide a powerful tool for future research that can be combined with qualitative intensive case analysis to increase confidence in the validity of our findings. As a consequence, we will produce a series of books and policy monographs based on a far more extensive evidentiary base than in the vast majority of extant studies.

Potential Impact on DoD Capabilities and Broader Implications for National Defense:
The emerging Sino-American competition will decisively influence the course of the 21st century. We must examine whether or not cultural expansion is benign and can serve as a form of soft power if we are to understand the long-range implications of Chinese cultural expansion and continued American cultural predominance. Here exists a substantial, if unrecognized, difference of opinion. On the one hand, culture is considered a way for the United States to improve its relationships with the world. On the other hand, the historical record demonstrates that cultural expansion can be a significant force of instability and potentially a cause of war. If the latter is true, China's cultural offensive may pose the most destabilizing aspect of its challenge to world stability in the 21st century. It is imperative for long-range American national security planning that a clear understanding be formulated regarding: how culture can be used to satisfy national security interests, how the use of culture by China can undermine America's global predominance, how a culture war could destabilize international community, and how the United States can use its cultural assets to ensure American preeminence throughout the 21st century.

Sharable data resources to be generated and outreach plans:

- A dataset of the estimated positions of analyzed media outlets in social spaces of their societies that includes the point estimates as well as the uncertainty attached to them.
- A multilingual dataset of dictionaries used in the analysis.
- A dataset of topics in reactions to selected Chinese and American policies in the analyzed mass and social media that contains the composition of the topics and their presence across the selected outlets.
- A dataset of reactions to selected Chinese and American policies in the analyzed mass-quantified as the positions of the selected outlets with regards to these policies.
- Each year the project will sponsor an end-of-year conference to bring academic and US GOV expertise to the project. The project will present its findings in a series of briefings to be held at the end of Year Three.

Understanding the Origin, Characteristics, and Implications of Mass Movements

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Government POC: Lisa Troyer, Office of Naval Research

Research Problem: In what conditions do mass movements aimed at societal change originate, what determines their characteristics—particularly whether they use violence as a tactic—and what are their consequences?

Mass mobilization is the subject of a large interdisciplinary literature, including some of the most influential scholarship on political and economic change. But in contrast to studies of the causes and consequences of political institutions, which have been able to draw on rigorous cross-national data on political institutions, systematic studies of mass mobilization have typically relied on case studies of particular movements or countries. Despite their many contributions to our understanding of mass movements, such case studies have difficulty uncovering general patterns: the political, economic, social, and environmental factors that facilitate mass mobilization and influence how mass movements mobilize members, organize themselves, make decisions, and express their views—including whether they use violence. Nor do they allow systematic investigation into the characteristics of mass movements, the environments in which they mobilize, and their political and economic effects. Thus as a body of work, scholarship on mass movements provides inconsistent and often contradictory answers to basic general questions about mass mobilization. The result is that at a time of increasing mobilization and insurgency that is reshaping the political and economic landscape across much of the world, including regions vital to U.S. security interests, we lack empirically verified theories of the origin, characteristics, and implications of mass movements.

Methodology:
Since 2011, the Mass Movements Project has been developing the first comprehensive cross-national dataset of mass movements, covering the nature and characteristics of all movements of more than 1,000 participants over the last century.

Thus far the project has coded a dataset of 23 countries—the 19 countries of the Middle East and North Africa, as well as Brazil, Ghana, Thailand, and Taiwan. This Minerva project will gather and analyze data on 35 additional countries in Africa, Asia, and Latin America, resulting in a geographically diverse sample of 58 countries. The planned list of countries includes: in Africa: Algeria, Burkina Faso, Cameroon, Chad, Djibouti, Eritrea, Ethiopia, The Gambia, Guinea-Bissau, Mali, Mauritania, Niger, Nigeria, Senegal, Somalia, Sudan, and South Sudan; in Asia: Bangladesh, Cambodia, Indonesia, Laos, Mongolia, Myanmar, Nepal, Papua New Guinea, Philippines, Sri Lanka, and Vietnam; and in Latin America: Bolivia, El Salvador, Guatemala, Haiti, Honduras, Nicaragua, and Paraguay.

We will use the methods developed and validated by the Mass Movements Project to analyze these data; specifically, we will code each mass movement's characteristics yearly on 216 variables covering its purpose, scale and scope, organization, tactics, leadership, and degree of government affiliation; the resulting dataset will be a panel that will map the landscape of movements across time and space. Multiple researchers gather and integrate data from numerous sources about each movement in a five-step coding and verification process designed to ensure reliability.

Anticipated Outcomes of Research:
Statistical analyses of these data will enable us to rigorously examine the origin, structure, and implications of mass movements:

1. to identify factors that shape the emergence and survival of mass movements;
2. to identify external conditions and movement characteristics (e.g., organizational structure) that shape movement tactics, particularly violence; and
3. to evaluate the consequences of mass movements on political change and economic and social performance (e.g., GDP growth, democratization, and improvements in education and health).

Potential Impact on DoD Capabilities and Broader Implications for National Defense:
As ethnic, religious, and class-based movements and insurgencies reshape the political and economic landscape in many regions vital to U.S. national security, the military and intelligence communities have devoted significant effort to understanding the nature and dynamics of mass movements. This Minerva project will further this effort to understand mass movements in two important ways.

- First, it will provide the opportunity to conduct empirical, historically grounded analyses of the nature and implications of mass movements. Rather than drawing lessons from prominent examples of particular mass movements (such as the FARC in Columbia or the Provisional Irish Republican Army), the Minerva project will allow the development of *generalizable* models of how movements of different types emerge or adopt certain organizational tactics like violence, given social, economic, geographic, and other environmental characteristics—models that will be based on the full historical record in a large, geographically diverse sample of countries.
- Second, these models can be used to make probabilistic predictions about future movements: the likelihood of movements developing, the tactics they will employ, and their ultimate impacts on society. Thus analysts faced with a particular environment that seems ripe for mass mobilization—or a particular movement that appears to be turning violent—would have rigorous empirical data at their disposable to enable more accurate predictions about what to expect.

Neural Bases of Persuasion & Social Influence in the U.S. and the Middle East

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Subawards to University of Michigan and Defense Group Inc
Government Program Officer: Benjamin Knott, Air Force Office of Scientific Research

Many aspects of geopolitical and military success around the world depends on the ways in which different groups in sensitive regions are influenced by other members of their culture, by neighboring countries, and by outside forces such as our military or other peacekeeping forces. Despite the need to understand how persuasion and influence functions in different groups around the world, almost all research on these topics has focused on American and Western European populations. Moreover, the research that has been done here has typically shown a disconnect between what individuals report finding persuasive and those messages that actually change the individual's behavior. Addressing these two issues (cross-cultural aspects of influence and moving beyond self-report indicators of persuasion) is the primary goal of this project. In addition, there is a focus on the increasing role of social media as a source of influence in our research plans.

Methodology

Unlike traditional studies of persuasion and influence, we use multiple neuroimaging modalities in order to assess the neurocognitive mechanisms that support influence. These same techniques are then used to predict which messages and methods of influence are likely to be effective, above and beyond typically used indices such as self-reported attitude change. Specifically, we are using functional magnetic resonance imaging (fMRI) and functional near infrared spectroscopy (fNIRS). fMRI has been used in multiple past studies to significantly improve our ability to predict persuasion-induced behavior change, message propagation, and social media use.

The current year of studies for this grant will validate persuasion and influence findings from fMRI with fNIRS. fNIRS measures an index of the hemodynamic response, similar to fMRI, however it does so using far more affordable and portable technology. While an MRI weighs several tons and costs millions, fNIRS can be sent anywhere in the world in a small box and costs $50,000-$100,000 per rig.

Anticipated Results

As we are in the first weeks of funding, we do not have results to report yet. Over the next year, we anticipate producing results with fNIRS that are comparable to fMRI in their ability to assess and predict persuasion and influence-related outcomes. Validating fNIRS in the domains of persuasion and influence will allow us to conduct later studies in the grant in a country of interest to the MINERVA program by setting up an fNIRS lab onsite.

Related publications:

- Vezich, S., Falk, E. B., & Lieberman, M. D. (in press). Persuasion neuroscience: New potential to test dual process theories. In E. Harmon-Jones & M. Inzlicht (Eds.) *Social neuroscience: Biological approaches to social psychology*. New York: Psychological Press.
- Falk, E. B., Morelli, S. A., Welbourn, B. L., Dambacher, K., & Lieberman, M. D. (2013). Creating buzz: The neural correlates of effective message propagation. *Psychological Science, 24*, 1234-1242.
- Falk, E. B., O'Donnell, M. B., & Lieberman, M. D. (2012). Getting the word out: Neural correlates of enthusiastic message propagation. *Frontiers in Human Neuroscience, 6*, 313
- Falk, E. B., Berkman, E. T., & Lieberman, M. D. (2012). From neural responses to population

behavior: Neural focus group predicts population level media effects. *Psychological Science, 23*, 439-445.

- Falk, E. B., Berkman, E. T., & Lieberman, M. D. (2011). Neural activity during health messaging predicts reductions in smoking above and beyond self-report. *Health Psychology, 30*, 177-185.
- Falk, E. B., Berkman, E. T., Mann, T., Harrison, B, & Lieberman, M. D. (2010). Predicting persuasion-induced behavior change from the brain. *Journal of Neuroscience, 30*, 8421-8424.
- Falk, E. B., Rameson, L., Berkman, E. T., Liao, B., Kang, Y., Inagaki, T. K., & Lieberman, M. D. (2010). The neural correlates of persuasion: A common network across cultures and media. *Journal of Cognitive Neuroscience, 22*, 2447-2459.

Tracking Critical-Mass Outbreaks in Social Contagions

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Clay Fink, Johns Hopkins Applied Physics Laboratory
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Government Program Officer: Benjamin Knott, Air Force Office of Scientific Research

The collapse of the Soviet Union, the outbreak of Arab Spring, and the Democratic party's nomination of Barack Obama have in common a transformative social movement that goes viral and takes the experts by surprise. The dynamics by which social movements break out of a small, localized group to become nationwide phenomena are not well understood.

We propose to analyze the dynamics of social movement mobilization with the help of the critical mass model of social contagion proposed in Barash, Cameron, and Macy [2011]. This mathematical model points to the existence of a statistical signature for the attainment of critical mass by social movements that could enable early detection before the movement goes viral. Our research has the potential for a significant breakthrough in the ability of scholars and policy makers to anticipate viral phenomena.

Methodology

We intend to test the critical mass model on four datasets of digital traces of social contagions, which include Twitter posts and conversations around:

- the 2011 Egyptian revolution;
- the 2011 Russian Duma elections;
- the 2012 Nigerian fuel subsidy crisis; and
- the 2013 Gezi park protests in Turkey.

For each dataset, we will use information retrieval and sentiment analysis methods to identify individuals mobilized in a social contagion and when they become mobilized. These methods enable us to construct an "adoption curve" that tracks the number of individuals mobilized in the contagion at any given point in time and to test that curve for presence of the statistical signature of critical mass, as described in the Barash et al. model. We will then correlate critical mass points predicted by the model with mass media accounts of demonstrations and other offline markers of social contagion virality, and improve the model to be more in line with offline data.

Our approach to identifying social contagions and the individuals mobilized therein is multipronged. We will use information retrieval to identify social contagions as bundles of Twitter hashtags and URLs and track overall adoption in terms of mentions of these objects by Twitter users; we will identify community structure within the target datasets and analyze not only the global adoption patterns, but also the distribution of individuals adopting a contagion across different communities; finally, we will use sentiment analysis to track contagions that have an emotional component, e.g. Tweets that convey anger, outrage, frustration. Sentiment analysis will help us distinguish between individuals who simply tag along with a contagion as it grows popular from true activists who call for social action.

Our methodology overcomes five towering obstacles that have impeded previous efforts at early detection of social epidemics:

- How to measure changes in behavior, not just opinion;
- How to measure these changes at the individual level yet on a global scale;

- How to observe the structure of these individuals' underlying social network;
- How to travel back in time to track the lead-up to what later becomes a transformative social movement mobilization; and
- How to identify failed social mobilization.

Anticipated Outcomes of Research

We will produce a large dataset of social contagions and a set of tools for identifying when these contagions go viral. In the end, we will use these tools to construct a social contagion critical mass monitor, which we will test on live streaming social media data. The monitor's anticipated functionality is to continuously observe social media streams across a variety of topics, countries and sociocultural contexts, to identify emerging contagious phenomena (as bundles of hashtags, URLs, keywords with a particular theme and/or sentiment), and to provide automatic alerts when a particular contagious phenomenon appears to be reaching critical mass.

Potential Impact on DoD Capabilities and Broader Implications for National Defense

The outcomes of our proposal have direct applications for the Military Information Support Operations (MISO) community in understanding how messages propagate through a population, especially in the context of online communications. In particular, the contagion model can be used as a measure of effectiveness for operations, giving personnel a tool for gauging which messages are playing well with a target audience. It is important to note that the critical mass model of complex contagions is useful for all three of the following: anticipating the spread of a contagion; preventing the spread of a contagion before it reaches critical mass; and helping contagions that have not yet reached critical mass do so.

Sharable resources to be generated

- We will share the datasets that describe the diffusion of contagious phenomena on each of the four data sets described above. These datasets will include identifiers of the phenomenon; "adoption curve" of individuals using the phenomenon over time, broken down by discreet time unit, e.g. day; summary statistics about the phenomenon; and information about communities that did / did not adopt the phenomenon within the dataset.
- We will share the data collected by the contagion monitor we plan to build in the last phase of this project. These data will be similar to those for the four test datasets described above, but will be in a streaming API format for continuous consumption by researchers so long as the tool operates.

We will also make our proposed contagion monitor tool available to the research community upon completion. The tool will provide up-to-date information about social contagions around the world, their identifiers (lists of associated hashtags, URLs, etc.), properties (including whether or not the contagion has reached critical mass), and communities of adopters. The tool will take the form of a web application with a graphical user interface as well as a streaming data API.

Taking Development (Im)Balance Seriously: Using New Approaches to Measure and Model State Fragility

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A self-immolation in Tunisia in December of 2010 initiated a revolution that few saw coming. Though widely used and cited, the existing state fragility indices, designed specifically to signal instances of abrupt socio-political change such as the Arab Spring or the uprisings in Ukraine, have often missed the mark, limiting the strategic options available to our country's national security and defense leaders.

In this project, our team is working to improve upon existing quantitative methods by developing and testing new measures of economic, political, or broader social (im)balance and fragility related to abrupt socio-political change and by forecasting these metrics to 2035.

Methodology:
Our team is working on a mixed methods approach for identifying and measuring (im)balances in a country's development, which we will find in existing theory and empirical analysis. We root ourselves in literatures, including those of modernization theorists and structural economists, arguing that development processes unfold in patterns. However, we understand that it is not always the case that "all good things go together." Instead, as Arab Spring countries demonstrated, significant change in some domestic systems but not others—for instance, human development and not governance development—results in destabilizing imbalances. Because existing state fragility indices largely correlate with national income levels, they have repeatedly overlooked the possibility of socio-political turmoil in middle-income nations, where these (im)balances are perhaps the most pronounced.

Recent events have illustrated that such imbalances alone do not lead to abrupt socio-political change. Indeed, in countries like Egypt or Libya, it was society's capacity to mobilize—as a result, we hypothesize, of higher education, denser population, and access to information and communication technologies—that out-stripped governmental capacity to either ameliorate grievances about imbalances or to repress the uprising. Therefore, in addition to investigating the nature and potential drivers of (im)balance within a society, we also plan to measure and test the interaction among a broad range of (im)balances, government capacity, and social mobilization capacity, so as to determine what sets of conditions are necessary for popular grievances to spark abrupt socio-political change.

We plan to establish these relationships through a combination of statistical and algorithmic analyses of existing data sets, as well as qualitative case studies to bridge the gap between macro-level and micro-level theory. Findings will be used to forecast prospective abrupt change using the International Futures (IFs) modeling system, used in recent National Intelligence Council's Global Trends reports.

Our approach and empirical analysis will help us address many questions, including the following:

- In the overall pattern of development of countries, where are the greatest imbalances within and across political, economic, and social domains?
- How do measures based on imbalances correlate with historical episodes of abrupt violent and non-violent socio-political change, or perform relative to traditional measures of state fragility?
- Looking forward, which countries will likely experience periods of instability over the next 20 to

40 years, and what particular challenges may they face?

Anticipated Outcomes of Research:
We plan to create new quantitative measures of potential for abrupt socio-political change that empirically capture social, economic, and political (im)balances, and the mediating factors of government capacity and social group mobilization capacity. Some measures of state fragility do capture aspects of system disequilibrium, and we want to build on this work. For example, the Political Instability Task Force has produced a four-variable model of the drivers of state fragility that consists of infant mortality, neighborhood effects, ethnic group discrimination, and regime type anocracy coupled with factionalism[12]. Ethnic discrimination and factionalism clearly signal imbalances in social systems, and anocratic governments are inherently imbalanced as they embody a clash between democratic and autocratic institutions and regimes. We expect our research to complement such existing work by revealing where and when our model of (im)balance outperforms traditional measures in predicting the historic onset, and potential future onset, of abrupt change.

Implications for National Defense:
Understanding when states are likely to fail can help policymakers cope with uncertainty and plan for disruptive changes that lead to humanitarian crises, changes in foreign policy alignment, and shifts in the outlook for states that were previously well understood. Whereas most analyses of fragility focus heavily on the "usual suspects" at the bottom of the developmental ladder (including Afghanistan, Chad, the Democratic Republic of Congo, Somalia, and Sudan), our work should provide additional understanding of countries at middle-income levels. Our research will provide new and improved insights into stability and instability of a variety of countries that are priorities for U.S. national defense policy.

Shareable Resources to Be Generated:
We will forecast the measures described above within the International Futures (IFs) system. IFs is a large-scale, long-term, quantitative tool that rests on a foundation of 2,500 historical data series. It endogenizes a wider range of variables across countries (186), time (from 2010 to 2100), and systems (economic, demographic, education, health, infrastructure, socio-political, international-political, agriculture, energy, environment, and technology) than any publicly available, open source tool. Previous work has forecasted state fragility (Hughes et al, 2014), but without a focus on the (im)balances, mediating variables, and dependent variable relationships planned in this project.

The project will also extend the existing Major Episodes of Contention (MEC) database (Chenoweth, 2014). The MEC database currently includes aggregate observations of major nonviolent and violent uprisings aimed at removing an incumbent leader or obtaining territorial independence and mobilizing over 1,000 observed participants for longer than a week. The data coverage is global and includes annual values from 1955-2013. The (im)balance project will facilitate extension to include similarly large episodes that are not necessarily aimed at government overthrow but may be similarly destabilizing (e.g., large-scale protests for economic or political reform). Such episodes are often the precursors to maximalist demands (i.e., removal of the incumbent government), and are therefore crucial indicators of mobilization capacity.

[12] Goldstone et al. 2010. "A Global Model for Forecasting Political Instability." *American Journal of Political Science* 54, pp. 190-208.

Political Language and Crisis: A Computational Assessment of Social Disequilibrium and Security Threats

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Co-PIs: **Art Graesser** and **Zhiqiang Cai**, University of Memphis
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Government Program Officer: Benjamin Knott, Air Force Office of Scientific Research

Key challenge: Analyze the speech of international actors to detect their motives, identify threats, and find predictive patterns of language and behavior.[13]

Actors and groups use language strategically to persuade allies, thwart adversaries, and win favor in the domestic and international courts of public opinion. Our project has three components: identifying language patterns related to armed political crises; identifying bluffs and threats pertinent to both national and international security; and analyzing the relationship between language and contentious behavior like protests, riots, and rebellions. We want to extend our analysis beyond the existing corpora which focus heavily on China and the Middle East/North Africa regions to encompass Sub-Saharan Africa and Latin America, where there are growing security threats and ample opportunities to collect and analyze linguistic data. Our preliminary analyses have already yielded the some compelling insights: linguistic cohesion precedes conflict escalation in Egypt under Hosni Mubarak (1981-2007); shifts in the use of first-person singular pronouns in al-Zawahiri's communications with Osama bin Laden reveal greater insecurity; and charismatic leaders' linguistic formality decreases over time in office.

Our approach can uniquely identify linguistic patterns embedded within texts that reveal leaders' routes to persuasion and strategies for managing conflict and dissent. We employ linguistic and event data from individual leaders, Twitter data from the civil conflicts in Syria and Libya, and United Nations Security Council data. Using a mixed methods approach with event data, political data, and linguistic analysis, we can generate robust analysis of potential areas of instability and threats to international peace and security. This research is informed by theories from multiple disciplines, including political science, cognitive and social psychology, linguistics, and computer science, reflecting the interdisciplinary nature of the team members on this project from the Institute for Intelligent Systems (IIS) at The University of Memphis.

Methodology:
We will use Coh-Metrix and LIWC, two computational linguistic tools, to identify features of language in speeches and texts produced by internationally relevant actors. Coh-Metrix can analyze the original language text in English, Chinese, Arabic, and Spanish. We will also use Topic Modeling, Speech Act Classification, Bayesian methods, and dynamical systems to analyze our linguistic data. Our automated tools can quickly analyze large quantities of text and identify distinguishing features of language that correspond to validated theories of persuasion and communication. This means that we can provide near real-time analysis of speeches and texts that provide insight into the motives and agendas of political leaders, a clear advantage over much slower human coding. We also contextualize the political speeches with event data to identify language patterns along a timeline. We will identify, collect, and analyze corpora for armed conflict, natural disasters, and credible threats in several regions including Latin America, the Middle East and North Africa, Eastern Europe/CIS, and Sub-Saharan Africa. We will identify, collect, and analyze corpora related to bluffs and credible threats to generate a metric to

[13] Our project will continue work from a previous NSF Minerva grant (#0904909).

distinguish between them. We will identify, collect, and analyze corpora related to sub-national contentious behavior, including speeches inciting mass civilian casualties and genocide, speeches,

Anticipated Outcomes of Research:
We anticipate gaining a better understanding of the defining characteristics of authoritarian leaders' language as well as the language of rogue actors like terrorists and rebel movements. We also anticipate distinguishing between language that indicates a credible threat and bluffing rhetoric.

Potential Impact on DoD Capabilities and Broader Implications for National Defense:
This project will help the Department of Defense to better understand the meta-linguistic relevance of leaders' speeches beyond the surface content of the words. Our software is able to identify subtle patterns of speech, like the formality, reading level, assuredness of intent, and emotional tone. This will help policymakers and defense analysts understand the deeper messages embedded in oratories and texts, like the intended audience, the believability of threats, and the likelihood of contentious political behavior. Our project will provide better information for calibrating policy responses to likely threats, for identifying linguistic patterns that provide early warning for political crises, and for identifying linguistic strategies for diffusing potential crises.

Sharable data resources to be generated:
Linguistic corpora for authoritarian leaders, social media and social movements

Minerva-Generated Resources for Academics and Policymakers

PI	Resource	Pg #
K. Carley	Twitter Analysis Metrics	122
	Country level meta-networks for Arab Spring based on twitter	122
	Country level meta-networks for Arab Spring based on news	122
R. Chesney	Armed Conflict Location and Event Dataset (ACLED)	123
	Social Conflict in Africa Database (SCAD)	125
	Malawi Geocoded and Climate Aid Dataset	127
	CCAPS Climate Security Vulnerability Model	129
	Subnational African Education and Infrastructure Access Data	130
	CCAPS Mapping Tool	131
	CCAPS Climate Dashboard	132
	CCAPS Conflict Dashboard	133
	CCAPS Aid Dashboard	134
T. Cheung	Chinese S&T – Relational Database Analysis System	135
T. Gerber	Transcripts of focus groups on housing and factors affecting societal stability	136
L. Gerdes	Dynamic Network Models of Salafist-Motivated Terrorism in Southeast Asia	137
C. Lee	Sharable Data on Chinese Communist Party Economic Transitions	138
D. Meyer	Partially Ranked Lists of Chinese Communist Party Central Committee Members: 1st through 18th National Party Congresses	139
	Biographical Database on Central Committee Members: 1978-2014	140
	Biographical Database on Provincial Standing Committee members: 1978-2014	140
P. Potter	Terrorist Alliance Database	141
L. Pratson	Duke Minerva Data and Tools	143
B. Prins	Maritime Piracy Event and Location Datasets	144
M. Woodward	LookingGlass: A Visual Intelligence Platform for Tracking Online Social Movements	147
J. Wright	Latent Dimensions of Authoritarianism	149

Multi-Source Assessment for State Stability

Kathleen M. Carley, Carnegie Mellon University, kathleen.carley@cs.cmu.edu

The data and tools described below have been and will be generated through the Minerva project "*Multi-Source Assessment of State Stability*" described on page 12. All are available within the ORA software tool at http://www.casos.cs.cmu.edu/projects/ora/software.php.

Twitter Analysis Metrics

Already Released

These are new network-based metrics for assessment trust and reach using Twitter data. Traditional metrics defined a trusted relationship as a co-mentions. This only gets at one aspect of Trust. In contrast, these new metrics consider different aspects of trust and can be calculated separately by topic area.

Are there any known uses of the resource outside of your research team?
None yet, however, the metrics are now available through the ORA network analysis tool for the broader community.

Country level meta-networks for Arab Spring based on twitter

Anticipated August 2015

This is a dataset comprised of a set of meta-networks in XML extracted from twitter. One per month per country. Senders are de-identified. No linkage to original tweet IDs or verbatim Tweet content.

Country level meta-networks for Arab Spring based on news

Anticipated August 2015

This is a dataset comprised of a set of meta-networks in XML extracted from newsdata. One per month per country.

Climate Change and African Political Stability Resources

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Project POC: Ashley Moran, CCAPS Senior Program Manager, amoran@austin.utexas.edu
www.strausscenter.org/ccaps

The data and tools described below have been and will be generated through the Minerva project "*Climate Change and African Political Stability*" described on page 15.

Armed Conflict Location and Event Dataset (ACLED)

Resource URL: www.strausscenter.org/ccaps/data
Resource Point of Contact: Clionadh Raleigh, c.raleigh@sussex.ac.uk
Production Date: 2010, updated weekly

Resource description:
CCAPS researchers at the University of Sussex and Trinity College Dublin developed the Armed Conflict Location and Event Dataset (ACLED) that tracks the actions of opposition groups, governments, and militias across Africa, specifying the exact location and date of battle events, transfers of military control, headquarter establishment, civilian violence, and rioting. ACLED includes data from 1997 to 2014, with real-time conflict data updated monthly for all of Africa and weekly for 30 high-risk states. All data are date-specific and geo-referenced to the town level. ACLED's disaggregation of civil war and transnational violent events allows analysis of the local factors that drive instability in Africa. ACLED provides the tools for analysts to explore which regimes are most dangerous in Africa, who are the most active conflict groups on the continent, where civilians are most at risk, what types of violence are most prevalent, and where violent social upheaval, such as rioting, is increasing.

In addition to collecting real-time data on conflicts continent-wide, ACLED also produces monthly conflict trend reports that highlight escalating and ongoing conflicts, violent group formation, and patterns of violence within conflict-affected states.

Related materials:
- Clionadh Raleigh and Caitriona Dowd, "Real-Time Analysis of African Political Violence," *Conflict Trends No. 29* (August 2014).
- Clionadh Raleigh, Andrew Linke, and John O'Loughlin, "Extreme Temperatures and Violence," *Nature Climate Change* 4, 76-77 (2014).
- Clionadh Raleigh and Caitriona Dowd, "Governance and Conflict in the Sahel's 'Ungoverned Space'," *Stability: International Journal of Security and Development* 2, 2 (2013).
- Caitriona Dowd, "Tracking Islamist Militia and Rebel Groups," *CCAPS Research Brief No. 8* (Austin: Robert S. Strauss Center for International Security and Law, 2013).

See all ACLED publications at www.strausscenter.org/ccaps/armed-conflict-publications.html.

Are there any known uses of the resource outside of your research team?
This dataset is widely used by U.S. government and military agencies, academic researchers, and international organizations. It is used for a range of purposes, informing humanitarian and development work in conflict-affected contexts, diplomatic policy, and academic research on the dynamics of conflict, being cited most recently for example by the International Panel on Climate Change in its 5th Assessment Report on the security implications of climate change.

The dataset has been downloaded by organizations in 66 countries, including:*

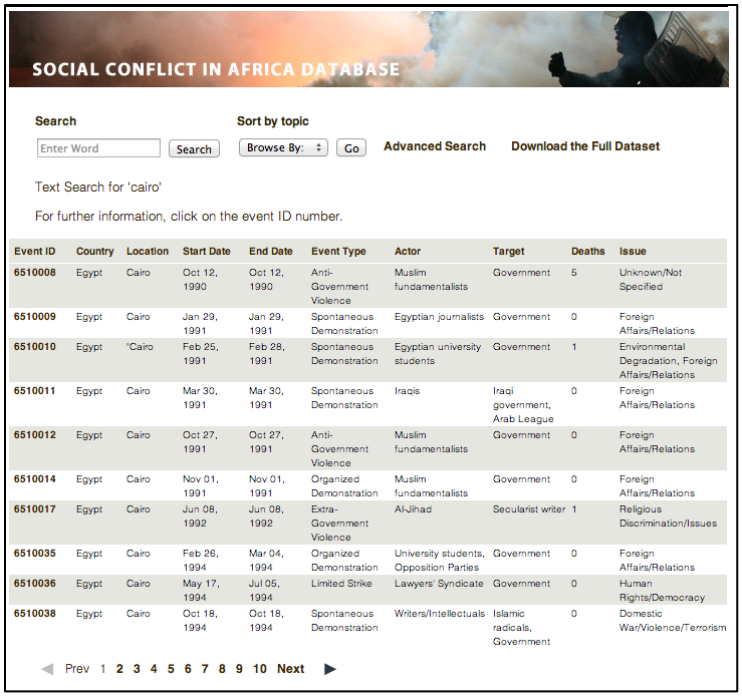
- 19 U.S. government agencies, including the Centers for Disease Control and Prevention, Combined Joint Task Force-Horn of Africa, Congressional Research Service, Defense Advanced Research Projects Agency, Defense Intelligence Agency, National Geospatial-Intelligence Agency, National Ground Intelligence Center, Office of Foreign Disaster Assistance, U.S. Africa Command, U.S. Agency for International Development, U.S. Army Africa, U.S. Army Corps of Engineers, U.S. Army Intelligence Directorate, U.S. Army Research Laboratory, U.S. Central Command, U.S. Department of Defense, U.S. Department of State, U.S. European Command, and U.S. Special Operations Command;
- 26 multilateral or foreign government agencies, including the African Development Bank, African Union Commission, International Committee of the Red Cross, International Criminal Court, German Federal Office for Migration and Refugees, Japanese Ministry of Defense, Mo Ibrahim Foundation, Netherlands Centre for Safety and Development, Niger Basin Authority, Norway Statistics Office, Potsdam Institute for Climate Impact Research, UK Department for International Development, UNDP, UNHCR, UNICEF, UNOCHA, UN Office in West Africa, World Bank, World Food Programme, and World Meteorological Organization;
- 13 nongovernmental or research agencies, including Chatham House, Direct Relief International, Freedom House, Fund for Peace, Institute for Defense Analyses, Institute for Security Studies, International Food Policy Research Institute, Overseas Development Institute, RAND Corporation, and Rift Valley Institute; and
- 54 universities, including Columbia, Cornell, Georgetown, Harvard, London School of Economics, MIT, NYU, National Intelligence University, Naval War College, Nigerian Defence Academy, Oxford, Princeton, University of Cape Town, University of Chicago, University of Geneva, University of Liberia, University of Nairobi, UN University for Peace, U.S. Naval Academy, West Point, and Yale University.

* Note this includes only downloads through the www.strausscenter.org/ccaps website and does not include organizations that downloaded the data from the www.acleddata.org site.

Social Conflict in Africa Database (SCAD)

Resource URL: www.strausscenter.org/ccaps/data
Resource Points of Contact:
Idean Salehyan (idean@unt.edu) and Cullen Hendrix (Cullen.Hendrix@du.edu)
Production Date: Version 4.0 released 2013. Expanded geographic scope to include social conflict events in Latin America, ready for release in fall 2014.

Resource description:
CCAPS researchers at the University of North Texas and the University of Denver developed the Social Conflict in Africa Database (SCAD), which includes information on over 10,300 social conflict events from 1990 to 2013. While previous data sources have focused on large-scale conflicts like civil and international wars, SCAD catalogues the myriad ways conflict manifests as political and social disorder. SCAD includes protests, riots, strikes, inter-communal conflict, government violence against civilians, and other forms of social conflict not systematically tracked in other conflict datasets.



Event ID	Country	Location	Start Date	End Date	Event Type	Actor	Target	Deaths	Issue
6510008	Egypt	Cairo	Oct 12, 1990	Oct 12, 1990	Anti-Government Violence	Muslim fundamentalists	Government	5	Unknown/Not Specified
6510009	Egypt	Cairo	Jan 29, 1991	Jan 29, 1991	Spontaneous Demonstration	Egyptian journalists	Government	0	Foreign Affairs/Relations
6510010	Egypt	"Cairo	Feb 25, 1991	Feb 28, 1991	Spontaneous Demonstration	Egyptian university students	Government	1	Environmental Degradation, Foreign Affairs/Relations
6510011	Egypt	Cairo	Mar 30, 1991	Mar 30, 1991	Spontaneous Demonstration	Iraqis	Iraqi government, Arab League	0	Foreign Affairs/Relations
6510012	Egypt	Cairo	Oct 27, 1991	Oct 27, 1991	Anti-Government Violence	Muslim fundamentalists	Government	0	Foreign Affairs/Relations
6510014	Egypt	Cairo	Nov 01, 1991	Nov 01, 1991	Organized Demonstration	Muslim fundamentalists	Government	0	Foreign Affairs/Relations
6510017	Egypt	Cairo	Jun 08, 1992	Jun 08, 1992	Extra-Government Violence	Al-Jihad	Secularist writer	1	Religious Discrimination/Issues
6510035	Egypt	Cairo	Feb 26, 1994	Mar 04, 1994	Organized Demonstration	University students, Opposition Parties	Government	0	Foreign Affairs/Relations
6510036	Egypt	Cairo	May 17, 1994	Jul 05, 1994	Limited Strike	Lawyers' Syndicate	Government	0	Human Rights/Democracy
6510038	Egypt	Cairo	Oct 18, 1994	Oct 18, 1994	Spontaneous Demonstration	Writers/Intellectuals	Islamic radicals, Government	0	Domestic War/Violence/Terrorism

Each event record contains information on the location, timing, and magnitude of social conflict events, as well as the actors, targets, issues of contention, and government response.

While other data sources contain rich information about *armed* conflict in Africa, the goal of the SCAD project is to provide researchers, journalists, NGOs, and the policy community more detail about other forms of *social* conflict.

Related materials:

- Idean Salehyan and Cullen Hendrix, "Explaining Government Repression in Africa," *CCAPS Research Brief No. 19* (Austin: Robert S. Strauss Center for International Security and Law, 2013).
- Idean Salehyan and Christopher Linebarger, "Elections and Social Conflict in Africa," *CCAPS Research Brief No. 6* (Austin: Robert S. Strauss Center for International Security and Law, 2013).
- Idean Salehyan et al., "Social Conflict in Africa: A New Database," *International Interactions* 38, 4 (2012): 503-511.

See all SCAD publications at www.strausscenter.org/ccaps/social-conflict-publications.html.

Are there any known uses of the resource outside of your research team?
This dataset is widely used by U.S. government and military agencies, academic researchers, and international organizations, being cited most recently for example by the International Panel on Climate Change in its 5th Assessment Report on the security implications of climate change.

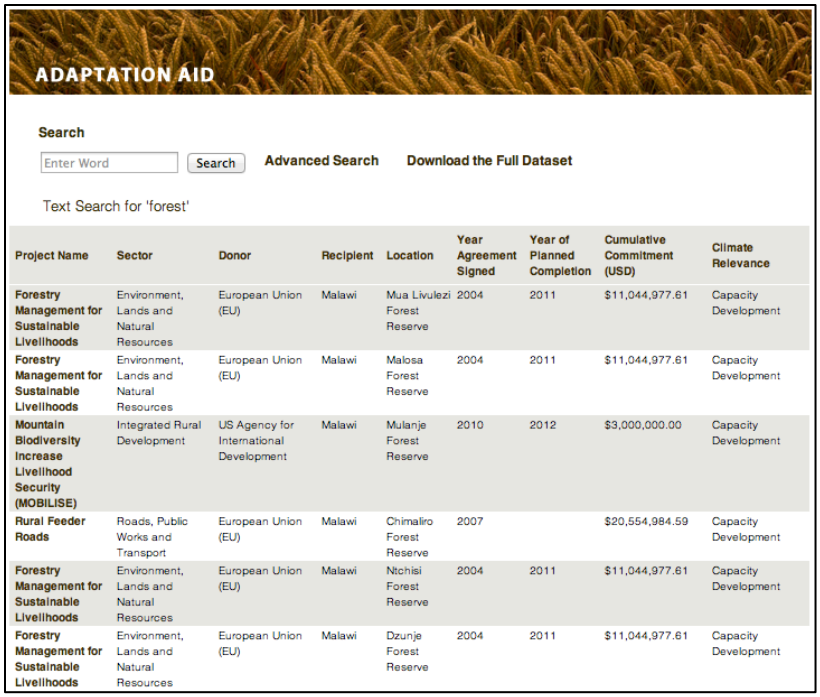
The dataset has been downloaded by organizations in 93 countries, including:

- 16 U.S. government agencies, including the Centers for Disease Control and Prevention, Defense Intelligence Agency, National Geospatial-Intelligence Agency, Office of Transition Initiatives, U.S. Africa Command, U.S. Agency for International Development, U.S. Army Cold Regions Research and Engineering Lab, U.S. Army Corps of Engineers, U.S. Army Engineer Research and Development Center, U.S. Army Research Laboratory, U.S. Central Command, U.S. Department of Defense, U.S. Department of State, U.S. Institute of Peace, U.S. Special Operations Command Africa, and U.S. Special Operations Command Headquarters;
- 29 multilateral or foreign government agencies, including the Defense Research and Development Canada, European Commission Joint Research Centre, German Development Agency, German Federal Office for Migration and Refugees, German Institute of Global and Area Studies, International Committee of the Red Cross and World Bank, International Criminal Court, Japanese Ministry of Defense, Kenya Medical Research Institute, Liberia Platform for Dialogue and Peace, Mo Ibrahim Foundation, Netherlands Centre for Safety and Development, Niger Basin Authority, Nigeria Foreign Service, Nigeria Ministry of Environment, Norway Statistics Office, Potsdam Institute for Climate Impact Research, UNDP, UNEP, UNHCR, UNICEF, UNOCHA, UN Office for West Africa, UN Operations in Cote d'Ivoire, UN Population Fund, World Bank, and World Food Program;
- 27 nongovernmental or research agencies, including Chatham House, Conservation International, Development Alternatives Inc., Direct Relief International, Economic Research South Africa, Energy and Resources Institute, Fund for Peace, Institute for Defense Analyses, Institute for Disease Modeling, Institute for Economics and Peace, Institute for Peace and Development, Institute for Security Studies, International Food Policy Research Institute, Mercy Corps, Norwegian Council for Africa, Pacific Disaster Center, Peace Research Institute Oslo, RAND Corporation, Small Arms Survey, Uganda Justice and Reconciliation Project, and World Vision; and
- 76 universities, including Addis Ababa University, Chinese Academy of Sciences, Columbia, Cornell, Duke, Emory, Fletcher School, Georgetown, Harvard, Johns Hopkins, King's College London, London School of Economics, MIT, National Defense University, Naval Postgraduate School, Northwestern, Notre Dame, Oxford, Princeton, SciencesPo, Stanford, Stockholm University, University of Bern, University of Cape Town, University of Chicago, University of Nairobi, University of Zurich, Uppsala University, U.S. Naval Academy, West Point, and Yale University.

Malawi Geocoded and Climate Aid Dataset

Resource URL: www.strausscenter.org/ccaps/data
Resource Points of Contact: Catherine Weaver (ceweaver@austin.utexas.edu) and Mike Findley (mikefindley@austin.utexas.edu)
Production Date: August 2012

Resource description:
In partnership with AidData and the Government of Malawi, CCAPS published a first-of-its-kind geocoded and climate-coded aid dataset. The dataset includes all types of aid from 30 donors in Malawi's Aid Management Platform, geocoded and climate-coded to provide a more complete picture of how adaptation fits into development efforts within the country.



Project Name	Sector	Donor	Recipient	Location	Year Agreement Signed	Year of Planned Completion	Cumulative Commitment (USD)	Climate Relevance
Forestry Management for Sustainable Livelihoods	Environment, Lands and Natural Resources	European Union (EU)	Malawi	Mua Livulezi Forest Reserve	2004	2011	$11,044,977.61	Capacity Development
Forestry Management for Sustainable Livelihoods	Environment, Lands and Natural Resources	European Union (EU)	Malawi	Malosa Forest Reserve	2004	2011	$11,044,977.61	Capacity Development
Mountain Biodiversity Increase Livelihood Security (MOBILISE)	Integrated Rural Development	US Agency for International Development	Malawi	Mulanje Forest Reserve	2010	2012	$3,000,000.00	Capacity Development
Rural Feeder Roads	Roads, Public Works and Transport	European Union (EU)	Malawi	Chimaliro Forest Reserve	2007		$20,554,984.59	Capacity Development
Forestry Management for Sustainable Livelihoods	Environment, Lands and Natural Resources	European Union (EU)	Malawi	Ntchisi Forest Reserve	2004	2011	$11,044,977.61	Capacity Development
Forestry Management for Sustainable Livelihoods	Environment, Lands and Natural Resources	European Union (EU)	Malawi	Dzunje Forest Reserve	2004	2011	$11,044,977.61	Capacity Development

The dataset includes 754 codable projects, from 1996 to 2011 that include over 2,900 activities, 2,500 locations, and approximately $5.95 billion of committed aid. The dataset also allows researchers to assess if adaptation aid is targeting areas of greatest climate security risks.

Related materials:

- Catherine Weaver, Stephen Davenport, Justin Baker, Michael Findley, Christian Peratsakis, and Josh Powell, "Malawi's Open Aid Map," Policy research report for the Open Aid Partnership (Washington: World Bank, 2014).
- Justin Baker, Sarah McDuff, and Catherine Weaver, "Tracking Climate Aid in Africa: The Case of Malawi," *CCAPS Research Brief No. 18* (Austin: Robert S. Strauss Center for International Security and Law, 2013).
- Abigail Ofstedahl, Elena Rodriguez, and Justin Baker, "Tracking Aid for Food Security: Methodology and Pilot Case Study in Malawi," *CCAPS Research Brief No. 17* (Austin: Robert S. Strauss Center for International Security and Law, 2013).

See all aid publications at www.strausscenter.org/ccaps/adaptation-aid-publications.html.

Are there any known uses of the resource outside of your research team?
This dataset is widely used by USG agencies, academic researchers, and international organizations as a resource on how adaptation fits into development efforts within Malawi. For example, it has been used for external or internal operations by Adaptation Watch, AidData, International Institute for Environment and Development, Heinrich Böll Foundation, Overseas Development Institute, Oxfam International, USAID Climate Change Unit, World Bank, and World Resources Institute.

The dataset has been downloaded by organizations in 43 countries, including:

- 4 U.S. government agencies, including the Combined Joint Task Force-Horn of Africa, U.S. Agency for International Development, U.S. Army Civil Affairs, and U.S. Army Research Laboratory;
- 16 multilateral or foreign government agencies, including the Mozambique Agricultural Research Institute, Niger Ministry of Foreign Affairs, Nigeria National Center for Technology Management, Norway Statistics Office, Organisation for Economic Co-operation and Development, Songwe River Basin Development Project, UK Department for International Development, UNDP, UNEP, UNOPS Africa Adaptation Program, UN Office for West Africa, UN Population Fund, World Bank, World Bank Institute, and Zambia Disaster Management and Mitigation Unit;
- 22 nongovernmental or research agencies, including the Africa Carbon Initiative, African Conservation Tillage Network, African Population and Health Research Center, Australia Institute for Economics and Peace, Australian Council of Social Services, Cameroon Center for Forestry Research and Development, Cameroon Center for Economics and Management, Center for International Forestry Research, Central Research Institute for Dryland Agriculture, China Institute for Urban and Environmental Studies, Development Alternatives Inc., Direct Relief International, European Association of Development Research, Ghana Community Directed Development Foundation, IMPAQ International, India Institute for Financial Management and Research, Kenya Regional Centre for Mapping Resources for Development, LEAD Southern and Eastern Africa, Wetlands Action, Wilson Center, World Resources Institute, and World Vision; and
- 74 universities, including Boston College, Chinese Academy of Sciences, Columbia, Duke, Emory, Harvard, Johns Hopkins, London School of Economics, NYU, Northwestern, Notre Dame, Pennsylvania State University, Princeton, Rutgers, SciencePo, Stanford, University of Witswatersrand, University of Zurich, and Yale University.

CCAPS Climate Security Vulnerability Model

Resource URL: www.strausscenter.org/ccaps/data
Resource Point of Contact: Josh Busby, busbyj@austin.utexas.edu
Production Date: Version 3.0 released April 2013

Resource description:
The CCAPS Climate Security Vulnerability Model (CSVM) aims to identify places most likely vulnerable to climate security concerns in Africa and go beyond national-level vulnerability rankings to identify vulnerabilities at the subnational level. The model identifies areas of chronic vulnerability relative to the rest of Africa. The maps created by the model are composite representations of climate security vulnerability. Thus, in contrast to maps seeking to chart vulnerability in terms of livelihoods, the CCAPS maps have an explicit security focus, emphasizing situations where large numbers of people could be at risk of death from exposure to climate-related hazards.

The model identified four main sources, or "baskets," of vulnerability: (1) climate-related hazard exposure, (2) population density, (3) household and community resilience, and (4) governance and political violence. Within three of the four baskets, several indicators were identified that contribute to that dimension of vulnerability. Population density is the only basket with a single indicator. All four baskets have equal weight in the final vulnerability analysis. Because each of the variables in this model was initially measured using different scales, all indicators are first normalized on a scale from 0 to 1, using either percent rank or percentiles. Low scores approaching 0 represent maximum vulnerability and high scores approaching 1 represent the least vulnerability, and thus high overall resilience.

All of the variables within a given basket of vulnerability were then summed and mapped to create composite basket maps for climate related hazard exposure, household and community resilience, and governance and political violence. Population density was mapped individually and treated as its own basket. To form the overall composite, scores for each of the four baskets are then summed together, with each basket receiving equal weight. To retain the 0 to 1 scale, the data are re-normalized, dividing by the total possible score. These scores then comprise the final composite vulnerability map.

Related materials:
- Joshua Busby et al., "Identifying Hot Spots of Security Vulnerability Associated with Climate Change in Africa," *Climate Change* 124, 4 (2014): 717-731.
- Joshua Busby et al., "Advances in Mapping Climate Security Vulnerability in Africa," *CCAPS Research Brief No. 13* (Austin: Robert S. Strauss Center for International Security and Law, 2013).
- Joshua Busby et al., "Climate Security Vulnerability Model, Version 3.0: Methodology" (Austin: Robert S. Strauss Center for International Security and Law, 2013).

See all publications at www.strausscenter.org/ccaps/climate-vulnerability-publications.html.

Are there any known uses of the resource outside of your research team?
The CCAPS Climate Security Vulnerability Model has been widely cited in peer-reviewed academic publications and has also been cited in key reports from the defense and scientific communities, for example by the U.S. Defense Science Board and the International Panel on Climate Change in recent reports on the security implications of climate change.

The final iteration of the model is still in its final stage of development, so it is not currently available for download from the CCAPS website.

Subnational African Education and Infrastructure Access Data

Resource URL: www.strausscenter.org/ccaps/data
Resource Point of Contact:
Josh Busby (busbyj@austin.utexas.edu) and Todd Smith (toddgsmith@utexas.edu)
Production Date: August 2013

Resource description:
This dataset provides data on literacy rates, primary and secondary school attendance rates, access to improved water and sanitation, household access to electricity, and household ownership of radio and television. Unlike other datasets, notably the World Bank's World Development Indicators, this dataset provides data at the subnational level, specifically the first administrative district level. Furthermore, the data is comparable both within and across countries. This subnational level of data allows for assessment of education and household characteristics at a more relevant level for allocation of resources and targeting development interventions. The dataset includes data for 38 countries, covering 471 of Africa's 699 first level administrative districts.

This data was calculated using raw survey data from three sources: the Demographic and Health Surveys supported by the U.S. Agency for International Development; Multiple Indicator Cluster Survey supported by UNICEF; the General Household Surveys conducted by Statistics South Africa. The datasets used are freely available for download from the websites of these agencies.

Related materials:
Todd Smith, Joshua Busby, and Anustubh Aghnihotri, "Subnational African Education and Infrastructure Access Data" (Austin: Robert S. Strauss Center for International Security and Law, 2013), www.strausscenter.org/images/Subnational_African_Data_Codebook_August_2013.pdf.

Are there any known uses of the resource outside of your research team?
This dataset has been used by U.S. agencies, academic researchers, and international organizations. In the last year since it was published, the dataset has been downloaded by organizations in 29 countries, including:

- 3 U.S. government agencies, including the U.S. Air Force, U.S. Army, and U.S. Army Corps of Engineers;
- 26 multilateral or foreign government agencies, including the Office for the Coordination of Humanitarian Affairs, South Africa Human Rights Commission, UNEP, UNFAO, UNHCR, UNOCHA, World Bank, and World Bank Institute;
- 13 nongovernmental or research agencies, including Consultative Group on International Agricultural Research, Development Alternatives Inc., Euro-Mediterranean Forum of Economic Research Institutes, Kenya Medical Research Institute, Institute of Economics and Peace, International Union for Conservation of Nature, Mozambique Climate Policy Initiative, Peace Research Institute Oslo, Tunisia GIS Services, and the Urban Institute; and
- 71 universities, including Columbia University, Cornell University, Georgetown University, Harvard University, King's College London, Leiden University, London School of Economics, MIT, Pennsylvania State University, Princeton University, Tufts University, University of Geneva, University of Pennsylvania, University of Zimbabwe, U.S. Naval Academy, and Yale University.

CCAPS Mapping Tool

Special Achievement in GIS 2013 Award Winner

Resource URL: www.strausscenter.org/ccaps/mappingtool
Resource Point of Contact: Ashley Moran, amoran@austin.utexas.edu
Production Date: January 2012, updated weekly with ACLED conflict data and periodically with other datasets as they are revised

Resource description:
The CCAPS mapping tool enables researchers and policymakers to visualize data on climate change vulnerability, conflict, and aid, and to analyze how these issues intersect in Africa. The mapping tool, built in partnership with Development Gateway, allows users to select and layer any combination of CCAPS data onto one map to assess how myriad climate change impacts and responses intersect. By integrating the various lines of CCAPS research, as well as other existing datasets, the CCAPS mapping tool aims to provide the most comprehensive view yet of climate change and security in Africa. In 2013, the CCAPS mapping platform received Esri's prestigious Special Achievements in GIS Award for its work mapping security risks related to climate change.

Mapping conflict data over climate vulnerability data, for example, can assess how local conflict patterns could exacerbate climate-induced insecurity in a region. The mapping tool can also be used to analyze how conflict dynamics are changing over time and space. Or, to analyze the interaction of climate vulnerability and aid interventions, users can locate aid projects layered on top of climate change vulnerability data. Mapping such aid flows provides a new way to discern if adaptation aid is effectively targeting the areas where climate change poses the most significant risk to the sustainable development and political stability of a country.

Related materials:

- Dominique Thuot, *User Guide to the CCAPS Mapping Tool* (Austin: Robert S. Strauss Center for International Security and Law, 2013).
- Ashley Moran and Dominique Thuot, "Bridging the Policy Gap: Mapping Climate Change and Security for Impact in Africa," *CCAPS Research Brief No. 20* (Austin: Robert S. Strauss Center for International Security and Law, 2013).

These publications are available at www.strausscenter.org/ccaps/publications.

Are there any known uses of the resource outside of your research team?
The CCAPS mapping tool and dashboards are used widely by U.S. government and military agencies, African national ministries, nongovernmental organizations, and international organizations, being used for example by analysts in the U.S. Africa Command, Combined Joint Task Force-Horn of Africa, U.S. State Department, U.S. Agency for International Development, and UNEP's Division of Early Warning and Assessment, to name a few diverse organizations. The mapping platform has been accessed from 133 countries, including 38 countries in Africa.

CCAPS Climate Dashboard

Resource URL: www.strausscenter.org/ccaps/mappingtool
Resource Point of Contact: Ashley Moran, amoran@austin.utexas.edu
Production Date: September 2013

Resource description:
The CCAPS climate dashboard displays the CCAPS Climate Security Vulnerability Model for analysis of where and when climate-related events disrupt Africa's security and development. The climate dashboard allows users to explore pressing climate security risks. Leveraging the rigorous modeling of CCAPS researchers, the dashboard allows people to use the model to explore insecurities in Africa and to test their own beliefs about what drives vulnerability to climate change.

The dashboard shows how the four sources of vulnerability used in the CCAPS model—physical exposure to climate-related hazards, population density, household and community resilience, and governance and political violence—contribute to local areas' overall vulnerability to climate security concerns. While the CCAPS model weights each source of vulnerability equally, the interactive features of the dashboard allow users to explore how changing these weights impact the overall understanding of vulnerability. In addition to reweighting the CCAPS climate security model, users can see how the model is built, learn more about how the model has been tested, and download maps produced by the CCAPS model.

Related materials:

- Dominique Thuot, *User Guide to the CCAPS Climate Dashboard* (Austin: Robert S. Strauss Center for International Security and Law, 2013).
- Ashley Moran and Dominique Thuot, "Bridging the Policy Gap: Mapping Climate Change and Security for Impact in Africa," *CCAPS Research Brief No. 20* (Austin: Robert S. Strauss Center for International Security and Law, 2013).

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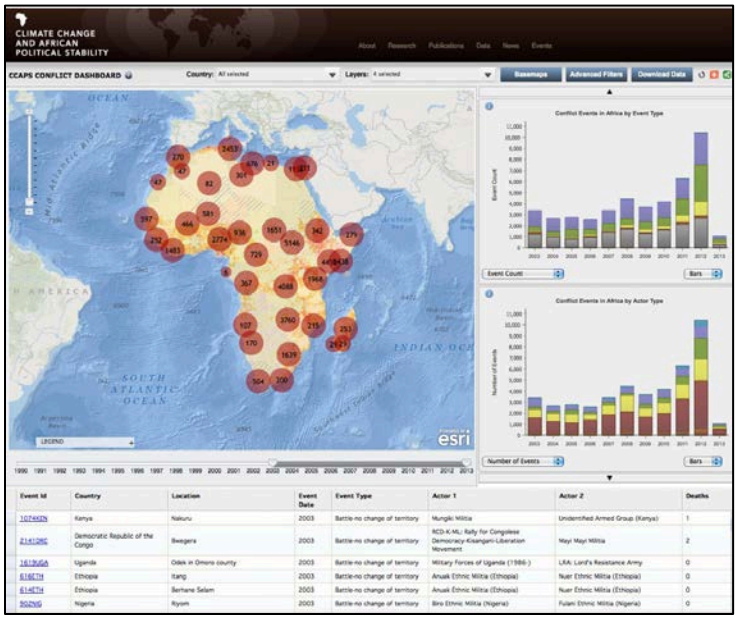
CCAPS Conflict Dashboard

Resource URL: www.strausscenter.org/ccaps/mappingtool
Resource Point of Contact: Ashley Moran, amoran@austin.utexas.edu
Production Date: February 2013, updated weekly with ACLED conflict data and annually with SCAD conflict data

Resource description:
The CCAPS conflict dashboard brings together mapping, trends analysis, and raw data so that users can visualize emerging and historical conflict trends in Africa. It allows users to analyze conflict by actor, event type, issue, intensity, and a range of other conflict dynamics. The dashboard utilizes two innovative conflict datasets supported by CCAPS: the Social Conflict in Africa Database (SCAD) and the Armed Conflict Location and Event Dataset (ACLED).



SCAD provides the first systematic tracking of a broad range of social and political unrest in Africa, including protests, riots, strikes, inter-communal conflict, government violence against civilians, and other forms of social conflict.

ACLED provides real-time tracking of armed conflict, with data updated weekly for 30 high-risk states and monthly continent-wide. It tracks the actions of opposition groups, governments, and militias, specifying the exact location and date of battle events, transfers of military control, headquarter establishment, violence against civilians, and rioting.

Related materials:

- Dominique Thuot, *User Guide to the CCAPS Conflict Dashboard* (Austin: Robert S. Strauss Center for International Security and Law, 2013).
- Ashley Moran and Dominique Thuot, "Bridging the Policy Gap: Mapping Climate Change and Security for Impact in Africa," *CCAPS Research Brief No. 20* (Austin: Robert S. Strauss Center for International Security and Law, 2013).

These publications are available at www.strausscenter.org/ccaps/publications.

Are there any known uses of the resource outside of your research team?
The CCAPS mapping tool and dashboards are used widely by U.S. government and military agencies, African national ministries, nongovernmental organizations, and international organizations, being used for example by analysts in the U.S. Africa Command, Combined Joint Task Force-Horn of Africa, U.S. State Department, U.S. Agency for International Development, and UNEP's Division of Early Warning and Assessment, to name a few diverse organizations. The mapping platform has been accessed from 133 countries, including 38 countries in Africa.

CCAPS Aid Dashboard

Resource URL: www.strausscenter.org/ccaps/mappingtool
Resource Point of Contact: Ashley Moran, amoran@austin.utexas.edu
Production Date: August 2012

Special Achievement in GIS
2013 Award Winner

Resource description:
The CCAPS aid dashboard includes geocoded aid data from CCAPS and several partner institutions. CCAPS and Development Gateway built the dashboard to combine trends analysis with the most comprehensive collection of geocoded data on aid projects in Africa.

The aid dashboard includes three aid datasets: (1) CCAPS' Malawi Geocoded and Climate Aid Dataset, which includes all types of aid for the 30 donors in Malawi's Aid Management Platform, (2) World Bank Aid Projects Continent-Wide, which includes all World Bank aid projects in all sectors from 1990-2011, and (3) African Development Bank Aid Projects Continent-Wide, which includes all African Development Bank projects in all sectors approved in 2009-2010. The Aid Dashboard also includes key contextual indicators courtesy of AfriPop (population density), Harvest Choice (poverty headcount ratio), and the World Bank (GDP per capita).

Related materials:

- Dominique Thuot, *User Guide to the CCAPS Aid Dashboard* (Austin: Robert S. Strauss Center for International Security and Law, 2013).
- Ashley Moran and Dominique Thuot, "Bridging the Policy Gap: Mapping Climate Change and Security for Impact in Africa," *CCAPS Research Brief No. 20* (Austin: Robert S. Strauss Center for International Security and Law, 2013).

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Chinese S&T – Relational Database Analysis System

POC: Tai Ming Cheung, University of California - San Diego, tcheung@ucsd.edu
POC: David Meyer, University of California - San Diego, dmeyer@math.ucsd.edu
http://igcc.ucsd.edu/research/technology-and-security/innovation-and-technology-in-china/

A key component of the University of California Institute on Global Conflict and Cooperation (IGCC) project entitled, "*The Evolving Relationship Between Technology and National Security in China*" (described on page 18) is the development of a "Relational Database Analysis System." This component is led by UCSD mathematics professor David Meyer, working in collaboration with IGCC. The principal aim of the database system is to support graph-theoretic social network analysis to characterize the positions of individuals, organizations, projects and technologies within networks, as well as provide general characterizations of the nature of these networks. This is the only database of its kind focused exclusively on Chinese science and technology programs, personnel, and organizations.

Data collection sources and methods include the use of an extensive array of publically accessible Chinese language materials, Chinese language journal and Chinese corporate databases as well as field research including interviews with officials, scientists, researchers, and business executives. Data includes biographical information of personnel, programmatic information on science and technology projects, and corporate and organizational information. This data can then be further analyzed using a graphical interface that can demonstrate relationships between personnel and personnel and organizations. Data is entered by IGCC staff, individually sourced, and carefully reviewed for accuracy and consistency.

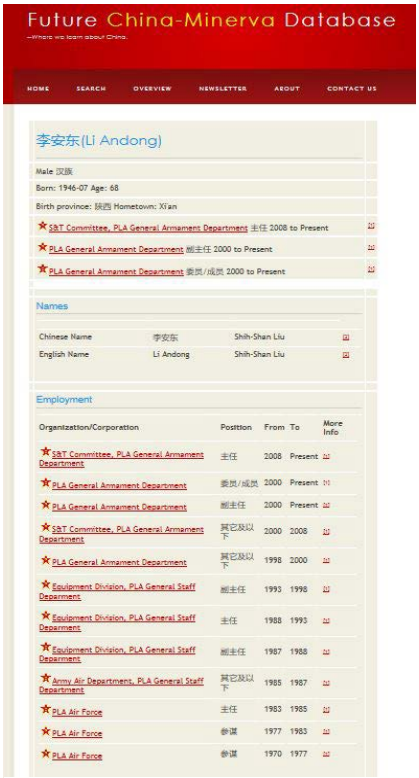


Figure 11: Biographical Data on General Armament Department S&T Committee Director

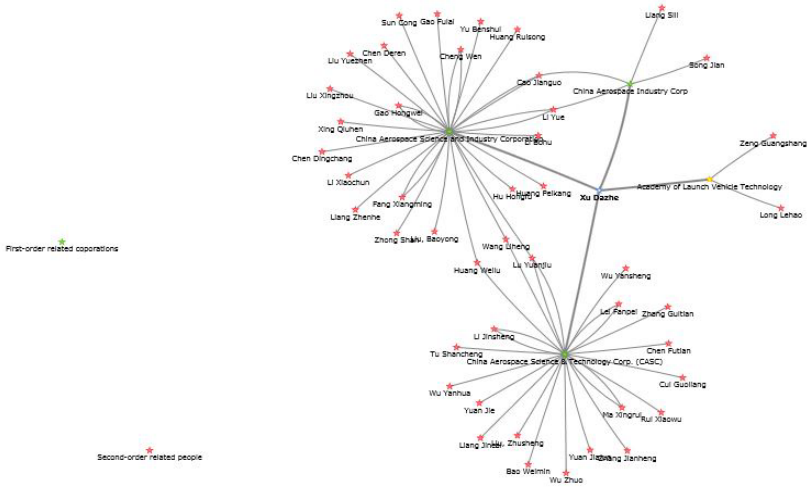


Figure 11: Relational Network of State Administration for Science, Technology, and Industry for National Defense Director Xu Dazhe

Release date: This database is expected to be available by May 2015.

Early access to the data by the U.S. government will be allowed once proprietary data obtained from a commercial vendor is appropriately filtered.

Transcripts of focus groups on housing and factors affecting societal stability

POC: Theodore P. Gerber, University of Wisconsin-Madison, tgerber@ssc.wisc.edu
Production Date: Transcripts are available upon request.

The data described below have been and will be generated through the Minerva project "*Homeownership and Societal Stability: Assessing Causal Effects in Central Eurasia*" described on page 34.

The first wave of focus groups for this project has been collected and transcribed (we will conduct an additional wave of focus groups, as well as two waves of survey research). Respondents were asked to describe their housing conditions, identify their main sources of discontent, and explore associations they make between housing and other grievances. They were also asked about their views toward the United States and Western culture; their own local, regional, and national governments, and the legacy of the Soviet period; their interpretation of different political concepts, and other related questions.

The chief advantage of focus groups is their open-ended and interactive format: the group moderator poses questions designed to elicit responses in informants' own words. Thus, the views expressed will not be framed by categories developed a priori by researchers; instead, they emerge spontaneously. For this reason, the focus group data not only provide rich insights into how residents in our study countries relate to our issues of concern, they will also provide us with examples of the wording that they use to describe their views.. Also, by comparing the views expressed across groups within and between countries, one can obtain a sense of whether specific logics and narratives represent common themes or idiosyncratic expressions. Due to their small and selective samples, focus groups are not necessarily representative of larger public opinion. In the next stage of research, we will use insights from the focus groups to develop quantitative survey questions and response categories based on local idioms and understandings.

We worked with local research organizations in each country to organize and carry out the groups. We developed the focus group guides and (with two exceptions) observed the groups, but native speaking moderators led each group. The exceptions were two groups in Sabirabad, Azerbaijan, which we were unable to observe due to logistical and political issues. Our local partners also recruited all participants, according to our specifications. All participants were 18-49 years old. All groups were conducted in local languages, and the transcripts of non-Russian groups were translated into Russian (in Ukraine) or English (in Azerbaijan and Kyrgyzstan). The timing, location, and composition were as follows:

Country	Dates	Locations	Composition
Azerbaijan	4/14 (Baku) 6/14 (Sabirabad)	2 in Baku, 2 in Sabirabad, small town with IDP settlements	One all-male and one all-female group in each location
Kyrgyzstan	6/7-6/9/14	2 in Bishkek, 2 in Osh, 2 in a village near Osh	In Bishkek, one highly educated and one less educated group; in Osh, one with Uzbeks, one with ethnic Kyrgyz, in the village, one male and one female group
Ukraine	5/10-5/12/14	2 in Kiev, 2 in Lviv	One group of 18-30 year olds and one of 31-49 year olds in Lviv; Russian-speakers and Ukrainian-speakers in Kiev
Russia	8/6-8/7/14	2 in Moscow, 2 in Kazan	In Moscow: highly educated/less educated; in Kazan: Tatar / ethnic Russian group

Dynamic Network Models of Salafist-Motivated Terrorism in Southeast Asia

Luke Gerdes, Luke.Gerdes@usma.edu
Minerva Fellow, U.S. Military Academy at West Point (2012–)

Knowledge dissemination among extremists

As part of the research described at "*Understanding Differences in Islamic Ideology in Asian Cultures*" on page 36, we built an original dataset that examines the extent/timing/nature of agent-level participation in kidnapping-teams by members of the Abu Sayyaf Group, which operates in-and-around the Southern Philippines.

This data demonstrates that current data-collection methods, which focus their information-acquisition strategy at the organizational level rather than the individual level, produce questionable results that negatively bias the scholarly community's understanding of extremism. I also used this new dataset to measure the amount of specialized knowledge that senior members of ASG distribute to junior members of the organization, and then I built a simulation that allowed me to test whether or not this observed pattern was random or meaningful. Thus, in the most general terms, this analysis combined network analysis and simulation.

Sharable Data on Chinese Communist Party Economic Transitions

Charlotte Lee, clee@hamilton.edu
Minerva Chair, US Air Force Academy (2012—2014)
Current institution: Stanford University

The data and tools described below have been and will be generated through the Minerva project "*The Chinese Communist Party's Economic Transitions via Organizational Reform*" described on page 53.

How does a ruling party maintain the relevance of its political organizations in the midst of a transition to a global market economy? My project considers organizational changes taking place within contemporary China's ruling communist party to understand how the party has adapted to economic and social reforms while maintaining its hold on political authority. Specifically, this project seeks to account for the party's renewed emphasis on an understudied but core set of party organizations: a national network of party-managed training schools, also known as "party schools."

Sharable data resources generated:

- Dataset of content of CCP Party School course syllabi
- Dataset of career histories of CCP Central Party School alumni

Methodology:
I integrated three methods to combine both qualitative and quantitative evidence: field interviews, content analysis of documents, and regression analysis of large-N data.

My case study of China's party school system draws on field visits that I conducted from the central to grassroots levels, in coastal and inland provinces, including over 200 interviews with party and government officials (from 2005 to 2011).

In addition to qualitative fieldwork, I draw on nationally representative survey data to determine patterns in the career paths of Chinese officials and test whether attending a training class at a party school constitutes a channel for selection to higher office. To control for selection bias, I employ a matching method on survey data to analyze a national sample of individuals on an administrative and/or political career track. I also present corroborating results drawn from a separate, original dataset of the career histories of Central Party School trainees.

To map changes in party school training content over time and across schools, I compiled an original dataset comprising over 100 syllabi from central and local party schools. Content analysis of these syllabi reveals a gradual de-emphasis on orthodox party theory and a heightened focus on modern management skills across training programs.

Databases for Quantifying Structural Transformation in China

David A. Meyer, UC San Diego, dmeyer@math.ucsd.edu
Government POC: Joe Myers, Army Research Office

The following data sets are associated with the project "*Quantifying Structural Transformation in China*" described on page 63.

Partially Ranked Lists of Chinese Communist Party Central Committee Members: 1st through 18th National Party Congresses

Production Date: These data have been submitted for inclusion in the Harvard Minerva Dataverse.

Resource description:
This is a partially ranked dataset on members and alternates of the Politburo Standing Committee, Politburo, and Central Committee for the 1st through 18th Congresses of the Chinese Communist Party (CCP). Our primary sources include documents provided by *People's Daily Online* and Wolfgang Bartke's *Biographical Dictionary and Analysis of China's Party Leadership 1922-1988*.

People's Daily Online, a state-owned media outlet, publishes news as well as a number of documents detailing party history and the composition of top political bodies in the CCP. We refer to a subset of these documents to create our partially ranked dataset of leaders. We provide the links, PDF files, and Pinyin transliteration of titles corresponding to each *People's Daily Online* document used to construct the partially ranked lists.

In these partial rankings, ties reflect lack of information. Thus for recent Central Committees, the members of the Politburo who are not in the Politburo Standing Committee are all listed with the same rank since their true ranks are not released by the Chinese Communist Party. For Central Committee alternates, who have been listed in ballot order in recent years, with members with equal numbers of votes listed in "stroke order", we have assigned different ranks only when the ordering is *not* by "stroke order".

This seems to be the most complete listing available outside China.

Related materials:
David A. Meyer, Megha Ram, Greg Shaw and Laura Wilke, "Circulation of the élite in the Chinese Communist Party", UCSD preprint (2014).

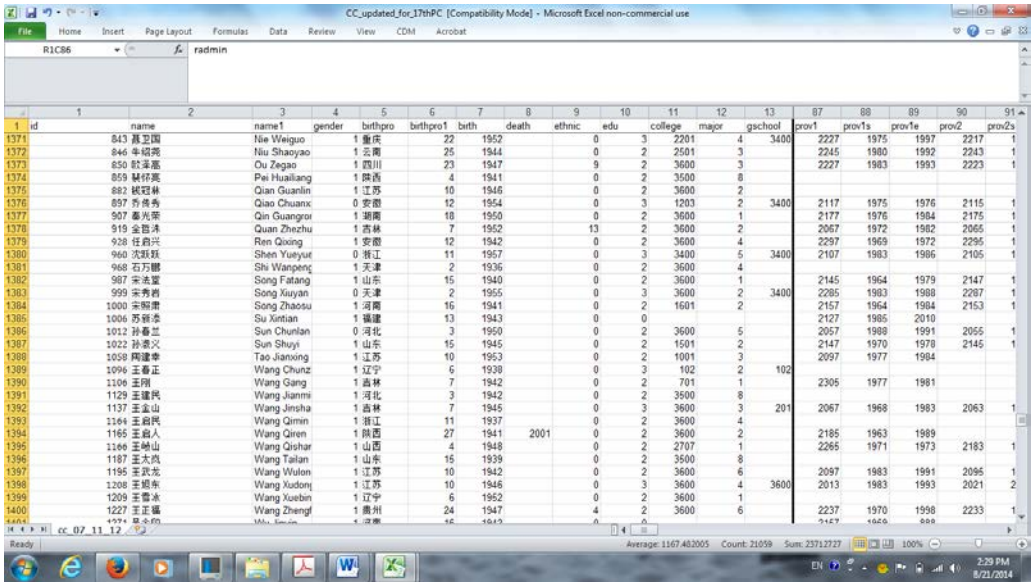
Biographical Database on Central Committee Members: 1978-2014
Biographical Database on Provincial Standing Committee members: 1978-2014

Resource Point of Contact: Victor Shih, vcshih@ucsd.edu
Production Date: public release June/December 2015 (respectively); for USG use November 2014/June 2015 (respectively).

Resource description:
Our data set contains all basic biographical information (gender, age, education level…etc.) as well as all publicly available information on the jobs of all Central Committee members, including start and end years of their jobs. Existing data either only contain qualitative CVs of Central Committee (CC) members or quantitative data which focus on particularly aspects of Central Committee members. For example, Cheng Li at Brookings compiled two data sets which identified whether a CC member had worked in the Chinese Communist Youth League or whether a CC member had been educated in the Tsinghua University. However, if analysts become interested in other aspects of the CC elite, one had to reinvent the wheel by coding a new data set.

In contrast, this data gathering effort transforms all publicly available qualitative data on the CC elite into a consistent quantitative data set. We devised a system which assigns a particular number to every major position in the Chinese bureaucracy. With every position that a CC member has held in the past, we assign a number to his position and, to the extent possible, also record the start and end year of that position. In this manner, this data set is additive so that with new information on a particular CC member, we can add that information in the data set without redoing any existing work.

In the first stage of the coding, a group of graduate students with Chinese background coded all the Central Committee members, which were checked by one of the co-PIs (Victor Shih). In the current stage of the coding, which focuses on provincial level elite, undergraduates with both Chinese and accounting backgrounds underwent 10 hours of training before commencing coding. A PhD student with expertise in Chinese politics is assigned to verify the accuracy of the coding.



DATA & TOOLS

Terrorist Alliance Database

Philip Potter, University of Michigan, pbkp@umich.edu
Erica Chenoweth, University of Denver; **Michael Horowitz**, University of Pennsylvania
Government Program Officer: Marvin Kruger, Office of Naval Research

The data and tools described below have been and will be generated through the Minerva project "*Terrorist Alliances: Causes, Dynamics, and Consequences"* described on page 66.

Recent scholarship challenges the image of the individual terrorist as a "lone wolf," suggesting few terrorists truly exist in isolation. The same is true of terrorist groups. Examples from around the world suggest that alliances between terrorist groups represent the rule much more than the exception. Such alliances can enhance the capabilities of the linked groups. When and how do terrorist groups ally with one another, states, and other non-state actors?

Unfortunately, answering that question is difficult because there is no comprehensive, time series data on terrorist alliances, and little systematic academic work addressing their causes and consequences. But understanding these alliances is vitally important for those interested in US security and counter-terrorism strategy. Intelligence organizations around the world already attempt, at the micro-level, to networks of terrorists within groups like Al Qaeda. We believe that a clearer understanding of the relationship between organizations will also yield significant benefits for those interested in reducing the capacity of these groups to inflict harm.

Methodology:
We began our dataset construction by generating a list of all terrorist groups known to exist from 1945-present. We are now in the process of identifying and coding the attributes of the relationships among these organizations including 1) the onset of collaboration; 2) the type of collaboration (material, training, ideological/inspirational, or intelligence); and 3) the termination of collaboration. We will then merge that into data on the activities of terrorist groups to understand the consequences of terrorist alliances for group behavior.

We have adopted a three-tiered data-collection strategy. First, we turn to content analysis of publically available media and scholarly sources to document the validity of these alliances described by prior research and identify alliances missed by prior data collection efforts. Relying primarily on encyclopedia, open source news reports, and declassified intelligence documents, we will also gather all available information on the genesis and decline of these relationships so that we can add the time series element to the data, which is entirely absent from existing studies but is crucial for any work that hopes to make causal inferences. Second, because linkages between many groups are difficult to identify and track over time, we will poll terrorism experts and generate a reliability score for each alliance relationship we identify. Third, we will conduct interviews with experts who have particular expertise in certain groups and regions.

In a parallel process, we are using use the same sources to develop brief case studies of each collaborative relationship. These case studies will both include what is known about the nature of the alliance and document the evidence that we have uncovered. The result will be a degree of transparency that is unusual in social science datasets. Qualitative analysis will further establish the motivations behind terrorist alliances, the processes that give rise to them, and the direction of the causal arrows in terms of the relationship between alliance and capability.

Anticipated Research Products:

1. A data set, which we will make publicly available.
2. An interactive website containing the dataset, animations of relationship formation over time, a resource bibliography, and profiles on each terrorist group alliance.
3. Additional refereed articles explaining the rise and decline of terrorist group alliances based on our analysis of the data and case studies. These articles will include:
    - A paper on the founding of terrorist alliances, based on our new dataset.
    - A methodological paper on the design of the study of terrorist alliances.
    - A paper on factors that influence the end of terrorist alliances. This paper should be of particular interest to the Department of Defense since it will explore strategies that states have used to disrupt relationships between groups and the success and failures of those various strategies
    - An additional paper on the consequences of terrorist alliances. This paper will build on existing work by the co-principle investigators and study how these alliances lead to the diffusion of terrorist attacks and influence the lethality of terrorist groups.
    - A book bringing together the papers described above and including in-depth case studies and network maps of the terrorist alliance universe.

Duke Minerva Data and Tools

PI: **Lincoln Pratson**, Duke University, lincoln.pratson@duke.edu
Resource Point of Contact: **Drew Haerer**, drew.haerer@duke.edu
Government POC: Lisa Troyer, Army Research Office
http://sites.duke.edu/minerva

The data and tools described below have been and will be generated through the Minerva project "*A Global Value Chain Analysis of Food Security and Food Staples for Major Energy-Exporting Nations in the Middle East and North Africa*" described on page 68.

Data and publications are available now. Government has early access to unpublished data, reports and manuscripts.

Resource description:
Duke Minerva is a website that allows visitors to learn about the MINERVA research being done by the Duke team, access our publications, view our map products, and download the data we have compiled to make these products and carry out our research.

The data we have compiled includes socioeconomic factors, demographics, agriculture, ports, trading, infrastructure and more for each MENA country. It also includes country consumption, production and trade data for rice, corn, wheat, crude, petroleum products, and natural gas. All data have been dynamically linked to GIS to allow for mapping and visualization. Databases have been created for all countries in the MENA region. Details of the data compilation and map creation are located at http://sites.duke.edu/minerva/database/ .

Are there any known uses of the resource outside of your research team?
Full access to our database was requested by and given to the Office of Geographic Sciences in the National Geospatial-Intelligence Agency.

Maritime Piracy Event and Location Datasets

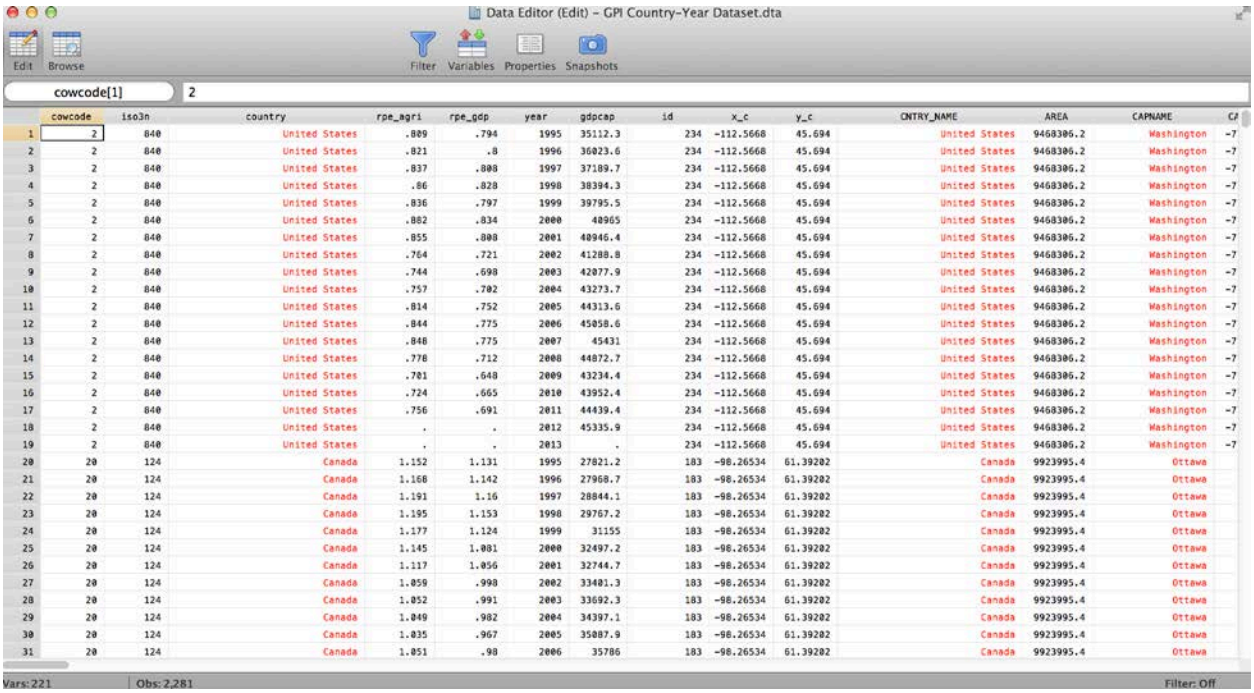
Brandon C. Prins, University of Tennessee, bprins@utk.edu
and **Ursula Daxecker**, University of Amsterdam
Government Program Officer: Harold Hawkins, Office of Naval Research
http://brandonprins.weebly.com/minervaresearch.html

The data and tools described below have been and will be generated through the Minerva project "*Political Reach, State Fragility, and the Incidence of Maritime Piracy: Explaining Piracy and Pirate Organizations, 1993-2015*" described on page 71.

Global Piracy Incidents Data Project

Production Date: October 1, 2014

Resource description:
The GPI database records information on maritime piracy incidents at the incident, month, and year level. A country-year level dataset has been built that will be available in October of 2014. The dataset includes year counts on maritime piracy attacks in every littoral country from 1995-2013. We also include societal, economic, political, and resource information for each littoral country by year. This dataset enables researchers to test conjectures about the structural drivers of modern maritime piracy while controlling for important country-level characteristics. We are currently building country-month datasets that should enable researchers to evaluate trends in maritime piracy in individual countries and forecast piracy incidents several months into the future.



	cowcode	iso3n	country	rpe_agri	rpe_gdp	year	gdpcap	id	x_c	y_c	CNTRY_NAME	AREA	CAPNAME	CA
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2	2	840	United States	.821	.8	1996	36023.6	234	-112.5668	45.694	United States	9468306.2	Washington	-7
3	2	840	United States	.837	.808	1997	37189.7	234	-112.5668	45.694	United States	9468306.2	Washington	-7
4	2	840	United States	.86	.828	1998	38394.3	234	-112.5668	45.694	United States	9468306.2	Washington	-7
5	2	840	United States	.836	.797	1999	39795.5	234	-112.5668	45.694	United States	9468306.2	Washington	-7
6	2	840	United States	.882	.834	2000	40965	234	-112.5668	45.694	United States	9468306.2	Washington	-7
7	2	840	United States	.855	.808	2001	40946.4	234	-112.5668	45.694	United States	9468306.2	Washington	-7
8	2	840	United States	.764	.721	2002	41288.8	234	-112.5668	45.694	United States	9468306.2	Washington	-7
9	2	840	United States	.744	.698	2003	42077.9	234	-112.5668	45.694	United States	9468306.2	Washington	-7
10	2	840	United States	.757	.702	2004	43273.7	234	-112.5668	45.694	United States	9468306.2	Washington	-7
11	2	840	United States	.814	.752	2005	44313.6	234	-112.5668	45.694	United States	9468306.2	Washington	-7
12	2	840	United States	.844	.775	2006	45058.6	234	-112.5668	45.694	United States	9468306.2	Washington	-7
13	2	840	United States	.848	.775	2007	45431	234	-112.5668	45.694	United States	9468306.2	Washington	-7
14	2	840	United States	.778	.712	2008	44872.7	234	-112.5668	45.694	United States	9468306.2	Washington	-7
15	2	840	United States	.701	.648	2009	43234.4	234	-112.5668	45.694	United States	9468306.2	Washington	-7
16	2	840	United States	.724	.665	2010	43952.4	234	-112.5668	45.694	United States	9468306.2	Washington	-7
17	2	840	United States	.756	.691	2011	44439.4	234	-112.5668	45.694	United States	9468306.2	Washington	-7
18	2	840	United States	.	.	2012	45335.9	234	-112.5668	45.694	United States	9468306.2	Washington	-7
19	2	840	United States	.	.	2013	.	234	-112.5668	45.694	United States	9468306.2	Washington	-7
20	20	124	Canada	1.152	1.131	1995	27821.2	183	-98.26534	61.39202	Canada	9923995.4	Ottawa	
21	20	124	Canada	1.168	1.142	1996	27968.7	183	-98.26534	61.39202	Canada	9923995.4	Ottawa	
22	20	124	Canada	1.191	1.16	1997	28844.1	183	-98.26534	61.39202	Canada	9923995.4	Ottawa	
23	20	124	Canada	1.195	1.153	1998	29767.2	183	-98.26534	61.39202	Canada	9923995.4	Ottawa	
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30	20	124	Canada	1.035	.967	2005	35087.9	183	-98.26534	61.39202	Canada	9923995.4	Ottawa	
31	20	124	Canada	1.051	.98	2006	35786	183	-98.26534	61.39202	Canada	9923995.4	Ottawa	

Related materials:

- Ursula Daxecker & Brandon Prins. 2014. "The New Barbary Wars: Forecasting Maritime Piracy." Forthcoming in *Foreign Policy Analysis.*

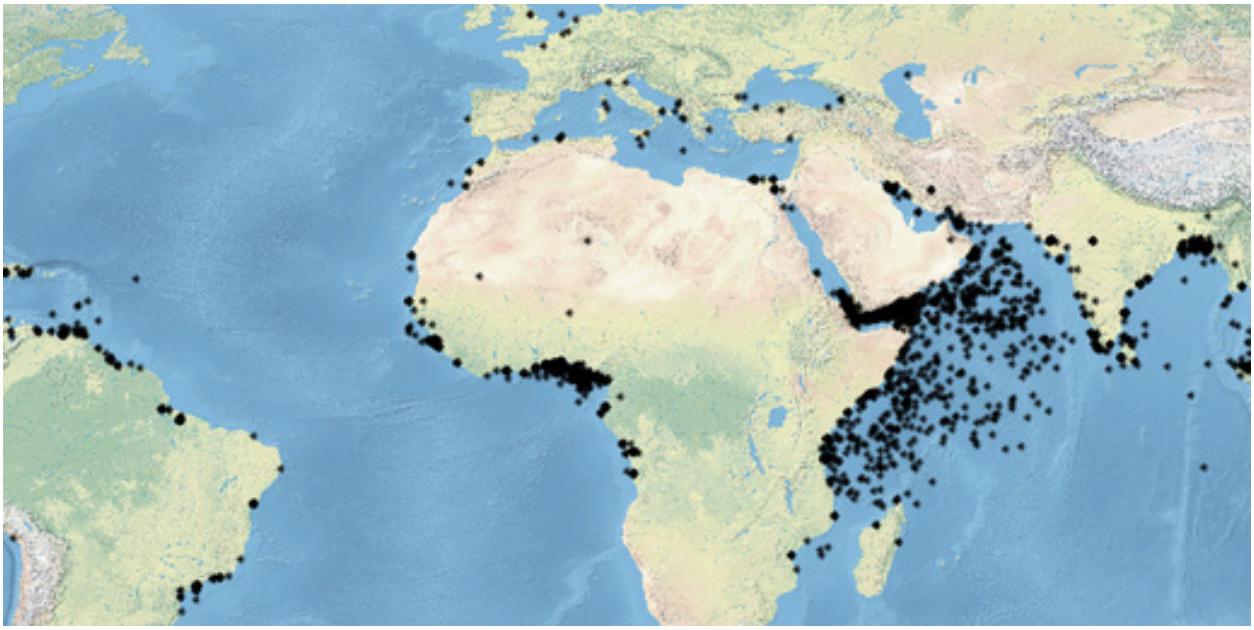
DATA & TOOLS

- Ursula Daxecker, Brandon Prins, & Amanda Sanford. 2014. "Terror on the Seas: Assessing the Threat of Modern Day Piracy." *SAIS Review*, 2014. http://saisreview.org/2014/02/10/terror-on-the-seas-assessing-the-threat-of-modern-day-piracy/
- Brandon Prins, Ursula Daxecker & Amanda Sanford. 2013. "The New Barbary Wars: Assessing the Threat of Modern Day Piracy." Howard H. Baker, Jr. Ctr for Public Policy, Policy Brief Series 3:13.
- Maritime Piracy Event & Location Dataset June 2014 Report: Focus on Piracy in Sub-Saharan Africa.

Maritime Piracy Event & Location Dataset

Production Date: August 1, 2014

Resource description:
This data project geo-codes and maps maritime piracy incidents from 1993-2013. Reports from the International Maritime Bureau are the basis of these data. The database includes information on the location of the attack, the day and time, whether the vessel was stationary or steaming, and information on the attacked vessel. Users of the database can filter by country and or by year. The database will be continually updated as new reports are produced. We also are carefully checking the data by comparing IMB reports with IMO, ASAM, and ReCAAP data collection efforts. The data are currently available in Excel format from the website listed above. A shapefile will be available in the near future.



Related materials:
- Ursula Daxecker & Brandon Prins. 2014. "The New Barbary Wars: Forecasting Maritime Piracy." Forthcoming in *Foreign Policy Analysis.*
- Ursula Daxecker, Brandon Prins, & Amanda Sanford. 2014. "Terror on the Seas: Assessing the Threat of Modern Day Piracy." *SAIS Review*, 2014. http://saisreview.org/2014/02/10/terror-on-the-seas-assessing-the-threat-of-modern-day-piracy/
- Brandon Prins, Ursula Daxecker & Amanda Sanford. 2013. "The New Barbary Wars: Assessing the Threat of Modern Day Piracy." Howard H. Baker, Jr. Ctr for Public Policy, Policy Brief Series 3:13.
- Maritime Piracy Event & Location Dataset June 2014 Report: Focus on Piracy in Sub-Saharan Africa.

Empirical Studies of Conflict Database Set

Jacob Shapiro, Princeton University, jns@princeton.edu
Eli Berman, University of California at San Diego
Joseph Felter, **David Laitin**, and **Jeremy Weinstein**, Stanford University
Jason Lyall, Yale University
Project Manager: Kristen Seith, kseith@princeton.edu
Government Program Manager: Benjamin Knott, Air Force Office of Scientific Research
http://esoc.princeton.edu

The Minerva "*Terrorism, Governance, and Development*" Team's goal is to enhance the understanding of how to implement governance and development policies to more efficiently (re)build social and economic order in conflict and post-conflict areas. (Details on page 76.) We use new data from a range of locations to extend and test current theories and provide empirically-based findings to inform policy decisions about terrorism, governance, and development.

Sharable data resources:

- Research-ready, fine-grained geospatial data on aid, economic development and political violence will be available via the Empirical Studies of Conflict project's website.
- Data and metadata from the following countries will ultimately be posted on the ESOC website: AFG (2001-present), COL (1999-2011), EGY (2010-11), KEN (2007-08), IRQ (2003-present), PAK (1988-present), the PHL (1975-present), and VNM (1965-73).

Other generated data (GIS and tabular format), publications, and working papers have been made available at the Empirical Studies of Conflict project's (ESOC) website: http://esoc.princeton.edu.

LookingGlass: A Visual Intelligence Platform for Tracking Online Social Movements

Principal Investigator: **Mark Woodward**, Arizona State University
Point of Contact: **Hasan Davulcu**, Arizona State University, hdavulcu@asu.edu
Minerva Dataverse - http://thedata.harvard.edu/dvn/
Production Date: June 9, 2014

The data and tools described below have been generated through the Minerva project *"Finding Allies for the War of Words: Mapping the Diffusion and Influence of Counter-Radical Muslim Discourse"* described on page 91.

Resource description:

1. Current technology for monitoring social media tracks keyword matching documents for names of known groups, individuals, and places. However, they cannot find the proverbial "needles in a haystack" corresponding to those individuals with radical or extremist ideas, or "connect the dots" to identify their relationships and their socio-cultural, political, and economic drivers. The amount of raw data is increasing exponentially as a result of the internet. Existing technologies fail to provide comprehensive tools for making sense of data that arrives in multiple modalities (e.g. tweets, blogs, and newswires) at very high rates and they fail to show the "big picture". We have developed a generic robust technique for recovering signals pertaining to a geographical area, such as a country, using Twitter data. A real-time dashboard, named LookingGlass (see **Figure 12**), displays all types of flows and hot spots of tweeters (i.e., individuals who post messages via Twitter) between extremist (red) and counter-extremist (green) social movements, alongside popular keywords, hash tags, events, and media sources driving the weekly shifts. LookingGlass is able to rapidly detect radical hot-spots of networks, narratives and activities, and their socio-cultural, economic, and political drivers, and is informed by highly trained area experts on the ground with social science and subject matter expertise as well as local cultural knowledge.

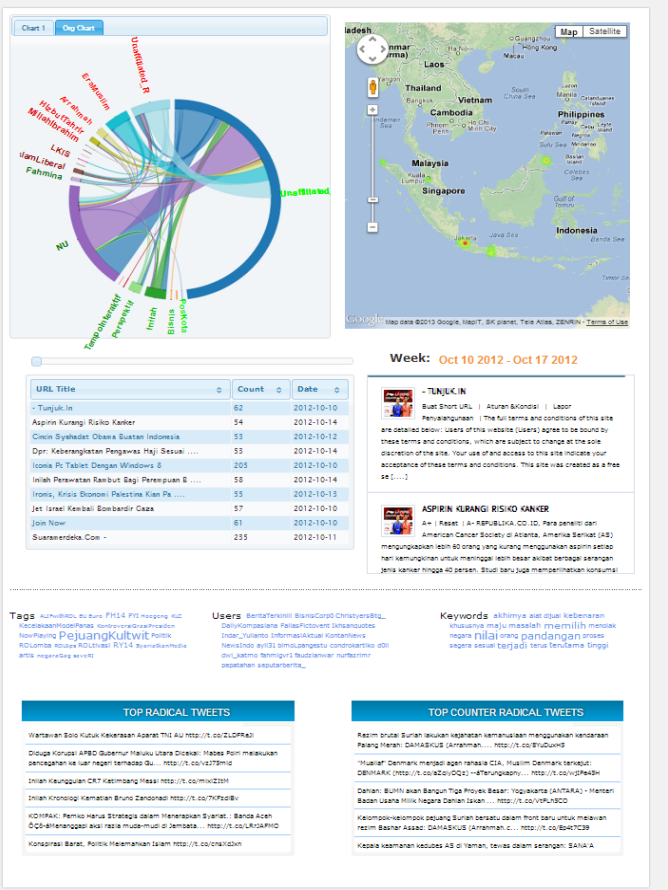


Figure 12: LookingGlass interface

2. By using discriminating perspectives and a logistic regression based classification model, LookingGlass can not only detect if a message or a collection of messages from a tweeter maps to one polarity or another polarity of a scale, but also if the tweeter classifies as a follower of ideologies of one of the known social movements. In our 10-fold cross-validation-based experiments with 37,000

DATA & TOOLS

web pages downloaded from web sites of 23 Islamic organizations (10 extremist and 13 counter-

Province	Index
Jakarta	6.16
East Java	12.33
Yogyakarta	4.53
Central Java	3.7
West Java	3.39

Figure 13: Provincial intolerance heat map of Indonesia for November 2013

extremist) from Indonesia, we observed that the LookingGlass classifier achieves over 98% accuracy for predicting the corresponding polarity of documents. Furthermore, we observed that logistic formulation-based classifier achieves over 83% accuracy for predicting the corresponding source (a particular Islamic organization) of a document. Combined with longitudinal analysis of an individual's messages (such as those that can be observed on Twitter, message boards, blogs, or in chat rooms), we can determine (i) shifts of individuals between social movements (SMs), (ii) growth and shrinkage drivers (i.e. types of events and narratives) of SMs, and (iii) influential promoters of SMs. A video demo of LookingGlass is published online at YouTube at this link[14].

3. As a validation step we used LookingGlass tool and its scaling algorithms for religious diversity intolerance to create monthly intolerance heat maps of Indonesian provinces by using Tweets from exclusivist intolerant Tweeters. The intolerance map for Nov. 2013 is shown below in **Figure 13**.

4. We validated the provincial rankings using Wahid Institute's Annual Report 2013 which lists 274 cases of religious intolerance in 2013, based on media reports and field observations. The WAHID Institute is a leading research center in Indonesia, named after Abdurrahaman Wahid, a former President of Indonesia, engaged in social science research. Our monthly results indeed showed strong correlation with Wahid Institutes reported rankings.

Related materials:

- Kim, N., Gokalp, S., Davulcu, H., Woodward M., 2013, LookingGlass: A Visual Intelligence Platform for Tracking Online Social Movements, *Proceedings of International Symposium on Foundation of Open Source Intelligence and Security Informatics (FOSINT-SI), in conjunction with IEEE ASONAM 2013*, Niagara Falls, Canada.
- Mazumder, A., Das, A., Kim, N., Gokalp, S., Sen, A., Davulcu, H., 2013, Spatio-Temporal Signal Recovery from Political Tweets in Indonesia, *Proceedings of the ASE/IEEE International Conference on Social Computing (SocialCom-13)*, Washington D.C., USA.
- Kim, N., Tikves, S., Wang, Z., Githens-Mazer, J., Davulcu, H., 2013, MultiScale Modeling of Islamic Organizations in UK, *Proceedings of the ASE/IEEE International Conference on Social Computing (SocialCom-13)*, Washington D.C., USA

DATA & TOOLS

[14] http://www.youtube.com/watch?v=m1eHXwQwYKY

Latent Dimensions of Authoritarianism

Joseph Wright, Pennsylvania State University, jgw12@psu.edu
James Honaker, Harvard University
http://dictators.la.psu.edu/

The research "*Autocratic Stability During Regime Crises*" described on page 93 helps policy makers understand the influence of different foreign policy tools on the behavior of military and security organizations in dictatorships during periods of domestic unrest. It contributes to our knowledge of how foreign policy tools and domestic factors such as regime type and leadership-security ties interact to influence government repression and democratic regime change.

Latent Dimensions of Autocratic Rule

Resource Point of Contact: Joseph Wright, josephGwright@gmail.com
Production Date: Spring 2016

Resource description:
Research on autocratic regimes in comparative politics and international relations has burgeoned in the past two decades, and often uses categorical typologies of autocratic regimes to distinguish among different types of dictatorships. Building on advances in methods for estimating the latent dimensions of democracy, this project uses historical data on over 30 features of autocracies to estimate the latent dimensions of autocratic rule. The raw data consist of time-varying information on the relationships between autocratic leaders, their support parties, and their militaries. The raw data will be made publicly available with a code book describing the variables and coding criteria. All information in the data set will have links to citations of publicly-available sources.

We identify three time-varying dimensions of autocracy that correspond to ideal types theorized in previous research: party dominance, military rule, and personalism. We show that the dimensions of autocratic rule are orthogonal to commonly-used measures of democracy-autocracy; compare these dimensions to existing categorical typologies of autocratic regimes; and propose how this information can be structured as clusters. We then show the latent measures we construct perform as expected in an empirical model of autocratic regime breakdown. Finally, we show that while party dominance and military rule can be measured using existing data sets, the new time-varying measure of personalism is unique.

Related materials:

- Barbara Geddes, James Honaker, and Joseph Wright. 2014. "The Latent Characteristics That Structure Autocratic Rule." Paper prepared for the 2014 Annual Meeting of the American Political Science Association (Washington D.C.)
- Joseph Wright. 2014. "The Classification of Autocracies: A Principal Components Approach." *APSA-Comparative Politics*. Volume 24, issue 1
- Barbara Geddes, Joseph Wright, and Erica Frantz. 2014. "Autocratic Breakdown and Regime Transitions: A New Data Set." *Perspectives on Politics* 12(2): 313-331.
- Barbara Geddes, Erica Frantz, and Joseph Wright. 2014. "Autocratic Regimes." Book manuscript in progress.

Leadership Security Ties Data Base

Production Date: Spring 2016

The *Leadership-Security Ties* data base compiles information from historical case studies, news reports, and primary sources into a comprehensive list of the operationally independent military and security organizations in all dictatorships in the world from 1990-2012. The data contain a list of the leaders of these organizations and codes whether these organization leaders have a personal family or politically-relevant ethnic connection to the regime leader. We use this information on the leaders of military and security organizations to construct two new measures of the patrimonial security sectors. The first measures the extent to which the leaders of the security apparatus in dictatorships are connected to the regime leader through familial or ethnic ties. Because the data set identifies both the key security organizations that support a dictator and the names of the de facto leaders of these organizations, we can construct a measure of leadership turnover -- or volatility -- within the security apparatus.

The data will be made publicly available in a time-series cross-section format, and will include: (1) a list of operationally independent military and security organizations in each year for each autocratic regime from 1990-2012; (2) the names of the leaders of these organizations; (3) a variable for shared (politically-relevant) ethnicity with the regime leader; and (4) a variable for directly family relationship (via blood or marriage) to the regime leader. Each data cell links to a citation of a publicly available source for the information. The data page for each country also includes a link to a 2-4 page country study that details the difficult coding decisions and lists the references for the data.

Data collection for this project proceeds in three steps. First, coders are asked to read the case study literature on military institutions and security organizations in each country to identify the key operationally independent military and security organizations. Country-case study memos describe difficult coding decisions with respect identifying these organizations. Coders then record information on the organizations' names, the leaders of these organizations, and family and ethnic relations to the regime leader.

We then conduct a second round of coding in which we use an "actor list'" for each country, which identifies the names of individuals and organizations in a particular country case, to conduct an automated search for articles and documents found in LexisNexus and Refworld.org. To facilitate human coding of these documents, we compile information from all the documents into one pdf file that contains the paragraphs in each document that mention a key word from the "actor list". Human coders then read the pdf file to verify existing information and fill-in missing data.

After the second round of data collection, we query country experts about the accuracy of the data from our initial collection efforts. The survey questionnaire will ask them to verify the names of the leaders of the military and security organizations as well as their family and ethnic ties to the regime leader.[15] It will

[15] The expert survey does not ask respondents to provide information about their own beliefs or behavior, and, more importantly, does ask them to subjectively assess or "rate" the concept on a predetermined scale. Instead, the respondents are asked to identify *objective* information and provide publicly-available sources to corroborate the information. Thus, our expert survey differs from surveys that either: (1) ask respondents to pairwise compare cases, for example, to assess the relative level of democracy or measure policy; or (2) ask respondents to subjectively assess the degree of a concept, such as democracy or party ideology.

also ask for additional source material and solicit open-ended feed-back. The experts will be contacted electronically and asked to provide information electronically on forms we have produced using Qualtrics survey software.

Related materials:
Thomas Brawner and Joseph Wright. "Introducing the Leadership Security Ties Data Base." Paper presented at the 2014 Annual Meeting of the American Political Science Association (Washington D.C.)