worth reporting to readers of *Science*. Many aspects of *Pfiesteria* research continue to be controversial in the field (*1*, *2*).

JOCELYN KAISER

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Individual Factors in Suicide Terrorism

IT IS PERPLEXING THAT IN HIS OTHERWISE compelling Review "Genesis of suicide terrorism" (7 March 2003, p. 1534), S. Atran fails to address the most conspicuous case in recent memory: the suicidal raids of September 11, 2001. These events might have provided empirical data to corroborate or invalidate his model. Perhaps because all of the direct perpetrators of the attacks perished, it may have seemed wise to avoid any reference to them at all: The data would have been indirect and anecdotic at best. Nonetheless, the same could be said of most of the examples discussed in the Review: The scanty evidence that Atran presents comes from interviews with families, acquaintances, and various recruiters of a handful of suicide bombers in the Middle East, or from polls surveying the degree of support that suicidal terrorist acts receive in certain societies.

"We need to dissect profiles that may characterize the different temperamental styles and goals of terrorism militants. Individual-oriented research seems essential in this respect."

–TOBEÑA

The paths to martyrdom are diverse. They require different abilities, talents, and temperaments, and this also applies to suicidal attacks. Rejecting individual factors on the basis of a "fundamental attribution error" (the tendency to explain behavior in terms of individual personality traits when significant situational factors in the larger society are at work) can lead to another fundamental miscalculation: neglecting traits robustly related to particular propensities or temperamental styles. However obvious the relevance of institutional factors to Al Qaeda attacks, it does not obviate the need to analyze whether the influence of peer pressure under a closed organization fully explains the exceptional behaviors under scrutiny. Emotion-driven loyalty in highly indoctrinated small cells had to be uncompromising during the preparation and execution of 9/11. Apparently, the model works. Nonetheless, the sheer elaborateness of the plan makes these attacks very different from a low-cost bus ride by a single youth carrying a homemade bomb under his (or, less commonly, her) belt, with the aim of detonating the artifact in a crowded marketplace. For the former, you need highly trained and reliable soldiers; for the latter, any indoctrinated believer will do (hence the wide sociodemographic variability in the studied samples).

Self-recruitment, for instance, is an individual factor that characterizes members of violent doctrinal groups, although it is not a distinctive feature among their members: fellow devotees, intermediate officers, and commanders typically share this attribute, which may be connected to biological proclivities (*1*). But there are other constitutionally based traits (dominance, proneness to risk-taking, fearlessness, aggressiveness, machiavellianism, narcissism, and obedience) that may make a contribution to the different roles played by self-recruited members, which in turn are crucial for the ties they establish within their microsocieties as well as the tactics they employ. To put it another way, can the sole trait of "charisma" explain the exceptional influence of unique leaders (*2*)? Some charismatic leaders commonly succeed in promoting highly prosocial and nondestructive goals; others are able to push entire groups of followers into mass suicide without injuring anybody else outside the group; and still others lead highly cohesive parties to challenge political power using terror (suicidal or not).

We need to dissect profiles that may characterize the different temperamental styles and goals of terrorism militants. Individual-oriented research seems essential in this respect. In addition to the aforementioned traits, altruistic punishment (*3*), messianism (*4*), and religiosity (*5*, *6*) are factors that may play important roles in the phenomenon of suicidal terrorism. Research efforts directed at disentangling the critical social vectors of suicidal terrorism are extremely important. They can, however, become even more valuable if individuals are taken into account, rather than rejecting the perspective out of hand just because there is an absence of clear links with psychopathology or the lack of reliable differences between introverts and extroverts (*7*).

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Response

TOBEÑA RAISES TWO CONCERNS ABOUT MY Review "Genesis of suicide terrorism" (GST): Data stem largely from interviews and polls, and individual selection factors may contribute to understanding, predicting, and countering suicide terrorism.

"Although both personal and contextual factors affect action, studies of individual behavior in group contexts show situation to be a much better predictor than personality."

–ATRAN

Such data are almost all that exist, although new material confirms patterns in GST (*1*). Information from Palestinian news services on 171 militants killed during 2000 to 2003 (including 87 suicide attackers) reveals a majority of young bachelors from multisibling families (both parents living) having completed secondary education (most Hamas suicide bombers were college-educated) (*2*). Terrorist incidents across the world (cited by U.S. Department of State) are unrelated to per capita income, whereas denial of civil liberties (defined by Freedom House) is related (*3*). U.S. Army Defense Intelligence (DIA) officials interrogating Saudi-born Al Qaeda detainees at Guantánamo report that these militants are often educated above reasonable employment level; a surprising number have graduate degrees and come from high-status families. Motivation and commitment are evident in willingness to sacrifice material and emotional comforts (families, jobs, physical security), to travel long distances, and to pay their own way (*4*). For Hamas, Al Qaeda, and allies, religious indoctrination (of recruits who initially express only moderate religiosity) appears crucial to creating intimate cells of fictive kin whose members commit to willingly die for one another. As with the 9/11 attackers (*5*), no "personality" defects seem evident.

No doubt, predisposing individual differences render some people more

susceptible to social factors that leaders use to get people to die for their cause. But individual differences often singled out as causally important—personal instability, hopelessness, and poverty (*6*)—are not dependable predictors (*1*). Tobeña proposes additional personality traits as possible factors (aggressiveness, narcissism, and obedience). But a U.S. Interagency report (used by the CIA) concludes: "there is no particular psychological attribute... or any 'personality' that is distinctive of terrorists" (*7*, p. 40). Months—sometimes years—of intense indoctrination can lead to "blind obedience" no matter who the individual, as indicated in studies of torturers (*8*).

Traits conceived as cross-situational dispositions are somewhat circular in scientific reasoning. How do we know someone is aggressive? Because the person attacks when provoked. Why does he attack? Because he is aggressive. In contrast to personality traits, cognitive attributions and appraisals (of how an individual construes the situation he finds himself in) may have explanatory value: One can present the same event and manipulate the attribution/appraisal of the event to get different reactions.

Although both personal and contextual factors affect action, studies of individual behavior in group contexts show situation to be a much better predictor than personality (*9*). One situational factor, according to a U.S. Defense Science Board, is political context: "Historical data show a strong correlation between U.S. involvement in international situations and an increase in terrorist attacks against the United States" [(*10*), p. 8]. In any event, we cannot do much about personality traits, whether biologically influenced or not. We presumably can think of ways to make terrorist groups less attractive and to undermine their effectiveness with recruits.

GST sought to encourage new research into what causes suicide terrorism so that knowledge of causes could be used to stop the killing and devastation. The final U.S. Interagency report on combating terrorism overseas shows funding increasing 133% from 2001 (apart from $165 billion voted for the Iraq war, which was primarily billed as depriving terrorists of weapons of mass destruction) (*11*). Incidence of suicide terrorism has not decreased. Despite detailed review of actions related to tens of billions spent by dozens of federal civilian and military agencies, there is scant mention of funding, or efforts to understand or prevent people from becoming terrorists in the first place.

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"Fictive Kin" and Suicide Terrorism

IN HIS REVIEW "GENESIS OF SUICIDE terrorism" (7 March 2003, p. 1534), S. Atran writes that institutional reinforcement of evolved psychological dispositions may play a role in the training of suicide terrorists. These dispositions "may have emerged under natural selection's influence to refine or override short-term rational calculations that would otherwise preclude achieving goals against long odds." In Atran's view, commitment to apparently irrational behavior is a signal that convinces others of one's sincere willingness to act. Organizations that recruit and train suicide terrorists purposefully manipulate dispositions to such commitment in order to engender or reinforce a willingness to engage in suicidal sacrifice. However, it is difficult to see how individuals could be induced to commit acts so personally costly that they preclude the fitness benefits that signaling is presumably evolved to provide. Only if commitment to suicide occurs in the context of kin and psychological dispositions related to kin-related altruism is successful manipulation plausible.

I have developed a model to explore the relationship between nonkin altruism and institutional practices related to kin recognition. Its logic is straightforward: Kin recognition is a necessary component of inclusive fitness calculations related to altruistic behavior in many species, and kin are often identified by means of evolved cues that are open to manipulation (*1*, *2*). As recognizing kin has been an important problem in hominid evolution (*3*), cognitive adaptations to address that problem have evolved (*4*, *5*). Relevant literature suggests that cues most applicable to human behavior are close physical association (particularly during development), phenotypic similarity, and the use of kin terms and other symbolic kin referents (*6*–*8*). Thus, institutions desiring to maintain and reinforce nonkin altruistic behavior among their members should attempt to manipulate predispositions associated with these cues (*9*, *10*). It is predicted that they will tend to "cloister" recruits with each other and their trainers, provide them with false phenotypic matches such as uniforms and distinctive hairstyles, and encourage use of linguistic and other symbolic kin referents. Additionally, because youth and separation from kin are conditions likely to facilitate manipulation, institutions should prefer young, impressionable recruits and discourage their association with actual kin.

As suicide terrorism is an example of dramatically self-sacrificial behavior often exhibited in institutional contexts, the model should apply to this behavior as well, and a preliminary review of available data suggests that it does. Atran describes two of the five predicted practices: Suicide terrorists are typically young (early twenties), and they are recruited and trained even younger. Parental and sibling kin terms are often used among recruits, trainers, and leaders. In addition, recruits are typically separated from kin and community to train in secret, isolated camps where uniforms and other markers of phenotypic similarity are common. For example, among the "Children of the Iman" in 1980s Iran, young boys and girls were selected for martyrdom and sent to isolated camps for training. They "no longer belong[ed] to their respective families," were assigned uniforms and red headbands, and were referred to as brothers and sisters, and children of the Ayatollah [(*11*), p. 91]. The same pattern can be seen among recruits to Al Qaeda, where kinship imagery is particularly pronounced: Osama bin Laden is known as the "elder brother," and recruits are placed in "families" during training and deployment (*12*).

It is no accident that suicide terrorists are often compared to monks (*13*) or members of religious cults (*14*), or that the organizational structure of suicide terrorist