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## **MANAGEMENT OF RISKS BY INDIVIDUALS AND ORGANISATIONS**

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### **ABSTRACT**

Understanding individual risk appraisal and safety in action is fundamental to risk assessment and managing risk within organisations. Because individuals manage organisational risks, it is vital to understand elements and processes that shape their personal risk appraisals. In this paper, individual risk appraisal is considered through a series of models, and parallels drawn with organisational risk assessment processes.

Models seeking to account for how individuals respond to hazard, danger and risk are typically deficient in two important ways. First, they are oriented towards individuals' reactions to 'pure' risks, and with exceptions, fail to consider benefits or utilities of risk-taking. A second shortcoming of most risk behaviour models is that they assume human rationality and absence of emotional components from risk appraisal and action in respect of risk. Thus they fail to reflect adequately the influence of human moods, emotions and motivations.

A model of risk-taking, describing individual risk appraisal and behaviour is proposed as a way of improving understanding how people appraise risk in their lives and to increase appreciation of individual factors affecting risk management within organisations. The models described here are considered in greater detail in Waring and Glendon (1998).

### **BACKGROUND**

In 1987, Andrew Hale and I proposed a model of individual behaviour in the face of danger (Hale and Glendon 1987) - see figure 1. The model dealt with the sequence of events that we postulated occurred when an individual was faced with some sort of physical danger. Among other applications, the model has been used to analyse errors that resulted in occupational fatalities in agriculture (Glendon, Thomas and Booth 1997, Thomas 1997).

However, like many models, ours was based on the assumption that individuals behaved (more or less) rationally when confronted with danger - i.e. that they proceeded logically through a series of decisions and

consequent actions. The model did not consider emotional aspects of risk taking, nor did it explicitly consider behaviour in respect of speculative risks - i.e. only pure risks were considered. While speculative risks (such as an investment) can have either (or both) positive and negative outcomes, pure risks (e.g. those associated with occupational hazards) can have only negative, or at best, neutral outcomes.

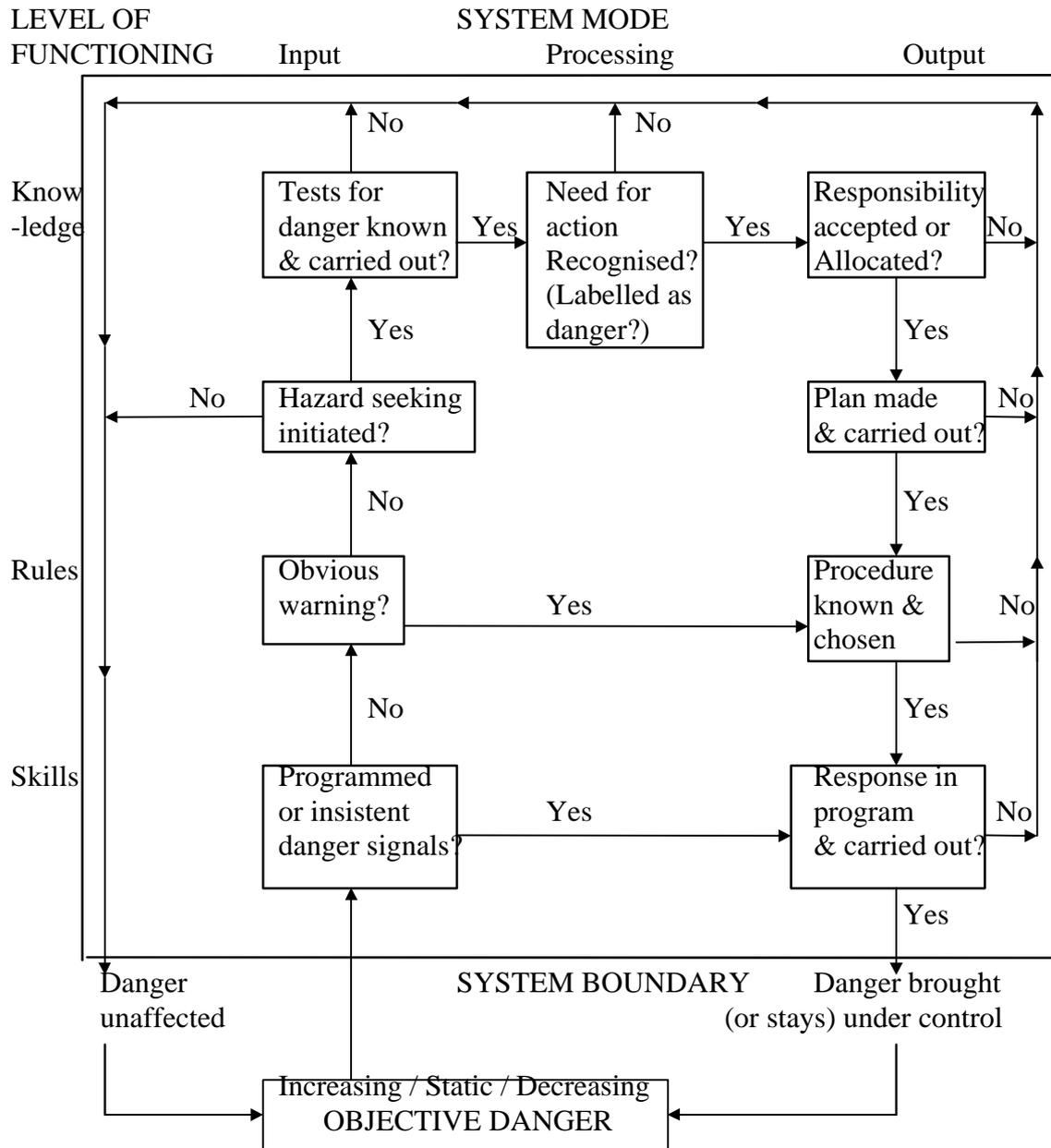


Figure 1 Individual Behaviour in the Face of Danger Model (Hale & Glendon 1987)

### RISK AT DIFFERENT LEVELS

While risk appraisals are strongly influenced by each individual's unique experiences they are also part of organisational functioning. Possible links between components are shown in figure 2. When strategic decisions involving risk are made within organisations, individual appraisals by key people are important. These appraisals are mediated (e.g. supported or influenced) by factors outlined in figure 2 - including technology, resources, power relations and organisational culture.

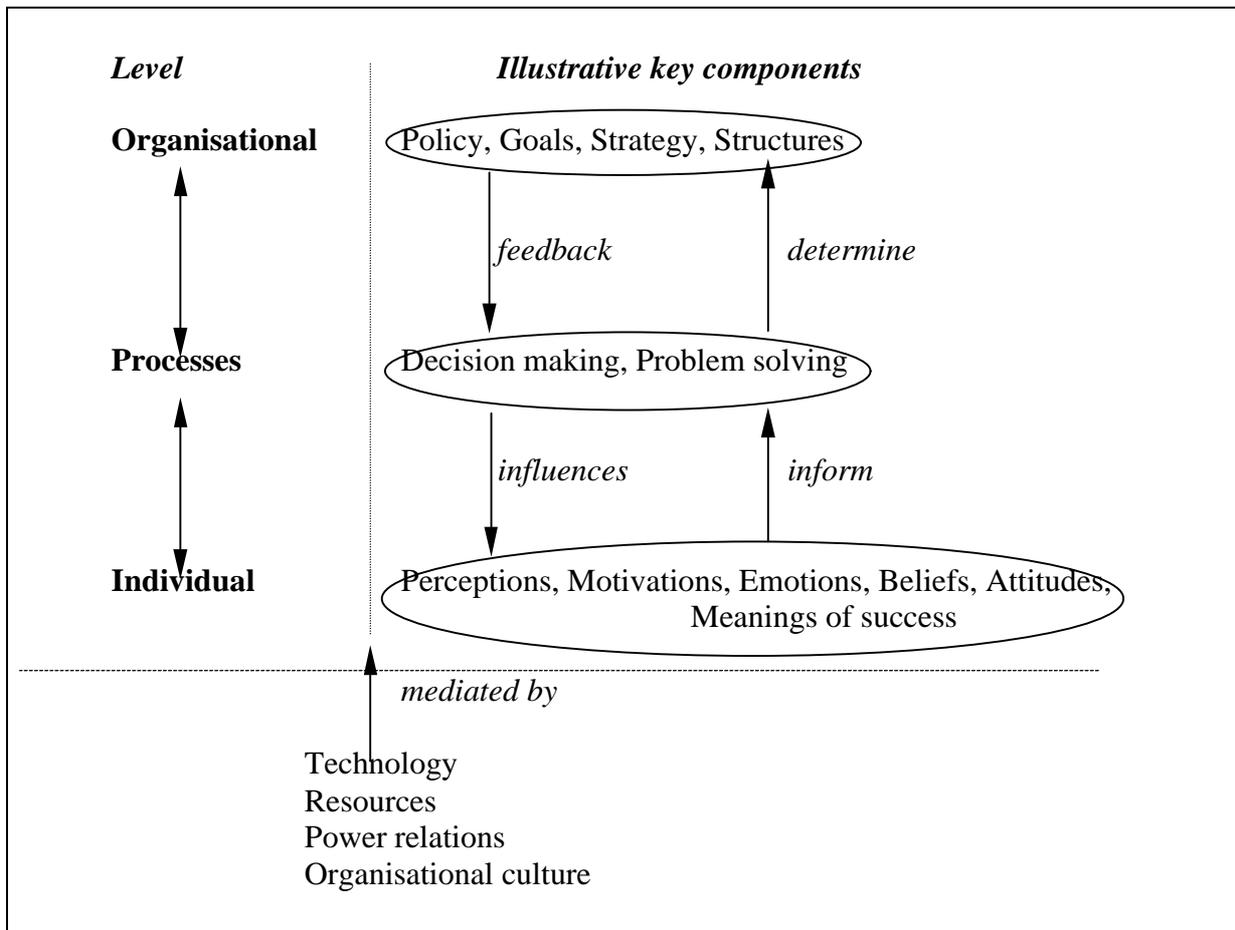


Figure 2 Risk components in organisational decision making

### Towards a model of individual risk appraisal

Risk assessment, as typically carried out by organisations, is increasingly part of a formal exercise using standard frameworks. It is implicit that such risk assessments are objective and unbiased. However, individual risk appraisals are frequently identified as being ad hoc and subject to various biases. Thus, people are generally portrayed as being poor at making risk-related judgements due to the influence of such biases and because of the difficulty of making judgements involving large numbers or probabilities. However, humans have developed heuristics to aid their decision making in a wide range of situations where issues may be complex and fast moving. Thus, to progress beyond the truism of stating that 'people are poor at making risk judgements' we need to understand more about components of individual risk appraisal.

Figure 3 is a model of key risk appraisal components. In appraising risk in their own lives, individuals are expert to the extent that they have survived and prospered on the basis of numerous past risk judgements and consequent behaviour. This individual expertise is intuitive rather than formal. Chance factors and a capricious environment (e.g. 'luck') play a part. However, individuals whose risk judgements and behaviours are best suited to their circumstances are more likely to survive and prosper. Figure 3 illustrates key components and processes involved in risk appraisal. The process requires a triggering stimulus, for example seeing a media item on a risk topic of interest, having a sudden idea spring to mind, being asked a question about something or perceiving a workplace hazard.

Risk perception also involves interpretation of input on the basis of our previous knowledge and experience. For example, when driving, in appraising the risk involved in overtaking a vehicle, drivers take immediately available stimuli into account, including relative speeds and distances of relevant vehicles, and other traffic which may be hidden from view. We would also, usually unconsciously, draw upon our pooled previous overtaking experiences, our general knowledge about local road conditions and perhaps geography

of the area. This information is combined to make a fairly rapid risk appraisal of possible outcomes, and the likelihood of success of the overtaking manoeuvre would be judged qualitatively. Thus, in describing the expertise involved in making what for many people are everyday decisions, humans' alleged poor judgement in respect of making decisions involving risk are largely irrelevant, as our subsequent actions, based upon our experience, nearly always leads to behaviour which is successful.

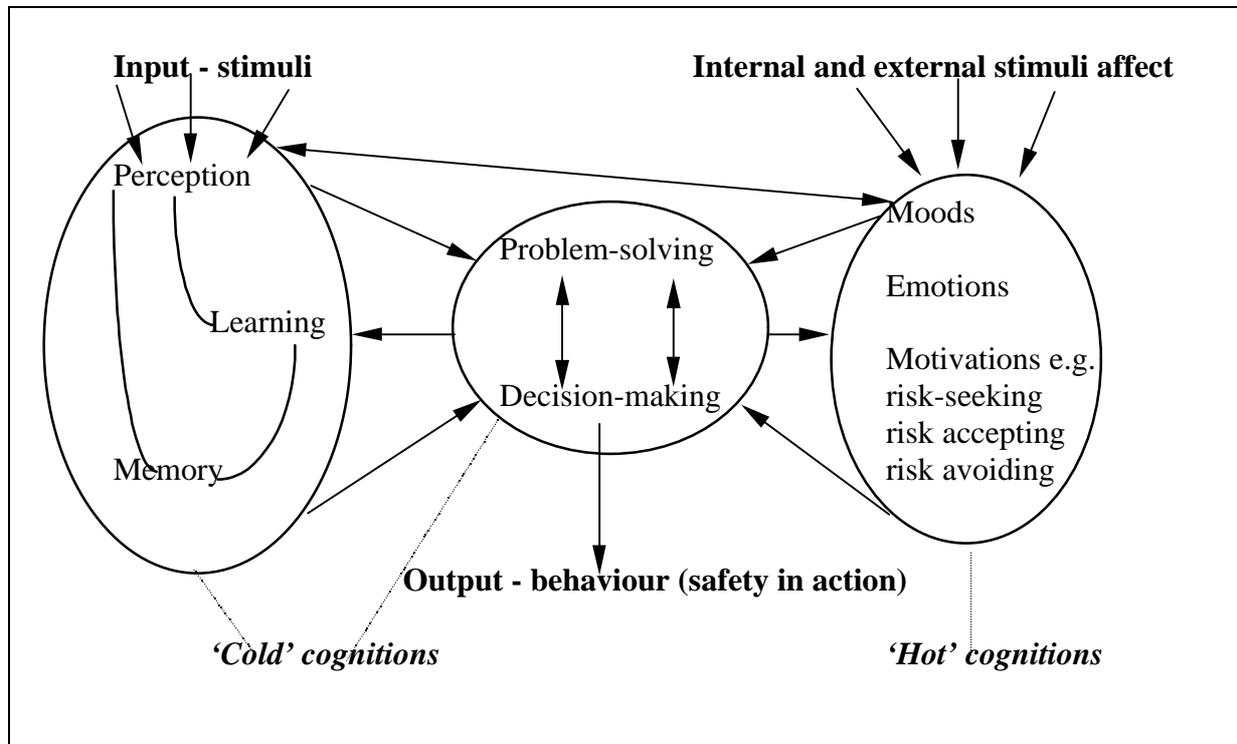


Figure 3 Towards a model of individual risk appraisal

Through many experiences with risk situations, individuals learn about dealing with external stimuli involving risk. Learning about risk results from repeated exposure to different types of risk, making decisions about them and experiencing a range of outcomes based upon those decisions. Some situations involving risk require problem-solving to deal with complex information.

At some point a decision is made about what action to take. The need for a decision may be urgent – for example, when faced with an armed assailant - or it may be possible for the person to defer a decision - for example, house purchase, or for more information to be obtained over a long period - as may be required in control room design. Choices available to individuals making decisions on risk issues are analogous with strategic options available to organisations - i.e. avoid, defer, reduce, retain, transfer, share or limit the risk, or act so as to mitigate potential damage.

The model components described so far imply that we make decisions entirely rationally. However, while it is possible for humans to act according to rational criteria, other processes also drive us. 'Crimes of passion' is a recurrent theme in both literature and the law, and reflects the often overwhelming influence of what have been termed 'hot' cognitions. In figure 3 these are described as our varying moods - which can swing between different positions within relatively short periods of time, as well as emotions and motivations. Individuals may seek out certain types of risk (risk, or thrill seekers) or may accept risk as part of daily life and deal with it as required. Some individuals go out of their way to avoid risks because of the discomfort and stress that they have experienced from risk in the past and which they wish to avoid in the future.

Not only will individuals' moods, emotions and motives affect their decision-making processes, feelings can also affect the way in which memories are stored and retrieved (consider the way in which a particular piece of music or a specific aroma might trigger a memory of the way you felt at a certain time in the past). Emotions are involved in the learning process and in the way in which risks are perceived. One way in

which this influence operates is through the selective perceptual filter. Because we cannot focus upon all of the many stimuli that impinge on us, we manage the perception process by attending selectively to stimuli. Our selection of which stimuli to attend to is governed very much by our motives and emotions - that is our needs of the moment and our feelings at the time. Our emotions and motives help to determine how we see the world.

**Individual decision making on risk**

Figure 4 describes various types of risk within the sphere of human decision making. Psychological risks relate to the ego or self, and social risks affect a person’s social position. Individuals also have a self-image and a level of self-esteem. By engaging in different activities, many of them involving risk, we test out and develop the way in which we perceive ourselves. We may set ourselves challenges in order to find out what sort of person we are as part of our personal development.

Risks associated with our core psychological being are speculative as they can either lead to an improvement or to a diminution of key areas of our psychological functioning. We also take speculative financial risks (e.g. investments, gambling). As consumers, we appraise functional risks relating to a wide range of goods and services. While this is mainly speculative risk appraisal, pure risk can also be involved in product purchase as certain types of product could harm consumers (e.g. pharmaceuticals, electrical goods).

Physical risks, while they are generally considered to be pure risks, may have speculative elements - through risk/benefit trade-offs. For example, occupationally related risks result in hundreds of traumatic deaths through accidents every year (Worksafe Australia 1996) as well as over 2000 deaths from occupationally related diseases. In the case of such risks, there may be trade-offs - it is frequently found that individuals who are killed in occupationally related incidents have been seeking more predictable benefits, including ‘keeping the work flowing’ and other rewards such as pay or merely keeping a job. Thus, in only a relatively small proportion of instances of individual exposure is the risk pure. Either speculative aspects - involving possible gains and/or losses - will be very obvious, or else they are implied in the risk appraisal or decision-making process.

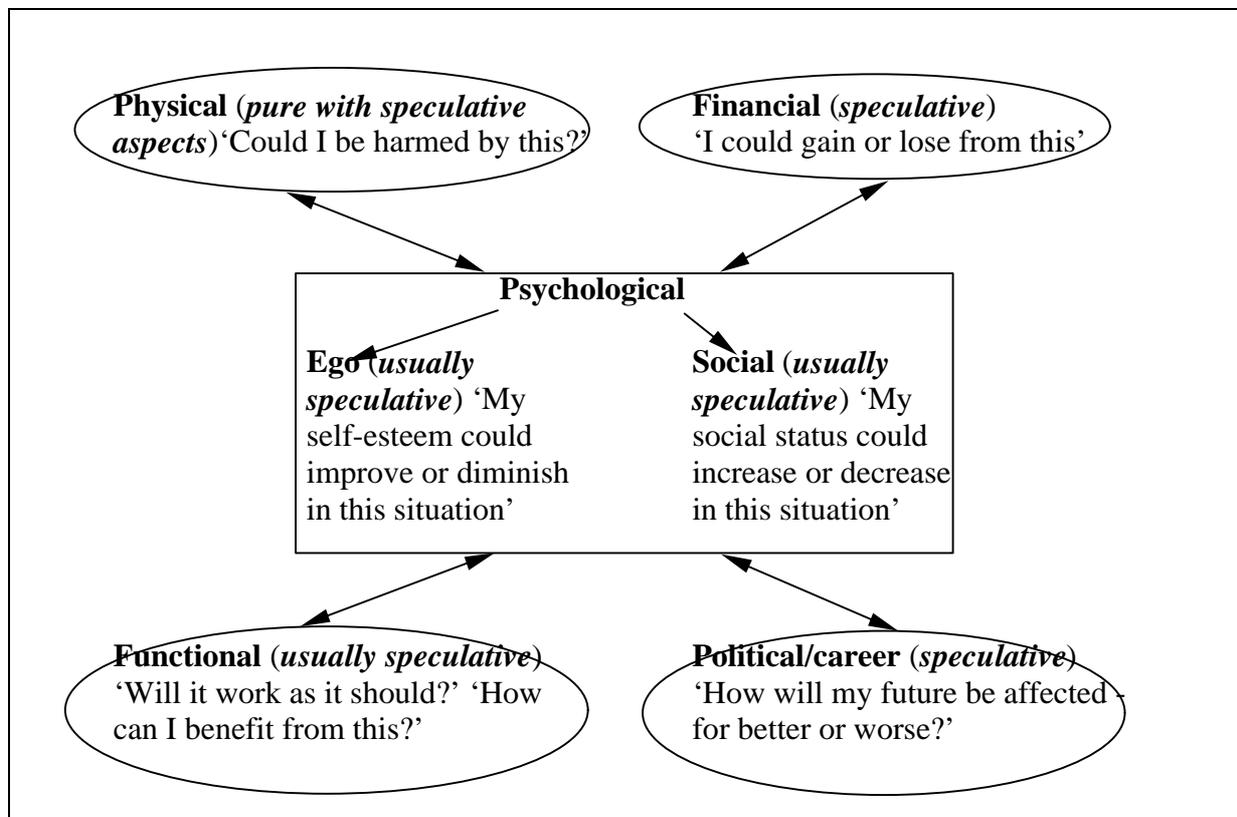


Figure 4 Individual decision making and different types of risk

## RISK HOMEOSTASIS AND RISK COMPENSATION

Risk Homeostasis Theory (RHT) (Wilde 1982, 1994) maintains that the unique determinant of accident loss (all costs associated with accidents) is not the level of risk within an environment, but the target level of risk desired by individuals. Individuals' target levels of risk are determined by the optimisation of utilities (benefits) presented in box (a) in figure 5. If one or more of the utilities in box (a) change, then the target level of risk changes, which ultimately affects accident loss. RHT was first proposed as a population-level, closed loop description of driver behaviour. Information enters the closed loop - e.g. reading about accidents, seeing or being involved in accidents or near misses - to warn the driving population about levels of driving risk. If target risk and actual risk are not aligned, then RHT asserts that individuals change their behaviour to bring them into line.

RHT posits three main pathways used by individuals to compensate for changes in target risk:

1. *Behavioural adjustments within the environment* - there are numerous ways in which individuals can change their level of risk in driving, e.g. more or less overtakes, drive faster or slower, increase or decrease attention, more or less frequent mirror checks;
2. *Mode migration* - if individuals cannot reduce the level of risk by behavioural adjustments, they could use a safer form of transport, e.g. train, bus, walking;
3. *Avoidance* - if the situation is perceived to be too risky then it can be avoided altogether, e.g. a particular journey may not be made because of adverse weather conditions.

RHT proponents argue that behavioural changes (in terms of accident loss) are most likely to be produced by manipulating the four sets of utilities - for example, increasing costs and decreasing benefits associated with risky behaviours, and decreasing costs and increasing benefits associated with more cautious behaviours - rather than attempting to adjust risk levels within the environment, which tend to be compensated for. An example is campaigns seeking to change drivers' motivations in respect of potential costs of drinking and driving. RHT embraces speculative risk because it acknowledges that risks are taken for some purpose or benefit - generally referred to as utility, including the thrill or challenge from certain forms of risk-taking activity.

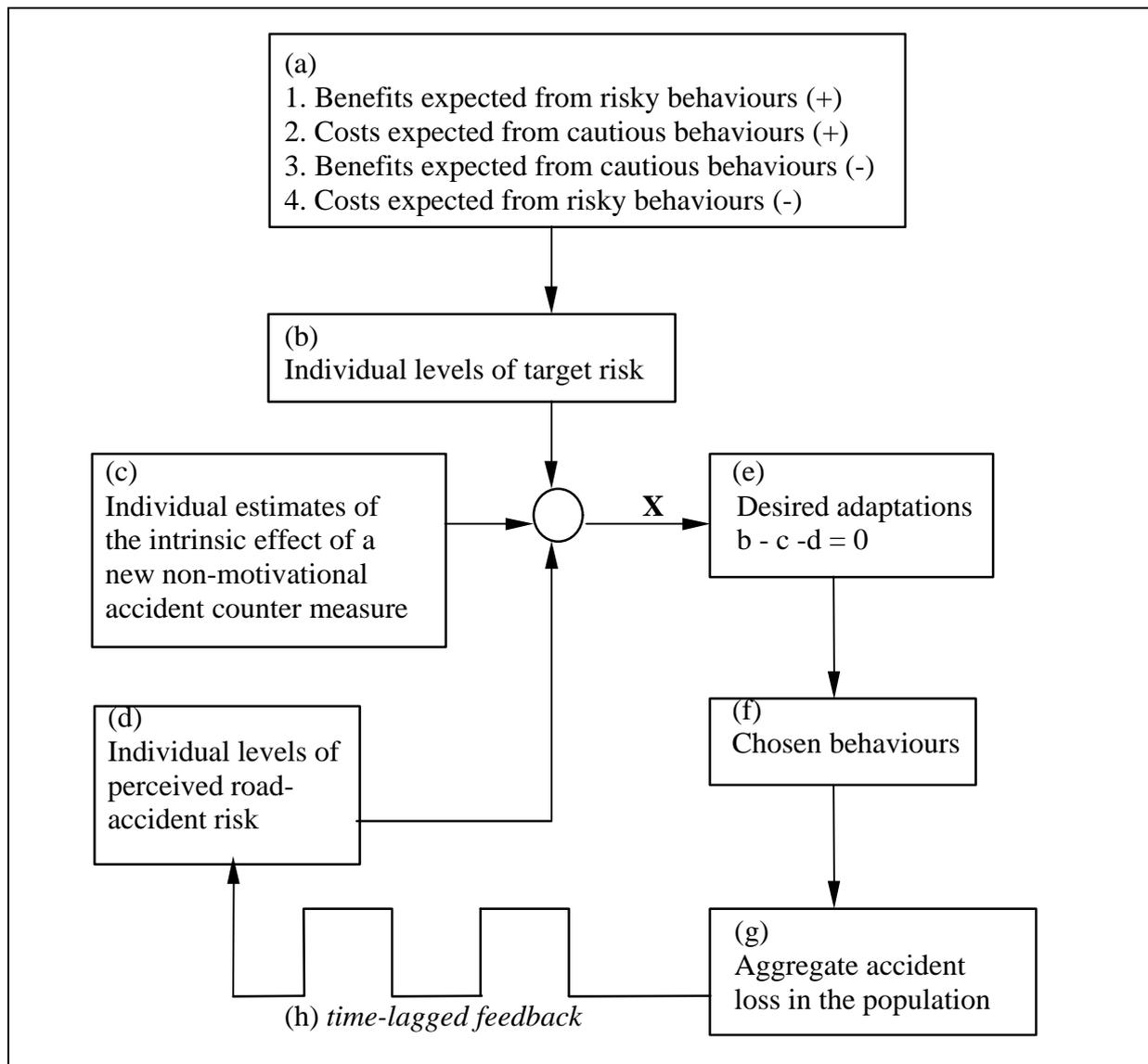


Figure 5 Wilde's closed-loop model of risk homeostasis

The RHT approach to risk contrasts with assumptions of formal risk assessment and risk management within organisations, which maintain that, by systematically and thoroughly assessing and managing risks, accidents and other losses will be reduced. Within organisations, the regulated setting for managing risk operates at a collective level where individual choices are subservient to risk assessment and risk management processes. As with RHT, the system is characterised by a closed-loop process. However, operation of the feedback mechanism in the case of organisational risk assessment is controlled by those managing the system rather than by individuals, who are generally unable to operate as autonomous elements within it.

It is an implicit belief of those operating within a risk management framework that applying appropriate controls can reduce environmental risk. A basic assumption of legislation requiring organisations to conduct risk assessments is that applying externally driven control measures can effectively control occupational risks. The idea that behavioural compensation by individuals might occur in response to changes in risk levels is generally not considered in organisational risk assessments.

Stanton and Glendon (1996) review some key issues in the potential debate between advocates of risk assessment and associated risk management measures, and those who might urge caution with respect to possible risk compensation effects (e.g. allowing automatic functions rather than operators to check system states). One key issue is whether risk compensation could reduce or even negate certain risk control (i.e.

safety) measures. Evidence to date is scanty and is mainly restricted to the road environment. By comparison, in work locations, individuals are more likely to have:

- reduced opportunities, if any, for mode migration;
- fewer opportunities, if any, for risk avoidance;
- limited opportunities for behavioural changes – which could include reduced attention (e.g. to monitoring devices), chosen exposure to greater risk when wearing personal protective equipment, or behaving as though their health and safety is being looked after in some other way.

An immediate impact of a newly introduced occupational safety (e.g. risk control) measure may be seen. However, given the timescale over which homeostatic or compensatory effects are said to operate - up to eighteen months - it may require evidence over several years to establish whether a change has occurred which is robust enough to resist behavioural compensation. The issue of whether a safety measure is sustained in the longer term may be rendered problematic by the absence or impracticability of adequate measurement techniques and only partial control over extraneous variables, for example organisational culture. While it may be possible to block behavioural, mode migration and other risk compensation strategies effectively - it could be argued that one task of risk management is to achieve this - there are costs involved in meeting this objective. Application of effective controls (e.g. machine guards) is designed, at least in part, to block possible risk compensation effects by individuals, in tacit recognition of their importance.

RHT and traditional risk assessment/risk management essentially operate in different domains. RHT has concentrated almost exclusively on the road transport environment and has been virtually silent with respect to non-transportational issues. Risk assessment has largely been concentrated in the more intensively regulated organisational domain. Glendon and Stanton (1996) point out that while risk assessment could be applied within other domains, including road transport, the nature of road transport systems in terms of generalised feedback to individual drivers means that attempts to control identified risks are likely to be diffused.

In contrast, in an increasingly regulated occupational sector, it becomes more and more difficult to find examples of individuals exercising significant degrees of choice with respect to risk-taking at work. In highly regulated domains, individual choices with respect to risk behaviours are bounded by imposed costs and benefits in work environments. By comparison, the relatively open road transport domain continues to provide almost limitless opportunities for each individual within it to behave in more or less safe ways, depending upon their individual matrix of utilities, which interact to produce their target level of risk (see figure 5). For many individuals, the road environment is also their work environment, or else is an important component of it.

This analysis implies that risk management methodologies in different domains need to take account of critical dimensions of those domains. RHT may only apply in situations in which individuals have a fairly high degree of choice over their risk-taking behaviours (as in driving). Addressing individuals' risk perceptions through motivational channels - via people's personal utilities for relatively safe and unsafe behaviours, may be the most appropriate method for influencing risk appraisals in such domains. Risk assessment assumes that, within already highly regulated occupational environments, risks can be assessed and managed by various techniques. A fundamental tenet of such an approach is that individuals within the system are essentially not authors of their own destiny, but operate within a bounded system.

### **Towards a general model of individual risk appraisal and behaviour**

Figure 1 addresses individual decision-making and behaviour in respect of pure risks - immediate or long term. Development of a model describing how individuals deal with speculative as well as pure risks could usefully improve our understanding of how individuals appraise and behave in respect of a wider domain of risks. The model shown as figure 6 incorporates risk appraisal processes described in figure 3 within a single box. Also incorporated are behavioural elements of risk management. Selected elements of the RHT model - see figure 5 - are also included.

In the model, *external cues to action* (1) are stimuli from the outside environment. These reflect the various types of risk outlined in figure 4 - physical, financial, functional, etc. This external input is selectively perceived, interpreted and dealt with by the individual's *risk appraisal process* (2), as described in figure 3.

The risk appraisal process is also instrumental in developing the individual's *desired level of personal risk* (3) (target risk in RHT) and is also involved in appraising the *degree of threat* (4) represented by an external stimulus. Both these personal assessments are continuously updated and the individual also considers whether they are congruent. They are moderated by the extent to which *resources are available* (5) for meeting the desired level of risk and also for dealing with the threat. Resources include financial, emotional (personal efficacy) and social (support).

This next stage is the *appraisal of costs and benefits* (6) perceived to be associated with a range of outcomes which are likely to follow from alternative behaviours. Desired level of personal risk and the degree of threat posed by the risk(s), as perceived by the individual, moderated by available resources, inform this appraisal process. There may be only a single risk to consider, although even in this simplest case there will be alternative possible outcomes, as the individual must decide from a range of possible behaviours in respect of the risk. However, there may be a complex variety of risks to be appraised and in this case the appraisal process is likely to involve heuristics to simplify the task. *Outcomes* predicted by the appraisal process will then be *evaluated* (7). The individual's feelings and thoughts (8) will also influence evaluation about various predicted outcomes. Evaluation may lead to a re-appraisal of expected costs and benefits of different courses of action before a final evaluation leads to the selection of one or more *behaviours* (9) in respect of the risk.

Behaviour(s) selected in response to risk are part of the feedback loop - analogous with monitoring in organisational risk management. They constitute internal cues for potential further appraisal - for example with risks requiring a series of responses, each dependent upon feedback from a previous action, for example dealing with a control room emergency.

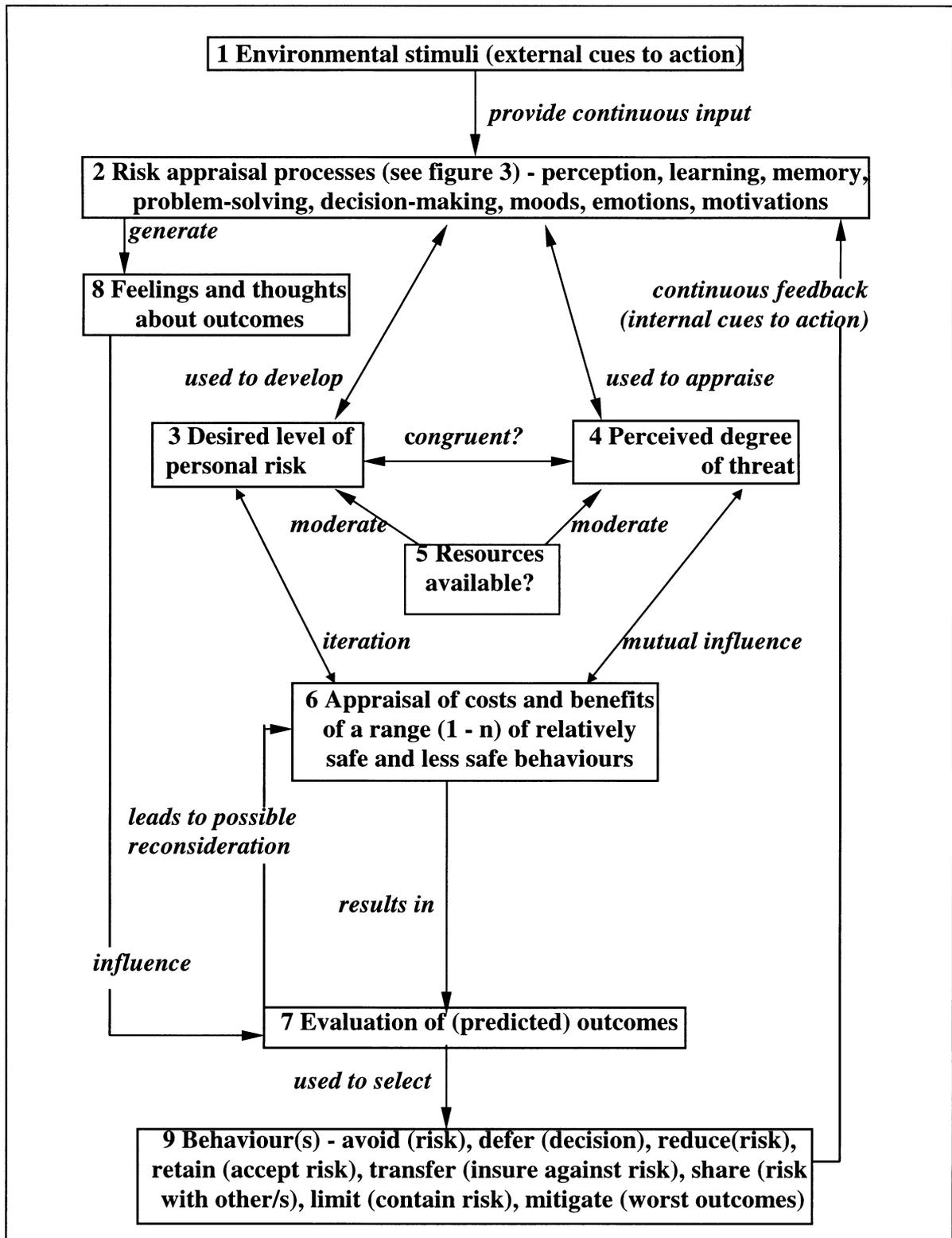


Figure 6 Individual risk appraisal and action

## CONCLUSIONS

Appreciating the nature of individual risk appraisal processes helps in understanding organisational level requirements, for example when risk assessments are carried out as part of risk management processes. The possibility that risk assessments may need to be broadened to incorporate compensation effects by individual operators and others in certain environments could be further investigated.

Compensation effects observed in many RHT studies may reflect individuals' attempts to maximise the degree of mastery or control over their environment. One cost of such motivated behaviour, for example on the road, is a toll of death, injury and disease that reflects resistance to attempts to reduce it. In contrast, the work environment is increasingly characterised by external control over risks, in which individuals have relatively much lower levels of individual control - either to increase or to reduce the level of risk to which they are exposed. However, efforts to reduce the rates of death, injury and disease at work have also proved to be remarkably resistant to attempts to improve them. Taking greater account of the way in which individuals appraise risk is one way forward.

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