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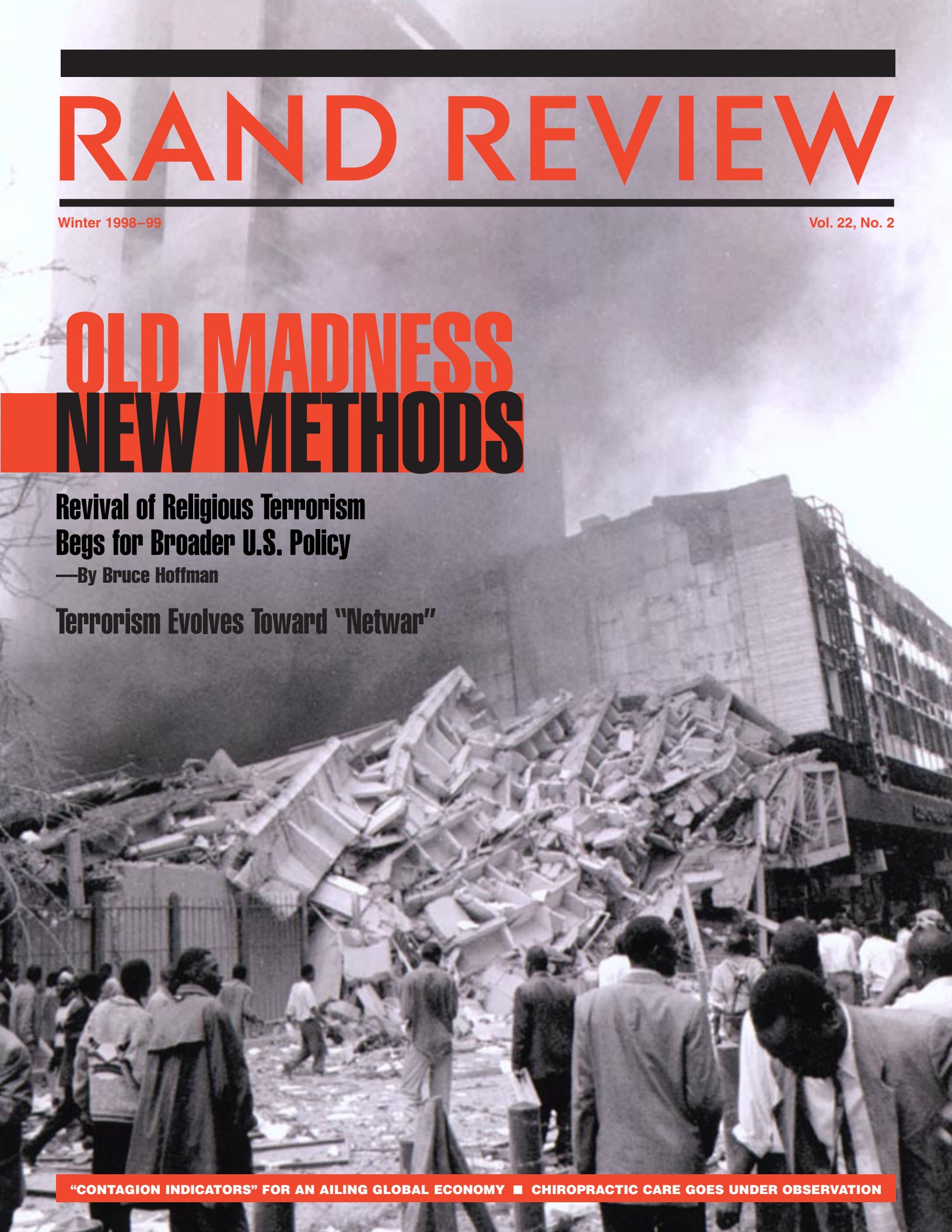
# OLD MADNESS NEW METHODS

## Revival of Religious Terrorism Begs for Broader U.S. Policy

—By Bruce Hoffman

## Terrorism Evolves Toward "Netwar"



"CONTAGION INDICATORS" FOR AN AILING GLOBAL ECONOMY ■ CHIROPRACTIC CARE GOES UNDER OBSERVATION

# Message from the Editor

Millennial madness can manifest itself in many forms.

The Book of Revelation foretells a thousand-year period of holiness during which Jesus and his followers will rule the earth for a golden age of peace, joy, prosperity, and justice. The same book of the Bible warns of the apocalypse: the imminent destruction of the world and the salvation of the righteous. We have no problem with religious prophecies. But there are those who believe it is their divine duty to foment an apocalypse of whatever scriptural persuasion and to usher in the kingdom of heaven on earth themselves.

The literal millennium—the year 2000 or, for purists, 2001—offers a once-in-an-eon opportunity to fulfill such a mystical destiny. As Bruce Hoffman explains in this issue, the rise in religious terrorism, from Japan to the Middle East to Oklahoma City, has coincided with the upcoming millennium. The rise has also coincided with the discovery by terrorists of powerful new information-age weapons with which to wage their religious wars.

Our cover story highlights how the ancient and modern forces driving terrorism today feed on each other and how we can respond to both. To counteract the religious root causes of terrorism—by definition largely impervious to military resistance—Hoffman asserts the need for national and international leadership that goes beyond military strategy. At the same time, research on information-age terrorism points to some nuts-and-bolts strategies that the U.S. military can and should pursue to reinforce the fight against terrorism.

As we went to press, the U.S. State Department and the Pentagon had issued new warnings about potential attacks in the Persian Gulf by terrorists linked to Osama bin Laden, the dissident Saudi millionaire who has issued a religious edict against the United States and attracted an estimated 5,000 adherents to his crusade from throughout the Muslim world.

It is our hope that we at RAND can help policymakers reframe the debate about how to counteract terrorism, both the home-grown and foreign varieties. Any debate that focuses on the root causes of terrorism—whether they are religious, economic, or a combination of factors—can only improve matters. The old debate doesn't seem to be getting us very far.

—John Godges

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## On the Cover

Passersby gather near the rubble of the U.S. Embassy compound in Nairobi, Kenya, after a huge explosion ripped apart several buildings, killing 257 people and injuring more than 5,000. The nearly simultaneous terrorist bombings of the U.S. embassies in Kenya and in Dar es Salaam, Tanzania, on August 18, 1998, demonstrated the use of information-age methods to support ancient religious motives. AP/WIDE WORLD PHOTOS.

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# News

## New Effort Will Evaluate California Welfare Reform

California's Department of Social Services has awarded a four-year, $6.4-million contract to RAND's Labor and Population Program to evaluate the state's welfare reform initiative, called California Work Opportunity and Responsibility to Kids, or CalWORKs.

CalWORKs is a "work-first" program of support services intended to move welfare recipients toward work and self-sufficiency. CalWORKs replaces both the federal Aid to Families with Dependent Children (AFDC) program in California and the statewide Greater Avenues to Independence (GAIN) program and gives counties greater flexibility to design their welfare reform efforts.

The RAND evaluation will analyze the effects of CalWORKs on the welfare system, on former welfare recipients, and on children and families. In more formal terms, the evaluation will include both a process analysis and an impact analysis.

The process analysis will evaluate the implementation of the program at the levels of the state government, county agencies, and local welfare offices. Researchers will evaluate government planning, agency coordination, budget allocations, and case flows of welfare recipients through welfare offices.

The impact analysis will study the outcomes of CalWORKs participants in terms of employment, earnings, schooling, and family well-being. The analysis will compare these outcomes under CalWORKs to what they might have been if AFDC had been kept in place. Researchers will also compare the outcomes of CalWORKs programs across various counties and the organizational outcomes at the state and county levels.

RAND will distribute the evaluation results regularly, starting with the public release of the first process analysis report in February 1999 and ending with the final impact analysis report in October 2001. Results will be available on the Internet at http://www.rand.org/CalWORKs/.

## Letter to the Editor

The first issue of the *RAND Review* as the successor of the *RAND Research Review* commemorated 50 years of the corporation's activities in a variety of fields. Having been closely associated with RAND's research and projects in the politico-military field, particularly when I served with NATO in the 1960s and as ambassador to the United Nations in the 1980s, I cannot let RAND's 50th Anniversary pass without expressing my admiration for its multiple achievements.

The close links between my own government and RAND in the fields of water control, communications, and others are an additional source of satisfaction. Although by now removed from the circle of decisionmakers, I do wish to assure you that this continued cooperation is as welcome as the efforts concerning less peaceful phenomena were in the past.

***Frans van Dongen***
*Former Ambassador of the Netherlands*

## The Arts: Who Participates—And Why?

The Lila Wallace–Reader's Digest Fund has commissioned RAND to evaluate the foundation's activities aimed at building participation in the arts.

The researchers will develop a "logic model" to understand how arts programs, arts organizations, artists, community organizations, and community contexts all can encourage or discourage individual decisions to engage in the arts. The researchers will then use the model to evaluate participation-building strategies.

The two-year, $710,000 evaluation will include a literature review, expert interviews, site visits, and a telephone survey.

## RAND Acquires Environmental Firm

RAND has acquired Science & Policy Associates, an environmental research company with offices in Washington, D.C., and Boulder, Colorado. The company's staff of six researchers now form the core of the new Environmental Science and Policy Center at RAND.

Since it was founded in 1985, Science & Policy Associates has developed a handbook for states and American Indian tribes on how to conduct ecological assessments, determined the safest replacements for ozone-depleting chlorofluorocarbons, analyzed the effects of different emission-reduction strategies on air quality and visibility, developed a claims process for natural resource damage caused by oil spills, and managed a global database on greenhouse gas emissions.

The company's clients have included the U.S. Environmental Protection Agency, U.S. Department of Energy, U.S. Coast Guard, U.S. Forest Service, NASA, the Western Governors Association, the Chemical Manufacturers Association, Exxon, the Edison Electric Institute, the Electric Power Research Institute, and agencies in Great Britain and the Netherlands.

The acquisition will "enable RAND to address a new class of increasingly important policy issues and take advantage of growing opportunities in the public and private sectors, both in the United States and overseas," said RAND President and Chief Executive Officer James Thomson.

Chris Bernabo, founder and former president of Science & Policy Associates, directs the new center at RAND.

## Pharmaceutical Group Aids Research on Elderly Care

Pfizer U.S. Pharmaceuticals and RAND recently began to collaborate on a three-year, $5-million study to measure and improve the quality of health care provided to elderly Americans.

The project focuses on the vulnerable elderly—those at high risk for loss of independent functioning or death because of chronic illnesses and impairments. Members of this rapidly growing group face serious declines in health if their medical care is poor. But current evaluation tools cannot measure the quality of that care—and so cannot be used to hold health care providers accountable or to improve care.

The research team—led by physicians from RAND, UCLA, and nearby Veterans Affairs Medical Centers—will develop new measurement tools and quality-of-care indicators for 21 medical conditions common among the elderly, such as congestive heart failure, stroke, and depression.

The team will select about 600 elderly patients, collect data on the care they had received for those medical conditions, and interview the patients regarding their preferred care. The sample of patients will be drawn from members of managed care plans and from residents in nursing homes.

"This initiative complements the focus of our extensive research and development programs—namely, to bring better medicines and care to patients as rapidly as possible," said Joseph Feczko, senior vice president for medical and regulatory operations at Pfizer Pharmaceuticals Group.

## Report on Aircraft Carriers Launches Future Savings

A recent RAND report, *The U.S. Aircraft Carrier Industrial Base* (RAND/MR-948-NAVY/OSD), already is helping the U.S. Navy generate huge savings by adjusting the production schedule for its next aircraft carrier, CVN 77.

The study team, led by John Birkler, found that hundreds of millions of dollars could be saved if fabrication of the next carrier begins in 2001, a year ahead of schedule, but is stretched out an extra year. The study also showed how ordering equipment from contractors in advance of shipyard construction could save tens of millions of dollars more.

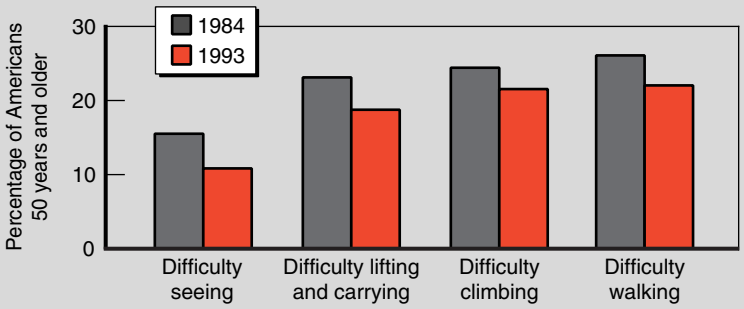
Finally, the study urged a major investment in research and development to find further ways to reduce the costs of construction, of operations and maintenance, and of staffing of these ships.

The navy has accepted the recommendations, which are reflected in this fiscal year's defense authorization bill.

## Functioning of Older Americans Improves

Yes, we're living longer, but are we living better? A new RAND study has some heartening news: The proportion of older Americans who

**FUNCTIONAL LIMITATIONS AMONG AMERICANS 50 YEARS AND OLDER**




SOURCE: Vicki A. Freedman and Linda G. Martin, "Understanding Trends in Functional Limitations Among Older Americans," *American Journal of Public Health*, Vol. 88, No. 19, 1998. Also available as RAND RP-732.

can perform the simple tasks of everyday life has risen significantly.

Analyzing trends from 1984 to 1993 in functional limitations among people 50 years and older, the study found overall declines in the percentage of people who have difficulty with each of these tasks: seeing newsprint (from 15.3 to 11.6 percent); lifting and carrying a 10-pound weight, such as a bag of groceries (from 23.5 to 18.9 percent); climbing a flight of stairs without resting (from 24.5 to 22 percent); and walking a quarter mile, about three city blocks (from 25.8 to 22.3 percent).

The extent of improvement varied by age group, however, with the smallest improvement occurring among 50-to-64-year-olds and the largest among those 80 and over. There were improvements across most groups, but the rate of functional limitations remained highest among women, the oldest, the unmarried, Hispanics, the least educated, and those without liquid assets. Blacks were more likely to report difficulties than whites.

The researchers, Vicki Freedman and Linda Martin, cautioned that their findings do not imply reductions in the absolute number of people with limitations. "Given the continuing growth in the older population, planning for the needs of this population remains a challenge." However, if the trends continue, "relatively fewer older people will need medical care and support services . . . and more should be able to work and live independently."

The conclusions of the research first appeared in the October 1998 issue of the *American Journal of Public Health*. The research is also available as RAND/RP-732.

## Defense Industry Mergers Could Jeopardize U.S. Edge

Further aerospace industry mergers could compromise the nation's ability to develop and produce the world's most advanced weapons systems, according to a new RAND book, *The Cutting Edge: A Half Century of U.S. Fighter Aircraft R&D* (RAND/MR-939-AF).

The authors, Mark Lorell and Hugh Levaux, link technological innovation and leadership to the size and character of the aerospace industry. They cite three key factors behind the past success of fighter aircraft programs: fierce competition among three or more prime contractors, decades of continuous experience within each of those firms, and government-supported research both in the industry and at government laboratories.

"History suggests that the most important outcome of intense competition among contractors has been unparalleled innovation, particularly by the second-rank contractors trying to replace industry leaders," said Lorell, a military historian. "Now there are no second-rank prime contractors; they have all ceased to exist.

"Today we're effectively down to two prime firms—Lockheed Martin and Boeing—and they have already divided up much of the market in many significant areas. Does sufficient competition remain? Probably, but mergers have now gone far enough."

One key cause of defense industry downsizing, the authors note, is the decline in defense procurement spending and the increasingly long gaps between major research and development programs. The authors propose various strategies to maintain experience and military-industrial cooperation under these conditions: competitive prototype and technology-demonstration programs, further acquisition reform, and selective exploitation of the commercial industrial base. ■

# Open Your Market And Say "Ahh"

## "Contagion Indicators" for an Ailing Global Economy

As the Asian economic collapse of 1997 sent shivers through world markets throughout 1998, threatening even the vigorous U.S. economy, financial experts blamed corrupt governments, unregulated banking systems, fickle investors, and the International Monetary Fund. The turmoil also led the world's financial elite to debate the need for capital controls in an age when global capital flows evidently can wreak havoc on national economies.

Few experts, however, have said much about how to diagnose and predict—and thus possibly prevent—recurrences of the type of financial contagion that has plagued the world in the past two years. Traditional economic indicators of national health reveal little about how the fluid exchange of capital across porous national borders can infect just about every country with contagion from the outside.

**Traditional economic indicators of national health reveal little about how the fluid exchange of capital across porous national borders can infect countries with contagion from the outside.**

Before the Asian crisis unfolded, however, a team of RAND researchers had set out to explore why some markets appear vulnerable to contagion while others do not. In *Financial Crises and Contagion in Emerging Market Countries*, authors Julia Lowell, C. Richard Neu, and Daochi Tong develop four "models of contagion," each with its own set of "contagion indicators" and associated prevention policies. The authors then apply their models to recent crises to demonstrate how to help fend off future disasters.

There are at least three reasons why the United States wants to predict and prevent financial contagion. First, some of the most important trade and investment partners of the United States are emerging market countries, and financial turbulence in these countries directly affects U.S. economic interests. Second, widespread failures of emerging financial markets jeopardize efforts to deregulate them and open them to foreign investors, including U.S. investors. Third, the United States wants to avoid costly bailouts of crisis-stricken nations.

### Diagnosing Contagion

When financial crises occur in several countries simultaneously, there are three possible explanations: (1) a coincidence of unrelated events in separate countries, (2) a common shock to economies across countries, and (3) a contagion that spreads from one country to another. These explanations are not mutually exclusive; a financial crisis can have elements of all three. But to the extent that concurrent financial crises are coincidental—or internally generated—they can often be predicted and prevented with the help of traditional economic signals, such as national rates of inflation, interest, unemployment, and growth. To the extent that crises are contagious—or externally generated—these traditional national signals may signal very little. In fact, "financial contagion" is defined as "the loss of confidence in local financial assets due to an external financial collapse."

The RAND authors identified eleven episodes from January 1989 to August 1997 in which stock markets crashed or currencies came under severe pressure

in four or more countries nearly simultaneously. Of those eleven episodes, six appeared to be purely coincidental. Two appeared to result from a common shock, specifically the Tiananmen Square episode of June 1989 and the onset of the Gulf War in August 1990. For the remaining three episodes—the financial turmoil surrounding the U.S. stock market crash of October 1989, the Mexican peso crisis of December 1994, and the Thai baht crisis of July 1997—a statistical analysis suggested that they were indeed contagious.

Following the 1989 U.S. stock market crash, loss of investor confidence spread to world and regional financial centers as well as to some developing markets, such as those in Malaysia and Turkey. The 1994–95 Mexican peso crisis spurred the collapse of stock and currency markets in Latin America and sent fears through Asia and the financial centers. And as early as August 1997, the Thai baht crisis already had triggered widespread damage on the stock and currency markets of Indonesia, Malaysia, and the Philippines as well as in some financial centers.

Neither the statistical analyses nor traditional economic indicators, however, could explain why some countries were vulnerable to these crises while others were not. Traditional indicators for Asia, for example, had changed very little between 1994 and 1996; yet Asian countries were far more deeply affected by the fall of the Thai baht in 1997 than by the fall of the Mexican peso in 1994. According to 10 standard indicators—including gross domestic product growth, export growth, money supply growth, unemployment, inflation, real exchange rate appreciation, international reserves position, and percentage of nonperforming loans—there was no consistent pattern of economic or financial deterioration for Southeast Asian countries other than Thailand during the three years prior to the baht's collapse. In fact, many of the 1996 indicators for Indonesia, Malaysia, and the Philippines suggested economies that were still booming. Yet the financial markets of these three countries suffered severely when the baht was officially devalued in July 1997.

## Tracking Contagion

To help explain the apparently capricious behavior of the emerging global economy, the RAND researchers devised four models—or theories—of contagion, each with its own contagion vulnerability indicators.

In the first model, the "economic linkages" model, a financial crisis in one country spreads to other countries with which it has strong trade and investment links. The second model, "heightened awareness," suggests that investors with incomplete information may project the problems of one country onto other countries with similar national indicators, or economic "fundamentals"; this suspicion by association prompts investors to flee the suspect countries in addition to the problem country. In the "portfolio adjustment" model, portfolio managers respond to a crisis in one country by selling off assets not only in that country but also in other countries that happen to be grouped in the same investment portfolio as the problem country. Finally, the "herd behavior" model, which may be the most widely accepted view of contagion, contends that investors abandon investments largely because of what they think other investors are doing.

These four models offer different prospects for predicting and preventing contagion. Crises spread by economic linkages can most likely be predicted once the first country founders, because trade patterns are well-known and rather slow to change. However, there may be little that susceptible countries can do to blunt the impact from this kind of contagion, other than making rapid policy adjustments, such as contracting their money supplies or tightening restrictions on bank lending. Crises spread by incomplete information are more difficult to predict, but unwarranted suspicions might be prevented by better reporting and analysis of data. Portfolio adjustment crises are fairly predictable as long as managers consistently group countries according to geographic regions and as long as portfolios remain the same over time; however, preventing portfolio contagion requires the opposite—that is, portfolio diversification—which would complicate prediction. Finally, it might be impossible to predict herd behavior or "panic," even among "sophisticated" investors, and so the only defense against herd behavior might be capital controls to prevent large and undesirable capital movements (see Table 1).

The contagion indicators follow from the predictive capabilities of the models. For the "economic

**Table 1**
**Four Models of Financial Contagion and Their Prospects for Prediction and Prevention**

| Transmission Mechanisms for Contagious Crises | Predictability Downstream | Preventability Downstream | Prevention Policies |
|---|---|---|---|
| **Economic Linkages Model** Crisis in first country affects fundamentals of other countries | Good | Poor | Rapid adjustments to relevant macroeconomic policies |
| **Heightened Awareness Model** Crisis in first country reveals possibly poor fundamentals in other countries | Fair | Good | Improved reporting and analysis of economic data |
| **Portfolio Adjustment Model** Crisis in first country forces technical realignment of investor portfolios | Good | Poor | Portfolio diversification or removal of institutional credit constraints |
| **Herd Behavior Model** Crisis in first country induces herd behavior by investors | Poor | Fair | Capital controls to prevent large capital movements |

linkages" model, there are two indicators: strong trade and investment links with the country experiencing a crisis, and heavy trade competition with the country in crisis. For the "heightened awareness" model, there are three indicators: economic fundamentals similar to the country in crisis, potential financial or political scandals, and poor or incomplete economic data or analysis available to investors. There are two contagion indicators for the "portfolio adjustment" model: consistent membership in portfolios that also contain the country in crisis; and capital inflows that are highly leveraged, or originally borrowed from somewhere else, which makes the investors highly fearful of low returns and thus quick to pull any insecure investments. The "herd behavior" model has two possible warning indicators: dramatic capital inflows in the past, and domination of the market by less-sophisticated small retail investors and by mutual funds. Table 2 outlines these indicators and their applicability to stock market crashes and currency devaluations.

## Confronting Contagion

To determine the predictive power of the models, the authors tested them against three recent, real-world financial crises:

- The Argentine crisis after the 1994 devaluation of the Mexican peso.
- The South African currency crisis of 1996, which did not spread to other countries.
- Turbulence throughout Southeast Asia after the 1997 devaluation of the Thai baht.

In Argentina, the "economic linkages" model did not apply. The other three models of contagion, however, did: The crisis in Mexico may have focused attention on financial problems in Argentina, especially on its unhealthy banking system; Argentina probably suffered from the disadvantage of being grouped with Mexico in regional investment portfolios; and by 1993, Argentina had attracted many retail investors who may have dumped Argentine assets at the first sign of trouble anywhere in Latin America.

In contrast, South Africa in 1996 was a true "loner" country, both as a result of its geographical isolation from other developed markets and because of its former status as an international political pariah. For those reasons, according to the contagion models, the currency crisis in South Africa remained isolated. With no strong economic or financial ties to other countries, with a unique recent economic and political history, with no involvement in regional investment portfolios, and with limited attraction for retail investors, South Africa's crisis passed almost unnoticed by investors and other emerging markets.

**Table 2**
**Each Contagion Model Offers New Indicators of Financial Vulnerability**

| Contagion Models and Their Indicators | Applicable to Stock Crises | Applicable to Currency Crises |
|---|---|---|
| **Economic Linkages Model** | | |
| • Strong economic links to country experiencing crisis | ✔ | ✔ |
| • Highly competitive with country experiencing crisis | ✔ | ✔ |
| **Heightened Awareness Model** | | |
| • Similar fundamentals to country experiencing crisis | | ✔ |
| • Financial or political skeletons in the closet | ✔ | ✔ |
| • Poor or incomplete economic data or analysis available to investors | ✔ | ✔ |
| **Portfolio Adjustment Model** | | |
| • Consistently member of portfolios containing crisis country | | ✔ |
| • Capital inflows highly leveraged | | ✔ |
| **Herd Behavior Model** | | |
| • Market experienced dramatic capital inflow in past | ✔ | ✔ |
| • Market dominated by retail investors and mutual funds | ✔ | ✔ |

Most worrisome of all, the contagion of Southeast Asia has continued to spread across oceans and markets. This case provides perhaps the clearest example of the failure of traditional indicators, because all four contagion indicators were relevant at the outset: strong economic linkages within Southeast Asia; similar economic fundamentals, including poor export performance and a large share of nonperforming loans in banking and real estate; common membership in regional investment portfolios; and the potential for being deserted just as quickly as they had been embraced by fickle investors.

In Southeast Asia, industries such as semiconductors and textiles are highly concentrated, and firms there tend to see each other as prime competitors. Investors may well have worried that firms based in Indonesia, Malaysia, and the Philippines could no longer compete against Thai firms after the devaluation of the baht. Financial connections within the region are also strong: For example, Singapore banks with extensive loans in Thailand and Malaysia immediately felt the impact of the collapse. Other Southeast Asian countries also shared Thailand's problems in real estate and banking, which could have prodded investors to worry that additional bank scandals lurked in nearby closets. At the same time, Southeast Asian countries are heavily grouped in regional investment portfolios. Finally, Southeast Asia was the darling of international investors throughout the early 1990s, many of whom were small-scale retail investors. Such sudden, huge, short-term capital inflows are highly vulnerable to changes in investor sentiment—changes probably triggered by events in Thailand.

Externally generated crises very well might be beyond the power of individual governments to prevent, especially when the crises involve multiple kinds of contagion, as in Southeast Asia. Nonetheless, the RAND researchers contend, it is possible to predict the ways that contagions will spread, given better indicators. And if better warning signals can be developed, then national leaders might, at the very least, have a better idea whether their markets are vulnerable to contagion and what might be done to inoculate their economies. ■

## Related Reading

*Financial Crises and Contagion in Emerging Market Countries*, Julia Lowell, C. Richard Neu, Daochi Tong, RAND/MR-962, 1998, 62 pp., ISBN 0-8330-2611-9, $10.00.

*The APEC Model of International Economic Cooperation: Assessing Its Value to the United States*, Julia Lowell, RAND/P-8028, 1998, 23 pp., $5.00.

*U.S. Economic Unilateralism: Implications for Pacific Rim Countries*, Julia Lowell, RAND/P-8029, 1998, 27 pp., $5.00.

# Who's Got Your Back?

## Quality of Chiropractic Care Goes Under Observation

When you've got a real pain in the back, who do you call? Some people visit internists, neurologists, orthopedists, osteopaths, or physical therapists. Other people contact their chiropractors—those alternative-medicine practitioners often frowned upon by some medical professionals.

Meanwhile, recent U.S. medical guidelines (published in 1994 by the Agency for Health Care Policy and Research) recommend spinal manipulation for some patients with low back pain. That recommendation increases the likelihood that physicians will refer more people to chiropractors, who already provide most of the manipulative therapy delivered in the United States. Yet the issue remains: Concerns have been raised for years about the appropriateness of chiropractic care, and the absence of data on the quality of care has made it difficult for many physicians and patients to place confidence in chiropractors.

For that reason, a RAND research team, led by Paul Shekelle and Ian Coulter, set out to determine the appropriateness of decisions by chiropractors to use spinal manipulation to treat low back pain. Based on a review of chiropractic office records from six sites across the United States and Canada, combined with ratings from a panel of back experts and reinforced with a literature review, the research produced somewhat encouraging results.

**Decisions to use spinal manipulation were deemed appropriate 46 percent of the time, a proportion similar to conventional medical procedures.**

Chiropractic decisions to use spinal manipulation were deemed appropriate 46 percent of the time, a proportion similar to conventional medical procedures studied previously. Spinal manipulation was judged inappropriate for 29 percent of those who received the treatment, a proportion the researchers say should be reduced. For the remaining 25 percent of the cases, the appropriateness of the treatment was uncertain.

"The message of our new study is a mixed one," said Shekelle. "First, everybody needs to stop treating chiropractors as if they are quacks. An appropriateness rate of roughly half is in the same ballpark as the findings [reached] for certain medical procedures when appropriateness measures were introduced a dozen years ago. Chiropractors are appropriately treating some patients, and those patients are likely to benefit as a result of their care.

"At the same time, chiropractors need to recognize that one of the missions of a health profession is to pursue and incorporate research on quality. Clearly, a 29 percent inappropriateness rate is too high."

### Scratching the Back Records

As detailed in the July 1, 1998, issue of *Annals of Internal Medicine*, the research team surveyed 131 chiropractic offices in Miami, Fla.; Minneapolis-St. Paul; San Diego; Portland, Ore.; Vancouver, Wash.; and Toronto. At each office, the team randomly selected the records of 10 patients who had sought care for low back pain. Of the total of 1,310 patients, fully 83 percent—or 1,088—underwent spinal manipulation, with the records for 859 of them sufficient to determine the appropriateness of treatment. The researchers developed an abstraction system to collect data on more than 70 clinical variables in the records. Senior chiropractic students or recent graduates collected the data.

To complete the process, the panel of nine experts—three chiropractors, two orthopedic spine

surgeons, one osteopathic spine surgeon, one neurologist, one internist, and one family practitioner—rated each treatment decision either as appropriate, inappropriate, or uncertain. "Appropriate" meant the expected benefits of the spinal manipulation exceeded the expected risks by a margin sufficiently wide enough to justify the treatment.

Most decisions rated as appropriate corresponded to diagnoses of acute low back pain—or pain lasting less than three months—with no neurologic findings and no sciatic nerve irritation. Few decisions were rated as appropriate for patients with subacute low back pain—or pain lasting between three and six months. And no decisions were rated as appropriate for patients with chronic low back pain—or pain of longer than six months (see table).

**Appropriateness of Delivery of Spinal Manipulation, by Duration of Low Back Pain**

| Appropriateness | Acute Pain | Subacute Pain | Chronic Pain |
|---|---|---|---|
| Appropriate | 357 (75%) | 39 (31%) | 0 |
| Uncertain | 45 (9%) | 52 (42%) | 114 (44%) |
| Inappropriate | 73 (15%) | 34 (27%) | 145 (56%) |
| Total | 475 | 125 | 259 |

**SOURCE: "Congruence Between Decisions to Initiate Chiropractic Spinal Manipulation for Low Back Pain and Appropriateness Criteria in North America," *Annals of Internal Medicine*, Vol. 129, July 1,1998, pp. 9–17. Also available at http://www.rand.org/organization/health/healthpubnav.html/.**

## Implications for Doctors, Patients

Although the results provide some reassurance to those concerned about chiropractic care, the researchers say the results probably underestimate the number of inappropriate spinal manipulations. The judgment of appropriateness applies only to the decision to initiate treatment and says nothing about its frequency or duration. Most patients receive several manipulations for low back pain. It is likely that all subsequent manipulations given to a patient whose initial treatment is inappropriate are also inappropriate. And even when the initial treatment is appropriate, it is difficult to determine when treatment should cease.

Moreover, the research team had no information about the actual outcomes of the patients whose care was rated. This study did not measure the efficacy of spinal manipulation. Rather, the appropriateness criteria were developed on the basis of expected outcomes for average patients with certain clinical conditions; actual outcomes for individual patients may differ from expected outcomes for average patients.

Finally, the study assumes that office records are valid sources of information upon which to judge the appropriateness of care. There are reasons to question this assumption: The office records may have been incomplete, the clinician may not have recorded all the relevant information, and the data collectors may have made errors. Nonetheless, the researchers believe that errors of these kinds are likely to have been small.

Despite these limitations, the study has various clinical implications. For example, patients with low back pain might be seeing internists and chiropractors concurrently, but not all of this care is uniformly appropriate. Patients with subacute and chronic low back pain, especially with related complications, should be informed that spinal manipulation most likely is inappropriate for them. Conversely, for patients with only acute low back pain and no related complications, internists should offer spinal manipulation as an appropriate therapeutic option; often, referral to a chiropractor is the most practical way to provide this option. Another implication of the study is that the use of so-called alternative therapies can be evaluated with methods as rigorous as those used to evaluate standard medical practices.

The study was funded by the Foundation for Chiropractic Education and Research, the Consortium for Chiropractic Research, and the Chiropractic Spinal Research Foundation. However, RAND retained complete control over the design and conduct of the study and the reporting of the results. ■

### Related Reading

"Congruence Between Decisions to Initiate Chiropractic Spinal Manipulation for Low Back Pain and Appropriateness Criteria in North America," *Annals of Internal Medicine*, Vol. 129, No. 1, July 1, 1998, pp. 9-17, Paul G. Shekelle, Ian Coulter, Eric L. Hurwitz, Barbara Genovese, Alan H. Adams, Silvano A. Mior, Robert H. Brook.

# OLD MADNESS NEW METHODS

## Revival of Religious Terrorism Begs for Broader U.S. Policy

**By Bruce Hoffman**

*One of the world's leading experts on terrorism, Bruce Hoffman has rejoined RAND as director of the Washington, D.C., office after four years at the University of St. Andrews in Scotland, where he served as chairman of the Department of International Relations and director of the Centre for the Study of Terrorism and Political Violence. His latest book,* Inside Terrorism, *was published by Columbia University Press in 1998.*

**"I acted alone and on orders from God,"** said Yigal Amir, the young Jewish extremist who assassinated Israeli Prime Minister Yitzhak Rabin in November 1995. "I have no regrets." Amir's words could have been uttered just as easily today by Islamic Hamas suicide bombers of buses and public gathering places in Israel; by Muslim Algerian terrorists who have targeted France with a campaign of indiscriminate bombings; by Japanese followers of Shoko Asahara, whose Aum Shinrikyo sect perpetrated the March 1995 nerve gas attack on a Tokyo subway in hopes of hastening a new millennium; by members of the American Christian Patriot movement, who bombed the Alfred P. Murrah Federal Office Building in Oklahoma City a month later; or by Arab Afghans linked to Osama bin Laden, the alleged Saudi mastermind behind the August 1998 bombings of U.S. embassies in Kenya and Tanzania.

**The emergence of religion as a driving force behind the increasing lethality of international terrorism shatters some of our most basic assumptions about terrorists.**

Indeed, the religious imperative for terrorism is the most important defining characteristic of terrorist activity today. The revolution that transformed Iran into an Islamic republic in 1979 played a crucial role in the modern advent of religious terrorism, but it has not been confined to Iran, to the Middle East, or to Islam. Since the 1980s, this resurgence has involved elements of all the world's major religions as well as some smaller sects or cults.

The characteristics, justifications, and mind-sets of religious and quasi-religious terrorists suggest that they will be much more likely than their secular counterparts to use weapons of mass destruction—that is, nuclear, biological, or chemical weapons. Four incidents in particular—the Tokyo nerve gas attack, the Oklahoma City bombing, the 1993 bombing of New York City's World Trade Center, and the 1998 attack on U.S. embassies in Africa—indicate that terrorism may be entering a period of increased violence and bloodshed. The connecting thread linking these four otherwise unrelated incidents is religion.

The emergence of religion as a driving force behind the increasing lethality of international terrorism shatters some of our most basic assumptions about terrorists. In the past, most analysts tended to discount the possibility of mass killing involving chemical, biological, radiological, or nuclear terrorism. Few terrorists, it was argued, knew anything about the technical intricacies of either developing or dispersing such weapons. Political, moral, and practical considerations also were perceived as important restraints. Terrorists,

we assured ourselves, wanted more people watching than dead. We believed that terrorists had little interest in, and still less to gain from, killing wantonly and indiscriminately.

The compelling new motives of the religious terrorist, however, coupled with increased access to critical information and to key components of weapons of mass destruction, render conventional wisdom dangerously anachronistic. And while it is true that the increasingly virulent threats posed by religious terrorists require increasingly superior military responses and deterrent measures, the ultimate solutions lie far beyond military strategy alone. Driven by value systems and worldviews that are radically different from those of secular terrorists and that are largely impervious to military counterattacks, religious terrorism demands vastly revised national and international diplomatic and cultural strategies that aim to strike at its root causes.

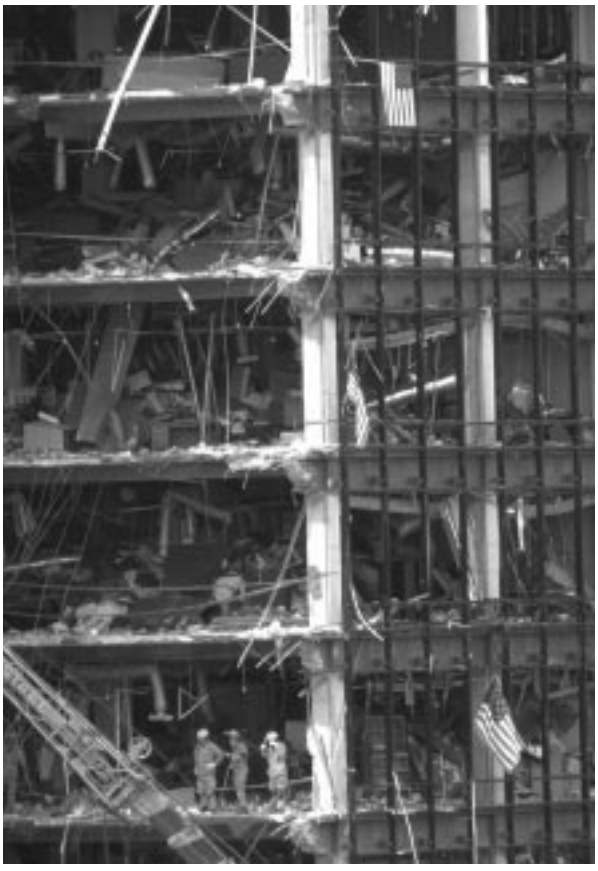
## Resurgence of Religious Terrorism

The connection between religion and terrorism is not new. In fact, some of the English words we use to describe terrorists and their acts today are derived from the names of Jewish, Muslim, and Hindu religious groups active centuries ago. The etymology of "zealot," for example, can be traced back to a millenarian Jewish sect that fought against the Roman occupation of what is now Israel between 66 and 73 A.D. The Zealots waged a ruthless campaign of both individual assassination and wholesale slaughter. Similarly, the word "assassin" is derived from a radical offshoot of the Muslim Shi'a who, between 1090 and 1272 A.D., fought the Christian crusaders attempting to conquer present-day Syria and Iran. The assassin, literally "hashish-eater," would ritualistically imbibe hashish before committing murder, an act regarded as a sacramental or divine duty designed to hasten the new millennium. Finally, the appellation "thug" comes from an Indian religious association of professional robbers and murderers who, from the seventh century until their suppression in the mid-19th century, ritually strangled wayward travelers as sacrificial offerings to Kali, the Hindu goddess of terror and destruction. Until the 19th century, religion provided the only justification for terrorism.

Only in the past century has religious terrorism tended to be overshadowed by ethnonationalist/separatist and ideologically motivated terrorism. These categories include the anticolonial, nationalist

CORBIS/ELDAD RAFAELI

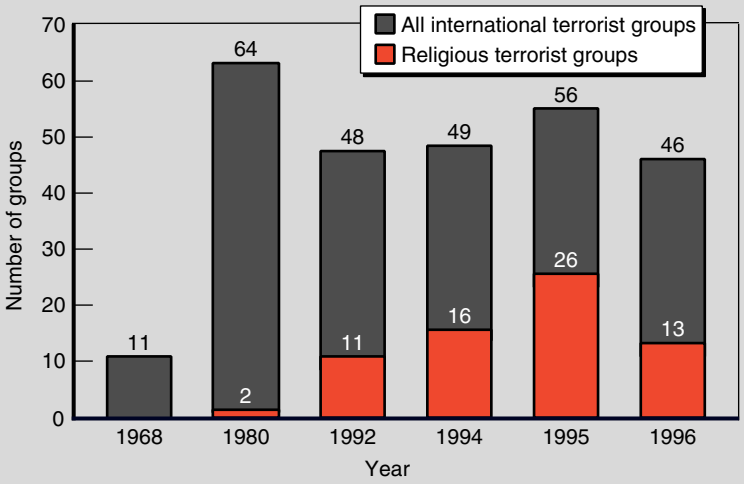
*Mourners gather to honor former Israeli Prime Minister Yitzhak Rabin on the day after his assassination by a Jewish religious extremist on November 5, 1995.*



PICTUREQUEST PHOTO

*Recovery workers pitch American flags to consecrate the floors of Oklahoma City's Alfred P. Murrah Federal Office Building, bombed on April 19, 1995, by individuals associated with the American Christian Patriot movement.*

**RELIGIOUS INTERNATIONAL TERRORIST GROUPS ON THE RISE**




SOURCE: The RAND-St. Andrews Chronology of International Terrorism is a computerized database of international terrorist incidents that have occurred worldwide from 1968 to the present. The chronology has been continuously maintained since 1972, first by RAND and since 1994 by the Centre for the Study of Terrorism and Political Violence at the University of St. Andrews, Scotland.

movements of Jewish terrorist organizations in pre-independence Israel; the Muslim-dominated National Liberation Front in Algeria; the overwhelmingly Catholic Irish Republican Army; their Protestant counterparts, such as the Ulster Freedom Fighters, Ulster Volunteer Force, and Red Hand Commandos; and the predominantly Muslim Palestine Liberation Organization. Although these groups evidence a strong religious component, it is the political, not the religious, aspect of their motivation that is dominant. The preeminence of their ethnonationalist or irredentist goals is incontestable.

In fact, *none* of the identifiable international terrorist groups active in 1968 could be classified as religious—that is, having aims and motivations of a predominantly religious nature. Perhaps this is only to be expected at the height of the cold war, when the majority of terrorist groups were left-wing, revolutionary Marxist-Leninist ideological organizations and the remainder were ethnonationalist/separatist groups typical of the postcolonial liberation movements of the late 1960s and early 1970s. Not until 1980—as a result of the repercussions of the 1979 revolution in Iran—do the first "modern" religious terrorist groups appear. For these groups, the religious motive is paramount.

By 1992, the number of religious terrorist groups had increased exponentially (from 2 to 11) and expanded to embrace major world religions other than Islam as well as obscure sects and cults. During the 1990s, the proportion of religious terrorist groups among all active international terrorist organizations grew appreciably. In 1994, 16—nearly a third—of the 49 identifiable organizations could be classified as religious; in 1995, their number grew yet again, to 26—nearly half—of the 56 organizations identified. In 1996, the most recent year for which complete statistics are available, only 13 of 46 identifiable groups had a dominant religious component (see figure). Nevertheless, religion remained a major force behind terrorism's rising lethality. Groups driven in part or in whole by a salient religious or theological motive committed 10 of the 13 most lethal terrorist acts of 1996.

It is perhaps not surprising that religion should become a far more popular motivation for terrorism in the post–cold war era as old ideologies lie discredited by the collapse of the Soviet Union and communist ideology, while the promise of munificent benefits from the liberal-democratic, capitalist state—apparently triumphant at what author Francis Fukuyama has termed the "end of history"—fails to materialize in many countries throughout the world.

Finally, it must be contemplated that we may be on the cusp of a new and potentially more dangerous era of terrorism as the year 2000—the literal millennium—approaches. One cannot predict the effect that this pivotal symbolic watershed might have on religion-inspired terrorist groups who feel impelled either to hasten the redemption associated with the millennium through acts of violence—as the Aum sect in Japan has already attempted to do—or, in the event that the year 2000 passes and redemption does not occur, to attempt to implement Armageddon by the apocalyptic use of weapons of mass destruction. The pattern of religion-inspired terrorism over the past few years alone suggests that the potential for still more and even greater acts of violence cannot be prudently discounted.

## Intensity of Religious Terrorism

Terrorism motivated in whole or in part by religious imperatives often leads to more intense acts of violence producing considerably more fatalities than the relatively discriminating acts of violence perpetrated by secular terrorist organizations. Although religious terrorists committed only 25 percent of the recorded international terrorist incidents in 1995, their acts were responsible for 58 percent of the terrorist-related fatalities recorded that year. The attacks that caused the greatest numbers of deaths in 1995—those that killed

eight or more people—were *all* perpetrated by religious terrorists. The reasons why religious terrorism results in so many more deaths than secular terrorism may be found in the radically different value systems, mechanisms of legitimization and justification, concepts of morality, and worldviews embraced by the religious terrorist.

For the religious terrorist, violence is first and foremost a sacramental act or divine duty executed in response to some theological demand or imperative. Terrorism thus assumes a transcendental dimension, and its perpetrators are consequently undeterred by political, moral, or practical constraints. Whereas secular terrorists, even if they have the capacity to do so, rarely attempt indiscriminate killing on a massive scale—because such tactics are inconsistent with their political aims and therefore are regarded as counterproductive, if not immoral—religious terrorists often seek to eliminate broadly defined categories of enemies and accordingly regard such large-scale violence not only as morally justified but as a necessary expedient to attain their goals. Religion—conveyed by sacred text and imparted via clerical authorities claiming to speak for the divine—therefore serves as a legitimizing force. This explains why clerical sanction is so important to religious terrorists and why religious figures are often required to "bless" terrorist operations before they are executed.

Religious and secular terrorists also differ in their constituencies. Whereas secular terrorists attempt to appeal to actual and potential sympathizers, religious terrorists seek to appeal to no other constituency than themselves. Thus, the restraints imposed on secular terrorist violence—by the desire to appeal to a tacitly supportive or uncommitted constituency—are not relevant to the religious terrorist. This absence of a broader constituency leads to the sanctioning of almost limitless violence against a virtually open-ended category of targets: anyone who is not a member of the terrorists' religion or religious sect.

Religious and secular terrorists also have starkly different perceptions of themselves and their violent acts. Whereas secular terrorists regard violence as a way to instigate the correction of a flaw in a system that is basically good, religious terrorists see themselves not as components of a system worth preserving at all but as "outsiders" seeking fundamental changes in the existing order. This sense of alienation further enables the religious terrorist to contemplate far more destructive and deadly types of terrorist operations than secular terrorists—and reinforces the tendency to embrace a far more open-ended category of "enemies" for attack.

Even more disturbing is that, in some instances, the aims of contemporary religious terrorist groups go far beyond the establishment of a theocracy amenable to their specific deity (e.g., the creation of an Iranian-style Islamic republic in Algeria, Egypt, or Saudi Arabia). These aims can embrace, on the one hand, mystical, transcendental, and divinely inspired imperatives or, on the other hand, a vehemently anti-government form of populism that reflects far-fetched conspiracy notions based on a volatile mixture of seditious, racial, and religious dicta. In this respect, the emergence of obscure, idiosyncratic millenarian movements—such as the Japanese Aum Shinrikyo sect and the American Christian white supremacist militias—alongside zealously nationalist Islamic groups represents a far more amorphous threat than secular terrorist groups. The members of the Aum sect in Japan; the fanatical Jewish groups in Israel, such as Eyal, of which Yigal Amir was a member; the Christian Patriot movement in America; and some of the radical Islamic organizations in Algeria, Lebanon, and Israel do not conform to our traditional models of the secular terrorist organization. Traditional groups had a defined set of political, social, or economic objectives, and however disagreeable or distasteful their aims and motivations may have been, their ideology and intentions were at least comprehensible.

**A bridge needs to be found between mainstream society and the extremists.**

## Countering Religious Terrorism

In terms of the countermeasures that the government, military, police, and security services can employ against these new types of adversaries, the first and most immediate challenge is simply identifying them. These ethereal, amorphous entities will often lack the "footprint" or *modus operandi* of an actual, existing terrorist organization, making it more difficult for intelligence, law enforcement, and other security specialists to get a firm idea of their intentions and capabilities, much less their capacity for violence, before they strike. A second challenge is unraveling the reasons why many "fringe" movements or hitherto peaceful religious cults suddenly embark on lethal campaigns of indiscriminate terrorism.

These primarily investigative, intelligence, and academic research issues need to be addressed before effective countervailing and deterrent measures can be considered. Traditional approaches and policies may not be relevant, much less effective, in the face of religious terrorism. Strategies that have been used successfully in the past—such as political concessions, financial rewards, amnesties, and other personal inducements—would be not only irrelevant but impractical, given the religious terrorists' fundamentally alienated worldviews and often extreme, resolutely uncompromising demands.

**In many pockets of the American hinterland, the challenge is to develop educational programs to mitigate grassroots alienation.**

Above all, the profound sense of alienation and isolation of these cults and religious movements needs to be vigorously counteracted. A bridge needs to be found between mainstream society and the extremists so that they do not feel threatened and forced to withdraw into heavily armed, seething compounds or to engage in preemptive acts of violence directed against what they regard as a menacing, predatory society.

Demonstrable progress arguably has been made along these lines in the United States. The nonviolent resolution of the 81-day standoff between the Freemen, a Montana militia organization, and the FBI in April 1996 stands in marked contrast to the debacle three years before in Waco, Texas, where 74 persons were killed, including 21 children. By skillfully employing the tactics of negotiation and the nonconfrontational approaches developed during previous encounters with antigovernment and white supremacist groups, the authorities defused a potentially explosive situation, obtained the surrender of 16 heavily armed Freemen who had barricaded themselves at the isolated ranch they had dubbed "Justus Township," and avoided the bloodshed that had accompanied previous incidents.

But while patient negotiation and minimum force have an important role to play in specific instances, particularly sieges, there is a more widespread problem of intense, often paranoiac, antigovernment sentiments in many pockets of the American hinterland. Here, the challenge is surely one of developing preemptive educational programs to mitigate grassroots alienation and polarization and to stop the spread of seditious and intolerant beliefs before they take hold and become exploited by demagogues and hatemongers. Across the United States, progress can also be seen in this respect. A number of community groups and political action committees are attempting to counter the spread of ignorance, hate, and simplistic conspiracy theories that are used to explain complex economic phenomena and thus acquire new recruits to the antifederalist movement. Through a series of "town hall" meetings featuring plain-speaking, commonsense presentations that communicate important lessons in a vernacular as accessible and relevant to the local populace as that peddled by the conspiracy theorists, people gain a more critical perspective from which they can challenge the assertions of the sophists and refute the homespun ideologies that lie at the core of their odious belief systems.

The immense challenge of countering religious terrorism at home is dwarfed, however, by that of ameliorating anti-U.S. sentiment abroad. In no region is this problem more acute than in the Middle East. The bombings of the American embassies in Kenya and Tanzania last summer once again brought into sharp focus the intense enmity felt by some Muslims toward the United States. The rise of Osama bin Laden and his worldwide Islamic revolutionary movement, al-Qaeda ("The Base"), is a case in point. The movement flows from a regionwide perception that America cares only about Israel and access to oil—and not about national rights to self-determination and truly democratic domestic institutions. In this respect, the use of U.S. military force—even in self-defense or to prevent terrorist attacks—is seen by many as symptomatic of a heavy-handed foreign policy.

Clearly, every country must retain the right to retaliate or use military force to defend itself. But the issue here is whether more subtlety—or a mix of policy options—might be more appropriate. For example, only 12 of the 267 persons killed in the Nairobi and Dar-es-Salaam bombings were Americans. The vast majority of the casualties were Kenyan and Tanzanian embassy employees and ordinary passersby. Among the victims, too, were many Muslims. Indeed, in the wake of the tragedy, there were many reports of moderate Arab opinion leaders throughout the Middle East having been appalled by the death and injury brought so callously to their brethren by terrorists acting in the name of Islam. Yet, in a stroke, the United States vitiated this sentiment with cruise missile attacks. This

## AN ANCIENT SCOURGE FOR THE NEW MILLENNIUM

Religion has been the major driving force behind international terrorism during the 1990s. As described below, the most serious terrorist acts of the decade—in terms of the number of people killed or the political implications—all have had a significant religious dimension.

- 1992 onward: Bloodletting by Islamic extremists in Algeria has claimed an estimated 75,000 lives.
- February 1993: Thirteen car and truck bombings shake Bombay, India, killing 400 and injuring more than 1,000, in revenge for the destruction of an Islamic shrine.
- February 1993: Islamic radicals bomb New York City's World Trade Center, attempting to topple one of the twin towers onto the other, reportedly while releasing a deadly cloud of poisonous gas.
- December 1994: Air France passenger jet is hijacked by terrorists belonging to the Algerian Armed Islamic Group (GIA), who plotted unsuccessfully to blow up themselves, the aircraft, and the 283 passengers on board precisely when the plane was over Paris, which would have caused the flaming wreckage to plunge into the crowded city below.
- March 1995: Apocalyptic Japanese religious cult releases sarin nerve gas in Tokyo subway system, killing a dozen people and wounding 3,796 others, with reports that the group also planned to carry out identical attacks in the United States.
- April 1995: Members of the American Christian Patriot movement, seeking to foment a nationwide revolution, bomb the Alfred P. Murrah Federal Office Building in Oklahoma City, killing 168 people.
- July–October 1995: GIA unleashes a wave of bombings in Paris Metro trains, outdoor markets, cafes, schools, and popular tourist spots, killing 8 and wounding more than 180.
- November 1995: Jewish religious extremist assassinates Israeli premier Yitzhak Rabin, viewing it as the first step in a mass murder campaign designed to disrupt the peace process.
- February–March 1996: String of attacks by Hamas suicide bombers kills 60 people and turns the tide of Israel's national elections.
- April 1996: Machine-gun and hand-grenade attack by Egyptian Islamic militants on a group of Western tourists kills 18 outside their Cairo hotel.
- June 1996: Religious militants opposed to the reigning al-Saud regime in Saudi Arabia perpetrate truck bombing of U.S. Air Force barracks in Dhahran, killing 19 people.
- November 1997: Terrorists belonging to the Gamat al-Islamiya (Islamic Group) massacre 58 foreign tourists and 4 Egyptians at the Temple of Queen Hatshepsut in Luxor, Egypt.
- August 1998: Attackers believed to have been financed by Saudi Arabian dissident Osama bin Laden bomb U.S. embassies in Kenya and Tanzania, killing 257 people, including 12 Americans, and injuring more than 5,000 in Kenya, and killing 10 people and injuring dozens in Tanzania. Bin Laden had issued a *fatwa*, or Islamic religious edict, as part of his worldwide campaign against the United States. An estimated 5,000 adherents throughout the Muslim world allegedly are prepared to follow his summons to battle.

is not to say that the attacks were unjustified or unnecessary—only that an important, and often exceedingly rare, opportunity may have been lost to influence opinion in the region against terrorism and against the terrorists claiming to act in the name of Islam.

The resurgence of this ancient breed of adversary, the religious terrorist, means that nothing less than a sea change is required in our thinking about terrorism and the policies needed to counter it. Perhaps the most sobering realization in confronting religious terrorism is that the threat—and the problems that fuel it—can never be eradicated completely. The complexity, diversity, and often idiosyncratic characteristics of religious terrorism imply that there is no "magic bullet"—no single, superior solution—that can be applied to all cases. Yet this fact only reinforces the need for multiple creative solutions, if not to resolve, then at least to ameliorate both the underlying causes of religious terrorism and its violent manifestations. Only by expanding our range of possible responses will we be able to target our resources prudently and productively in ways that will have the greatest positive effect. ■

# OLD MADNESS NEW METHODS

## Terrorism Evolves Toward "Netwar"

Classic motivations for terrorism will endure in the information age. What will change will be the methods used by terrorists who avail themselves of newly expanded opportunities to disrupt and destroy their enemies, as revealed in "Networks, Netwar, and Information-Age Terrorism," one chapter in a forthcoming RAND book, *Countering the New Terrorism* (MR-989-AF), by Ian Lesser, Bruce Hoffman, John Arquilla, David Ronfeldt, and Michele Zanini.

**Terrorists will move from traditional hierarchical groups toward more flexible network forms of organization. "Great man" leaderships will give way to "flatter," decentralized designs.**

Terrorism will continue to appeal to its perpetrators for mainly three age-old reasons. First, terrorism is a weapon of the weak; it appeals to racist militias, religious fundamentalists, ethnonationalists, and other minorities who cannot match the military might of their "oppressors." Second, terrorism is a way to assert identity and command attention; as such, it is an end in itself. Third, terrorism is appealing, especially to those with a religious fervor, as an expedient way to achieve a new future order if only by wrecking the present.

The authors outline emerging changes in organization, strategy, and technology that typify the "new terrorism" of the information age:

- *Organization.* Terrorists will move from traditional hierarchical groups toward more flexible network forms of organization. "Great man" leaderships will give way to "flatter," decentralized designs. More effort will go into building transnationally networked groups than stand-alone groups.

- *Strategy.* Some terrorist groups, with newly acquired capabilities for lethal acts, are already moving to a "war paradigm" of attacking U.S. military forces and assets. For other terrorists, destruction of physical targets may become less an objective than disruption of information infrastructures. In the latter case, dangers will increase as terrorists move beyond isolated acts of disruption toward campaigns based on "swarming" a target, even a society, with multiple "attacks" from all directions.

- *Technology.* Terrorists will become increasingly dependent on advanced information technologies not only for offensive and defensive purposes but also to support their own organizations. Despite widespread speculation about terrorists using cyberspace warfare to take "the Net" down, they may have stronger reasons for keeping it up—e.g., to spread their message and to communicate with one another.

In short, terrorism is evolving toward "netwar," a new form of protracted conflict with nonstate actors. The August 1998 bombings of U.S. embassies in East Africa, along with the retaliatory American missile strikes, may be the opening shots of this kind of war between a leading state and a terror network.

The authors weigh the implications for the U.S. Air Force. Beyond outlining some offensive and defensive steps the air force can take to fight information-age

terrorism, the authors propose that a key in the fight will be the creation of interorganizational networks within the U.S. military and government, on the grounds that it will take networks to fight networks.

## The Emergence of Netwar

Netwar refers to an emerging mode of crime and conflict, short of traditional war, in which the protagonists use network forms of organization and related strategies and technologies attuned to the information age. These protagonists are likely to consist of small, dispersed groups who communicate, coordinate, and conduct their campaigns in an internetted manner, without a precise central command.

Various groups across the spectrum of crime and conflict are evolving in this direction. Netwar is about the Middle East's Hamas more than the Palestine Liberation Organization, Mexico's Zapatistas more than Cuba's Fidelistas, and America's Christian Patriot movement more than the Ku Klux Klan. Netwar is also about the Asian Triads more than the Sicilian Mafia, and Chicago's "Gangsta Disciples" more than the Al Capone Gang.

The spectrum includes familiar adversaries who are modifying their methods to take advantage of networked designs: transnational terrorist groups, transnational crime syndicates, black-market proliferators of weapons of mass destruction, fundamentalist and ethnonationalist movements, smugglers of migrants and of black-market goods, pirates of intellectual property, high-seas pirates, urban gangs, back-country militias, and militant single-issue groups in the United States. The spectrum also includes a new generation of radicals and activists who are just beginning to create information-age ideologies, in which identities and loyalties may shift from the nation-state to the transnational level of "global civil society." Other new actors, such as anarchistic and nihilistic leagues of computer-hacking "cyboteurs," may also practice netwar.

What has long been emerging in the business world is now also becoming apparent among netwarriors. Organizationally, they are likely to resemble a set of diverse, dispersed "nodes" who share a set of ideas and interests and are arrayed to act in a fully internetted, "all-channel" manner. Networks come in basically three types:

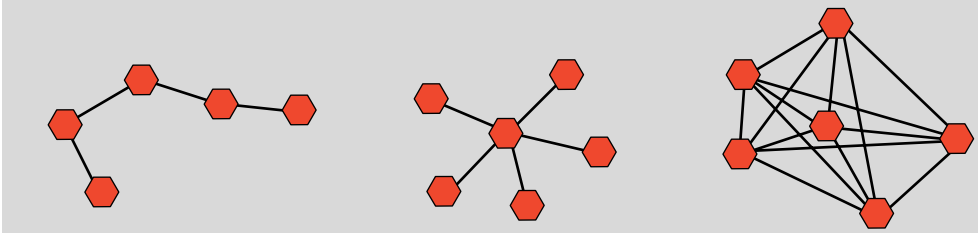
CORBIS/BETTMANN/AFP

*Although not terrorists, the Zapatista National Liberation Army, shown here on their way to discuss the peace process with the Mexican government in November 1998, have demonstrated the advantages of a network form of organization. Since January 1994, the Zapatistas have pressed demands for more rights for Mexican Indians.*

- The chain network, as in a smuggling chain, where people, goods, or information move along a line of separated contacts and where end-to-end communication must travel through the intermediate nodes.
- The star, hub, or wheel network, as in a terrorist syndicate or a cartel structure, where a set of actors is tied to a central node or actor and all must go through that node to communicate and coordinate with each other.
- The all-channel network, as in a collaborative network of militant small groups, in which every group or node is connected to every other (see figure).

Each type of network may be suited to different conditions and purposes, and there may be any number of hybrids. The all-channel network has historically been the most difficult to organize and sustain, partly

**TYPES OF NETWORKS**



U.S. DEPARTMENT OF DEFENSE PHOTO

*Aerial photograph identifies the remote Zhawar Kili Al-Badr Camp in Afghanistan, one of the Arab Afghan terrorist training camps targeted by U.S. military strikes on August 20, 1998.*

because of the dense communications required. Yet the all-channel network is the type that is gaining strength from the information revolution. The design is flat. Ideally, there is no single, central leadership or command or headquarters—no precise heart or head that can be targeted. Decisionmaking and operations are decentralized, allowing for local initiative and autonomy. Thus, the design may sometimes appear acephalous (headless), and at other times polycephalous (Hydra-headed).

The all-channel design has unusual strengths for both offense and defense. For offense, the design is adaptable, flexible, and versatile, especially for "swarming," which occurs when the dispersed nodes converge on a target from multiple directions. The overall aim of swarming is the "sustainable pulsing" of repeated attacks that coalesce rapidly and stealthily on a target, then separate and redisperse, immediately ready to recombine for a new pulse.

For defense, all-channel networks tend to be diverse and redundant, making them robust and resilient. They can be difficult to crack and defeat as a whole, and they may defy counterleadership targeting. Moreover, the deniability built into the network affords it the option of simply absorbing a number of attacks on distributed nodes, leading the attacker to believe the network has been harmed when, in fact, it remains viable and is seeking new opportunities for tactical surprise.

Given the nature of netwar, the authors propose three counternetwar principles:

- *Hierarchies have difficulty fighting networks.* Examples include the failure of government attempts to defeat transnational drug cartels, as in Colombia; the persistence of religious revivalist movements in the face of unremitting state opposition, as in Algeria; and the Zapatista movement in Mexico, which shows that social netwar can put a democratizing autocracy on the defensive and pressure it to continue adopting reforms.

- *It takes networks to fight networks.* To defend against netwar, governments might have to develop interagency approaches involving networked structures. The challenge will be to blend hierarchies with networks, retaining enough authority to enforce adherence to networked processes. The U.S. Counterterrorist Center, based at the CIA, is a promising effort to establish an interagency network. Its success may depend on the strength of links made with the military and with other institutions outside the intelligence community.

- *Whoever masters the network form first and best will gain major advantages.* In these early decades of the information age, adversaries who have adopted networking (whether they are criminals, terrorists, or peaceful social activists) are enjoying an increase in their power relative to state agencies.

## Netwar in the Middle East

Middle Eastern terrorism seems to be evolving in the direction of violent netwar. Islamic fundamentalist organizations, such as Hamas and the Arab Afghan network of Osama bin Laden, consist of loosely interconnected, semi-independent cells with no single commanding hierarchy. Hamas exemplifies the shift away from a hierarchically oriented movement based on a "great leader," such as the Palestine Liberation Organization and Yasser Arafat.

Israeli and Western agencies have waged successful counterterrorism campaigns against the traditional, more bureaucratic groups. Meanwhile, the newer and less hierarchical groups—Hamas, the Arab Afghans, Algeria's Armed Islamic Group, and the Egyptian Islamic Group—have become the most active organizations in and around the Middle East.

Even though bin Laden finances Arab Afghan activities and directs some operations, he apparently does not command and control all operations. Rather, he coordinates and supports several dispersed activities. He represents a key node in this network, but any actions taken to neutralize him would not neutralize the network. Already, the network conducts many operations without bin Laden's involvement, leadership, or financing. Should he be killed or captured, the network would suffer, but it would still go on.

The Arab Afghans appear to have widely adopted information technology. According to reporters who visited bin Laden's headquarters in a remote mountainous area of Afghanistan, the terrorist financier has computers, communications equipment, a large number of disks for data storage, and a communications network that relies on the World Wide Web, e-mail, and electronic bulletin boards so that the extremists can exchange information without running a major risk of being intercepted by counterterrorism officials.

Bin Laden complements his significant technological capabilities with an extensive human courier network, the critical importance of which he learned during the Afghan war against the Soviet Union. His combination of advanced and traditional communications systems represents a solid, redundant network.

Among the other groups, Hamas activists in the United States and elsewhere use Internet chat rooms to plan operations and use e-mail to coordinate activities across Gaza, the West Bank, and Lebanon. Algeria's Armed Islamic Group reportedly makes heavy use of floppy disks and computers to store and process information for members dispersed in Algeria and Europe. Hizbullah uses the Internet as a propaganda tool, managing three different World Wide Web sites: one for the central press office (www.hizbollah.org), another to describe its attacks on Israeli targets (www.moqawama.org), and the last for news and information (www.almanar.com.lb).

Yet everything that is high tech about "cyberterrorism" is often fueled by ancient forces. Whereas Middle Eastern terrorist groups dating back to the 1960s and 1970s still maintain a nationalist or Marxist agenda, most of the new groups that have arisen in the 1980s and 1990s rely on Islam as a basis for their radical ideology. Indeed, the goal of the Arab Afghan alliance is global opposition to perceived threats to Islam, as indicated by bin Laden's 1996 declaration of holy war against the United States and the West.

Some of the new terrorist groups—driven by religious mania, a desire for totalitarian control, or an impulse toward ultimate chaos—aim to induce the birth of a "new world." This paradigm harks back to millennialist movements that arose in past epochs of social upheaval, when would-be prophets attracted adherents from the margins of other social movements and led them to pursue salvation by seeking a final, violent cataclysm.

**Even though Osama bin Laden represents a key node in the Arab Afghan network, any actions taken to neutralize him would not neutralize the network.**

This paradigm is likely to seek the vast disruption of political, social, and economic order, possibly even involving weapons of mass destruction. Religious terrorists might desire destruction for its own sake or for some form of "cleansing." However, their ultimate goal is not so much the destruction of society as its rebirth after a chaotic disruption. Three of the authors—Arquilla, Ronfeldt, and Zanini—contend that netwars will emphasize disruption over destruction. In this view, networked terrorists no doubt will continue to destroy things and kill people, but the principal strategy may move toward the nonlethal end of the spectrum, where U.S. and allied command and control nodes and vulnerable information infrastructures provide rich sets of targets.

## U.S. Air Force on Alert

The high profile of the U.S. Air Force suggests that attacks upon it will be one way to grab worldwide public attention. The U.S. Air Force epitomizes American power—as the Royal Navy did in the heyday of the British Empire—and offers high symbolic value as a target of terror. Of all forms of American military power, air assets are the most available to support U.S. interests in any region of the world. The air force also has expensive and sophisticated equipment—plenty of attractive targets. And given U.S. air mastery, which precludes direct challenges, an indirect assault might prove an attractive alternative. The high profile of the air force also provides terrorists an opportunity to strike at what some believe is the fragile ability of the American public to accept losses and casualties.

At the same time, interconnectivity is a two-way street, and the degree to which a terrorist network uses complex information infrastructures for offensive pur-

poses may determine its own exposure to counterattacks. Although terrorist organizations would often enjoy the benefit of surprise, their tactics could be adopted by their adversaries.

The key task for counterterrorism, therefore, is the identification of technological terrorist networks. Once they are identified, it may be possible to insert and disseminate false information through them, overload systems, misdirect message traffic, preclude access, and otherwise destroy and disrupt activities to prevent terrorist attacks.

**A key in the fight against netwar will be the creation of interorganizational networks within the U.S. military and government, because it will take networks to fight networks.**

The U.S. Air Force can take the following defensive and offensive steps against netwar, according to the RAND authors:

1. *Do not modernize some communications nodes.* Full interconnectivity with the Internet may allow cyberterrorists to enter where they could not go against the old command and control structures. The air force retains robust, dedicated systems, and so perhaps the answer lies in not interconnecting all sensitive communications as rapidly as possible. Paradoxically, less modernization may make for more security in some cases.

2. *Develop defensive antiterror standards for all bases and missions.* There are two situations in which aircraft are most vulnerable to attack: (1) when they are sitting on the ground, and (2) when they are taking off or landing. Air force commanders in disparate settings—deserts, urban areas, etc.—need to adhere to a common set of practices that would restrict the ability of terrorists to target aircraft with ground attacks or with standoff weapons during takeoff and landing.

3. *If terrorism worsens substantially, shift air assets from overseas bases to the continental United States.* Increased U.S. basing likely will make terrorism against air force personnel and equipment more difficult, but the shift will also be controversial, because it entails military and political costs. Some of these costs could be mitigated by negotiating with key countries to retain access to foreign bases in times of crisis, and regular exercises in these areas would demonstrate that the United States retains its extensive reach.

4. *Possibly develop a war paradigm to counter terrorists who see themselves as waging war against the United States.* Adopting a war paradigm would extend the range of targets to include more terrorist network nodes and the entire network itself. New weapons, such as high-energy radio frequency and high-power microwave weapons, might be needed to disrupt terrorist information flows. However, careful consideration would have to be given to the implications of a war paradigm on broader geopolitical and diplomatic objectives.

5. *Organizationally, deepen interservice and interagency networking.* Countering terror requires the formation of highly effective interagency and interservice command structures. As noted earlier, it may take networks to fight networks—and whoever masters the network form of organization will gain the greatest advantages. The U.S. Air Force should be a key node in such a network. This recommendation does not contradict the first recommendation about technological caution, because interorganizational networking is about cooperation, not technology. The U.S. military and intelligence communities are still largely stovepiped organizations despite having the best technology in the world. Conversely, true networking can happen with even very limited technical capabilities, because it relies on interactions between people, which can happen the old-fashioned way—in person.

6. *Develop requirements for counterterrorist intelligence operations.* Investigate the possibilities for "virtual human intelligence" ("virtual humint"), or virtual spying based on both hacking into terrorist telecommunications nets and developing capabilities to read "emanations" (communications read off of terrorist computer screens before they are encrypted). The latter capability probably would require using very small unmanned aerial vehicles teleoperated by information warfare personnel. The air force would have to remain mindful of the international legal constraints on such data "snooping."

7. *Continue planning for traditional operations such as raiding key terrorist nodes, particularly deep underground facilities that might produce weapons of mass destruction.* A key element of an eventual counterterrorist war paradigm, such planning would require careful analysis of terrorist nodes. ■

## LEXICON OF THE NEW TERRORISM

*antiterrorism*—defensive measures against terrorism

*counterterrorism*—offensive (proactive) measures against terrorism

*cyberterrorism*—computer-based, information-oriented terrorism

*cyberwar*—information-oriented warfare waged by formal military forces

*cybotage*—acts of disruption and destruction against information infrastructures; computer sabotage

*cyboteur*—one who commits cybotage; anarchistic or nihilistic computer hacker; computer saboteur

*infosphere*—the totality of all information media, especially those that are interconnected and internetted

*millennialism*—in the context of terrorism, the belief, often driven by religious mania, that a rebirth of society requires a period of chaotic disruption

*netwar*—information-oriented conflict waged by networks of primarily nonstate actors

*node*—a person, vehicle, office, computer, or other point within a network

*superterrorism*—the use by terrorists of weapons of mass destruction, including nuclear, biological, and chemical weapons

*sustainable pulsing*—the repeated convergence, redispersion, and recombination of small, dispersed, internetted forces against a succession of targets

*swarming*—attacking from all directions; a mode of conflict suited to small, dispersed, internetted forces, especially if they can achieve sustainable pulsing

*teleoperate*—to operate an aircraft or vehicle remotely via satellite, modem, or other telecommunications device

*virtual humint*—virtual "human intelligence," or spying performed by unmanned aerial vehicles and other pilotless aircraft capable of "listening in on" satellite telecommunications of terrorists. (In military terminology, HUMINT differs from IMINT, or "imagery intelligence" from satellites, and SIGINT, or "signals intelligence" from radar.)

### Related Reading on Religious Terrorism

*Inside Terrorism*, Bruce Hoffman, Columbia University Press, 1998, 288 pp., ISBN 0-5750-6509-5, $17.99.

*Domestic Terrorism: A National Assessment of State and Local Law Enforcement Preparedness*, Kevin Jack Riley, Bruce Hoffman, RAND/MR-505-NIJ, 1995, 66 pp., ISBN 0-8330-1627-X, $13.00.

*The Urbanization of Insurgency: The Potential Challenge to U.S. Army Operations*, Jennifer Morrison Taw, Bruce Hoffman, RAND/MR-398-A, 1994, 45 pp., ISBN 0-8330-1528-1, $7.50.

*"Holy Terror": The Implications of Terrorism Motivated by a Religious Imperative*, Bruce Hoffman, RAND/P-7834, 1993, 14 pp., ISBN 0-8330-2161-3, $5.00.

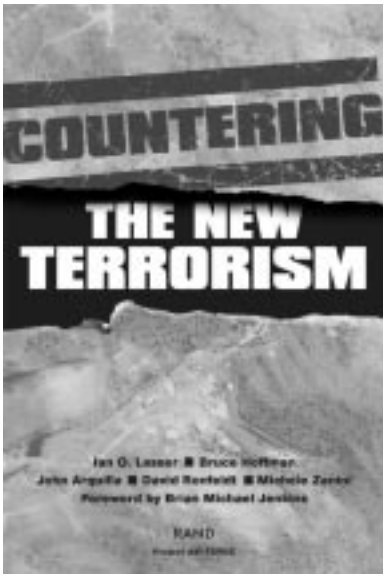
### Related Reading on Information-Age Terrorism

*Countering the New Terrorism*, Ian O. Lesser, Bruce Hoffman, John Arquilla, David Ronfeldt, Michele Zanini, RAND/MR-989-AF, 1999, 148 pp., ISBN 0-8330-2667-4, $15.00.

*The Zapatista "Social Netwar" in Mexico*, David Ronfeldt, John Arquilla, Graham Fuller, Melissa Fuller, RAND/MR-994-A, 1998, 168 pp., ISBN 0-8330-2656-9, $15.00.

*In Athena's Camp: Preparing for Conflict in the Information Age*, John Arquilla and David Ronfeldt, eds., RAND/MR-880-OSD/RC, 1997, 501 pp., ISBN 0-8330-2514-7, $20.00.

*The Advent of Netwar*, John Arquilla and David Ronfeldt, RAND/MR-789-OSD, 1996, 118 pp., ISBN 0-8330-2414-0, $15.00.



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