Who's Afraid of a Poor Old-Age?
Risk Perception in Risk Management Decisions

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Abstract

Retirement planning and voluntary as well as mandated contributions to pension plans require a series of decisions under uncertainty. Those range from initial decisions about the magnitude of contributions and allocation across different investment options and choice of option providers, to periodic reviews of these decisions in light of possible changes in goals or circumstances. Behavioral decision research provides a series of lessons about how such decisions are made and thus for the optimal design of pension plans. This chapter will addresses the role of affect in perceptions of risk and subsequent decisions to take actions that reduce or manage perceived risks. I review evidence showing that individual and group differences in risk perception, much more than differences in risk attitude, are responsible for differences in the choices people make. If people fail to be alarmed about a risk or hazard, they fail to take precautions. Risk perception, on the other hand, is predictable from general characteristics of the hazard and from prior, personal history. The risks associated with inadequate retirement planning have all the characteristics associated with hazards that do not evoke strong visceral reactions.

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Risk Perception in Risk Management Decisions

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The initial decision to save anything at all, the consideration of plan providers and investment vehicles, the periodic examination and readjustment of one's investment portfolio, all constitute a risk management process with important individual and societal consequences. There is little question that the financial and social implications of low saving rates and of inappropriate investment strategies are significant and far-reaching. And yet the risk of being financially ill-prepared for one's sunset years keeps few of us awake at night, and it engenders little legislative enthusiasm among our politicians. This chapter argues that it is the lack of any visceral perception of risk or danger that is responsible for the inadequate allocation of personal and collective resources to deal with this issue. By inadequate allocation of resources, I refer to both financial resources and, perhaps even more importantly, attentional resources.

Behavioral decision research is well-positioned to predict the neglect we observe. In what follows, I review theory and empirical evidence to document two claims:

● Affect is the wellspring of action: When we encounter or anticipate consequences that engender positive affect, we act in ways that will maintain those consequences. Negative affect, on the other hand, serves as a trigger to take action that will avoid aversive consequences in the future. Fear, for example, motivates us to remove ourselves from the fear-provoking situation or to change the environment in ways that reduce the fear. Visceral reactions such as a fear or anxiety serve as an early warning system that some risk management action is in order.

● Perceived risk, and in particular, people's visceral reactions to risky situations, often has little correspondence to other measures of risk that consider either the information-theoretical

uncertainty of outcomes or the magnitude and dispersion of material consequences. Instead, visceral judgments of risk (which fuel self-protective action) are determined by a small number of situational characteristics that elicit affective reactions as part of our evolutionary heritage.

In what follows, I show that the risk of providing inadequately for one's retirement years and the risk of being vested in underperforming assets are ill-suited on every dimension to elicit subjective *feelings* of risk. As a result, it is not surprising that people fail to allocate the attentional resources to retirement planning and retirement saving maintenance that they deserve, based on their financial importance to our lives. I conclude by considering the implications of psychological models of decision-making for the design of procedures or institutions that improve on the current state of affairs.

Behavioral decision research and theory

Associative/Affective vs. analytic processing. People process information in two fundamentally different ways, mediated by different neural substrates when they make judgments or arrive at decisions (Chaiken and Trope, 1999; Epstein 1994; Sloman, 1996; Slovic, Finucane, Peters, and MacGregor, 2002). The first system, which is evolutionarily older and thus shared with lower animals, works by way of similarity and associations. It requires real world knowledge (i.e., experienced decision makers make better decisions than novices), but its basic mechanisms seem to be hard-wired. Experience-based thinking is intuitive, automatic, and fast. It relies on images and associations, linked by experience to emotions and affect (feelings that something is good or bad). This system transforms uncertain and threatening aspects of the environment into affective responses (e.g., fear, dread, anxiety) and thus represents *risk* as a *feeling* (Loewenstein etal., 2001), which tells us whether it is safe to walk down a dark street or

drink a strange-smelling liquid. The second processing system works by analytic algorithms and rules, including those specified by normative models of judgment and decision making (e.g., the probability calculus, Bayesian updating, formal logic, and utility maximization). It is slower and requires awareness and conscious control.

These two processing systems typically operate in parallel and interact with each other. Neuroscientists have demonstrated that logical argument and analytic reasoning cannot be effective unless it is guided by emotion and affect (Damasio, 1994). We become aware of the simultaneous presence and operation of the two systems mainly in those situations where they produce different outputs. Thus, the question of whether a whale is a fish produces an affirmative answer from the similarity-based processing system ("a whale sure looks like a big fish"), but a negative response from the analytic, rule-based system ("it can't be a fish because it is warm blooded").

Affect and risk perception. Much evidence from cognitive, social, and clinical psychology demonstrates that risk perceptions are influenced by association- and affect-driven processes as much or more than by analytic processes (Loewenstein etal., 2001). In cases where the outputs from the two processing systems disagree, the affective, association-based system usually prevails. Even in seemingly "objective" contexts, such as financial investment decisions, subjective and largely affective factors have been shown to influence perceptions of risk. For example, Holtgrave and Weber (1993), showed that both affective variables (e.g., dread) and cognitive-consequentialist variables (e.g., outcomes and probabilities) are necessary to predict people's perception of risk in the financial and health/safety domain.

Differences in risk perception lie at the heart of many interpersonal and societal disputes about the best course of action. They appear to be the result of differences in affective reactions

to risky situations as the result of prior experiences or general orienting disposition or worldview (Dake, 1991). Familiarity with a risk (e.g., acquired by daily exposure) lowers perceptions of its riskiness, with the result that technical experts perceive the risk of such technologies as nuclear power generation to be much lower than members of the general public (Fischhoff et al., 1978). Hertwig etal. (2003) describe the affective processing and updating mechanisms by which personal experience with rare events (e.g., negative consequences that have a low probability of occurrence) leads to a greater risk taking (and lower risk perception) than the statistic description of the same events. Numerous studies show differences in risk perception between men and women, with women judging health, safety, and recreational risks (Slovic, 1987; Finucane et al., 2000; Flynn et al., 1994) and also financial and ethical risks (Weber et al., 2002) to be larger and more problematic than men. This gender difference in perceived riskiness reverses only in the social domain, in which women have greater familiarity with risks and risk taking (Weber et al., 2002). This tendency of women to worry more about financial risks is consistent with the result observed by Sethi-Iyengar et al. (this volume) to enroll in voluntary pension plans in greater numbers and make larger contributions. Weber and Hsee (1998, 1999) find differences in the perception of financial risks between American and Chinese investors—with Chinese investors perceiving the risks of investment options to be lower and showing greater willingness to invest in risky options—and then explain these differences in risk ratings and expressions of worry by cultural differences in social collectivism. Chinese investors tend to have larger social networks (family members and associates) to which they can turn for material support than American investors; these networks provide implicit insurance against catastrophic risks, and thus lower both the objective and experienced level of risk.

These studies and many others show that differences in risk perception but not (so much) differences in risk attitude are responsible for group or individual differences in risk-taking behavior, i.e., differences in preference for risky decision alternatives (Weber and Milliman, 1997). Risk taking and risk attitude have been conceptualized in several ways (Weber 1999, 2001a). The most promising and consistent approach seems to be provided by models that allow for the fact that individuals or groups may differ in their subjective *perception of risk* and in their *risk attitude*, (i.e., reaction to risk), which some people find exciting and pleasurable (and thus seek out) and most people evaluate negatively (and thus avoid). While there are individual differences in risk attitude (i.e., positive or negative reaction towards risk, as it is perceived), probably mediated by biological differences in optimal arousal levels, differences in risk perception (mediated by culturally determined differences in worry and concern about possible adverse consequences) are a far better predictor of risk taking.

Measuring risk perception. At least three different paradigms have studied subjective risk perception, with the goal of explaining individual and group differences in perceived risk (Weber, 2001b). Studies within the first measurement paradigm, known as axiomatic studies, have focused on the way in which people subjectively transform objective risk information (i.e., possible consequences of risky choice options such as mortality rates or financial returns and their likelihood of occurrence) in ways that reflect the impact that these events have on their lives (c.f., Weber, 2001b; Palmer, 1996). The conjoint-expected risk model, for example, allows for the possibility that upside variability in financial returns has a different and usually smaller effect on perceived riskiness than downside variability (Luce and Weber 1986). Studies within the second paradigm, called the socio-cultural group, have examined the effect of group- and culture-level variables on risk perception (e.g., Douglas and Wildavsky, 1982). Research within

the third or psychometric paradigm is of greatest interest to our discussion, since it explicitly addresses people's emotional reactions to risky situations. It shows that these psychological/affective risk dimensions strongly influence judgments of the riskiness of physical, environmental, and material risks in ways that go beyond their objective consequences (Fischhoff et al., 1978; Slovic et al., 1984).

Dread and predictability as determinants of perceived risk. The psychometric paradigm uses psychophysical scaling and multivariate analysis techniques to identify the characteristics of hazards that affect people's quantitative judgments about their perceived riskiness. Figure 1 shows a two-dimensional factor space that has been replicated across numerous studies covering both lay people and technical experts judging large and diverse sets of hazards in multiple countries (Slovic, 1997). Factor 1, labeled "dread risk," captures aspects of the described hazards that speed up our heart rate and make us anxious as we contemplate them: perceived lack of control over exposure to the risk, with consequences that are catastrophic, and may have global ramifications or affect future generations. At its high (right hand) end, we find such hazards as nuclear weapons fallout, nuclear reactor accidents, or nerve gas accidents or attacks. Factor 2, labeled "unknown risk," refers to the degree to which exposure to a hazard and its consequences are predictable and observable: how much is known about the hazard and is exposure easily detected? At the high (top) end, we find chemical hazards and radiation, which might kill exposed parties without their awareness, and DNA technology which has unforeseeable consequences not yet tested by time.

Perceived risk of inadequate pension saving. It is an interesting and instructive exercise to place the hazard of not having adequate financial means in one's old age into the two-dimensional space of Figure 1. Most people would probably characterize it as a risk that is

controllable, non-fatal, observable and predictable, which would place it into the "harmless—harmless" lower-left quadrant, comparable to such hazards as riding a bicycle or owning and operating a home swimming pool.

Figure 1 here

Yet in addition to its psychological risk-dimension profile, other factors also contribute to the fact that the prospect of financial destitution in old age carries low emotional intensity and perceived threat. Trope and Liberman (2003) argue convincingly that people construe future events differently, depending on their temporal distance to them. In particular, events in the distant future (an invitation to give a conference paper two years from now, or retirement 20 or 30 years from now) tends to be construed in terms of abstract features, whereas events close to us in time (the upcoming trip on Monday to attend the long-scheduled conference, or the possibility to escape winter chills for a week with an advertised last-minute travel special to Bermuda) are construed in very concrete terms. A number of interesting behavioral phenomena derive from this construal difference. One difference between the abstract vs. concrete representation of the consequences of possible actions important for our discussion lies in their discrepancy in affective strength, or visceral salience and impact. Abstract representations of consequences in the distant future (e.g., "living on 60% of your current income") lack concrete associations connected to emotional reactions, essentially by definition. In contrast, concrete representations of choice alternatives in the present or in the near future (e.g., "buying the 5-bedroom, 4 bath, ocean-front bungalow you saw last week, that will provide space and recreation for your growing family") tend to be saturated with affective associations.

The difference in the richness and concreteness of the representation of anticipated consequences of close vs. distant consequences (and thus in their affective strength) may well lie

at the root of observed problems of self control, arising from impatience and impulsivity in obtaining desirable outcomes (Mischel etal., 1969, Laibson, 1997) or procrastination with undesirable tasks (O'Donoghue and Rabin, 1999). Duflo and Saez (this volume) drew the analogy between obstacles to adequate pension saving and obstacles to successful dieting, and they address the self-control issues therein. Both pension saving and dieting require the sacrifice of concrete, immediate, benefits, for the sake of abstract, distant goals. While these phenomena can and have been modeled by hyperbolic time discounting functions (Ainslie, 1975; Loewenstein and Elster, 1992), at a behavioral process level it most likely is the strong positive affect associated with immediate consequences that drives impulsive consumption decisions. The affective impoverishment of both the positive and the negative distant future consequences of current actions related to retirement saving puts any decision options that would increase positive consequences and decrease negative consequences in the distant future at a distinct disadvantage.

Affect, risk perception, and action. Visceral factors, including emotions and affect, have a potent impact on behavior (Loewenstein, 1996). In general terms, visceral states such as hunger or fear have the effect of focusing attention and motivation on activities and forms of consumption associated with the visceral factor. In the context of risk management, the specific hypothesis we propose is the following: a visceral perception of some risk is a necessary condition for any action taken to manage the risk. Putting it negatively, a purely analytic judgment of risk will have little or no impact on behavior. In situations where choice options with affective reactions to possible consequences compete with choice options that have no affective associations, people's attentional focus hypothesis will predict decisions that favor consideration of the former and neglect of the latter.

Is there any evidence for the view that the affect generated by a potentially dangerous situation drives action to reduce the affect-flagged risk, and that the absence (or removal) of the affective risk perception component reduces the likelihood of risk management actions? Evidence comes from a variety of sources. Damasio (1994) argues that decision makers encode the consequences of alternative courses of action affectively, and that such "somatic markers" are an essential input into future decisions. The prefrontal cortex of the brain seems to play a critical role in translating cognitive inputs from the cortex into terms that the emotional mind can understand. A study was conducted in which patients suffering damage to the prefrontal cortex and normal subjects played a game in which the objective was to win as much money as possible (Bechara et al., 1997). Players earned hypothetical money by turning over cards on which were written either monetary gains or losses. On any given turn, subjects could draw from any of four decks, two of which included high payments ($100) and two of which contained lower payments ($50). The high-paying deck, however, also included occasional very large losses, to the point where these decks had a net negative expected value. The investigators found that both normal subjects and prefrontal subjects began by sampling from all four decks, and both groups avoided high-paying decks immediately after penalty cards were encountered. But compared to normal respondents, prefrontal patients returned to the high-paying decks more quickly after suffering a loss. As a result of this tendency, the prefrontal subjects often went "bankrupt" in spite of a (reportedly) strong desire to win and a thorough understanding of the game. One possible interpretation of the prefrontal patients' behavior is that they even though they "knew" the high-paying deck was risky, their inability to experience fear when contemplating a draw from one of those decks made risky draws more palatable. Consistent with this interpretation, subsequent research has examined the behavior of normal subjects in this task, and it found that those people

who showed higher affective reactions to negative events (as measured by two standard scales) were more likely to sample from the lower-paying, but safer decks of cards (Peters and Slovic, 2000).

Additional support for the idea that affect plays an important role in behavioral intentions and actual behavior comes from a series of studies by Slovic and collaborators. In a typical study, participants free-associate about a concept of interest to the experimenters. For health-related behaviors such as smoking or exercising (Benthin et al., 1995), respondents might be asked to list everything that comes to mind when they here the word "cigarette" or "jogging." In the financial domain, they might be asked to list everything that comes to mind when they hear the name of a new company on the stock market (MacGregor et al., 2000). Trained raters subsequently evaluate the positive and negative affective connotations of the responses elicited in these free associations. Both for health-related behaviors and for investment decisions, these ratings of the (positive or negative) affective tone of respondents' free associations show strong correlations with their propensity to act. Thus, people with more positive imagery about exercising tend to exercise more, those with more negative imagery toward smoking tend to smoke less, and those who have more positive associations with a given company are more likely to buy its stock.

Single action bias. There is another class of suboptimal risk management response that is at least consistent with the role of affect as a flag for action. Weber (1997) coined the phrase *single action bias* for the following phenomenon observed in a wide range of contexts (e.g., medical diagnosis, farmers' reactions to climate change). Decisionmakers are very likely to take one action to reduce a risk that they encounter, but they are much less likely to take additional steps that would provide incremental protection or risk reduction. The single action taken is not

necessarily the most effective one, nor is it the same for different decision makers. However, regardless of which single action is taken first, decision makers have a tendency to stop from taking further action, presumably because the first action suffices in reducing the feeling of fear or threat. Thus Berbaum et al. (1991) found that radiologists looking for abnormalities in x-rays often halt their search after finding one lesion, leaving additional lesions undetected. Weber (1997) found that farmers who became concerned about climate change in the early 1990s were likely to change either something in their production practice (e.g., irrigate), their pricing practice (e.g., ensure crop prices through the futures market), or lobby for government interventions (e.g., ethanol taxes). But they hardly ever engaged in more than one of those actions, even though a portfolio of protective actions might have been advisable. The fear of climate change seemed to set a "flag" that some action was required, but it remained in place only until one such action was taken. Thus any single protective action had the effect of taking down the "impending danger flag."

While such behavior might have served humans well in evolutionary history, where single actions generally sufficed to contain important risks, purely affect-driven, single-action biased responses may not be sufficient in more complex environments where a portfolio of risk management actions is advised. The single-action bias illustrates the connection between visceral reaction to some risk and risk management actions. In the absence of a fear or dread response to the prospect of economic destitution in old age, purely affect-driven risk management decisions will likely result in insufficient responsiveness to the risk.

Implications for pension decision making

Our review of the behavioral decision literature in tells us a great deal about how retirement saving decisions ought to be guided and structured. We structure our consideration of

implications around the different component decisions that people encounter as part of the retirement risk management process. There are at least three classes of decisions: (1) the initial decision to save towards retirement at all, above and beyond any legally mandated contributions, and how much to put away; (2) choice between plan providers and investment vehicles; and (3) the decision to periodically examine and rebalance one's investment portfolio. Since others (Sethi-Iyengar et al., this volume; Statman, this volume) have plenty to say about behavioral decision research results that speak to decisions in Class 2, I restrict myself to implications regarding decisions in Classes 1 and 3. In the course of considering lessons and implications, I also think of other decision situations offering useful parallels for retirement investment decisions.

Whether to save for one's retirement and how much. These decisions clearly suffer from the lack of attention to distant consequences of one's actions (i.e., the disproportionate temporal discounting) that people experience when considering tradeoffs between choices that result either in sacrifices in consumption now, or in sacrifices in consumption in the distant future. I have argued that the reason for this attentional neglect lies in the abstract representation of distant-future consequences and in the psychological risk dimension profile of the hazard. Contemplating the consequences of inadequate pension saving does not result in an affective reaction of fear or worry. As a result, no "flag" gets set that indicates the presence of some "clear and present danger" which mandates some protective action. In addition to retirement saving decisions, individual or societal decisions to manage such risks as climate change and species depletion fall into the same category of threats that fail to elicit fear or anxiety. In the absence of such anxiety, the impetus to take action is greatly reduced. A clear implication of this analysis is the prescription to engage decisionmakers in exercises that will concretize the

consequences of their current choices. If it is the abstract and often statistical nature of information about consequences in the distant future that is responsible for the lack of visceral reaction to potentially serious circumstances, we ought to find ways to turn those statistics into experiential consequences that *do* carry affective associations, perhaps in the form of simulation games that dramatize and illustrate life at 60 percent one's current budget levels.

Another factor distinguishing the retirement problem from the relationship between fear and action described above, is the fact that any contemplation of one's eventual demise and death is existentially disquieting and unpleasant. In this respect, retirement-related decision making is analogous to decisionmaking about organ donation or estate planning. Such decisions involve topics that decision makers find inherently unpleasant, and thus any consideration of these questions tends to be avoided, not because of lack of attention or because of lack of an affective signal, but because the topic generates negative affect in the present. Setting the right kind of defaults for decisions where such avoidance behavior might be expected may be the best way to help people make decisions more in line with their own preferences and long-term self-interest, and certainly more in line with societal interests. European countries, for example, differ in the default preference assumed when citizens fail to make a decision on whether or not to donate some or any of their organs after death. In those countries that assume, as a default, that people want to donate their organs (i.e., action is required to opt *out*), compared to those countries that assume that people do not want to donate their organs (i.e., action is required to opt *in*), the rates of declared and actual organ donations are dramatically larger, and they are typically closer to those proportion of people who express a positive attitude towards organ donations in opinion surveys (Johnson and Goldstein, 2003). In those cases where the deliberation necessary for to make a deliberate decision has aversive elements (e.g., the contemplation of one's own death), it

may well be a mark of enlightened paternalism to set non-action or non-decision defaults in ways that maximize the well-being of the reluctant decision makers over time (Statman, this volume). The experiments reported by Benartzi and Thaler (2003) show that the lessons from organ donation transfer to the design of voluntary pension investment plans. Making contributions the default outcome that happens when employees fail to make a deliberate decision seems to align participation and saving rates more closely to participants' long-term interests.

Whether and when to examine and rebalance one's retirement investment portfolio. In addition to low savings rates, retirement savings account maintenance presents another problem. Several studies show that the median number of changes that people make to their pension investment portfolio over their lifetime may be zero (Samuelson and Zeckhauser, 1988; Ameriks and Zeldes, 2000; Benartzi and Thaler, 2003). Part of the reluctance to spend time or energy on retirement saving maintenance decisions is undoubtedly related to the two mechanisms discussed in the last section. First, failure to take any maintenance action does not have consequences that frighten the decisionmaker in any way, and the taking of some action does not result in immediate delight. Secondly, every revisit of a retirement saving decision is an unwelcome reminder of pending decline and eventual death.

Recent behavioral decision research on decision modes, that examine the qualitatively different ways in which people make decisions, may provide some additional insights for the design of procedures or institutions to promote more optimal retirement saving behavior (Weber, 1998). This research suggests that people use a much broader range of decision modes than traditionally studied in psychology, economics, and management science. For example, Yates and Lee (1996) coined the term *decision modes* in their description of particular methods or strategies for arriving at decisions and distinguished between analytic, rule-based, and automatic

decision modes. Weber (1998) proposes a similar, though somewhat more differentiated taxonomy of modes. While the *analytic* decision mode of arriving at a decision by explicit or implicit weighing the costs and benefits of different alternatives has received most of decision-theoretical and empirical attention, a recent content analysis of 20th century American and Chinese novels, thought to be representative of contemporary decisions and decision processes, shows that only about one third of even the major decisions in these novels were described as having been made in an analytic mode (Weber et al., 2004). Two other decision modes were just as common, or even more common: *affect-based* decisions, in which people base their decision on their immediate, holistic, affective reaction to different choice alternatives, with affect-guided approach and avoidance reactions as the primary decision process (Epstein, 1994; Loewenstein et al., 2001); and *recognition-and-rule-based* decisions, where people recognize the decision situation as a member of a category for which a best action is known (Simon, 1990). As soon as the decision situation has been classified, an "if–then" rule is activated, which implements the known best action. Examples include the rule of a recovering alcoholic never to accept any alcoholic beverage, or a dieter's rule never to eat after five p.m. Many other explicitly and consciously rule-based decision situations involve self-control issues (Prelec and Herrnstein, 1991).

In sum, the evidence reviewed here suggests that cost-benefit decisions about whether to engage in some retirement portfolio review may not result in a decision that is in a person's long-term financial best interest. This is because the costs of taking action are immediate and concrete, and the benefits distant and abstract. Similarly, an affect-driven decision will not result in a retirement portfolio review. Failure to take action does not frighten people and anticipation of taking this action does not delight. Nevertheless, procedures that encourage the establishment

of rules (“once a year, when I get my annual account report, I review my investment portfolio”), analogous to the rules we set and follow about visiting dentists and doctors for checkups at regular intervals, and the use of a rule-based decision mode for this purpose, hold much stronger promise. Social influence techniques of the type discussed by Duflo and Saez (this volume) can be used to establish the required behavioral norms.

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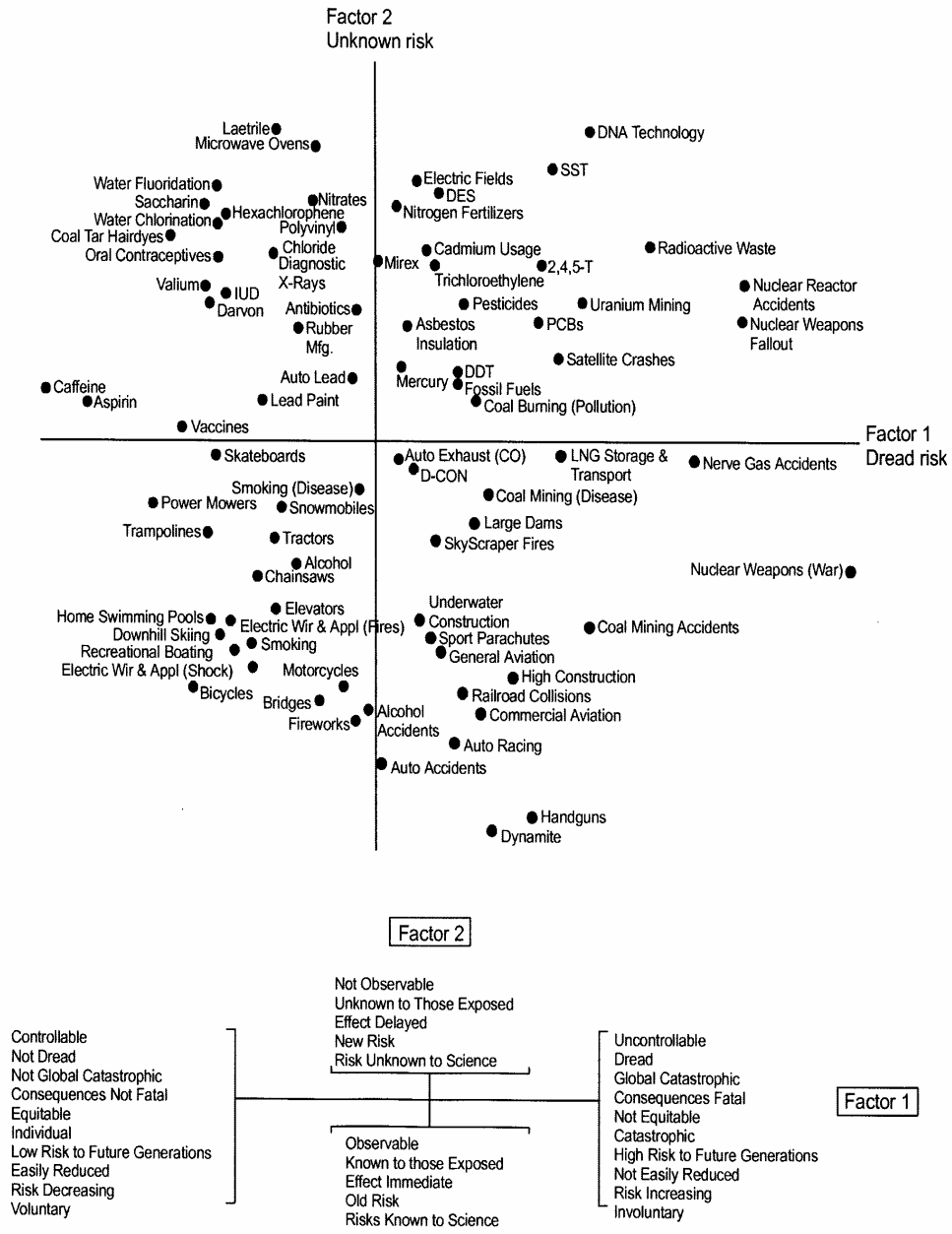

Figure 1. Location of 81 hazards in a two-dimensional space derived by factor analysis from the intercorrelations of 15 risk characteristics.
Note: Each factor is made up of a combination of characteristics, as indicated by the lower diagram.
Source: Slovic (1987).