Psychological/Behavioral Considerations in the Management and Analysis of Extreme Events

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The impact and consequences of catastrophic events, whether natural, accidental, or malevolent, are heavily influenced by people's behaviors, perceptions, and emotions. Behavioral research presents compelling evidence that people's motivation, perception, and actions often diverge in systematic and important ways from those envisioned either by normative analyses or through intuition. The dominance of the rational-agent model in the assessment and management of risk, in game-theoretic and cost-benefit analyses, and in many areas of policy, is likely to yield misguided impressions about the role and nature of a variety of behavioral and psychological factors. Descriptively valid behavioral assumptions will prove essential in thinking of risk management in an uncertain world.

Behavioral considerations ought to figure prominently in analyses concerning the perceptions and actions of victims, perpetrators, law enforcement agents, or policy planners. One important factor that distinguishes genuine behavioral analyses from standard normative accounts, and makes life significantly more difficult as a result, is that true behavioral analyses will often depend on the specific details and nuances of the particular case. Whereas standard analysis may rely, say, on observed probabilities and on tangible costs and benefits, a good behavioral account would need to consider not only a variety of intangible factors but also the manner in which these are perceived by individual actors in particular contexts.

Perhaps the most profound tension between the normative and behavioral perspectives is the fact that normative analyses tend to be based on figures as they can best be gauged. The costs, benefits, probabilities, risks, are all evaluated with sophistication and insight, as are the optimal strategies presumed to be adopted by agents who see things in just those sophisticated ways. Behavioral analyses, on the other hand, hinge on how the various factors are perceived by regular human actors: These can involve idiosyncratic, intangible, perhaps misunderstood costs and benefits, (mis)perceived likelihoods, misdirected or ineffective strategies, etc. Seen in this light, normative analyses, where, for example, some probabilities can be precisely computed, may often prove more straightforward than their behavioral counterparts, wherein a probability may be perceived in a multiplicity of ways. A serious inclusion of behavioral factors is unlikely to simplify our task, and in many instances it may muddle it. But by not incorporating genuine

behavioral considerations, we will not thereby avoid their impact - we will just end up implicitly anticipating the wrong behaviors.

As an example, consider some of the severe punitive measures (e.g., "3 strikes and you are out") recently incorporated into the American legal system. The logic of deterrence behind these laws is based on the assumption that, among other things, potential criminals consider the severity of the expected punishment in deciding whether or not to engage in the behavior. Instead, it appears that the severity of punishment, particularly in the context of relatively minor crimes, is often unknown and of little interest to potential criminals. A consequence of this is that extremely severe punishments are meted out to individuals who are presumed to know about and be deterred by the potential consequences of committing the crime, but often don't. In general, a misunderstanding of the factors that drive or restrain people can occasionally promote policies that prove terribly ineffective, if not outright bizarre.

Following are a few thoughts about a variety of domains where a more insightful behavioral analysis may prove of great worth.

Ordinary people's assessments

We know that people's perception and assessment of risk are systematically influenced by factors that lie outside the purview of standard analyses. Our thinking about behaviors that might impact on extreme events as well as our forecasting of public response to such events must take such non-normative factors into account. How outcomes are envisioned, or described, can have a substantial impact even when, logically, the alternatives all describe the same actual state of the world.

The difficulties raised above can be substantial even when things are processed with relative calm and ease. Things get significantly worse, of course, when people are acting under great pressure, or when they are depressed, angry, scared, or just plain anxious or confused. In light of what we know about people's relative insensitivity to minor variations in labeling, for example, it is questionable to what extent the newly devised Homeland Security Advisory System (HSAS) is likely to be able to convey the intended nuances of the declared "levels of vigilance, preparedness, and readiness" to citizens who need to decide "what action to take."

Analysts' assessments:

The analysis of extreme events must take into account the likelihood of human error or intention. One may think of this as material- or equipment-failure of a psychological variety. This often requires relatively sophisticated analyses of human agents. The relevant dimensions may be reasonably clear in some circumstances (e.g., pilot error in a cockpit), but more subtle and ephemeral in others, such as an analysis of people's potential willingness to die in committing a terrorist act. Both Israeli and American intelligence communities, for example, have had to revise their profile of a suicidal terrorist, from an uneducated man living a life of poverty and hopelessness, to middle- or upper-middle class men, and occasionally women, who are often

highly educated. Note that the dimensions that enter into these analyses are complex, involving social, political, and religious considerations, among others. But without this, analysts' ability to gauge the likelihood of events is severely hampered, just as it is when we do not know the failure rate of the relevant materials or equipment. Following the 9/11 attacks, most intelligence analysts expected another attack soon to follow. Given the state of the American psyche, it was thought that even an attack significantly smaller in magnitude (say, a solitary suicide bomber is a random Gap store in any mall in America) would be sufficient to paralyze the pre-Christmas American economy in profound ways. Those expectations led to a series of vague and demoralizing public warnings; yet, the envisioned attack never occurred, and this has continued to baffle analysts. Assuming that (despite many arrests) enough people with the required ill-will continue to roam free on American soil, assuming that they have easy access to the minimally required materials, assuming that they have heard on one of the many talk-shows of the expected paralysis of the American economy pursuant to a follow-up attack even if they did not think of it themselves, why did it not happen?! Is it that, at least in the American context, the willingness to die as a terrorist is actually much rarer than we might think? (It is now assumed that only a handful of the 19 hijackers of 9/11 actually knew it to be a suicide mission.) And how should that alter the relevant strategies and analyses of the relevant public and private sectors?

Perpetrators' assessments:

Because they often are motivated by unfamiliar cost-benefit analyses, perpetrators' actions may be difficult to predict based on standard rationality assumptions. At the same time, such actions may be influenced by factors that can be learned and at least partly understood. Empathy, fear, hatred, as well as a variety of political, religious, and assorted sectarian beliefs are all features that could be used to adjust the predicted and, with the right interventions, perhaps the actual probabilities of intentional harmful acts. As was made exceedingly clear in events surrounding the 9/11 disaster and its aftermath, there is a great need for sophisticated understanding of the relevant cultures, religions, social norms, and belief systems. All of which, in turn, need to inform our thinking about the relevant uncertainties surrounding possible extreme events.

People's reactions

The analysis and management of extreme events depend critically on a successful forecasting of people's reactions and ensuing behaviors. Will people evacuate in an orderly fashion or will they panic? Will they be able to gauge which is the best route to follow, or do they need more specific guidance? Some have claimed that the evacuation routes of the WTC were not designed wide enough for the massive evacuation needs that developed. Others worry about ways to quarantine people and ensure their cooperation in avoiding contact with others in case of exposure to chemical weapons. In general, people's reactions, particularly in the context of extreme events, are hard to predict and often difficult to simulate; yet, they may prove critical for the outcomes and for our ability to shape them.

Another important factor are people's emotional and hedonic reactions. For example, the massive sleeplessness that apparently impacted on the US soon after 9/11, or the perpetual (possibly low-level) anxiety that lingers among Californians with regard to earthquakes.

Along with the other issues raised above, what is important to realize is the following:

1) A variety of psychological / behavioral factors are likely to prove critical to our management and analysis of extreme events.

2) A majority of these factors do not naturally arise nor are they addressed in the context of normative assessment and management of risk, nor in game-theoretic or even in cost-benefit analyses.

3) The relevant psychological/behavioral factors and their potential impact are often not available to intuitive introspection. Instead, a serious empirical program needs to be pursued and the right behavioral insights and predictions derived.