



HAL
open science

Commentary: A Failure of Imagination (Intelligence, WMDs and ‘Virtual Jihad’).

Scott Atran

► **To cite this version:**

Scott Atran. Commentary: A Failure of Imagination (Intelligence, WMDs and ‘Virtual Jihad’).. Studies in Conflict and Terrorism, 2006, 29, pp.263-278. ijn_00505171

HAL Id: ijn_00505171

https://hal.science/ijn_00505171

Submitted on 22 Jul 2010

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L’archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d’enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Studies in Conflict & Terrorism, 29:263–278, 2006

Copyright © Taylor & Francis Group, LLC

ISSN: 1057-610X print / 1521-0731 online

DOI: 10.1080/10576100600564166

Commentary

A Failure of Imagination (Intelligence, WMDs, and “Virtual Jihad”)

SCOTT ATRAN

Centre National de la Recherche Scientifique

Paris, France

and

The University of Michigan

Ann Arbor, Michigan, USA

Intelligence estimates based on models keyed to frequency and recency of past occurrences make people less secure even if they predict most harmful events. The U.S. presidential commission on WMDs, the 9/11 commission, and Spain's comisión 11-M have condemned the status quo mentality of the intelligence community, which they see as being preoccupied with today's "current operations" and tactical requirements, and inattentive to tomorrow's far-ranging problems and strategic solutions. But the overriding emphasis in these commissions' recommendations is on further vertically integrating intelligence collection, analysis, and operations. Such proposals to further centralize intelligence and unify command and control are not promising given recent transformations in Jihadist networks to a somewhat "leaderless resistance" in the wake of Al Qaeda's operational demise. To defeat terrorist networks requires grasping novel relations between an englobing messianic moral framework, the rootless intellectual and physical mobility of immigrant and diaspora communities, and the overarching conceptual, emotional, and logistical affordances of the Internet. Britain's WWII experience provides salutary lessons for thinking creatively with decentralized expertise and partially autonomous approaches.

Received 12 May 2005; accepted 25 May 2005.

For information, comments and criticisms, the author thanks Robert Axelrod, Isaac Ben Israel, Noam Chomsky, Baruch Fischhoff, Richard Garwin, Pervez Hoodbhoy, Todd Laporte, Edwin Meese, Marc Sageman, Simon Wessely, and Richard Wilson.

Address correspondence to Scott Atran, Institute for Social Research, University of Michigan, 426 Thompson St., Ann Arbor, MI 48106-1248, USA. E-mail: satran@umich.edu

“The temptation to tell a Chief in a great position the things he most likes to hear is the commonest explanation of mistaken policy.”

—Winston Churchill

“Do not think what you want to think until you know what you ought to know.”

—“Crow’s Law,” R.V. Jones, Head of Scientific Intelligence,
British Air Staff, 1939–45

Overview

According to the presidential commission on intelligence regarding weapons of mass destruction, U.S. intelligence agencies were “dead wrong” in nearly every prewar assessment of Iraq’s WMDs.¹ “The bottom line,” the panel co-chairman told reporters, “is the intelligence community operated on presumptions or assumptions based on what they had seen in 1991. What little evidence they did have, which was inconsistent, was tortured into those presumptions.”² But political chicanery is not required for such a huge intelligence failure.

The historical reporting by the presidential commission is often admirable, as with the 9/11 commission before it.³ Most lucid is the call to focus diverse expertise on longrange problems that now may be only dimly perceived. But recommendations fall short on helping to parry the future sources of attack that carry the most risk, and how best to respond. The presidential commission offered over 70 proposals to bolster the powers of the new Director of National Intelligence, whose appointment was the core recommendation of the 9/11 commission. These powers greatly favor vertical integration of intelligence collection, analysis, and operations. Such proposals to centralize intelligence and unify command and control are not promising given recent transformations in Jihadist networks in the wake of Al Qaeda’s operational demise.

Hindsight criticism from all sides of the political divide, concerning lack of preparedness and astuteness on the part of government agents and officials in regard to Iraqi and Al Qaeda designs, often suffers from the illusion that the gathering storm was foreseeable, as in a video run backward. More serious is a general lack of awareness on the part of intelligence agencies and their critics that intelligence estimates based on models keyed to frequency and recency of past occurrences make the United States less secure even if they predict most harmful events. The more one looks to the ripples, the less one is prepared for a tsunami.

Terrorist attacks over the last few decades,⁴ like wars over the last few centuries,⁵ follow a non-obvious trend in which a very few events are responsible for the vast majority of casualties and most of the wrenching changes in world history. Distributions of low-probability, catastrophic events are inherently unpredictable but not inconceivable. An overriding reason for these avalanching effects is lack of preparation owing to a failure of imagination, in addition to over-reliance on what is most usual, obvious, and immediately relevant. This trend anticipates future terrorist events with ever broader effects, and retaliatory wars that may come to harm hundreds of millions of people (with destructive looping effects sweeping the entire world). So, regardless of attitudes towards the United States, preventing an attack in America demands the world’s close attention.

“Scientific intelligence,” which originated in wartime Britain, provides salutary lessons for thinking “outside the box” with decentralized, partially autonomous expertise to imagine and reduce the risks and consequences from innovative weapons and methods

of attack—a tact that Al Qaeda’s acolytes have used implicitly to great effect. Londoners’ responses to the German Blitz, like New Yorkers’ responses to Al Qaeda’s bombing of the World Trade Center, also suggest that locally varied and distributed response outperforms unified command and control.

Conjectures and Refutations

Perhaps the most damning aspect of the presidential commission’s report, at least on the issue of biological weapons, was “the Intelligence Community’s heavy reliance on a human source—codenamed ‘Curveball’—whose information later proved to be unreliable.”⁶ German intelligence first interviewed Curveball, an Iraqi chemical engineer living in Germany, and informed the Pentagon’s Defense Intelligence Agency (DIA). The DIA passed along the information to the CIA. When the CIA sought to interview Curveball, German intelligence told the CIA it was a waste of time because Curveball was “a fabricator and crazy.”⁷ Tyler Drumheller, former head of the CIA European Division, recently told reporters that in 2002 he saw “dozens and dozens of e-mails and memos” impugning Curveball’s credibility. Nevertheless, former CIA director George Tenet claimed that there was never a “formal memo” questioning Curveball’s reliability until after then-Secretary of State Colin Powell proffered Curveball’s fantasies as “facts and conclusions based on solid intelligence” in a speech to the UN on 5 February 2003.⁸

Forgotten or ignored in the fiasco were at least three hard lessons, which Reginald V. Jones, Britain’s Head of Scientific Intelligence in WWII, summarized years ago:⁹ (1) It is necessary to avoid “the steady and immediate broadcasting of each . . . uncollated fact,” and to withhold such information from political decision makers until checked because “to spread half-truth is often to precipitate erroneous action.” (2) The intelligence community must provide an “independent voice” that takes no consideration of what political decision makers may want to hear because this, as Winston Churchill concurred, is “vital” to “the leader on whose decisions fateful events depend.” (3) Information from disaffected nationals is usually the most unreliable source on weapons or methods available to actual or potential enemies and “must always be checked.” As Machiavelli noted long ago:

How dangerous it is to trust the representatives of exiles . . . such is their extreme desire to return to their homes that they naturally believe many things that are not true, and add many others on purpose A prince therefore should be slow in undertaking any enterprise upon the representations of exiles, for he will generally gain nothing by it but shame and serious injury.”¹⁰

The presidential commission cites over-reliance on conjecture and lack of concrete evidence as critical to the intelligence failure over Iraq’s WMDs. But General Isaac Ben Israel, one of Israel’s top military strategists, explained to the author why he sees matters differently.¹¹ It is not too much conjecture, but too little that’s at fault. All intelligence reports—including those of U.S. allies—noted past attempts by Iraq to build and hide chemical, biological, and nuclear weapons or weapons-grade materials. But no one really bothered to ask if Iraq had the operational capability to still use them, and if there is no such capacity, then either there are no weapons and materials or they are useless. Observes Ben Israel: “Surely one shouldn’t expect to dig hidden missiles or production facilities out of the sand or some other hiding place, twelve years after they had been

buried there, and launch them without all sorts of training and equipment. There was not even one report on these subjects. And that's why I concluded that Iraq posed no real threat, at least with WMDs."

As in science or business, only bold attempts at both conjecture and refutation can significantly reduce uncertainty. For Ben Israel, that is one key lesson of the R.V. Jones brand of "scientific intelligence." Without concerted effort to hypothesize *novel* scenarios, and equal effort to *reject* such creative hypotheses, no true advance in knowledge is possible.¹² This is not to deny that history and its mistakes can teach many valuable things in preparation for the future. For without knowledge of history, one is altogether blind. The failure of Israeli Military Intelligence in the October 1973 "Yom-Kippur" War is a good illustration of how historical examples can cut both ways. On the one hand, pre-occupation with the recent and familiar can lead to erroneous conclusions—philosopher Karl Popper has deemed this "the fallacy of induction"—but more significantly it can lead to operational or policy disasters.¹³ For example, preparations for a surprise attack by Egypt and Syria took place under cover of a series of military exercises called "Tahrir 41." After careful scrutiny of the previous 40 exercises, Israeli Intelligence learned the Tahrir pattern all too well. "When the 41st began, we immediately recognized the pattern and assessed it to be another exercise in the series," says Ben Israel, "only this time the Egyptians deviated from the pattern and crossed the canal." On the other hand, this acknowledgment is itself an enlightening use of historical example to gain insight. But this kind of example should not be taken as an indication or suggestion of a historical pattern that can be projected into the future.

The coaches and players of successful sports teams seem to intuitively understand the point. Once a rival team runs a trick play, shame on you if they do it to you again. So, teams prepare for trick plays. But how does a team prepare for a new trick play? What local information can lead to a global (or team) response that something strange is afoot? Certainly not just by re-reading the play book. True, the past is the only guide to the future, but fixing on what is most frequent and near in time can miss the blindside. Intelligence estimates that continue to be based primarily on models keyed to frequency and recency of past occurrences, make one less secure even if they predict most terrorist events.¹⁴ The more one fixes on box-cutters and airport security, the more vulnerable the U.S. may become. There is little indication from either the intelligence community or its critics that this enduring vulnerability is being lessened.

Facing Catastrophe

It is not frequent or familiar events, but large and rare ones that are responsible for most of the cataclysmic and cascading consequences that shape history, be they climatic and biological disasters, major financial and health crises, political and cultural revolutions, increasingly destructive wars, or terrorism. Mathematicians call this trend of events a "power law distribution" and natural scientists call the resulting shake-up in the structure of the world a "phase shift." Applied to terrorism, this anticipates future terrorist events with ever broader political, economic and social effects, and points toward ever more massive attack. If the power-law distribution and phase shifts that seem to characterize war also kick in, then the world might expect hundreds of millions of casualties if a nuclear device were exploded on U.S. soil. (Unless there was specific information to the contrary, U.S. intelligence might simply assume that a small-scale nuclear attack was carried out by Jihadists and the U.S. military would likely retaliate disproportionately and massively against any group, government, or society that tolerated a Jihadist

presence).¹⁵ Whatever one's sentiment toward the United States, then, preventing a catastrophic terrorist attack on American soil merits the entire world's immediate and sustained concern even if the likelihood of such an attack appears low.

Physicist Richard Garwin, a former U.S. presidential adviser and recipient of the National Medal of Science, sees suicide terrorists more likely to explode a small nuclear device at ground level, rather than in the air by missile or plane, because it is easier to deliver. "If such a device were delivered by truck or train and detonated in a densely populated area," Garwin told me, "more people would be killed by radiation than in the Hiroshima air burst."¹⁶ Garwin is concerned that not enough is being done to prevent theft of Highly Enriched Uranium (HEU).¹⁷ He notes that United States and Soviet Union made an agreement some years back that the United States would provide 20 billion dollars to take 500 tons of HEU—enough for some 8 to 20 thousand nuclear bombs—and reduce them from about 94 percent weapons uranium to about 4 percent nuclear grade that can be used in nuclear reactors. This process is now a little more than half way through. But there are still hundreds more tons of uranium in the former Soviet Union that have not been reprocessed. The additional cost of early reprocessing that, not down to 4 percent but just down to 19 percent, would be in the tens of millions rather than billions of dollars. Garwin believes that the risk of a nuclear attack substantially greater than during most years of the Cold War.¹⁸

General Anatoly Kulikov, Vice-Chairman of the Russian Duma's Security Committee, downplays the risk of waiting. At a NATO workshop on suicide terrorism that the author co-chaired with Ariel Merari last summer, Kulikov declared: "we are absolutely certain that current safeguards make theft of HEU practically impossible in our country." Senior Pakistani military officials tell a similar story about the lack of risk that rogue elements in their country will disseminate nuclear materials (A.Q. Khan's clandestine nuclear operations notwithstanding). Outside experts are not so sure.

Pakistani physicist Pervez Hoodbhoy, who presently devotes much of his life to easing tensions between Pakistan and India,¹⁹ and who was one of the first to publicly warn against the rogue nuclear operations of fellow countryman Abdul Qader Khan, does not fear so much that terrorists could manufacture a plutonium device like North Korea now says it has (which can only be used in an implosion mode that is hard for non-state actors to engineer because it requires highly sophisticated technology to achieve exact spherical symmetry and extremely precise timing) or even steal a HEU device (because of sophisticated locks that render the weapon useless if tampered with). But he is concerned that HEU can be mined from existing stockpiles for use in a gun-type weapon. It would probably have to be built on location from smuggled parts because fabrication would require a bit of room, at least an apartment.²⁰

A main worry is that well-educated and motivated Jihadist sympathizers—like the anarchist student bombmakers a century ago—know as much about what is needed as those trying to stop them.²¹ "Any graduate student of mine who couldn't design a workable nuclear bomb," Hoodbhoy said without boast, "doesn't deserve a Ph.D." (The basic principles for an A-bomb design, though not for an H-bomb, can be had from the declassified Serber lectures).²²

How can those who yearn for apocalyptic terror be stopped? One cannot be certain to ever completely prevent an attack or eliminate its effects, but the risk of attack can be greatly reduced and, if an attack comes the damage and suffering can be strongly contained. Yet, proposals by the U.S. presidential commission, like the 9/11 commission before it, to further centralize intelligence and unify response command and control are not promising.

The Departments of Defense and Homeland Security annually spend hundreds of billions of dollars,²³ and mobilize hundreds of thousands of people, trying to disrupt and interdict terrorist operations, but furnish orders of magnitude less money and manpower to understanding where Jihadist-inspired terrorism comes from, what it is about, and where it is going. But to defeat terrorist networks one must understand them. This requires grasping the novel relations between an englobing messianic moral framework, the rootless intellectual and physical mobility of immigrant and diaspora communities, and the overarching conceptual, emotional, and logistical affordances of the Internet. Let's briefly consider, then, each of these dynamic aspects of Global Network Jihad and some of their interrelations.

“Born-Again” Islam: Intermittently Apocalyptic, Not Nihilistic

Jihadism is a thoroughly modern movement, despite atavistic cultural elements, filling a significant portion of the popular political void in Islamic societies left in the wake of locally discredited Western ideologies (anarchism, colonialism, fascism, nationalism, socialism, communism). Appeals to Muslim history and calls for a revival of the Caliphate are important and deeply heartfelt, yet to a considerable extent Jihadism is also a countermovement to the ideological thrust ensconced in the *National Security Strategy of the United States*,²⁴ which sees liberal democracy as the “single sustainable model of national development . . . right and true for every person, in every society and the duty of protecting these values against their enemies [a]s the common calling of freedom-loving people across the globe and across the ages.”²⁵

Whether right or not, most people in the world pay less attention to U.S. *intentions* to democratize others than to the U.S. military expansion and its palpable *consequences*, including tens of thousands of Iraqi civilian dead,²⁶ with mistrust of the United States ever higher across the world.²⁷ According to the Pentagon's “Base Structure Report” for 2004, the U.S. military currently operates more than 900 installations in 46 countries, in addition to over 4,600 bases in the U.S. homeland and territories.²⁸ The United States State Department presently claims, that “over 100 nations benefit from U.S. military training, education,” with funding doubled over the last four years.²⁹ Yet nearly a decade ago, a Defense Department Science Board report found that: “Historical data show a strong correlation between U.S. involvement in international situations and an increase in terrorist attacks against the United States.”³⁰ Global Jihad grows in tandem.³¹

As with most historical counter-movements, this countermovement incorporates some of the main social and spiritual missions of its adversary. Indeed, perhaps more may be learned about Jihadism's apocalyptic yearnings and its “Born Again” vision of personal salvation through radical action from the New Testament's *Book of Revelation* than from the *Quran*.³² Nor does Islam *per se* or “Muslim civilization” really have anything to do with terrorism—no more than some impossibly timeless or context-free notion of Christianity, Judaism, Hinduism, or Buddhism can be held responsible for the dead millions of which these religious traditions have been accused.³³

One of the most important post 9/11 developments in Global Network Jihad is that surviving Al Qaeda offshoots and newly emerging Jihadist groups and cells no longer consider themselves to be territorially rooted in supporting populations. For example, although Egyptian Islamic Jihad (*Al-Jamaat al-Islamiyya*, EIJ) and Egyptian Islamic Group (*Al-Gama'a al-Islamiyya*, EIG) have common roots in Egyptian society, one crucial difference between them is that the EIJ leadership under Dr. Ayman Zawahiri left Egypt to join bin Laden in Afghanistan whereas EIG remained behind in Upper Egypt (Said).³⁴

The hostile reaction of Saidis to the 1997 EIG massacre of 58 tourists at the Temple Of Queen Hatshepsut in Luxor, and to interference by outside jihadis and loss of trade, effectively ended EIG's ability to mount military operations. By contrast, al-Zawahiri continues to urge Jihadists everywhere to inflict the greatest possible damage and cause the maximum casualties on the West, no matter how much time and effort these operations take, and regardless of the immediate consequences.

Unconstrained by concrete concerns for what will happen to any population that supports them, they can allow themselves to seriously imagine fulfillment of their apocalyptic vision. Still, it is nonsense to claim—as most leading U.S. politicians and pundits do—that Al Qaeda and its sympathizers have no morality and simply want to annihilate Western civilization. In general, charges of “nihilism” against an adversary usually reflect the willful ignorance of those leveling the charge regarding their adversary's moral framework. According to Michael Scheuer, former head of the CIA team tracking Al Qaeda, bin Laden has never preached destruction of Western culture and, at every turn, has sincerely sought moral justification for Al Qaeda's actions and demands.³⁵ This includes bin Laden's invocation of a fatwah published in May 2003 by radical Saudi cleric Hamid bin al-Fahd permitting the use of nuclear weapons to inflict millions of casualties on the United States³⁶—unless the United States changes its foreign policy in the Middle East and elsewhere in the Muslim world.³⁷

Current risk management approaches to countering terrorism often assume adversaries model the world on the basis of rational choices that are commensurable across cultures. But for the would-be martyrs the author has interviewed it often does not matter that others will reap the rewards of his sacrifice. Neither does it seem to matter for those who issue religious edicts (fatwahas) condoning Jihadist martyrdom if the martyr (shaheed) kills thousands of foes or no one but himself—he will attain Paradise just the same. When the author asked questions of the sort: “So what if your family were to be killed in retaliation for your action?” or “What if your father were dying and your mother found out your plans for a martyrdom attack and asked you to delay until the family could get back on its feet?” To a person the would-be suicide bombers the author interviews answer along the lines that there is duty to family and duty to God but duty to God cannot be postponed. Such answers, if sincere (and there is little doubt they are), suggest that devotional values are not very sensitive to standard calculations of cost and benefit, to quantity, or to tradeoffs across different moral and cultural frameworks.³⁸ This means that traditional calculations of how to defeat or deter an enemy (for example by eliminating most key operatives or threatening destruction of supporting populations) may not succeed.³⁹

The Jihadist Diaspora: Rootless and Dynamic

Many of the most effective and enduring terrorist movements of modern times originated with, and have been sustained by, diaspora communities, often led by student immigrants who later import radical ideology and terrorist methods into the national movements of their home territories. Examples include the anarchist “Black Hand,” the Boston-bred IRA, the “exile leadership” of the PLO, and the British Commonwealth's Tamil Tiger support groups. Similarly, for Al Qaeda and the global Jihadist network that claims inspiration from it, over 80 percent of known activists live in diaspora communities.⁴⁰

Arguably the greatest potential terrorist threat in the world today lies with uprooted and egalitarian Muslim young adults in European cities, who provided the manpower for both the 9/11 and Madrid train-bombing attacks. Immigrant integration into European societies has always been more difficult than in America, being more state-driven

and “top down” than community-based and “bottom up.” In the United States, for example, if an immigrant group pays local property taxes, then the schools that run on those taxes tend to be more sensitive to cultural diversity. Integration into American society is one important reason that Jihadist groups have not viably taken root in the United States. By contrast, Jules Ferry, the French prime minister who instituted modern secular education in Europe, once bragged that he knew what every public school teacher in every town in France would be teaching at a given time. Observes French political scientist Olivier Roy, in Europe “multiculturalism” is taken not as valuing diversity but as a sign of withdrawal—an attempt to create alien entities between the individual and state.⁴¹ That is why almost the entire political spectrum of France opposed attempts by Muslim girls to wear headscarves in public schools. There is no indication that any rival to Jihadism’s uncompromising vision of a fair and just society—which debriefings show clearly motivate these people—is being conveyed to would-be Jihadist youth in Europe. Secular education and open elections do not by themselves speak sufficiently to the spiritual and cultural needs that their rootlessness generates.

The European Union’s increasingly open society is currently more favorable to farflung networking among Jihadists than to an efficient coordination among different government services that remain hidebound to national territories and politics, and to professional hierarchies and traditional languages. The steep decline in birth rate among native Europeans, which is highest in southern European countries most accessible to immigration from North Africa and the Middle East, and rising need for immigrant labor will only exacerbate the problem. Neither Europe nor the United States can deal with this alone.

“The Virtual Hand” of Global Jihad

Despite claims to the contrary, there is no longer the controlling agency of the Al Qaeda leadership to target, which seems to be operationally near dead: remnants of the—mostly Egyptian—hardcore around bin Laden have not managed an attack in over three years, do not know who many of the new terrorists are, and cannot communicate secretly with those they do know.⁴² Instead, groups of friends and family originating from the same area “back home” in North Africa or the Middle East, or from similar European housing projects and marginal neighborhoods, bond into action as they surf Jihadist websites on the internet to find direction from Al Qaeda’s inspiration.

Analyzing case studies of nearly 500 globally networked Jihadists, University of Pennsylvania forensic psychiatrist Marc Sageman, a former intelligence officer who ran operations during the Afghan–Soviet War, finds that the social networks of these hard-to-penetrate militant groups are composed of about 20 percent kin and 70 percent friends (who tend to become kin over time through intermarriage).⁴³ Most operational cells of Jihadists have only a few members—cells of eight members seem to be the mode. Although the members of each cell usually show remarkable in-group homogeneity (age, place of origin, residence, educational background, socioeconomic status, food likings, and so on) there is little homogeneity across the Jihadist diaspora (which renders attempts at profiling global Jihadists worthless). The cells are often spontaneously formed and self-mobilizing, with few direct physical contacts to other cells. But radicalization usually requires outside input from, and interaction with, the larger Jihadist community. Radicalization is proceeding apace with exponential growth in internet connections (in the last five years the number of Jihadist websites has increased from under 20 to over 3,000).

Although as yet scarcely researched, personal bonds formed without physical contact.

on the Internet appear to generate solid reputations for trustworthiness⁴⁴ and all the deep commitment and even love that physical intimacy does, but often faster and over a wider set of personal relations. A recent study by psychologists at the University of Bath of online dating site members has found that when couples who had built up a significant relationship by e-mailing or chatting online met for the first time, 94 percent went on to see each other again. Moreover, “We found that men tend to be more committed to the online relationships than women, possibly because the anonymity of writing gives them a chance to express their emotions more readily than in real life.”⁴⁵ Nevertheless, the internet also provides special affordances for women, especially in Muslim society where they could not otherwise participate directly in Jihadist meetings with men. (Two suicide attacks in spring 2005 in Egypt wove together these strands of friendship, kinship and women meeting on Internet.)

The semi-anonymity of Internet communication, which lessens the compulsion to hedge and defend oneself, promotes self-disclosure and facilitates disregard of contextual differences that might otherwise distract from or hinder communication (distinct physiques and surroundings, unfamiliar expressions and gestures, strange smells or sounds, clothes, cars or smoking preferences, and so on). Especially with groups of individuals who are stigmatized in physically non-obvious ways (say, gays as opposed to the physically handicapped) such disclosure is often emotionally bare and truthful, which cements trust. In addition, the need to make verbally explicit one’s feelings and ideas favors disambiguation of messages and reaching mutual understanding and consensus.

So, a self-organized group of friends, like the would-be Madrid bomber plotters, may read an Internet text, like “Iraqi Jihad” that suggests bombing Spanish trains to force that country’s withdrawal from the U.S.-led coalition in Iraq.⁴⁶ Chatting with likeminded Jihadists on the web, the group of friends radicalizes into a Jihadist cell and—in just a few weeks—an “amateur” plot is hatched and devastatingly executed (unlike the 5 years or so it took Al Qaeda to plan and execute 9/11).⁴⁷ The fact that all of the plotters are caught or blow themselves up may have no effect on the ability of other groups to self-organize and be radicalized for attack.

A new and vibrant Jihadist “market” is emerging, which is decentralized, self-organizing and self-adjusting. How do we deal with the “virtual hand” that regulates this growing world exchange? Raw police force and military power likely will not do the trick but only generate more varied and insidious forms of the Jihadist hydra. It may take a broad and elastic web, of the diverse talent and spare conformity of our democracies, to snare the virtual hand of Jihad.

Responses from the intelligence community are also not encouraging. The CIA’s new director Porter Goss, in his inaugural appearance before Congress,⁴⁸ simply reaffirmed the misleading impression that some specific group called “Al Qaeda” is out there planning bigger and better attacks, with the inference that hammering Al Qaeda should remain the principal occupation of America’s “war on terror.” And the best that some people who advise the intelligence community seem to come up with for preventing another 9/11 or Madrid attack is to better combine “the three methodologies” that are almost guaranteed failures for anticipating catastrophic events: pattern projection, frequency, and probability.⁴⁹ Tinkering with broken pots is not the answer.

Decentralizing Responses to Terrorism: A “Paradigm Change”

A key factor in the success of any intelligence effort is the realization that strategies to defeat an enemy must change with changes in scale. It may take distributed intelligence

networks to fight globally connected networks of local terrorist cells. The very framework for formulating hypotheses and operationalizing ways to test them may require what philosopher Thomas Kuhn has called a “paradigm change” in thinking that fundamentally alters the relation between figure and ground.⁵⁰ Defense against national armies and so-called rogue states, where classical measures of deterrence and threats of massive retaliation against readily identifiable populations and infrastructure are still likely to prove effective, may have to be decoupled from defense against transnational terrorist networks, where such measures may be wholly counterproductive.

Traditionally, hierarchical forms of military and intelligence “command and control” were suitable for large-scale operations against the Taliban and Al Qaeda’s global organization, but are patently less so now (although classical means are still needed to prevent sanctuaries from reemerging). Informal bonds may need to grow among diverse experts with idiosyncratic personal skills and the operational branches fighting terrorism, so that a phone call from an expert or operator in one country to another country can trigger specific responses without plodding through official channels—much the way globally networked Jihadists now operate. This would help to convert fairly static modes of attack-response into a dynamic and evolving system of “predator–prey” relations between intelligence networks and Jihadist networks, and throw open the flow of information that would allow the intelligence and military communities’ technological advantages to keep ahead of Jihadist innovations in the arms race between the networks.

Todd Laporte of the University of California at Berkeley finds in a review of U.S. nuclear facilities the best way to ward off unexpected catastrophe is to have decentralized networks with specialized teams of technically competent people whose culture rewards them for revealing their own errors⁵¹—a practice Al Qaeda has used to great effect. This tact contrasts markedly with recommendations for further directorial control of security services. Even now there is no institutional means for intelligence case officers who may know better to challenge information once it is passed on by “the 7th floor” (the inside name for the political directorship).

General evolutionary theory teaches that many small and energetic creatures or systems—for example, bacteria or decentralized Jihadist networks—are often able to overwhelm and out compete larger and more ponderous ones—for example, whole bodies or the armies and police forces of nation-states.⁵² The allied theory of complex adaptive systems conveys a parallel lesson: if you want to solve a novel problem in an by consulting a decentralized group of problem solvers with diverse skills and expertise rather than a hierarchically organized group of like-minded experts who seek consensus, even if they are the best in the field.⁵³

R. V. Jones, the father of “scientific intelligence,” implicitly knew much of this. With the Battle of Britain in full swing and his country’s back to the wall, this junior staffer networked a hodge-podge of thinkers to deal with national survival, from actor Leslie Howard (of *Gone with the Wind* fame) to the Bletchley cryptographers, such as the unconventional mathematical wizard and sometimes biological theorist, Alan Turing, who founded computer science. They blocked the Luftwaffe to prevent the invasion of Britain (by “bending” guidance beacons so that bombs fell off target), and capped the missile menace that represented the Nazis’s last hope of survival (by focusing decryption efforts not on immediate operations but on V-1 and V-2 trails in Poland). All in all, they were enormously successful in breaking Nazi codes, anticipating attacks, and keeping one step ahead of a bewildering array of ingenious German weapons systems that were

recognized—as early as September 1944—as having the potential to take men to the moon and deliver atomic bombs from the stratosphere.

Another lesson from wartime Britain was that local citizens and responders drawn from the population under attack were more efficient than any central planners in caring for their people, preventing panic, and helping them get back on their feet. A British team of psychologists and defense analysts that recently re-examined the evidence from WWII, not only found that panic was a rare phenomenon, even during the most unexpected and horrific airplane and missile attacks, but that civilians proved more resilient than planners had predicted, largely because the planners had underestimated civilian adaptability and resourcefulness.”⁵⁴ Studies of responses to urban air raids during the Spanish Civil War⁵⁵ and among German civilians who suffered saturation bombing in WWII⁵⁶ show similar results.

One interpretation of civilian wartime resilience is that the population was being habituated to war and so had time to develop coping responses.⁵⁷ But the utterly surprising and unprepared for attacks on the World Trade Center and the Madrid commuter trains show civilian reactions to be much the same, despite no time for habituation.⁵⁸ For the most part, local citizens responded immediately and efficiently. A lesson of 9/11 was that locally aware actors are best able to respond to unexpected and varied local conditions.⁵⁹ One irony of 9/11 was that the principal facility of the New York Mayor’s Office of Emergency Management, located at 7 World Trade Center, was completely destroyed in the attack. Volunteers who came primarily from local universities began staffing a geographic information systems and mapping unit within New York City’s emergency operations center, and a motley collection of local boats spontaneously began to efficiently coordinate supply and relief efforts well before official efforts were under way. Not only was there no panic, but in the case of the World Trade Center, victims of the attack responded much better than any current response model would have predicted. They were “better than rational.” So has Al Qaeda been, and so must the intelligence community learn to be.

Old Wine in New Bottles: A Recipe for Disaster

The presidential commission on WMDs and the 9/11 commission have condemned the *status quo* mentality of the intelligence community, which they see as being preoccupied with today’s “current operations” and tactical requirements, and inattentive to tomorrow’s far-ranging problems and strategic solutions. Both commissions call for steps to improve analysis and encourage diversity, including routine critiques of finished intelligence and alternative assessments by outside experts. But the overriding emphasis in both commissions’ reports is on further vertically integrating intelligence collection, analysis, and operations.

“It won’t help matters to have a National Intelligence Director whose job is to prepare briefs to bring to the President every day or simply to coordinate intelligence products,” former Attorney General Edwin Meese recently commented; “what we could use is a facilitator to bring people and ideas together, not another operative. But it’s not clear to me that’s what’s being proposed.”⁶⁰ Indeed, given the novel and peculiar nature of the threat, what has been proposed and is currently being implemented—ever more hierarchical command and control—may be precisely the wrong way to go. *People don’t repeat history’s catastrophes just because they forget; people build self-destructive ideologies and behaviors that continue history’s catastrophic path because they may remember the past too well.*

Notes

1. *Commission on the Intelligence Capabilities of the United States Regarding Weapons of Mass Destruction*, online release 29 March 2005; available at (www.wmd.gov/report) (herein “Presidential Commission”).

2. “US intelligence ‘dead wrong’ on Iraqi weapons: panel,” *Agence France Presse*, 1 April 2005; accessed (April 1, 2005) at (<http://sg.news.yahoo.com/050331/1/3rm6p.html>).

3. *National Commission on Terrorist Attacks upon the United States*, online release 22 September 2004; available at (www.9-11commission.gov/report/index.htm) (herein “9/11 Commission”).

4. Aaron Clauset and Maxwell Young, “Scale Invariance in Global Terrorism,” *Physics and Society*, online release 3 February 2005; available at (<http://arxiv.org/abs/physics/0502014>).

5. Lars-Erik Cederman, “Modeling the Size of Wars: From Billiard Balls to Sand Piles,” *American Political Science Review* 97(203), pp. 135–150.

6. Presidential Commission, p. 37.

7. Bob Groggin and Greg Miller, “‘Cureveball’ Debacle reignites CIA Feud,” *Los Angeles Times*, 2 April 2005.

8. *Remarks to the U.N. Security Council*. Secretary Colin Powell, New York City, 5 February 2003; available at (www.state.gov/secretary/former/powell/remarks/2003/17300.htm).

9. Reginald V. Jones, *The Wizard War: British Scientific Intelligence, 1939–1945* (Cowan, McCann & Geoghegan, 1978), pp. 74, 161, 334.

10. Niccolo Machiavelli, *The Prince and the Discourses* (Random House, New York, 1950), *Discourses*, ch. 31.

11. Isaac Ben-Israël, *Philosophie du renseignement, Logique et morale de l’espionnage* (Éditions de l’éclat, Paris, 2004), and personal communication, 14 February 2005.

12. This suggests that intelligence analysts might profitably employ both “blue” and “red” teams that compete to knock out one another’s suppositions, and that teams should range far and wide (employing people with or without security clearances, working on classified and open sources, and even bringing in—unwittingly—real enemies and adversaries to work on parts of a problem).

13. Karl Popper, *Conjectures and Refutations: The Growth of Scientific Knowledge* (New York: Harper, 1968). For an interesting discussion of intelligence failures as going beyond mere induction fallacy and involving, more critically, a failure of imagination, see Isaac Ben Israel, “Philosophy and methodology of military intelligence: Correspondence with Paul Feyerabend,” *Philosophia* 28(2001), pp. 71–102.

14. Robert Axelrod, *Risk in Networked Systems*, Prepared for the Office Assistant Secretary of Defense for Networks and Information Integration, 20 October 2003, available at (www-personal.umich.edu/~axe/). It is worse than random if the other side is “mistraining” you.

15. For an unofficial but widely current view in defense and intelligence circles, see LTC Joseph Myers, “Proliferation terror: Time for a new deterrence strategy,” online release at *World Tribune.Com*, 9 March 2005; accessed at www.worldtribune.com/worldtribune/05/breaking2453439.html: “Needless to say a nuclear detonation in a major U.S. city would have incalculable far-ranging global reverberations. . . . If you are a state sponsor of terror, with or without a WMD research base; or are an avowed enemy of the U.S., and you have a public policy that espouses the hope and bent for the destruction of the U.S.; you clandestinely proliferate (buy or sell) WMD technologies outside international arrangements and inspection regimes, then you are subject to immediately being held strategically culpable should there be a catastrophic WMD event inside the U.S.”

16. According to Harvard physicist Richard Wilson, the Hiroshima and Nagasaki bombs were deliberately exploded at 500 feet to avoid radiation, so that 99 percent of the 300,000 or so casualties came directly from the bomb blasts (personal communication, 10 February 2005).

17. Richard Garwin, paper presented to 32nd Session, International Seminars on Planetary Emergencies, World Federation of Scientists, Erice, Sicily, 20 August 2004; available at (www.fas.org/rlg/040820-sani.pdf).

18. Former Defense Secretary William Perry estimates at 50 percent the probability of a catastrophic nuclear terror attack on American soil in the next 10 years, Philipp Bleek, Anders Corr, Micah Zenko, "Nuclear 9/11: What if Port is Ground Zero?" *The Houston Chronicle*, 1 May 2005.

19. See Pervez Hoodbhoy, "Can Pakistan Work? A Country in Search of Itself," *Foreign Affairs*, November/December 2004; available at (www.foreignaffairs.org/20041101fareviewessay83611/pervez-hoodbhoy/can-pakistan-work-a-country-in-search-of-itself.html).

20. Such a "gun-type" device, weighing over 500 kg, consists of four elements: a "gun" that shoots a "uranium bullet" from one end of a "rail" to a "uranium target" at the other end. Neither the bullet nor target have enough Uranium-235 to generate a chain reaction, but when slammed together a "critical mass" is achieved sufficient for a nuclear explosion. The minimum "fizzle bomb" needed to do serious damage is estimated to be about one kiloton. According to Richard Garwin, the effective distances within which (roughly speaking) all the people die and all those outside survive are shown in the following table:

Summary of ranges for significant effects (in meters).				
Yield (kt)	(a)*	(b)*	(c)*	(d)*
1	275	610	790	5500
10	590	1800	1200	9600

a* Range for 50% mortality from air blast (m)

b* Range for 50% mortality from thermal burns (m)

c* Range for 4 Gy initial nuclear radiation (m)

d* Range for 4 Gy fallout in first hour after blast (m) (downwind)

Although a country would not be destroyed by such an explosion, it could ruin itself by its reaction.

21. For a fictional portrayal—but realistic summary—of anarchist suicide bombers in 1905, see J. Conrad, *Secret Agent* (London: Penguin, 1983). Beginning in the late 1870s, a loosely connected worldwide terrorist movement arose, egalitarian in principle and dedicated to elimination of the power of the state and international capital. State reaction to anarchism played a formative role in creating national police and intelligence (FBI, Scotland Yard, Russian Okhrana; see David Rapoport, "The 4 Waves of Terror," *Anthropoetics* 8, Spring /Summer 2002). The world community of nations considered anarchism to pose the greatest threat to the internal political and economic order, and to international stability. While policies of the U.S. and European states to combat anarchism were often based on the assumption of fighting a well-organized international terrorist network, in fact there was little international or centralized terrorist planning (and in the case of U.S. President McKinley's assassination, no organized plot at all). Rather, as with current Jihadist operations, anarchist attacks were usually carried out by peer groups (mostly friends, sometimes kin) who organized themselves in operational cells of a few people. As with Jihadism, anarchist ideology and operations often parasitized pre-existing local ethnic and national aspirations and organizations, such as the Serbian "Black Hand," which plotted the assassination of Austria's Archduke Ferdinand, sparking WWI. Following WWI, Bolshevism coopted militant anarchism as a world political force—a process that culminated with Stalin undermining the anarchist role on the Republican side during the Spanish Civil War. Then, with Communism's demise, came Jihadism's rise.

22. Hoodbhoy does not restrict his concern to the former Soviet Union or to Jihadist students; "I have had the opportunity of meeting top people associated with nuclear weapons in Pakistan and India. These include retired and serving generals, air marshals, senior defence analysts, and also the current president of India. I am always struck by their blanket denial of risks, not just of an intentional or accidental use of nukes against the other but also of any kind of leakage or theft of materials. One could call this posturing, but these people have assiduously

worked to lull themselves, as well as others, into this supremely comfortable position. This is really disturbing.” [Personal communication, 10 March 2005.]

23. For earlier figures on relative spending by U.S. Departments of State and Defense, see supplementary online materials for Scott Atran, “Individual factors in suicide terrorism,” *Science* 304(2004), pp. 47–49; available at (www.sciencemag.org/cgi/content/full/304/5667/47/DC1). Currently, of the five divisions of the Department of Homeland Security, the largest is the division handling borders and interdiction, with 150,000 people, and the smallest is the one dealing with science and strategy, with 300 people, a few of which are directly concerned with understanding terrorist networks.

24. See discussion in “Epilogue” to S. Atran, *The Strategic Threat from Suicide Terrorism*, Related Publication 03-33, AEI-Brookings Joint Center for Regulatory Study, December 2003; available at (www.aei-brookings.org/admin/authorpdfs/page.php?id=311).

25. Introduction to *National Security Strategy of the United States*, White House, Washington, DC, September 2003, available at (www.whitehouse.gov/nsc/nss.html).

26. Estimates range from about 30,000 in the continuously updated *Iraq Body Count* report (www.iraqbodycount.net/database/) to well over 100,000 [see survey by Johns Hopkins University researchers Les Roberts, Riyadh Lafta, Richard Garfield, Jamal Khudhairi, Gilbert Burnham, “Mortality before and after the 2003 invasion of Iraq: Cluster sample survey,” *The Lancet* 364 (2004), pp. 1857–1864; available at (www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=15555665)

27. See Pew Global Attitudes Survey, 16 March 2004; available at (<http://people-press.org/reports/display.php3?ReportID=206>); Angela Woodall, “Global opinion: Let Europe lead the world,” *Washington Times*, 7 April 2005. Nevertheless, most people surveyed in the Muslim world express a desire for democracy, Pew Global Attitudes Survey, 3 February 2005; available at (<http://people-press.org/commentary/display.php3?AnalysisID=107>).

28. *Base Structure Report Fiscal year 2004*, U.S. Department of Defense, Washington, DC, September 2004; available at (<http://www.ciaonet.org/wps/dod33/>). This represents a net reduction of over 100 domestic bases and a net increase of over 200 foreign bases from the previous year.

29. “Over 100 nations benefit from U.S. military training, education,” online release by Lincoln Bloomfield, Assistant Secretary of State, December 2004; available at (<http://usinfo.state.gov/sa/Archive/2004/Dec/09-685591.html>).

30. “DoD Responses to Transnational Threats, Vol. 2: DSB Force Protection Panel Report to DSB,” U.S. Department of Defense, Washington, DC, December 1997, p. 8, (www.acq.osd.mil/dsb/trans2).

31. Introduction to *National Security Strategy of the United States*, White House, Washington, DC, September 2003, available at (www.whitehouse.gov/nsc/nss.html).

32. For an extreme example of convergence, compare Ayman al-Zawahiri’s *Knights Under the Prophet’s Banner* [trans. Al-Sharq Al-Awsat, London, 2 December 2001, available at (www.fas.org/irp/world/para/ayman_bk.html)] and the works of White Supremacist ideologue William Pierce: for example, *The Turner Diaries* (Washington, DC: National Alliance, 1978), which ends with the hero ploughing his jet into the Pentagon on a successful suicide mission; also Pierce’s analysis of the 9/11 attacks being carried out for the right reasons by the wrong people, *Free Speech* 7, November 2001, available at (www.natvan.com/free-speech/fs0111c.html).

33. Arguments by outsiders that militant Islam can be undermined by showing it does not reflect the religion’s “truth” or “essence” are likewise vacuous, for there is no “essence” or fixed content to *any* religion. [Scott Atran, *In Gods We Trust: The Evolutionary Landscape of Religion* [New York: Oxford Univ. Press, 2002].) Nevertheless, debates among Muslims about—for example—whether killing children is acceptable, are critical to how their religion will be interpreted and applied.

34. Marc Sageman, *Understanding Terror Networks* (Philadelphia: University of Pennsylvania Press, 2004).

35. Michael Scheuer, *Imperial Hubris: How the West is Losing the War on Terror* (Potomac Books, Dulles, VA, 2004).

36. Reuven Paz, "The First Islamist *Fatwah* on the Use of Weapons of Mass Destruction," *PRISM Special Dispatches on Global Jihad* 1(1) (May 2003); available at (www.e-prism.org).
37. Changing the "policy of the White House . . . [is] the ideal way to prevent another Manhattan," Osama Bin Laden, "Address to Americans," *Al Jazeera*, 30 October 2004. Consider also "the final piece of advice" to Americans on forestalling future disasters by Al-Qaeda deputy Ayman al-Zawahiri, *Al Jazeera*, 28 November 2004: "What matters to us is the way in which the United States behaves towards Muslims."
38. Scott Atran, "The Moral Logic and Growth of Suicide Terrorism," *Washington Quarterly* 29(2006), pp. 127-147.
39. Scott Atran, "The Emir: An Interview with Abu Bakr Ba'asyir, Alleged Leader of the Southeast Asian Jemaah Islamiyah Organization," *Jamestown Foundation Spotlight on Terrorism*, September 15, 2005, <http://jamestown.org/terrorism/news/article.php?articleid=2369782>. To be sure, instrumental cost-benefit calculations often prevail within one's own moral and cultural framework. Most would-be martyrs and Jihadist religious leaders the author interviewed, like Ba'asyir, also say that if a roadside bomb can produce the same damage (i.e., without causing the deaths of any members of the group), then it is preferable. In *Knights under the Prophet's Banner*, al-Zawahiri highlights instrumental concerns that lead to: "the need to concentrate on the method of martyrdom operations as the most successful way of inflicting damage against the opponent and the least costly to the mujahedin in terms of casualties."
40. Robert Leiken, *Bearers of Global Jihad? Immigration and National Security after 9/11*, Nixon Center Monograph, 25 March 2004, p. 6; available at (www.nixoncenter.org/publications/monographs/Leiken_Bearers_of_Global_Jihad.pdf).
41. Oliver Roy, *Globalized Islam* (New York: Columbia University Press, 2004).
42. The last successful attack by Bin Laden's Al-Qaeda organization was in Tunisia in October 2002. Websites, such as the Zarqawi-associated Global Islamic Media Front (<http://online2005.100free.com/>) that host Jihadist chat rooms and tracts (for example, "Iraqi Jihad: Hopes and Risks," which the Madrid train bombers downloaded and acted on) have become the new organizational agents that "govern" Jihadist networks. These sites increasingly control the distribution of knowledge and resources as physical agents like Bin Laden once did (and can be modeled and monitored as such). Although websites are assuming central actor, hub and bridge positions in the network, the network itself is shifting profoundly to an acephalic "leaderless resistance." See the online musings of Mustafa Setmariam Nasar (aka Abu Mus'ab al-Suri), the new global Jihad "web "star" and principal theoretician of what Marc Sageman has aptly dubbed "leaderless jihad." Al-Musri's 1600-page tract, *Da'wah lil-Muqawamah al-Islamiyyah al-'Alamiyyah (A Call for the Islamic Global Resistance*, www.fsboa.com/vw/index.php?subject=7&rec=27&tit=tit&pa=0), contains essential elements of a short 1983 treatise on "Leaderless Resistance" (<http://reactor-core.org/leaderless-resistance.html>) by Louis Beam, a former Aryan Nations and Klu Klux Klan leader. Leaderless Jihad has now looped back into the Aryan Nation's new doctrine of "Aryan Jihad" (www.aryan-nations.org/about.htm).
43. Marc Sageman, paper presented to the colloquium series, "Cultural Values and Terrorism," University of Michigan, Ann Arbor, 11 February 2005.
44. Paul Resnick and Richard Zeckhauser, "Trust among strangers in Internet interactions," in *Advances in Applied Microeconomics, Vol. 11*, edited by Michael Baye (Elsevier Science, Amsterdam, 2002), www.si.umich.edu/~presnick/papers/ebayNBER/RZNBERBodegaBay.pdf.
45. "Internet dating much more successful than thought," online press release, University of Bath; available at (www.eurekalert.org/pub_releases/2005-02/uob-idm021305.php).
46. Scott Atran, "The Jihadist Mutation," *Jamestown Terrorist Monitor* 2(2004), pp. 1-4; available at (http://www.jamestown.org/publications_details.php?volume_id=400&&issue_id=2929).
47. *Comisiones de investigación sobre el 11 de marzo de 2004*, Congreso de los Diputados, Madrid, Session 13, 19 July 2004 and Session 30, 15 November 2004; available at (www.losgenoveses.net/11M/CI_007.pdf and www.losgenoveses.net/11M/CI_017.pdf). Testimony before Spain's 11-M commission reveals failures of intelligence and imagination similar to those involved in 9/11.
48. *Global Intelligence Challenges 2005: Meeting Long-Term Challenges with a Long-Term Strategy*. Testimony of Director of Central Intelligence Porter J. Goss before the Senate Select Committee on Intelligence, Washington DC, 16 February 2005; available at (www.cia.gov/cia/public_affairs/speeches/2004/Goss_testimony_02162005.html).

49. Glen Segell, "Intelligence Methodologies Applicable to the Madrid Train Bombings, 2004," *International Journal of Intelligence and Counterintelligence* 18 (2005), pp. 221–238. The author's discussion of the respective shortcomings of the three methodologies is good, but not the combination.

50. Thomas Kuhn, *The Structure of Scientific Revolutions* (Chicago: University of Chicago Press, 1966). The notion of "paradigm change" has, of course, become hackneyed through popular misuse, but still applies here in many of its core philosophical senses.

51. Todd Laporte, paper presented to the Critical Incident Analysis Group (CIAG), University of Virginia, Charlottesville, 6 April 2004.

52. Geerat Vermeij, *Nature: An Economic History* (Princeton, NJ: Princeton University Press, 2004).

53. Lu Hong, Scott Page, "Problem solving by heterogeneous agents," *Journal of Economic Theory* 97(2001), pp. 123–163.

54. Edgar Jones, Robin Woolven, Bill Durodié, and Simon Wessely, "Civilian morale during the Second World War: Responses to air raids re-examined," *Social History of Medicine* 17(2004), pp. 463–479.

55. Emilio Moria, "Psychiatric Experience in the Spanish War," *British Medical Journal* 1(1939), pp. 1217–1220.

56. Robert Pape, *Bombing to Win: Air Power and Coercion in War* (Ithaca, NY: Cornell Univ. Press, 1996).

57. There is support for this argument in the observation that British soldiers panicked after the first German gas attack in 1915, but not after subsequent attacks.

58. Similarly, following the Chernobyl Disaster, according to physicist Richard Wilson who was in Pripjat investigating at the time, "of the 1000+ bus drivers in Kiev asked to take evacuees from Pripjat (where they had to drive through a short stretch of over 100 Rems per hour) only 3 declined" (personal communication, 27 April 2005).

59. Kathleen Tierney, "Not Again! Recycling Disaster Myths in the Aftermath of 9-11," paper presented to the Special Session of the Annual Meeting of the American Sociological Association, Chicago, 17 August 2002.

60. Edwin Meese, Remarks to the Critical Incident Analysis Group (CIAG), University of Virginia, Charlottesville, 3 April 2005; and personal communication, 6 April 2005.