

Coping With Extreme Events

Kenneth R. Hammond

The conference on extreme events is timely with respect to developments in the field of judgment and decision making. If the question before the conference is how to increase the cognitive competence of citizens, command and operational personnel, as well as policy makers in coping with extreme events, then it fits with the growing emphasis in the field of judgment and decision making on the interaction between the ecology of events and the cognitive activity of the decision maker.

In my view, the first step in this effort will require a systematic, empirically justified description and classification of various types of catastrophic events. At best this means the development of a theory of such events; a more modest and possibly reachable goal would be to produce a classification of them, differentiated with respect to the appropriate psychological, as well as physical, dimensions. At present, however, the psychological dimensions remain obscure. Nevertheless, experience and folk lore (both highly fallible sources) suggest a beginning. Among dimensions that suggest themselves for differentiating extreme events are: the time period of the event, the time available for response to it, the size of its impact, the uncertainty of its consequences, understanding of, or mystery surrounding, the causal conditions. And it is variation in these, and others as yet unknown, (as well as the purely physical dimensions) that evoke the different cognitive responses of interest.

For example, because they tend to happen quickly and without much notice certain extreme events (earthquakes, explosions) will very likely induce immediate intuitive judgments on the part of the citizens affected. That is, when an earthquake occurs, people will be guided by their intuitions to run outside or hide underneath some object. A tornado will almost certainly induce intuitions to hide below ground. Exactly which intuitions will occur in the wide variety of other extreme circumstances is not well known or documented, however. It is uncertain what people's intuitions will tell them to do in the event of a flood; run down stream? upstream? up the bank? Currently policy makers apparently believe that people's intuitions will NOT tell them to run up the bank, although present wisdom urges that course. So a policy has been instituted to post signs on many mountain streams instructing people to engage in that (presumably) counterintuitive activity in case of a flood. (What course the elderly or others who cannot run up a bank should take is not clear.)

The effectiveness of this policy is unknown to me. And I have no idea of what intuitions are evoked by those who suffer a flood on the flatland rather than in the mountains, nor do I know what instructions are given to them. Nor do I know the effectiveness of counterintuitive instructions in general, although I do know that they are not always successful. In short, a sharply focused survey will be required to determine which extreme circumstances will evoke which intuitions, and when these will be appropriate or inappropriate, and when they need to be (or can be) countermanded by instructions or training. (The military may serve as a model in the latter respect.)

It is also known that many extreme events have evoked analytical and quasi-rational responses as well as intuitive ones among command and operational personnel. In my own studies (Hammond, 2000) of cognitive responses to extreme events by command personnel I have found a wide variety of cognitive reactions (even creative ones) to occur across the entire continuum from intuition to analysis in the most demanding and life-threatening circumstances. Consequently, it is my belief that only careful and extensive surveys of extreme circumstances will enlighten us in this regard. (The exemplary behavior of the Air Traffic Control personnel during the recent earthquake at the Seattle airport in their attempts to restore operations is a prime example of successful creative analytical cognitive activity under extraordinary conditions. Neither panic, or other emotional responses, seem to have occurred.)

Would survey-based knowledge about ecologies of extreme events and cognitive responses to them provide useful information to those concerned with improving public policy with regard to coping with extreme events? Yes, provided we are able to agree on the cognitive dimensions of interest and thus develop a research program. For if we can discover the relation between the ecologies of various extreme events and the cognitive activities induced by them (both by citizens and by command and operational personnel) then various cognitive activities can be examined, evaluated and changed if necessary and possible. No training program is likely to be successful without discovering that relation.

A systematic examination of the ecological properties of various extreme events will also enable us to discover the cognitive activities they hold in common, as well as their differential effects on decision making by both citizens and command and operational personnel. Such a systematic examination should give rise to a theory of the ecological properties of various extreme events to be considered and make it unnecessary to resort to (highly fallible) common sense and folklore.

I advocate the use of the above approach because in a post-hoc study of judgment and decision making in a variety of extreme events (e.g., fire, explosion, aviation disasters and others) I found it to be useful. Whether it will provide an acceptable conceptual framework for the research to be contemplated remains to be seen.

Hammond, K. R. (2000). *Judgments Under Stress*. Oxford University Press, N.Y.

Comments submitted after the workshop

Kenneth R. Hammond

I. A Conceptual Framework for a Research Program on Extreme Events

[Note: in this outline I restrict myself to merely noting the topics of interest and their relation to one another]

Premise 1: Judgment and decision making is of critical importance in relation to extreme events

Premise 2: Three levels of organizational structure will be found in all agencies created to cope with such events;

1. the policy making level
2. the command and control, or operational, level
3. the citizen level.

(Although these three levels are common to all agencies concerned with extreme events, variations in structure within these categories are to be expected.)

Premise 3: Judgment and decision (J/DM) processes by persons within these categories will differ sharply, therefore it is important to distinguish among them when planning research on J/DM for periods before, during, and after the events.

Premise 4: Although J/DM (that is cognitive) processes will differ sharply between persons within these categories, all such processes can be described within a single, comprehensive J/DM theory known as Brunswikian theory.

Premise 5: If the above is true, or even merely mainly true, it is a statement of such importance that it deserves, at a minimum, careful consideration before rejection, and at a maximum, funding for research support. (Note: the author is not an applicant for support.)

II. Illustrations of Premises

A. J/DM at the policy level

1. Examples of hypothetical policy statements:

- a. "triage" will not be permitted at the site of an extreme event because of religious and moral objections by members of the policy board

b. Rescue attempts shall not be made in circumstances where it can be shown that the persons involved ignored warnings

c. Rescued persons will be required to pay for their rescue

2 Example of research problem:

we know little about the nature of policy statements or how policy boards arrive at policy statements. What criteria should be placed on policy statements? Should they be required to meet criteria of process rationality? (I.e., must all such statements be coherent with one another: are contradictions accepted?) How many policy statements are in place before the extreme event? How comprehensive are they? How many actually control behavior at the site of the event? To what extent are such statements communicated to other agencies affected by them?

a. General hypothesis: a survey of the policy statements of 100 policy boards would provide highly useful information about J/DM at the policy level regarding extreme events. Such information would be valuable to such boards as well as researchers.

b J/DM hypothesis: Members of policy boards strive to develop *coherent* policy statements based on a combination of *analytical* and *intuitive* cognitive processes. The result is that policies are frequently confused and difficult to employ and communicate without inducing conflict during and after the event.

c. Sociologists would be most likely be able to carry out this research

B. J/DM at the command and control level

1. Examples of command and control J/DM concerning orders and deployment of resources

a. “we need search dogs at this site immediately”

b. “ there are people alive in there; we need medics right now

c. “ this structure is unstable! everyone out now!”

2. Example of research problem

a. critique of training

i. will require survey of cognitive demands on command and control personnel; to what extent are such persons expected to rely on analytical cognitive activity, with particular attention to time pressures?

b. General hypothesis: training does not include reference to distinction between analytical and intuitive demands; such training would improve performance

c. J/DM hypothesis: a survey of training would show which tasks demand training in analytical work

d. Note: see my “Judgments Under Stress” for numerous field examples of analytical and intuitive judgments by command and control personnel

C. J/DM at the citizen level

1. By citizen I refer to persons without training for behavior in emergency situations

2. Examples of citizen J/DM

a. Prior to the event

1. precautionary J/DM (insurance, etc)

2. anticipations, predictions, expectations

b. During the event

1. judgments under “stress”

c. After the event

1. regret

3. Examples of research problems

a. some research has already been carried out on insurance choices and anticipations; these will serve as starting points

Addendum

Decision makers are not likely to be free to choose whether to employ a correspondence strategy or a coherence strategy; the problem itself or the social context usually determines which strategy will be employed. For example, if the problem demands accuracy (e.g., weather prediction) then the correspondence strategy is most likely to be chosen, because that is all the consumer is interested in. But if the problem is one of formulating a policy then defensibility of the judgment is paramount, and the decision maker will seek coherence, because coherence provides the best defense (if accuracy is irrelevant or impossible to ascertain).

Choosing tactics is more likely to be within the decision maker's control, however, and that is why the choice between intuitive tactics and analytical tactics is often assumed to be a matter of personal style. There is some truth to that (though I confess that I don't know how much) but it is hardly a well-researched area. No doubt some people prefer to use intuitive tactics rather than analytical ones, no matter what the circumstances are, and possibly vice versa. But I believe that it is the task conditions that induce the mode of cognition that will be employed. And I have some research findings on my side.

It is easy to see why different task conditions evoke different cognitive tactics. A simple example informs us; analysis takes time, intuition doesn't. So if the task situation doesn't allow time, you won't be able to engage in analytical cognition, even if you prefer it. Intuition, on the other hand, is indifferent to time; it has no use for time because intuition reaches its judgments very quickly. So in this case personal style has nothing to do with the choice of tactics. Minimal time for a judgment always means intuition will be employed irrespective of personal preferences.