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Aviation Terrorism: An Analysis of Analyzing Antiterrorism Programs

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Title: Aviation Terrorism: An Analysis of Analyzing Antiterrorism Programs

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Abstract. This is the second in a series on aviation terrorism. (The first article is in the February 14, 1997 Issue of IBPP, V. 1, No. 12, and describes basic problems in psychological profiling.) The current article describes problems of analysis comprising (1) base rates of terrorism, (2) true and false positive and negatives of terrorist threat estimates, (3) the reliability, validity, social transformation, and scope of terrorist threat estimates, (4) need for an ongoing interdisciplinary analysis of terrorist-related information, (5) traditional human factors and the performance of antiterrorism personnel, and (6) additional research design and statistical Issues in developing an aviation antiterrorism program.

The White House Commission on Aviation Safety and Security and the Federal Aviation Administration's Aviation Security Advisory Commission have proposed a number of policies, programs, and procedures. Even if both were largely motivated by what seems more and more to be a nonterrorist event--the TWA 800 fatalities--how can we best appraise the quality of these analyses and recommendations? Let's focus on aviation antiterrorist programs.

Several criteria must be addressed to establish the merits of one's antiterrorist program for a military or civilian organization. (IBPP is not addressing in this article the social psychological criteria facilitating persuasion regardless of a program's merits.) (1) Given some estimated base rate of terrorist events, the program must make not only a statistically significant difference but a practically significant one. (In fact, the former may be largely irrelevant.) This is often difficult to demonstrate because estimated base rates usually do not reflect the incidence or prevalence of terrorist events which (a) occur but are not labeled as such, e.g., a mislabeled accident, and (b) were stymied through terrorist ineptitude, poor planning, or bad luck before they were actually implemented. Moreover, base rates usually are very low frequency, even if each terrorist act is potentially of high impact. True base rates also change through time depending on--among other things--current political, social, and economic events and trends, yet estimated base rates--qualitative and quantitative--often are based on the past comprising a different set of political, social, and economic events and trends.

(2) One's antiterrorist program needs to be founded on threat estimates which have acceptable true and false positive and negative rates. With a terrorist profile approach as an example, true positives denote people deemed to be a terrorist threat who actually are. False positives denote alleged threats who actually are not. True negatives are allegedly not threats and actually are not threats. False negatives are allegedly not threats but actually are. Even in the most rigorously researched program, there may be an acceptable true positive rate as arbitrarily defined by the organizations paying for and employing the program, along with a false positive rate that is too high as defined by these organizations. This estimate of "too high" often reflects unwanted publicity towards wrongly identified terrorist threats and the sanctioning organizations who are perceived as at fault.

Another problem is that one might demonstrate an acceptable true positive rate but with it a huge false negative rate--i.e., with many real terrorist threats getting by. This may reflect acceptable specificity but--almost certainly--unacceptable sensitivity. (It also illustrates how a statistically significant result may have a disastrous, practical consequence.)

(3) One's antiterrorist program must also be time sensitive--responsive to changes in the social transformation of knowledge. Even if one can demonstrate acceptable handling of the base rate and rates of true and false positives and negatives, one needs to show how there is an ongoing analytic capability to continually fine-tune or significantly revamp the program as appropriate. This requirement should make at least intuitive sense to an organization considering an antiterrorist program as allies become adversaries, adversaries become allies, sensitive program information becomes compromised, changes in political, social, and economic factors occur, and--with them--psychological change.

But there's more. (4) The organization considering an antiterrorist program may be sophisticated enough to have concerns about the vulnerabilities of the social sciences based on logical positivism in describing, explaining, and predicting human behavior--the basis of any antiterrorist program.

For example, an antiterrorist program's estimates of terrorist threat--based, for example, on a psychobiographical profile--must be reliable. One common measure of reliability entails taking estimates of the threat at different points in time. If the estimate itself does not change, assuming nothing else of significance has changed, then the program developers would usually assume that it may be reliable. Unfortunately, sometimes an estimate looks reliable but it isn't. For example, program developers may derive the same estimate of threat at two different points in time and assume it's reliable. However, it actually isn't. Relevant factors related to terrorism have changed, but the developers aren't aware of it, because the estimate process is not sensitive or specific enough to pick up the changes.

Or sometimes an estimate of threat looks unreliable but actually is reliable. For example, program developers derive two different estimates of threat at two different points in time--and actually should have derived this result because relevant factors related to terrorism have changed. However, the program developers aren't aware of the change, because the estimate process is not sensitive or specific enough to pick up the changes.

Moreover, program developers may inadvertently or unethically choose particular time intervals between deriving estimates of threat to increase the probability of demonstrating reliability--the unreliability of some other commercial competitor's threat estimate. The only thing reliable about reliability is the sine qua non of some degree of unreliability. This bodes ill for organizations interested in authorizing and funding antiterrorist programs--especially those based less on pure physical security but more on operations and personnel security depending on some sort of profiling.

Another example concerns the validity of an antiterrorist program's threat estimates. The estimates will be valid if they turn out to describe, explain, or predict what they claim to. If they are to measure terrorist threats, that's what they should measure--not ethnicity, running speed, or expressive emotion. Sounds simple enough, but how does the program developer infer that estimates measure what they should? The usual approach is as follows. The program developer creates a theory about whatever the estimate purports to measure. The theory entails what other behavior(s), tendency(ies), or construct(s), should be associated with what is allegedly being measured--in the past, present, or future. Then the developer attempts to provide data supporting the theory. There are at least four different ways to do this. The developer can show that the estimate (1) seems to predict elements of the theory, i.e., behaviors, tendencies, and constructs, according to the theory--viz., predictive validity; (2) seems to be associated with elements of the theory at the same moment in time--viz., concurrent validity; positively associates with other estimates of phenomena similar to terrorist threat--viz.,

convergence validity; and (4) does not associate or negatively associates with estimates of phenomena dissimilar to terrorist threat--viz., discriminant validity.

Unfortunately, we're still not yet out of the woods. For validity, everything depends on the theory. If the theory is wrong-headed, so will everything else. Even with the validating data just described, the program developer may end up creating and reinforcing a delusion--and as with many delusions, an entity that is not rational but very logical. Everything fits. Everything make sense--except that the basic premise is so far-fetched that the program and developer seems divorced from reality. As well, even if the theory seems appropriate, program developers may inadvertently or unethically choose convergent or divergent validity approaches that increase the probability such validities are demonstrated, even if they truly do not. For example, if a threat estimate seems to be associated with an acceptable predictive validity, the association may dissipate as the artifactual elements of the relationship are identified.

All of these problems--base rate, rates of true and false positives and negatives, social transformation of knowledge, reliability, and validity--need to be addressed to establish the merits of an antiterrorist program. (There are other problems as well--e.g., fact-opinion dichotomies, uniformity myths, behavior-construct approaches to empirical questions--which will be described in a future article on aviation terrorism.)

Now to the program itself. A comprehensive aviation antiterrorism program needs to provide threat estimates for events (1) on an aircraft; (2) on the flight lines; (3) at or in the terminals; (4) at other command, control, communication, and intelligence sites--e.g., air traffic control and global positioning satellite locations; (5) and at various terrorist planning and operations locations. The problems described above relate to estimating these events--things occurring which shouldn't, things not occurring which should. The optimum manner of estimating these events--e.g., through assigning meaning and weighted import to passenger, staff, population, environmental and ecological characteristics--consists of establishing an interdisciplinary working group continuously analyzing and integrating (1) contextual political, social, and economic data; (2) psychological and demographical data of individuals, groups, and organizations; and (3) personnel, operations, physical, and communications security realities of the moment. Out of this analysis and integration come not only threat estimates but security recommendations.

The organization(s) approving the program and authorizing and allocating funds need(s) to be persuaded that the program will be in continual flux--and that this flux does not indicate nonadaptive uncertainty, ignorance, or unethical urges to earn more money. Instead, the flux mirrors the real world--the world of continual change. There are enough "horror stories" about completely predictable, set, and rigid security programs which became "easy pickings" for political vultures.

Another vital component of an aviation terrorism program comprises procedures to optimize the cognitive, emotional, motivational, and behavioral skills--i.e., staff human factors--required for security personnel to employ security recommendations addressing threat estimates. Representative goals include decreasing non-task preoccupations leading to inattention, increasing "situational awareness," decreasing emotional processes contaminating the quality of task-judgment, increasing a task's intrinsic and extrinsic reinforcement--hopefully relating both to self-esteem, self-worth, and self-identity--and increasing the overlearning of security contingencies.

The best way to implement a training program comprising continually changing threat estimates and staff human factors would be through some variant of virtual reality technology (VRT.) (For a discussion

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of current VRT research, see the January 31, 1997 Issue of IBPP, Vol. 1, No. 10.) Whether employing futuristic headgear, trendy gloves, or single computer screens, VRT would facilitate experience with situations too dangerous, expensive, continually changing, or unlikely--again, terrorism usually being a low- frequency, high-impact event--to regularly confront for real. Employing VRT allows the program developer to exploit research in VRT applications as diverse as educational technology, aviation and aerospace human factors, rehabilitation medicine, psychiatry, and cultural studies. Although VRT would be the usual training mode, "real" training exercises would be interspersed as well.

An additional word about research design and statistics supporting the analysis of aviation antiterrorism programs. (1) Using the simplest possible design and statistics often is most preferable because they may be (a) based on the fewest constraints about true threat estimate values, (b) less likely to be applied erroneously, and (c) easier to communicate to other program members and outside researchers and consumers. (2) Theories of terrorism and antiterrorism are not just precursors of empirical research. They also are its result and a vital cog in a continually iterative relationship involving empirical research. Flaunting an antitheoretical stance is bad applied science and may lead to recommendations that have as disastrous consequences as a high false negative rate. (3) Besides statistical correlations, antiterrorist threat estimates should be based on the magnitude of relationships, e.g., the probability that a terrorist event may follow given a certain psychobiographical indicator. (4) There's a significant need for program developers to be attuned to self and other deception, reactance, demand characteristics, and stimulus pull among research subjects whose reactions help establish the antiterrorist program and subjects in resulting training programs.

For organizations that are multilocal or even multinational, the greatest challenge will be having many different kinds of training to reflect local conditions. (This training will comprise generic program components which apply to all as well as the unique local aspects.) At this point, organizations can best confront terrorism--a problem which in different forms has existed throughout human history and in all probability will continue to do so. (See Azar, B. (February, 1997.) Analyzing analyses. APA Monitor, (<http://www.apa.org>); Choi, Jin-Tai. (1994.) Aviation terrorism: Historical survey, perspectives, and responses. NY: St. Martin's Press; Jenkins, B. (1990.) The terrorist threat to commercial threat to commercial aviation. TVI Report, 9, 1-14; The role of technology in combating terrorism: A symposium. (1987.) Terrorism, 10, 211-287; Wilkinson, P. (August, 1992.) Designing an effective international aviation security system. Technology and Terrorism Seminar. pp. 103-114; Wilkinson, P. Aviation security: The fight against terrorism. Interdisciplinary Science Reviews, 18, 163-173.) (Keywords: Psychobiography, Terrorism, Typology.)