

## **Why Do People Sometimes Fail when Adapting to Danger? A Theoretical Discussion from a Psychological Perspective**

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*During life-threatening danger, people may react in ways that decrease their chances of surviving or coping with the event. Several empirically demonstrated reactions have a potentially maladaptive effect on performance, due to limitations in our cognitive and emotional processing capacity or the activation of obsolete adaptation mechanisms. The possible psychological explanations for this are discussed in terms of assumptions derived from three major psychological paradigms: Darwinian, Freudian, and cognitive psychology. These theoretical models all illustrate useful concepts and assumptions, which do not logically exclude one another, necessary to understand more thoroughly how psychological adaptation occurs in danger situations. However, no theory alone explains the empirical findings, and the various theories should be integrated into a model that includes different levels of psychological function, from consciously controlled processes to emotional and automatic process.*

In a dangerous incident, people may react or behave in a way that decreases their chance of survival or their ability to minimize the negative consequences of the incident. In other dangerous circumstances, individuals may perform considerably better than they expect. The present article aims at discussing why this is the case, with special focus on understanding maladaptive reactions by making an inventory of the explanations derived from major psychological theories.

The notion that different survival strategies can have both adaptive and maladaptive consequences is present in modern theories (see, for example, Rees-Nishio 1997; Valent 1999). However, these strategies have been associated with long term health effects rather than with the immediate social and psychological functioning of those in danger. The present focus is on how people react before and during the danger incident and whether their psychological reactions can be considered as adaptive or maladaptive in relation to the immediate demands of the situation. These demands include minimizing the negative consequences such as loss of life, physical injuries, human suffering, and major material damage. The present definition of adaptive reactions is accordingly a reaction that increases the motivation or the capacity for coping with the threatening danger in the present situation. The definition of maladaptive reactions pertains to reactions that decrease the motivation or the capacity for coping with these threats.

Judging what may increase the safety or decrease the danger is a complex issue since there is an obvious incongruity between different objectives. To escape from a danger area may be adequate in the short-term, but in the long-term can leave individuals feeling as though they had abandoned others. Furthermore, certain behaviors may be adequate for a single individual but inappropriate if a large number of people act in the same manner. An illustrative and somewhat drastic example is the advice given by Silverstein (1992) on how to survive a low-level, low-deceleration plane crash. Ninety seconds is the estimated amount of time in one of these crashes before fires break out. The best action a single individual can take to ensure survival is, without regard to the other passengers, to rush to the nearest emergency exit, even if he or she has to climb over others in the process.

In spite of that advice, the "correct" behavior occasionally may be hard to define. There is, however, in a more general sense a need to maintain an adequate level of psychological functioning during dangerous period. Prior to the danger incident, people need to be aware that a danger can occur and be motivated to prepare for it. When a danger does strike, individuals must deal with distressing information, which utilizes cognitive and emotional control. It is preferable to be sufficiently motivated to make preparations, to react to a warning, or to be capable of minimizing negative consequences of the situation when it occurs.

Different phases within a danger situation have different implications for what constitutes adaptive behavior. The present focus is on the relationship between the immediate demands of the threat and the psychological reactions to it. The post-impact phase will not be discussed

further since its relevance to the present problem about reactions and performance is minor. However, since the psychological and material preparedness for danger is assumed to affect impact performance, psychological coping during the pre-impact phase is included in this discussion. The pre-impact phase is divided into two sub-phases due to the differing psychological demands of each. The first sub-phase has no clear starting point, but is defined here as the time span during which an individual has the opportunity to prepare for danger, and thus to cope more effectively with its actual materialization. A second warning sub-phase transpires when there is an actual sign that some danger is approaching. These phases are, however, not absolutely distinct or sequential. In Table 1 the different psychological demands are mapped which relate to the desired survival behavior during each of these sub-phases.

Table 1. Desired Behavior and Psychological Demands  
within each Sub-phase of the Danger Situation

<i>Period</i>	<i>Desired Behavior</i>	<i>Psychological Demands</i>
<i>Pre-impact</i>	Preparation	Motivation, risk awareness
<i>Impact</i>	Appraising the threat Taking measures against the acute threat; impact limitation Moving into safety	Capacity to accept and deal with worrisome information Physiological and psychological activation Emotional control Cognitive control Behavioral control

## Facing Danger in a Social Context

Several lines of research have addressed related problems which concern the effects of danger, stress, or increased arousal upon human functioning. Traditional experimental research is typically limited by the obvious ethical dilemma posed by deliberately exposing people to real danger, which has naturally led to the use of quasi-experimental approaches as a favored methodology (see, for example, Baum et al. 1993). Combat and disaster, both naturally occurring and man-made, are two real-life life situations in which individuals are exposed to real danger (for reviews, see Drabek 1986; Noy 1991). Recently the study of stress exposure within a peacekeeping context has expanded as a research field. From a Scandinavian point of view, the peacekeeping missions of the 1990s have included more exposure to acute danger, such as exposure to enemy fire, than missions prior to this decade (Bache and Hommelgaard 1994; Johansson 1997).

Disaster research has resulted in an abundant scientific literature which has documented the individual response patterns that typically emerge immediately after disaster strikes. Since the start of disaster



research, however, there has been a debate regarding how to define disaster and what dimensions to use when categorizing it (see, for example, Quarantelli 1998). One of these controversies has questioned whether or not wars should be defined as disasters (see, for example, Meyers 1991; Quarantelli 1998).

In the classification of disaster, the most important element is exposure to an immediate danger that threatens the health, life, or environment of those exposed. This broader disaster definition includes conflict situations such as wars and peacekeeping operations. Related phenomena such as social disasters (crowd control incidents, terrorist outrages, etc.) or internal disturbances are often included in this broad disaster concept (see, for example, Drabek 1986). Present peacekeeping operations often consist of dangers midway between those found in traditional war and those inherent in intense terrorism. Accordingly, there exists no natural limit to danger; rather, a continuum between traditional disaster via terrorism and traditional warfare is found on modern peacekeeping missions. Furthermore, questions regarding human behavior are often the same, regardless of the character of the physical event (see, for example, Quarantelli 1991). Disaster research was initiated during the 1950s due to a need to predict how the population would react in case of war, especially in case of biological, chemical, or nuclear attack (Meyers 1991). The inclusion of several social contexts makes comparisons between different types of danger situations possible. It may indicate to what extent reactions are context specific or whether they are more generally applicable. This focus implies an interaction between psychological mechanisms and different contexts, rather than focusing specifically on social contexts.

Most disaster research has not addressed the problem of immediate psychological adaptation to danger. On the sociological level, the interest in disaster research has included the definition of disaster, societal disaster planning, how disasters affects the society, and how the society recovers from a crisis. On the psychological level, considerable research has primarily concerned the occurrence of PTSD (Post-Traumatic Stress Disorder) and other delayed effects of disaster on well-being (for a review, see Warheit 1988). The general lack of theoretical discussion of this issue was further supported by Fischer's (1998) recent observation that "for years disaster researchers have noted the paucity of theory in the disaster literature" (p.183). An even smaller number of extensive discussions, particularly focused on inner psychological processes, have been based on explanatory psychological theories. This article focuses on impact and pre-impact reactions, based on psychological and social-



psychological approaches, in an attempt to explain why people behave the way they do prior to and during threatening situations. The present objective is to make an inventory of the main explanations for behavior during danger and to discuss how these relate to one another.

The theoretical discussion will be divided into pre-impact and impact reactions, even if there is no absolute division between these two stages. Explanations valid for one of the phases may also be valid for the other. The discussion will conclude with some principal explanations as to why people sometimes behave in ways that—at least to an outside observer—seem irrational and counterproductive to survival.

### **Assumptions from Three Psychological Theories**

The theoretical frameworks chosen below are derived from the major psychological paradigms covering threat adaptation. These theories include Darwinian theory, Freudian theory and cognitive theory. The assumptions reported are those that relate to two main questions:

- How do we detect a danger?
- How do we adapt to a danger?

These questions cannot be separated completely, since one assumed mechanism is, as we shall see, a distorted perception of the threat. The perception of the threat is highly affected by some of the adaptation mechanisms; thus the two questions are connected.

Each of these three theories focus on different levels of psychological functioning. Evolutionary theories focus on the very basic survival mechanisms that we still harbor, some from our phylogenetic history. Freudian theory focuses on an emotional and subconscious level of stimulus processing. Cognitive theory focuses on mechanisms unique to humans which, from an evolutionary point of view, have emerged late in the developmental process. These processes occur on different levels (instincts—emotions—cognitions) and do not necessarily exclude one another, but from a holistic perspective they may be in an interactive process where they could simultaneously reinforce and counteract each other.

The three theories have different assumptions about how we detect a threat. Evolutionary theory assumes that we have a genetically activated and directed threat detection system. Freudian theory identifies defense mechanisms which in various ways may distort the awareness of the threat. Cognitive theory assumes an appraisal process that incorporates a conscious or subconscious analysis of the present relation between individual capacities and situational demands.

The three theories also have different ideas about how we adapt to a threat. Evolutionary theory assumes an automatic alarm system activates in threat situations. Psychoanalytic theory assumes that we adapt by denying the awareness of the threat, with the purpose of regulating our emotional state to avoid emotional discomfort. Cognitive theory identifies several coping strategies that may focus on both the problem and on our own emotional reactions. In the following, each theory is summarized with emphasis on the main assumptions relevant to the present problem.

### **Darwinian Theory**

The essence of Darwinian theory is, in relation to the present discussion, that present human survival instincts should be understood as ecologically functional but not necessarily for current environmental demands. Instead, we have retained many basic survival mechanisms that were successful during the evolution process, not only from the hunter-gatherer era, but also from earlier ancestors such as primates, lower mammals, and reptiles.

Concerning threat adaptation to dangerous situations, humans automatically activate adaptive defense responses (see, for example, Öhman 1993). However, these responses activate only when humans encounter evolutionary-specific threats. The specificity of those threats developed as a result of an evolutionary selection processes in which mechanisms that proved effective for survival were maintained in the genetic pool and thus included in the DNA structure of subsequent generations. Accordingly, it is expected that humans will react differently to threats that materialized during prehistoric times than they will to those threats that are closer to the present in evolutionary history.

Evolutionary older threats are those presumed to have existed before and during the hunter/gatherer era. Examples include dangerous animals, natural disasters, heights, hostile groups of people, and exclusion from the group. These threats are more generally related to loss of reproductive resources, which signify life and health, but also relate to anything that could increase Darwinian fitness, such as relationships, property, status, reputation, and skill (Marks and Nesse 1994). Evolutionary modern dangers are those originating from the technological and social development of the past 200-300 years. Examples of modern threats that are dangerous from a statistical point of view involve motor cars, guns, cigarettes, and alcohol. Other examples of modern threats often discussed are radioactivity and environmental pol-

lution. The threatening situations discussed in this paper are in several cases characterized by the high technological and social complexity of the modern age, compared to the dangers that hunter/gatherer groups encountered. This does not exclude a resemblance from a psychological point of view between evolutionary old and new threats.

The fact that evolutionary older dangers were obvious, limited in time and space and of minor complexity, implies that adaptation would be in the form of physical strength and a cognitive and perceptual focusing on the threat. Those mechanisms developed in the pre-human era should be expected to be characterized more by instinctual control and less by conscious cognitive control. Darwinian theory also focuses on humans as a herd animal. Due to the fact that exclusion from the group during the hunter-gatherer era was highly maladaptive from a survival perspective, humans can be expected to contain genetically preprogramming that results in adherence to group norms, which can be highly relevant to the behavioral outcomes during danger incidents.

### **Freudian Theory**

The kind of coping mechanisms discussed by the psychoanalytic tradition are defense mechanisms (for a review, see Cramer 1991). Although there has been much discussion about the defense mechanism concept, there is a general agreement that the purpose of these defenses is "to prevent other ego functions from being disrupted or disorganized by excessive negative affect, such as anxiety or guilt" (*ibid.*, p. 3). In later theoretical development, defenses are considered to be directed against painful feelings or feelings that may threaten self-esteem and self-cohesion.

Most defenses are directed against inner threats, according to the classical Freudian conceptualization. An exception is denial, which is assumed to operate in relation to outer concrete threats. Humans are supposed to appraise reality in a way that avoids activation of unpleasant emotional reactions. Thus, due to an effort to avoid unpleasant worry, processing of distressing information is characterized by a tendency to deny or explain away its personal relevance.

Several conceptual frameworks reflect that individuals differ in their disposition to detect threats. Repressors/sensitizer and monitors/blunters are concepts related to the degree to which individuals selectively attend to the negative aspects of aversive events and the degree to which they cognitively avoid objective sources of danger or anxiety-arousing material (Rothbart and Mellinger 1972, Miller 1989).



Defensiveness refer to “the tendency to deny problems, while trying to maintain a semblance of adequacy, effectiveness and control” (Buntrock and Reddy 1992). The present approach, however, is directed to the process of denying rather than to individual differences.

## **Cognitive Theory**

Cognitive theory has several sub-approaches. Lazarus has focused on the impact of the cognitive appraisal process to understanding adaptation to stress. He has presented several models over the years, but originally there were three steps: primary appraisal, secondary appraisal, and coping (see Lazarus and Folkman 1984). This theoretical model was from its very beginning a reaction to the simple stimulus-response models predominant in psychology during the mid-twentieth century. The theory emphasizes that there is no such simple S-R relation and that certain stimuli or stressors do not activate certain stress-coping responses in a simple and unambiguous way. Instead, the method of coping is related to the appraisal process. In a first step, called primary appraisal, the individual appraises whether or not there is a threat. Thus, active coping is a result of a favorable primary appraisal, that the threat is identified as such.

In a second step, secondary appraisal, the individual appraises what he or she can do. Two forms of coping are defined: problem-focused coping is directed at managing or altering the problem causing the distress; emotion-focused coping is directed at regulating the emotional response to the problem. The kind of acute threats discussed here needs to be actively coped with, which usually implies that problem-focused coping is of primary importance. This does not mean, however, that emotion-focused coping is unimportant. It could be important to maintain the capacity for active problem-focused coping. However, emotion-focused coping in itself, without any action, is maladaptive in most cases in which a real danger is approaching. “In general, emotion-focused forms of coping are more likely to occur when there has been an appraisal that nothing can be done to modify harmful, threatening or challenging environmental conditions. Problem-focused forms of coping on the other hand, are more probable when such conditions are appraised as amenable to change” (Lazarus and Folkman 1984, p 150). Thus, appraisal of personal control should encourage active and problem-focused coping, while appraised lack of control should decrease active coping and lead to emotion-focused coping strategies.

A second cognitive sub-approach focus is on the concept of decision-making under stress (see, for example, Collyer and Malecki 1998). Humans do not make unequivocally rational decisions and do not follow the statistical theory of prediction but instead rely on a limited number of heuristics, some of which lead to severe and systematic errors (see, for example, Tversky and Khaneman 1974). For instance, people tend to overestimate the probability for outcomes that are easily recalled because they are using stereotypes and categories when processing information, and thus seek information that supports notions or opinions already held (see, for example, Stormer 1991). Our intellectual ability to make decisions about risky activities has many shortcomings, which makes us occasionally both overestimate and underestimate the probability of certain risks. The actual risks involved in daily gambling may be oversimplified to avoid cognitive strain (see, for example, Drabek 1986). Thus, due to the fact that these mechanisms are designed to save cognitive energy and promote cognitive short cuts, miscalculations in risk perception can occur.

A third cognitive sub-approach focuses on the schema concept. Schemas serve as personal preexisting theories, or a coherent set of assumptions, that guide what is noticed and remembered as well as how new information is interpreted (see, for example, Janoff-Bulman and Timko 1987). The general tendency is to search for confirmation and to avoid information that threatens the integrity of these inner cognitive structures. These cognitive schemas have limits, because traumatic experiences often cannot be logically incorporated into these preconceived conceptions of the world. The new data created by traumatic danger situations often do not conform to old inner theories and serve as a threat to existing cognitive structures or conceptual system. Due to a need to maintain inner cognitive structures that would otherwise be overwhelming by information associated with traumatic situations, humans often protect themselves by utilizing mechanisms interpreted as denial that serve to regulate the amount of incoming stimuli and facilitate their assimilation within existing cognitive structures.

### **The Pre-impact Period**

The following assumptions were derived from these three different theoretical approaches and will be discussed in relation to empirical results from disaster research. First, the pre-impact period will be considered.

*Darwinian Assumption 1: Due to the fact that our innate threat detection system has not been updated since the hunter-gatherer era, we do not activate our basic adaptation mechanisms to evolutionary new threats.*

Our genetic equipment has not, according to Darwinian theory, advanced much since the conclusion of the hunter-gatherer era. Accordingly, humans are genetically calibrated to deal with evolutionary old dangers. As a result, it is to be expected that our interest in disaster preparation is so low, since we do not really fear evolutionary modern threats.

Disaster research supports this hypothesis. Even if reactions and performance in the pre-impact period are complex, the literature suggests that preparation for these kinds of threats have a tendency to rank low in people's priorities (Drabek 1986). People underestimate the hazardous quality of their environment (*ibid.*), and it is in general difficult to motivate people to take preparatory action (see, for example, Lehman and Taylor 1987; McCaughey, Hoffman, and Llewellyn 1994; Edwards 1993). A prominent psychological aspect of the pre-impact period is denial (Drabek 1986, McCaughey et al. 1994; see also Rehorick 1986) or unrealistic optimism (see, for example, Burger and Palmer 1992). The tendency to reason that "It won't happen to me" or to deny the danger is also prevalent among peacekeeping personnel (Wallenius, Johansson, and Larsson 2001).

It is generally difficult to affect this pre-impact indifference. For example, it has been found that public information campaigns generally do not produce major changes in people's preparedness activities (Drabek 1986; Gregory 1995; see also Larsson and Enander 1997). The effect of information campaigns is furthermore often limited in time (Hale and Glendon 1987). Information may only lead to behavior change under highly specified conditions, if properly executed, and only with specified targets (Sims and Bauman 1983). Provided that people already know and can put into action effective ways of reducing the risk, fear-arousing hazard information can be effective (Hale and Glendon 1987). Neither formal education nor specific education programs have proven effective in changing people's perceptions or behaviors with regard to preparing for natural disasters (Sorensen 1983). The personal experience of danger does alter one's hazard perception, but it does not do so in a uniform way. There are instances in which experiences have evoked thoughts of invulnerability according to the rationale that "Lightning never strikes the



same place twice” or that survival of one storm also will lead to survival of the next (Drabek 1986).

However, to assume that the lack of preparation by humans is the result of the evolutionary recency of disaster is problematic, since humans do not seem to prepare more for evolutionary old dangers than for new dangers. Evolution seems to have resulted in mechanisms functional in relation to materialized threats, but not in any emotional instinct to prepare. The motivation to prepare may be primarily dependent on the cognitive ability to anticipate a danger.

*Freudian Assumption 1: In an effort to avoid unpleasant worry, we tend to process distressing information by denying or explaining away its personal relevance.*

Denial may generally manifest itself in a lack of worry when worry should be expected, such as when one is confronted with an actual danger but fails to respond to it. More specifically, denial may explain several phenomena found during the danger adaptation process. Examples could be when individuals rate any risk to themselves as less than the risk to another person, the lack of activity in relation to warnings, the initial delay in accepting the impact seriousness, the lack of fear or any other unpleasant strong emotion, or the sense of invulnerability during danger exposure that occasionally are observed (see, for example, Wallenius et al. 2001). Psychological defenses offer one explanation found in the literature to explain why providing information is not always effective in altering behavior. “If they have to go and seek out those ways of coping, the level of horror used must be much lower, otherwise the rationalizing defense mechanisms will take over and the fear will be suppressed in ways which will not lead to an increase in health or safety.” (Hale and Glendon 1987, pp. 283-284).

Generally, there may be more immediate problems in daily life that takes precedence over preparation for a disaster. Since disaster risks are usually quite low, this priority level may be understandable. However, even when there are actual signs of danger, the typical response is disbelief (Drabek 1986). Warnings create no panic but rather elicit attempts to confirm or neutralize the danger. People tend to continue with normal routines and search for alternative interpretations: basically, they maintain that which is known and familiar. Denial is generally the most common first reaction to an upcoming disaster in which the individual has not accepted the possibility of danger (Glenn 1979; Janis and Mann 1977). Any vagueness in the message may be used to reinterpret the

situation in a non-threatening fashion until perceptions indicate almost indisputably otherwise (Drabek 1986). The early stage of fire recognition is either characterized by ambiguity or the acceptance of the severity of the fire is delayed to a dangerous extent (Canter 1990; Proulx 1993). Evacuation decrees are often met with passivity. People are often unwilling to evacuate, even in salient threat situations. The most common response is the reverse of panic, that is, inaction or postponing the evacuation to the latest possible time (for a review, see, Enander, Larsson, and Wallenius 1993).

People who not have been victimized by negative life events, such as accidents or diseases, tend to perceive themselves as less vulnerable to victimization than others (see Perloff 1983 for a review). This "illusion of unique invulnerability" may be adaptive in reducing psychological distress in general but becomes maladaptive when it causes a decrease in motivation to prepare for a disaster. This illusion can also impair one's coping ability when the individual actually is victimized. At least temporarily, the "illusion of unique invulnerability" may break down when a trauma actually occurs (see, for example, Burger and Palmer 1992). The effects of optimism due to denial on precautionary behavior have been discussed and called in question, however. For instance, van der Pligt, (1998) argues that perceived vulnerability is a necessary but not sufficient condition for preventive action.

There are several possible explanations for this pre-impact denial. The invulnerability explanation has claimed that it is a manifestation of either denial or cognitive biases (Perloff 1983). The present suggestion is that a denial process may explain the non-adaptive passivity mainly to dangers of medium intensity, which might be vague enough to be reinterpreted in a non-threatening fashion. If the danger intensity is very low, the danger adaptation could just have a deliberately low priority. If the intensity is very high and the danger is very obvious, it is unlikely that a person with normal capacity for reality testing will deny it.

*Cognitive Assumption 1: Due to mechanisms aimed at saving cognitive energy, we take a number of cognitive short-cuts in response to low-intensity threats and remote risks, implying a tendency to misjudge risks.*

People's cognitive skills are not adequate for coping with risk information. We lack the capacity for dealing with complex probabilistic problems. Instead, we resort to "rules of thumb" that simplify problems and occasionally guide us to false conclusions. Generally, small

probabilities are overestimated and large probabilities underestimated. Cognitively available risks from dramatic or sensational causes are overestimated, such as dramatic accidents, fires, tornadoes, and floods. A recent disaster may increase the perceived risk even further. Less sensational and more common risks such as diseases or traffic accidents are often underestimated (Fischhoff, Slovic, and Lichtenstein 1982; Slovic 1986; van der Pligt 1998).

There seem to be inconsistencies in what disaster research generally reports about indifference to disaster risks, while research on risk perception reports that most disaster risks are greatly overestimated. Obviously, something happens between the cognitive judgment of the risk and the actual interest in the risk. It could be noted that most risk perception research is based on comparisons between a judged risk and a statistical risk that people know less about in general. Heuristics become evident when subjects are asked to judge risks intellectually that do not immediately affect them. In real life situations, the impact of emotional defense processes may interfere with or even surpass the impact of cognitive heuristics. Furthermore, the statistical risk of being killed by a disaster is generally quite low compared with other causes of death. Thus, even if we overestimate a risk, there is still a low probability that it will occur.

Emotional reactions to risk have been largely neglected in risk research (Sjöberg 1987). Relying solely on studies of cognitive processes may generate less understanding of the causes of real-life phenomena. We have, however, no reason to exclude explanations from risk research, even if they do not seem applicable for explaining a general pre-impact indifference in relation to disaster risks. Shortcomings in our information-processing ability are relevant in relation to the present problem, but cognitive processes must be put together in context with emotional and instinctual processes.

## The Impact Period

*Darwinian Assumption 2: Due to the fact that our genetically preprogrammed adaptation mechanisms are primarily functional in relation to evolutionary older threats, these mechanisms should function well if the threatening context and the demands of the situation do not principally differ from these old threats.*

There are several views regarding impact performance. One position is that disaster impact causes a number of adverse short- and long-term reactions, while the other position suggests that the negative



psychological consequences have been greatly overstated (for a discussion, see Perry and Lindell 1978). The controversy seems, however, to be most unresolved when discussing the frequency of long-term reactions. Disaster research has previously shown that panic reactions or other extreme reactions during impact are uncommon (see, for example, Quarantelli 1954). In spite of the fact that fear is present, the behavioral response is often adaptive, controlled, and rational. Continuity, composure, self-reliance, resource sharing, and spontaneous helping behavior despite presence of authorities characterize these responses. Having responsibility may even act as a barrier to negative effects of fear and strengthen adaptive responses (Drabek 1986; Perry and Lindell 1978). During the impact period, people tend to seek information about the danger because they have an acute need to define the situation. People also tend to perform in ways that are familiar to them, such as using familiar exits or assuming familiar roles. When they are not familiar with the situation, they tend to follow a leader or copy others' behavior. Contacting relatives and relying on family ties are often important during these situations (Drabek 1986).

Several empirical examples lend support to the assertion that adaptive behavior is common within the impact period. No panic or non-adaptive disorganized behavior was detected during the King's Cross underground fire (Donald and Canter 1992). Both non-survivors and survivors attempted to leave the station, either by the way they had entered or by the originally intended route. Generally, people continue a sequence of actions, even it is not necessarily the most appropriate action. Several earthquake studies emphasize adaptive coping responses primarily geared towards escaping from danger, collecting information, and restoring order (Mikami and Ikeda 1985; Ohta and Ohashi 1985). Swedish citizens present at the 1995 earthquake in Kobe, Japan, perceived themselves to have dealt with the situation better than expected. They were active, calm, and did not lose their emotional or cognitive control to any major extent, even if their fear was powerful (Enander and Wallenius 1999). Weisaeth (1989) showed that about two-thirds of those exposed to high disaster stress in a disastrous factory explosion displayed adaptive or optimal disaster behavior. Impact performance during dangerous situations in a peacekeeping context has also been reported as higher than expected. Fear is moderate in most cases, and the alarm reaction is in many cases described as activating or providing an adrenaline rush (Wallenius et al. 2001).

Since there is a common belief that a disaster will result in panic and chaos (see, for example, Fischer 1998), most outcomes will appear

as controlled and rational. To a certain extent this could be an effect of expectation. There is a tendency to overestimate how frightened one will be when encountering a fear-provoking situation (Rachman 1994). Even if the expectation that panic may sometimes be present when humans experience danger, several theoretical approaches explain why this may not actually be the common result. Darwinian theory views emotional reactions as a preprogrammed pattern of responses, shaped by natural selection and meant to increase coping ability when threats are encountered. Anxiety does actually increase fitness in dangerous situations that are similar to older evolutionary dangers (Marks and Nesse 1994). A complementing cognitive explanation would be that the appraisal process results in an acceptance of the danger and an appraised control potential (see, for example, Lazarus and Folkman 1984). The empirical findings are in accord with these theoretical assumptions. In many cases humans do function well within certain threatening contexts. The theory suggests that one necessary condition for this outcome is that the demands of the situation do not differ fundamentally from evolutionary older threats, specifically that the threat is obvious and the situation is uncomplicated. This aspect will be applied subsequently.

*Darwinian Assumption 3: Since our adaptation mechanisms are functional in relation to evolutionary older and less complex threats, a cognitive focusing on the threat is associated with physiological arousal.*

Disaster victims are occasionally described as having a restricted field of attention that prohibits them from appraising the situation, formulating a plan of action, and implementing that plan (see, for example, Boyd 1981). According to Darwinian theory, humans are well prepared to deal with evolutionary older dangers, and our adaptive mechanisms should be most fitted to dangers that resemble those ancient threats. This implies that adaptive behavior would employ physical strength as well as cognitive and perceptual focusing upon the threat. It also implies that we should react more adaptively in relation to threats that are of minor complexity, are limited in time and space, and have a degree of clarity. In relation to a threat of minor complexity, such as an attacking predatory animal, the perceptual and cognitive focusing is functional. What may appear as a mental restriction may, in fact, instead be a functional reaction wherein the mind focuses on the danger and ignores everything else.



Empirical research concerning different kinds of stress has consistently shown that heightened arousal is generally accompanied by a systematic change in cognitive processes. The perspective field is narrowed, the focus of attention is diminished, and the scope of complex perceptual activity is reduced. The use of stereotyping during high arousal problem solving is characterized by a decrease in the number of alternative solutions that need consideration and an increase in the tendency to scan alternatives in a nonsystematic fashion. There is also a reduction in one's tolerance of ambiguity and a diminished ability to consider abstract thoughts. Furthermore, heightened arousal is related to restricted search behavior, performance rigidity, and regression to simpler and more primitive modes of response. The ability to discriminate the dangerous from the trivial is reduced. There is a disorientation of visual-motor coordination. Finally, the work rate under high arousal increases, but accuracy decreases (see, for example, Bergström 1990; Edland 1989; Holsti 1979; Driskell, Carson, and Moskal 1986; Keinan 1987).

The contention that danger reduces efficiency is supported by studies, one of which specifically investigates soldiers' performance efficiency during combat (Baddeley 1972). One source of decrement is the perceptual narrowing of attention, in which the subject concentrates progressively more on the central features of the task and less on the more peripheral features. At a certain juncture this process will begin to decrease performance; the more complex the tasks involved, the faster this will happen, and a broader span of attention will be needed to meet the demands of the situation. Furthermore, while decision-making in danger focuses on fewer information units, the irrelevant self-concern information may compete for space within the information-processing system (Proulx 1993). In the worst cases, a system overload will lead to confusion.

Increased arousal may interfere with adequate responses. The level of interference will in turn depend upon how much complex cognitive activity the situation requires. Especially those in a commanding position may fail to maintain a more general view of the situation in a more extensive emergency. For example, Fredholm (1997) argues that it is a problem in major firefighting and rescue operations that commanders tend to function on a minute, operative level of decision-making by focusing on details. To command in more complex and dynamic situation, leaders need to raise the focus of their attention to a more abstract and long-term level. Evidence in peacekeeping contexts supports this attention pattern, with descriptions indicating a narrowing cognitive space during danger situations, particularly among com-



manders. Their thinking could be described as intuitive with little or no advanced planning, as mentally fixated on particular objects, and too focused upon their own perspective (Wallenius et al. 2001). Other empirical phenomena related to this cognitive focusing is the intense and very detailed “supermemory” that has been recorded (Dyregrov 1992) as well as the illusion of centrality. The latter is a tendency to think that only one’s own house was hit or that the disaster was focused more heavily on oneself than on others (Wolfenstein 1957).

If the adequate behavior is restricted to running away, arousal may be less of a problem. A study done by Weiseath (1989) showed that, despite the fact that a substantial proportion of a disaster victims’ group reported serious disturbances in their cognitive control, their behavior was not seriously inadequate for the situation. Those with more severely disturbed cognitive functioning coped with the situation by copying what others did (“passive following”), which typically involved flight behavior. However, if evacuation necessitates higher levels of cognitive activity, then the increased arousal may be considered maladaptive.

As already mentioned, training is a relatively efficient method of promoting adaptive behavior because it, hypothetically, requires less cognitive ability to act in familiar ways. Practical training may compensate for the cognitive degradation caused by high levels of arousal.

In summary, a wealth of research on different kinds of stress, which includes stress due to disaster, has shown a cognitive and perceptual narrowing. This reaction is probably basic, and the theoretical assumption that we basically are calibrated to evolutionary older threats is supported by these empirical findings.

*Darwinian Assumption 4: Since basic survival mechanisms developed in the pre-human era, our adaptation to more intense danger should be relatively more characterized by instinctual control and less by conscious cognitive control.*

Darwinian theories assume that every organism struggles for survival and that basic instinctual, rather than the sophisticated cognitive, human functions are responsible for these survival mechanisms. The instinctual space should, according to this assumption, increase at the cost of the cognitive after a certain point, as the danger increases. In cognitive theory there is a similar view: “The greater the threat, the more primitive, desperate, or regressive emotion-focused forms of coping tend to be and the more limited the range of problem-focused coping” (Lazarus and Folkman 1984, p 168).

The behavior of disaster victims are occasionally described as automatic (see, for example, Boyd 1981). The subject may experience it as a "survival instinct" that increases as the danger intensifies. Kosaka (1994) concludes that at lower intensity people may take more action to protect both the physical environment and other people, but after a certain point they may concentrate only on saving their own lives.

Survivors from the Estonia shipwreck described these phenomena in interviews with the present author (Wallenius 1996) in terms such as these: "And then you shift over from the helping phase, when you realize that it is messed up, and then . . . then it is just a egoistic survival instinct that drives you"; "It is a lot of reflex behavior. . . . I am not sitting down to make out a theoretical analysis of what to do"; "For there is no rational thinking to speak of anymore"; "You were head over heels pumped up with adrenaline and endorphins or whatever is in your body"; and, "The only thing running through my head was that I was not going to die there." These may be descriptions of an alarm reaction, but it is interesting that it not only involves an increased arousal but also a subjective inner drive to survive. In a clinical observation study, also of Estonian shipwreck survivors, it is described as an instinct of self-preservation which at some point of time had lost its emotional strength (Taiminen and Tuominen 1996).

Generally, there seem to be fewer observations from disaster research in which the distinction between instinctual and cognitive processes has been studied and how, in particular, the relative impact of the different levels of psychological functioning changes during an incident. However, within related research fields there are models that make this distinction between rationally-controlled and automatic emotionally-driven processes (see, for example, Power and Brewin 1991; Lazarus 1991; Öhman 1993; Izard 1993; Epstein 1994).

*Darwinian Assumption 5: Due to the fact that exclusion from the group in the hunter-gatherer era was highly maladaptive from a survival perspective, we are pre-programmed to follow group norms and what others do.*

Most of the time humans have existed, we have lived in hunter-gatherer groups of roughly 25 persons that were able to survive because of considerable cooperation skills (see, for example, Hyland 1994). Performance that promotes group acceptance, such as submission to norms of appearance and custom, is assumed to prevent the dangers inherent in group exclusion (Marks and Nesse 1994).

The impact of the social context is often strong, even upon disaster impact. Group membership is protective, as is the presence of a leader (Glenn 1979). There is an assumption that there is a phase in the disaster syndrome, called suggestibility, in which there is a temporal inability to deal with the situation alone and a tendency to regress to a passive-dependent position. Direction and help from others is gratefully accepted, while the powers of the potential helpers may be overestimated (Coleman 1976, cited in Glenn 1979). There is a general tendency to follow others in the middle of a danger situation. One common reason for evacuating is that neighbors do so; most evacuate with their family (Drabek 1986; Fitzpatrick and Mileti 1991). Weisaeth (1989) showed, as already mentioned, that disaster victims whose cognitive functioning was most disturbed coped by copying what others did ("passive following"), which is consistent with this group mentality and the tendency to follow others.

Disaster research clearly illustrates the importance of the social context and our dependence on group norms. Our pre-impact indifference may also be related to social context factors. Our disposition to follow group norms and to guard our status in the group may make us disinclined to overreact or be the most worried in the group, mostly because it may be interpreted by others as a sign of weakness. Toughness, at least for males, may be regarded as strength and as an asset in reproductive competition. Of course, it could be argued that individual survival, and indirectly the possibility to reproduce, may increase if the individual is sensible and reacts quickly to a tangible danger. The tendency not to overreact seems to be stronger than the latter case, as already concluded.

There are alternative explanations to the phenomena mentioned, excluding the issue of group exclusion. The proposed temporary inability to deal with the situation alone could, for instance, be related to a Freudian assumption about regression to a child-parent relationship. Upon disaster impact, the feeling of vulnerability may evoke a primitive longing for a parental figure, capable of providing shelter.

*Darwinian Assumption 6: Kinship and family will have priority in a danger situation, as they will contribute to the individuals' reproductive success.*

Of all groups the family is, not surprisingly, the most important with regard to disaster situations. Family unity at the time of warning increases the likelihood that active warning responses will occur (Glenn



1979; Fitzpatrick and Mileti 1991). Most people evacuate with their families (Drabek 1986). Families try to stay together, and contacting the family is a primary concern (Mikami and Ikeda 1985).

According to Darwinian assumptions, every organism acts to increase the frequency of its genes in future generations, regardless of whether this is by directly taking care of its own offspring or by helping a near kin who carries similar genes. The latter is termed "inclusive fitness" (see, for example, Buss et al. 1998; Daly, Salmon, and Wilson 1997). The Darwinian assumption about the importance of family and kinship relations is also supported by disaster observations. Kinship and family do have priority in a danger situation. The explanation about inclusive fitness can also be contrasted with the more intuitive notion that families are tied together by emotional factors. These two suppositions are not necessarily contradictory. Inclusive fitness is not in itself a conscious motivating force but rather is manifested, for instance, by emotional bonding.

*Cognitive (and Freudian) Assumption 2: Due to a need to not demolish our inner cognitive structures by overwhelming impulses in a trauma situation, we are protected by mechanisms, similar to denial, that regulate the amount of incoming stimuli and serve to facilitate their assimilation.*

Denial may be odd and pathological when considered in light of a consensually validated external reality. What may look like denial is, in fact, a process that allows the individual to realize the realities of the external world slowly and gradually and then incorporate them into his or her internal world. This kind of denial allows for the processing of tolerable doses of both new information and emotional responses. Denial becomes an adaptive process when considered in the context of the trauma victim's task—that of rebuilding and reshaping one's cognitive world (Janoff-Bulman and Timko 1987; see also Lazarus 1985).

Denial with the purpose of protecting or rebuilding our schemas may explain the lack of expected reactions when confronting acute stress. Several such phenomena have been described, such as an absence of strong feelings ("psychic analgesic"), a blunted emotional expression, and a feeling of invulnerability even during exposure to danger (see, for example, Boyd 1981; Dyregrov 1992; Wallenius et al. 2001). One empirical example here could be brought from clinical observations of Estonian shipwreck survivors, who showed blunted affects

immediately after rescue (Taiminen and Tuominen 1996). Symptoms of shock—that is, being stunned, dazed, or apathetic—are hypothesized to stem in part from psychological decompensation and in part from denial mechanisms protecting individuals from the full impact of the catastrophe until they are better prepared to assimilate the trauma (Coleman 1976, cited in Glenn 1979). Shock could also be a protective mechanism to prevent a system breakdown caused by stimulus overload. It should be noted here that shock also could be a result of a more basic freezing reaction (Marks and Nesse 1994).

To perceive the situation as unreal or the state of consciousness as changed may also be an indication of inability to process the information or an indication that awareness of the risk has been reduced. The lack of immediate response to warnings may be explained by the situation being schema-inconsistent as well as by an initial experience of chaos before goal-directed activity sets in or an initial delay before accepting the seriousness of the event (see, for example, Wallenius et al. 2001; Lindström and Lundin 1982).

It should be noted that it is unclear whether dissociative symptoms (numbing, reduced awareness of surroundings, derealization, depersonalisation, dissociative amnesia, etc.) are expected to be present during impact or only within a period of forty-eight hours. It is claimed that dissociative symptoms are part of an acute stress disorder (see, for example, Bryant and Harvey 2000), a syndrome that refers to the period forty-eight hours post-trauma. The more immediate acute stress reaction has no dissociative symptoms, as defined for example by ICD-10 (International Statistical Classification of Disease). The presence of dissociative symptoms during impact needs further investigation. One theoretical perspective suggests that dissociative symptoms should be understood as defensive (Bryant and Harvey 2000). It could also be argued that the schema-inconsistency of the trauma and the subsequent problems of cognitive processing are possible explanations for these symptoms.

Practical training and experience seems effective both to decrease the number of accidents (Hale and Glendon 1987) and for optimal performance during disasters (Weisaeth 1989). An explanation using the schema concept could be that training and experience may construct schemas. There is also the possibility that, when actions in accordance with earlier training are unconsciously effectuated even if the situation is difficult to process, some cognitive schema could still be unconsciously activated.

This schema-based theory has several parallels with Freudian trauma theory. One of Freud's formulations is that trauma occurs when the intensity of the stimulus is so great that the stimulus barrier is over-

whelmed (Brett 1993). The organism will then be flooded with unmanageable impulses, and functioning will be disrupted. It should be mentioned that the concept of denial is used in several ways. It is used in situations where denial has the purpose of defending the cognitive schema of breaking down by too much data or handling data that do not fit. Denial is also used as a reaction to prolonged stress where denial protects the ego from painful affects or emotions.

*Cognitive Assumption 3: Active coping is a result of a favorable appraisal, implying also that non-obvious threats are immediately identified. Passive coping is a result of an interruption of the appraisal process.*

In interviews performed by the author with survivors of the Estonia shipwreck, one of the main problems was that most passengers could not make an accurate appraisal of the situation. When the ship began to heel over, most people could not estimate how dangerous the situation was. In that moment it was not obvious to the passengers that the boat was going down (Wallenius 1996).

Active coping presupposes that one has made an appraisal of danger. Some situations could falsely be appraised as not dangerous, which is not necessarily an individual shortcoming but more due to the fact that some dangers are tricky to appraise. For instance, technologically complicated dangers are not always apparent to the average person, and some dangers require special knowledge to judge correctly. In the Estonia case, it was hard for most passengers to judge the implications of the list. Without previous knowledge of boats, it was difficult to guess the severity of the situation.

*Cognitive Assumption 4: Appraisal of personal control should encourage active coping while appraised lack of control should decrease active coping, resulting in resignation.*

Generally, maintenance of control is regarded as a fundamental human motivation. Individuals strive to acquire both actual control and a general sense of control (Friedland, Keinan, and Regev 1992). Most of the research on the control concept suggests that increase in perceived personal control will increase the capacity to cope (see Burger 1989 for a review). It has frequently been assumed that perceived control has a stress-reducing effect. There are, however, exceptions to this phenomenon. Contextual



factors and the personal meaning that control has are important in understanding the impact of perceived controllability (Averill 1973).

Those with internal locus of control experience less stress in disasters, employ more task-centered coping, and employ fewer emotion-centered coping behaviors compared with those who have an external locus of control (Anderson 1977). For peacekeeping personnel, a sense of control and self-confidence is related to lack of fear during exposure to fire from small arms and artillery. Danger incidents are sometimes even perceived as thrilling or unreal. Conversely, strong fear is related to negative control appraisals. The strongest reactions of fear are not necessarily related to the amount or the closeness of shooting but rather to experiencing a lack of control over the situation or to feelings of helplessness and inferiority (Wallenius et al. 2001).

The lack of control appraisal seems to have several possible effects. It may result in stronger fear, resignation, helplessness, or even panic reactions. Several findings suggest that an increased sense of risk combined with a low expectation of success in dealing with that risk may provoke a helplessness reaction, thus decreasing the motivation to behave adaptively (van der Pligt 1998). Generally, an appraised lack of control implies maladaptive behavior. Resignation may be adaptive in situations with no objective possibility for control and no need for any emotional activation. Adaptive coping includes knowing when to stop trying to achieve a goal that is unattainable (see, for example, Lazarus and Folkman 1984).

It could be argued also that appraisal of too much control might lead to maladaptation. Occasionally, peacekeeping personnel were actually seeking the danger and thrill rather than avoiding them (Wallenius et al. 2001). A sensation-seeking trait may be over-represented within groups present by their own free will at a dangerous location. Several explanations of this voluntary risk-taking have been offered, one of which suggests that it is a way to develop control (see, for example, Lyng 1990). Sensation-seeking as a personality trait is assumed to be a function of a higher optimal level of arousal, a lower tolerance for arousal constancy, or individual differences in the neuro-chemical substances of the limbic system (see, for example, Björck-Åkesson 1990). This trait may be adaptive up to a certain limit when the task demands some risk-taking, but maladaptive when individuals seek danger at the expense of their own and others safety. This implies that control appraisal is not always a guarantee of adaptive coping. A false or exaggerated appraisal of control may also lead to a lack of active coping. In conclusion, perceived control is generally associated with adaptive coping, but the connection is complex and there are exceptions.

*General assumption: Our adaptation mechanisms are calibrated to threats of a certain intensity; hence, they have a point of collapse.*

Lack of active and purposeful coping could be a consequence of excessively intense stress that the mind is not constructed to handle. Some empirical phenomena seem best explained by this, mainly cases of severe maladaptation in dangerous situations.

Even if most behavior during a disaster is reasonably adaptive, a recurrent theme has been that a small fraction of victims react with inappropriate emotional responses. Examples include, but are not limited to: confusion; paralyzing anxiety; "hysterical" crying and screaming (Boyd 1981); psychological shock reactions such as motoric paralysis (Weisaeth 1989); paralyzing mortal fright and/or hyperactivity; confused behavior; loss of cognitive control and logical thinking (Wallenius et al. 2001); panic (non-rational imperative behavior) resulting in injuries (Alexander 1990); dissociative reactions such as derealization, depersonalization, and distortions of time (Cardena and Spiegel 1993); and overwhelming feelings of terror, powerlessness, helplessness, abandonment, and isolation (Wolfenstein 1957). Wallace (1956) noted that one-third of disaster victims showed traces of an initial disaster syndrome in which the first stage, shock, is characterized by being stunned, dazed, and apathetic (Coleman 1976, cited in Glenn 1979). Drabek (1986), however, has such occurrences are less frequent and has claimed that there is little, if any, evidence of any "zombie-states" even if there are some emotional disturbances in people's reactions.

Situation-related explanations for these more dramatic reaction patterns may be associated with the intensity of the danger, for instance earthquakes which generally have a high speed of impact and occur unexpectedly (see, for example, Kosaka 1994). Person-related explanations concern the limits of our adaptation systems. Different theoretical approaches assume inner psychological structures, schemas, ego functions, or some kind of psychologically-operating system that can be used to cognitively and emotionally process incoming stimuli. Our psychological threat adaptation systems are just not adequate since they are designed for lower levels of stress than we may be exposed to in a disaster. Individuals may reach their point of breakdown and dissociate. The point of breakdown may differ among different people, but in the end most will fail in their ability to process incoming stimuli if the stress exposure is intense or sufficiently long-lasting. This will manifest itself in the loss of cognitive and emotional control, which may surface as panic behavior.

The definition of panic, as well as its prevalence, has long been debated in the literature (see, for example, Fischer 1998). The term seems to be used in two senses. What may be most associated with the term is a situation in which a crowd gets out of control in an irrational and uncontrolled flight behavior is elicited, implying that the negative consequences are highly amplified. A single individual may, however, also panic, in the sense that he or she loses the cognitive and emotional control of his or her behavior. As a crowd phenomenon, panic is—as we have already concluded—uncommon. Panic behavior manifested in a single individual may be more common, even if it is far from the most typical disaster response.

## General Discussion

### Integration of the Theories

To sum up, many reaction patterns are recurrent in the literature. In the pre-impact period the main reaction seems to be denial, the tendency not to accept threats or their relevance. This tendency seems to be especially prominent when facing threats low in magnitude and clarity and prolonged in time. The description that research gives of behavior characteristic of the impact phase is more complex and sprawling. The occurrence of adaptive and maladaptive behaviors varies in the reviewed literature, mainly dependent upon (a) the intensity of stress, (b) the complexity of the task, and (c) individual coping resources. Table 2 summarizes possible maladaptive performances that have been empirically demonstrated, related to the kind of psychological reaction that may activate them, and to the character of the threat in different sub-phases.

Table 2. Schematic Presentation of Possible Maladaptive Performance, According to the Reviewed Research

<i>Character of the Threat</i>	<i>Occurring Reaction</i>	<i>Possible Maladaptive Behavior</i>
<i>Low Magnitude (Pre-impact)</i>	Denial	Low motivation for preparation or precautionary measures Passivity Misinterpretation of threat Delayed acceptance of possible danger
<i>High Magnitude (Impact)</i>	Initial shock	Delay of initial response Confusion
	Alarm reaction	Narrowed cognitive space Low ability for complex information-processing
	Extensive loss of cognitive and emotional control	Irrational behavior and decision-making Hyperactivity—paralysis



The present survey of the correspondence between empirical findings from disaster research and explanatory psychological theories does not show that any single theory is superior but that each is insufficient alone. The assumptions from the three different theories do not logically exclude one another; in fact, they may all be valid depending on different circumstances. Generally, Darwinian theory has the most explanatory strength in relation to impact or warning behavior, while it has weaker explanations for the lack of motivation to prepare during pre-impact. Preparation presupposes an ability to anticipate future dangers, which most likely is cognitive rather than instinctual or emotional. Freudian theory has its greatest explanatory strength in regard to warnings when the individual neutralizes potential worry with a defense mechanism. Appraisal theory and risk-decision theory may generally best explain reactions to chronic threats of lesser intensity. On the other hand, schema theory is designed to explain reactions to acute threats.

The present aim is to argue for an integration of existing theories. A holistic assumption about several levels of adaptation mechanisms is consistent with other attempts by modern theorists to integrate parallel—but dissimilar—modes of information processing. The distinction is often made between rational and controlled processes on the one hand and automatic or emotionally driven processes on the other (see, for example, Epstein 1994; Power and Brewin 1991; Öhman 1993; Izard 1993).

The different adaptation strategies in the review, which are contained in Table 3, relate to different psychological behavioral control levels. Any theoretical approach that seeks to find a more comprehensive understanding of danger adaptation must take into consideration that we have several levels of psychological functioning. Many approaches tend to focus on too restricted a sphere of human functioning to truly grasp the complexity of this matter.

The division of psychological processes can also be related to the organization of the central nervous system. Automatic or emotional processes are presumed to be located mainly in the evolutionary old brain parts (e.g., the brain stem, the hypothalamus, and the limbic system), while higher cognitive processes are located mainly in the evolutionary newer cortex. These different parts of the brain are, however, interconnected and should not be regarded as separate functional entities. The whole brain is always active, but the level of activity in each specific part varies.

The different danger adaptation mechanisms can be connected to the different psychological control levels. Problem-focused coping presupposes higher cognitive levels, analysis, and appraisal of reality.

Emotional-focused coping could be either a conscious or a subconscious process. In the latter case, it is categorized intimately with psychological defenses. The alarm reaction is mainly an automatic process with minimum conscious control. We do not switch between these adaptation mechanisms in an all-or-nothing way. It is instead an interactive process, even if the dominant level is variable. Danger situations are perhaps one of those situations in life in which the automatic and emotional levels are mostly dominant, while consciously controlled processes are sacrificed.

Table 3. Adaptation Mechanisms at Different Levels

<i>Behavioral Control Level</i>	<i>Kind of Danger Adaptation Mechanisms</i>	<i>Trigger of Adaptation Mechanisms</i>	<i>Strengths in Relation to Acute Danger</i>	<i>Main Weaknesses in Relation to Acute Danger</i>
<i>Conscious Cognitive Processes</i>	Problem-focused coping Emotional-focused coping	A conscious appraisal that a danger is present or upcoming	High adjustment to the specific situation High flexibility Direct conscious control	Can process only limited amount of stimuli Slow in relation to acute danger Does not always motivate people to act
<i>Subconsciously Controlled Cognitive Processes</i>	Psychological defenses	Unpleasant emotions, e.g. worry and anxiety	Makes people less worried	Makes people ignore threats and emotional warning signals Less conscious control
<i>Unconsciously Controlled (Automatic) Processes</i>	Emotions-fear/aggression Alarm reaction	Evolutionary old stimulus features announcing danger – trigger mechanism modified by personal experience	Makes people physically activated and cognitively focused	Not updated to modern dangers Occasionally activated in the "wrong" contexts Inflexible Less conscious control

The different adaptation levels differ in their evolutionary length. Higher cognitive functions such as complex appraisal could be assumed to have evolved within the last million years of human development, while basic mechanisms meant to avoid or cope with danger are much older. Basic mechanisms used during the hunter-gatherer era did not begin to evolve then, but were already being used by the humans of that time. It can be assumed that this was the last period in human history in which drastic changes to these mechanisms were made.

The adaptation levels' mechanisms differ in the relative importance of hereditary patterns, personal experience, and situational circumstances. The relative impact of innate patterns is higher on the outcome of an alarm reaction, which to a lesser extent is affected by situational factors that differ from those that triggered the reaction. The effect of

learning and experience on alarm reaction is basically what cues that we have learned signify danger. For instance, experience generally facilitates discrimination between the dangerous and the non-dangerous. The actual alarm reaction does not differ from situation to situation. Defense mechanisms are according to the classical Freudian hypothesis a result of early childhood experience, even if the validity of this hypothesis could be questioned. Denial is triggered by stimulus-activating unpleasant emotions, but the mechanism is in itself not highly differentiated in relation to the specific situation. A problem-focused coping strategy is considered mainly a mixture of an immediate analysis of different situational circumstances and personal experience. A problem-focused strategy is to a greater extent adapted to specific situational demands.

The adaptation levels differ in how controllable they are for "the ego," or the conscious part of the mind. The problem-focused coping is most controllable, and the outcome is most easily changed or adapted to the specific danger situation. The ability to control psychological defenses and alarm reactions is more indirect. One can, for example, gain some control over the defenses by better insight in one's own psychological functioning. Alarm reactions could be controlled to some extent by relaxation techniques, for instance. But a strong alarm reaction, when triggered, may imply a behavior difficult to consciously control. It could be noted that the ability for control by higher cognitive strata is both good and bad. An automatic alarm reaction or a strong emotion may sometimes be a better guarantee than an intellectual analysis that the individual really is active against the danger. Cognitive ability to judge risks and dangers may more easily succumb to denial or rationalization and thus be less trustworthy. A strong emotion implies a higher motivating force than an intellectual analysis.

### **Principal Explanations for Maladaptation**

We can conclude that there are some principal explanations for faulty danger adaptation. The first one is that there are limitations on the human capacity for information processing. Our information-processing capacity has a quantitative limit. Too much input of inner and outer stimuli may overload the system. Secondly, there is also a qualitative limit. Stimuli that we are not used to or not expecting will be more difficult to process, especially if it is complex and difficult to appraise.

The second principal explanation is that there are limitations on the human capacity to process distressing emotions. First, it is a quantitative limitation. Extremely strong emotional reactions may overload the



system. The push for emotional discharge may be too powerful. Secondly, there is a qualitative limitation, in the sense that unpleasant emotional reactions, such as worry, fear, or anxiety, may be repressed, and information that activates those emotions may be denied.

The third principal explanation is that reactions that in other contexts have been successful in adaptation are activated in the "wrong" context. We have certain genetically predisposed reactions that by this reason may be maladaptive relative to the present threat. Another example of obsolete adaptation mechanisms is general coping dispositions or psychological defenses acquired from earlier experiences. We may be trapped with infantile defenses due to an arrest of psychological development caused by unsuccessful childhood coping. The circumstance that a reaction is adaptive in relation to a certain context has definitional implications. It is thus important to separate, on a conceptual level, the reaction which is successful in the present situation from the purpose of the reaction to better adapt to the environmental context. A maladaptive reaction is unsuccessful in adapting the organism to the present environment, but it may in some way have an adaptive purpose.

The fourth explanation is that different adaptive strategies conflict with each other. One is that denial is an adaptation mechanism that compensates for anxiety, which is another more basic adaptation mechanism. Another example is resignation, which is a mechanism that we could assume functions to deactivate an alarm reaction in situations lacking the actual possibility for control acquisition.

The kind of danger situation that is discussed in this paper is complex and incorporates several dimensions. The different kinds of threats, the different roles an individual assumes, and the different phases all indicate different demands placed upon the individual. Analogous to the complexity of the situation, there also seem to be several human reactions and mechanisms that have relevance in research concerning life-threatening situations. The present focus has been primarily on how people react before and during the situation and on how these reactions affect performance. Research tells us that different subjects in different situations may react maladaptively in different ways to a threatening situation. Understanding why this happens will help us minimizing the negative consequences when we have to operate in dangerous environments. But we are also in need of theoretical development. The conclusion to be drawn from this review is that the basis for this research should be a holistic and integrative approach in which the individual operates on instinctive, emotional, and cognitive levels. We currently have no such theory. Future theoretical development needs to determine

more about how these levels interact, instead of focusing on only one at the time, and the challenge will be to further integrate existing theories.

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