Universiteit Twente
de ondernemende universiteit

The influence of unrelated affect on risk perception

Sonja Sander

27.03.2009

Enschede

Universiteit Twente
de ondernemende universiteit

The influence of unrelated affect on risk perception

Abstract

This review investigates the possible role of unrelated affect in risk perception by reviewing the Affect Heuristic theory from the field of risk psychology and the Affect Infusion Model (AIM) from social psychology. The conclusion is guided by four questions. It is concluded that it is possible to compare the two fields of psychology according to their theories about the role of affect in judgement and perception but, for an efficient communication, there is a strong need for general accepted definitions for the important terms. Furthermore, the Affect Heuristic theory could be extended in its understanding of the role of affect in risk perception, by assuming that not only related affect can be influential on risk perception but unrelated affect can have influence, too. To clarify this role of unrelated affect in risk perception risk psychology could use findings from social psychology and the Affect-as-Information mechanism from the AIM. Finally, it is discussed what the two theories have in common and how they differ according to their understanding of the role of affect in judgement and perception. While the Affect Heuristic sees the judge as in a context free situation the AIM assumes the judge to perceive and process information depending on the context. Furthermore the Affect Heuristic describes only one possible way of risk perception while the AIM describes four possibilities of information processing. The Affect Heuristic could be seen as referring to one of the four situations that are described by the AIM.

Contents

1 Introduction

To understand the role that *affect* can play in the perception and the judgement of social situations and risk situations, two major theories have been developed. One theory is the *Affect Heuristic*, a risk psychology theory, which is described by Slovic (2005). The other one is an integrating framework from social psychology, the *Affect Infusion Model (AIM),* which is presented by Forgas (1995). The first theory has its interest in *related affect,* while the second assumes that both *related* and *unrelated affect* can be influential. This review compares these two theories with regard to their compatibility. Before the main questions of this review can be introduced, there is need for an introduction that clarifies the term *affect*, the both theories of interest mentioned above, as well as the motivation for this study.

1.1 What is meant by the term affect?

Because there is no general agreement about the definition of *affect*, it is even more important to give a short introduction to that term first. Forgas & Laham (in press) present the following explanation: *Affect* is "used as a generic label" referring to mood and emotion. Following this, the two authors use a differentiation given by Forgas (1992). It says that mood is distinguished from emotion by its "low-intensity, diffuse and relatively enduring affective states without a salient antecedent cause and therefore little cognitive content". Emotions are defined as "more intense, short-lived and usually have a definite cause and clear cognitive content" (Forgas, 1992, p.230).

Forgas (1995) presents the term "*affect infusion*" to name the process wherein an affective state can have influence on a judgemental outcome. The affect can be caused by a stimuli that is not the target of judgement. This is called "*unrelated affect*" in opposition to "*related affect*". The second expression refers to an affect that people have because of the target they are about to judge.

Think of the news on TV, for example. Imagine they start with a distressing report. This report could influence your mood. Now, imagine further that a report about a certain hazard follows. Could your mood be manipulated by the first report (*unrelated affect*) and influence the perception and judgement of the later report? Or, could the *affect* which you have because of the second report influence the judgemental outcome?

1.2 Motivation for this study

The area of *risk* is studied by several academic disciplines. Scientists, engineers, humanists, and behavioural scientist are interested in how *risk* is perceived. In this terms *risk* can be defined as *risk perception, risk communication, risk assessment* or *risk management* (Wilkins, 2001).

Because the field of *risk assessment* is so interdisciplinary, the concept of *risk* itself is even more difficult to define. “Experts may use the word several times, each time with a different meaning” (Slovic, 2002, p.2-3). For example: *risk* as a hazard, *risk* as a probability, *risk* as a consequence, or *risk* as a potential adversity or threat (Slovic, 2002).

Even more complicating for the field of *risk communication* is the finding that experts and laypeople understand *risk* in different ways (Slovic, 2002). How can they communicate if they understand different situations as risky? In 1995, Fischhoff (1995, p.137) wrote that there had been “twenty years of process”, in which “risk communication research has undergone its own evolution”. Still, there is need for more research, before experts and laypeople can communicate without misunderstandings. One example of a central question is: why do people underestimate certain risks while they overestimate less risky topics? On the one hand, people can behave unhealthy or even self-disturbing, for example: excessive drinking and drunk driving, smoking, drug abuse and risky sexual behaviour (Vollrath & Torgersen, 2002); on the other hand, a minor incident, like the discovery of pollution with

relatively small damage, can be corporately perceived as very frightening, catastrophic and dramatic. People even can perceive related companies, industries and technologies as 'equally problematic', even if they are not directly involved in the incident. This can have massive indirect impact of losses. Slovic (2002, para.3.2) called this "the social amplification of risk". In this process, the actual costs and losses can go far beyond the direct damage because of the indirect damage for the whole industry or related companies. It is important that "the direct impact need not to be large to trigger major indirect impacts" (Slovic, 2002, para.3.2). Slovic mentioned the role that the media can play in this process of dramatisation.

There has been a lot of research showing that the media sensationalism can raise public concern about minimal risks or can even complicate "the efforts to respond to a disaster" (Rodrigue, 2001). Vastermann, Yzermans and Dirkzwager (2005) have been able to show that the media can have negative impacts on health and the way people perceive their health problems in the aftermath of disasters. This makes clear, how important it is to have an appropriate risk communication. Therefore, there is need for an understanding of how risks are perceived by lay people. One theory that describes this process is the *Affect Heuristic.* It assumes that *affect* can influence the outcome of this process of risk perception. The theory will be shortly introduced in the following.

1.3 The influence of related affect on risk perception

The *Affect Heuristic* is a risk psychology theory which assumes *affect* to be influential on risk perception. Within this theory, Slovic (2004) states that risk can be seen as: *risk as feelings*, distinguished from *risk as analysis*. The two modes of thinking differ in some ways. "Risk as a feeling refers to our fast, instinctive, and intuitive reaction to danger. Risk as analysis brings logic, reason, scientific deliberation to bear on hazard management" (Slovic, 2004, p.311). Moreover, the two systems are said to interact, while information is processed. When people

make a judgement, they use their *affect pool* to make it quick and easier, especially when the situation is complex and the resources are limited (Slovic, 2004, p.314). Slovic calls this "mental shortcut" the *Affect Heuristic*. The *affect pool* is created during a lifetime of learning and it holds images mapped (or "marked") by affective information. If people find themselves in a risky situation, they can rely on their *affect pool* to know immediately, how they should think and feel about the situation.

The most important idea, for this review, about this theory is that the *affect* seems to be *related* to the target that is being judged. Research in social psychology shows that *unrelated affect* can be influential, as well. The theory about this phenomenon is introduced in the following.

1.4 The influence of unrelated affect on social judgements

There is a growing field of research in social psychology, about how *affect* can influence social judgement, motivation and behaviour. It shows that it is possible to change the affective state of people in an experimental situation. These different affective states can have various influences on, for example, people's social judgement, self-perception, social behaviour or consumers' evaluations of products (Isen, Clark, Shalker & Karp, 1978; Forgas & Moylan, 2002; Forgas, Dunn & Granland, 2008; Barone, Miniard, Romeo, 2000).

This review focuses on the part of these studies in which is shown that *unrelated* as well as *related affect* seem to be influential. This means that the stimulus for judgement and behaviour needn't be the same stimulus that creates the affective state (Forgas, 1995).

For example, Schwarz and Clore (1983) were able to show that people who had to describe an unpleasant life event, reported afterwards to be significantly less happy than did those people who had to describe a positive life event. This momentary mood was in turn

influential when it came to the task to judge their general happiness and life satisfaction (Schwarz & Clore, 1983).

The different findings and theories about the role of *affect* in social situation and their perception are combined in an integrating framework, the *Affect Infusion Model* (AIM), presented by Forgas (1995).

In this model, *affect* is said to influence *what kind of* information is processed (content) and *how* this information is processed (process). The model further claims that depending on the features of the target, the judge or the situation, people use four different processing strategies. Namely, these are the two *low infusion strategies: direct access* and *motivational processing;* and the two *high infusion strategies: heuristic* and *substantive processing*. The last two are called *high infusion strategies* because they make an *affect infusion* likely to occur. This is the reason why they are of special interest for this review. To explain these two strategies, Forgas uses the two principles: *Affect-Priming* and *Affect-as-Information* mechanisms. The *Affect-Priming* principle suggests that "*affect* can prime the encoding, retrieval, and selective use of information in the constructive processing of social judgements" (Forgas, 1995, p. 44). According to the *Affect-as-Information* idea, *affect* directly influences the decision. *Affect* simply tells people 'how they feel about it' (Forgas, 1995). Especially the last principle reminds strongly of the *Affect Heuristic* given by Slovic.

1.5 The purpose of this review

As described above, there are theories in social psychology and in risk psychology, which assume *affect* to be influential in judgement and perception. In risk psychology, Slovic describes the *Affect Heuristic* to understand the role of *related affect* in risk perception. For the field of social psychology, Forgas invented the *Affect Infusion Model* to describe the role of *related* and *unrelated affect* in the judgement of social situations. In this review, the

possible compatibility of the two theories is assessed, to clear if the field of risk psychology should have a look at the theories about the role of *unrelated affect* in social judgements to broaden its understanding of the role of *affect* in risk perception. Could it be possible, for example, that the *Affect-as-Information* theory is in fact close to the *risk as feelings* idea, presented by Slovic? Then, *unrelated affect* could directly influence perception of risk, as well as *related affect* does. Or, could it be that *unrelated affect* influences risk perception indirectly like assumed in the *Affect-Priming* mechanism. For the *Affect Heuristic*, could this mean that people retrieve different information from their *affect pool* if they are in a good mood, compared to the information they retrieve in a bad mood?

In short, the review tries to answer the following questions:

1. ***Is it possible to compare the two fields, risk psychology and social psychology according to their theories about the role of affect in judgement and perception?***
2. ***Can the Affect Heuristic theory be extended in its understanding of the role of affect in risk perception by assuming a role of unrelated affect as well as related affect?***
3. ***To what extend can risk psychology use the findings from social psychology, which are explained by the Affect Infusion Model to clarify the role of unrelated affect in risk perception?***
4. ***What are the differences between the AIM and the Affect Heuristic according to their understanding of the role of affect in judgement and perception and what do they have in common?***

The review has three parts. The first part is about risk and risk perception and will mainly introduce the relevant risk psychology theory; the *Affect Heuristic*. It will further show why it is important to broaden the understanding of the role of *affect* in risk perception. The second part is about Forgas' *Affect Infusion Model* (AIM) and about the high affect infusion mechanisms: *Affect-Priming* and *Affect-as-Information*. It starts with a discussion about the

different definitions of the term *affect* and a comparison of the two fields, social psychology and risk psychology. The third part is the conclusion; it will sum the answers the review was able to give in the first two parts.

2 Risk and Risk Perception

To define the concept of *risk* and the concept of *risk perception* it is possible to make the distinction between *risk as a feeling* and *risk as an analysis*, again. The clarification of this point as well as the definition of *risk* is based on an article written by Rundmo (2004). He and many others identify different categorisations and definitions of *risk*. One definition which is originally developed by Short Jr. (1984) says that, *risk* is "the likelihood that an individual will experience the effect of danger" (Rundmo, 2004, p.7). Following this, Rundmo (2004) offers the definition of risks of engineering-type calculations, according to Rayner and Cantor (1987), which is close to the concept of *risk as analyses*. It states that r*isk* is "the probability of an adverse event and the magnitude of its consequences" (Rundmo, 2004, p.7). In literature about *risk*, there is consent that these definitions are insufficient. That is why Rundmo (2004) gives further explanation about the concept of *risk*. He mentions that all definitions have one thing in common: "the distinction between reality and risk" or "the uncertainty of a situation" (Rundmo, 2004, p.7). Therefore, he quotes Rosa (2003, p.56), who defined risk as "a situation or an event where something of human value (including humans themselves) is at stake and where the outcome is uncertain". The assumption that something of human value has to be in danger shows, the necessary involvement of *feelings*. Furthermore, '*uncertainty'* could be described as a feeling for itself. That is why in this review, the last definition is used to clarify what is implied by the term *risk* in the *risk as a feeling* concept.

But, what exactly is *risk perception*? It is mentioned earlier that it is connected to feelings of dread and uncertainty or with the way people perceive certain situations as risky or not. Rundmo describes it as "the subjective assessment of the probability of a specified type of accident happening and how concerned we are with the consequences." He further writes:

”To perceive risk includes the evaluations of the probability as well as the consequences of a negative outcome. It may also be argued that affects related to the activity is an element of risk perception.” Here, it has to be mentioned that in risk psychology the term *perception* is used in another way than in other fields of psychology. Especially in cognitive theories it is often used to name the process in which sensory information is delivered to the higher centres’ in the brain (Anderson, 2005). In risk psychology, the term *perception* names not only the ‘sober’ process of perceiving but also the process of *experiencing* risk. Consequently it can be stated that in *risk perception*, ‘*affect’* is present and that it is a stronger and more personal way of perceiving. Note that perceiving *risk* often has to do with feelings such as fear or anger.

Still, the question about how exactly people perceive *risk,* remains. Which role does *affect* exactly play in the transformation of information about risky situations and during the judgement about the risk of a certain situation? And, what could be the influence of worrying about one risk on the perception of another risk?

One theory of risk perception that includes the important role of feelings is the *Affect Heuristic* presented by Slovic. This will be the topic of the next chapter.

2.1 Slovic’s Affect Heuristic

Slovic once stated: “danger is real but risk is a construct”. *Risks* are not only judged by, what people think about it, but also “how they feel about it” (Slovic, Peters, Finucane & MacGregor, 2005, p.36). According to this, risk perception is not only the objective perception of a dangerous situation. If people perceive risk, they see more than ”the probability of an adverse event and the magnitude of its consequences” (Rundmo, 2004, p.7).They not only react because of an analysis of the situation. They react on feelings such as dread, fear or anxiety. That is why, Slovic and others tried to identify people’s emotional

reactions to risky situations by using an analysis techniques they called the psychometric paradigm (Slovic, 2002). This will be explained in the following.

2.1.1 The psychometric paradigm

The psychometric paradigm uses "psychophysical scaling and multivariate analysis techniques to produce quantitative representations or 'cognitive maps' of risk attitudes and perceptions" (Slovic, 1987). In this kind of research people are presented a set of hazards and are asked to make a quantitative judgment of each hazard concerning the aspects: the current riskiness, desired riskiness, and desired level of regulation. Furthermore, the test persons are asked to judge the risk according to the following parameters:

- The hazards' status on characteristics, like e.g. voluntariness, dread, knowledge or controllability, as an example.
- The benefits a society has because of a certain risk.
- The number of deaths from a certain hazard in an average year.
- The number of deaths from a certain hazard in a disastrous year.
- The seriousness of each death from a particular hazard relative to death due to other causes (Slovic, 2002).

Studies can show that it is possible to quantify and predict the risk people perceive. Furthermore research makes it assumable that there are differences among groups. Two especially relevant groups for the field of risk communication are experts and lay people. This is because the experts have to give the relevant information to the lay people. Unfortunately, the concept of risk seems to mean something else for experts than for laymen. Results show that the experts' responses correlate highly with technical estimates and annual fatalities. For lay people the hazards' characteristics, like e.g. the catastrophic potential threat to future generations, are more predicting.

It is also shown that it is possible to create a profile for each hazard made of these risk characteristics. This means that each hazard get a certain score on each characteristic. For example a score on a scale ranging from chronic to catastrophic (other examples could be: voluntary vs. involuntary; common vs. dread; certain not fatal vs. certainly fatal...). These profiles tend to correlate with each other, "across a wide range of hazards" (Slovic, 2002). This means, for example, that a hazard that is predominantly highly rated as 'controllable' and 'well known' is mostly also highly rated as 'voluntary' (Slovic, 2002). According to these correlations, factor analysis is able to show that all these characteristics can be sorted in a small set of higher order characteristics of factors. Figure 1 shows that the two most important factors can create a factor space, with the horizontal factor "*dread risk*" and the vertical factor "*unknown risk*". As already mentioned lay people perceive risk much the same concerning the hazards profile of these characteristics. For example, the hazards that are placed in the factor space in the upper right are collaborative perceived as being very risky, like DNA Technology or Radioactive Waste.

They are high on factor "*dread risk*", which means that lay people perceive a lack of control, dread, catastrophic potential, fatal consequences, and an inequitable distribution of risk and benefits. In addition, they score high on factor "*unknown risk*" which means that people perceive the risk as unobservable, unknown, new and delayed in their manifestation of harm. The lower diagram in figure 1 shows the characteristics that make up the two factors. (Slovic, 1987). Now, remember the definition of *risk*, which is given by Rosa. In that definition "something of human value has to be at stake". This reminds of the factor *dread risk*. The second factor, *unknown risk,* could stand for the "uncertainty of a situation" (Rosa, 2003, p.56). As a consequence, Rosa's definition can be linked to the results of the psychometric paradigm research.

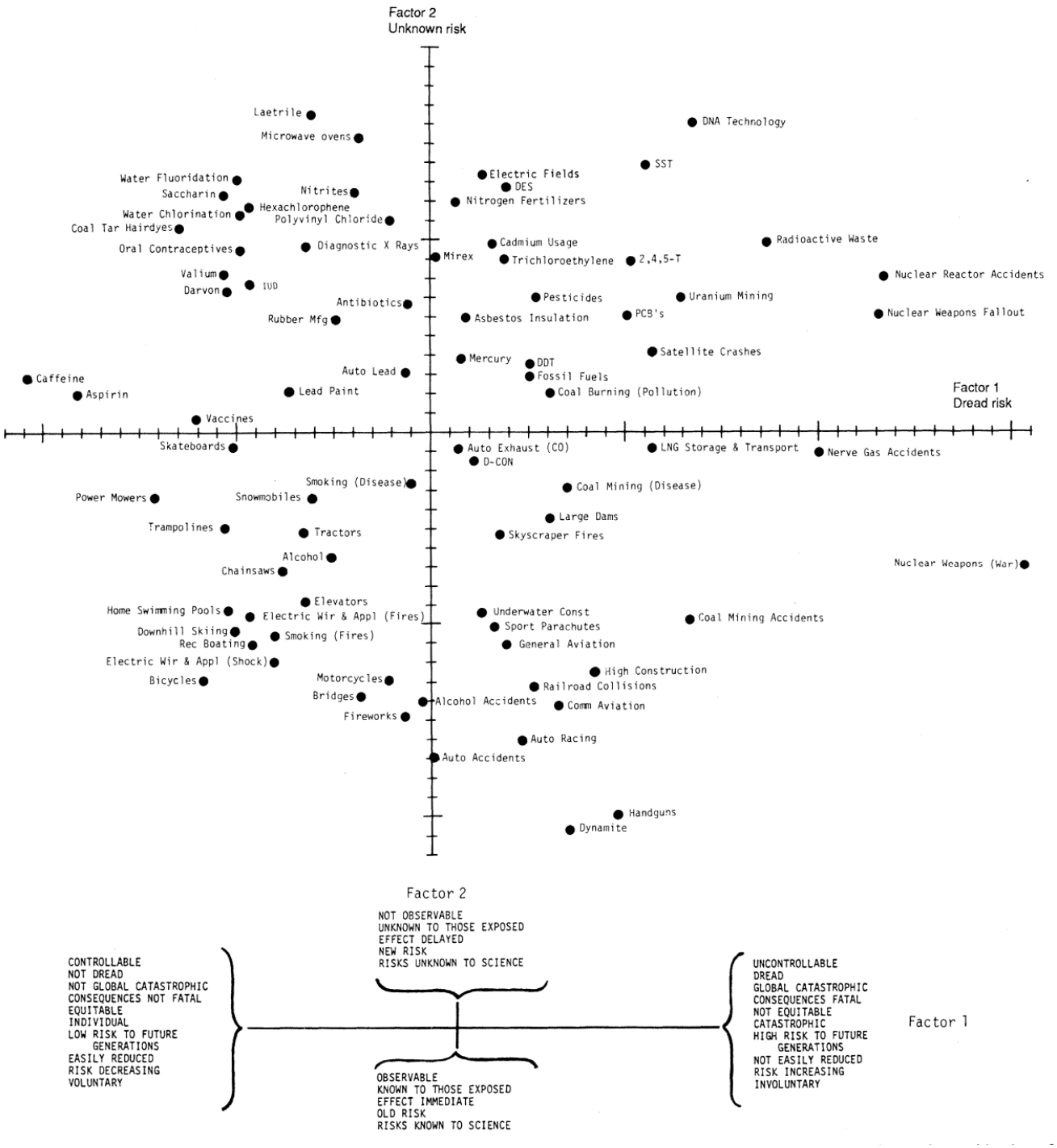

Figure 1: "Location of 81 hazards on factors 1 and 2 derived from the relationships among 18 risk characteristics. Each factor is made up of a combination of characteristic as indicated by the lower diagram" (From: Slovic, P. (1987). Perception of risk. *Science, Vol. 236*, p. 236).

Slovic's studies were also able to show that "feelings of dread were the major determiner of public perception and acceptance of risk for a wide range of hazards" (Slovic et al., 2005, p. 36). It can be concluded that *affect* does play a role in perception of *risk*. To clear this and *Affect Heuristic* further research, presented by Slovic, will be the topic of the following paragraph.

2.1.2 Further research about the influence of affect on the perception of risk

One research topic in risk psychology is about people's perception of *risk*, in relation to the perception of *benefits*. One phenomenon, Slovic rediscovered is originally found out by Fischhoff, Slovic, Lichtenstein, Read & Combs (1978). They found out that people negatively correlate risk and benefit (more benefit - less risk; less benefit - more risk), while this correlation tend to be positive, "in the real world" (more risk - more benefit; less risk - less benefit). For Slovic, the most relevant part about this was that "the inverse relation between perceived risk and perceived benefit of an activity (e.g., using pesticides) was linked to the strength of positive or negative affect associated with that activity as measured by rating the activity on bipolar scales such as good/bad, nice/awful, dread/not dread, and so forth" (Slovic et al., 2004, p. 315). In short, depending on their feelings, people judge the risk as high and the benefits as low (negative feeling towards the risk) or the risk as low and benefits as high (positive feeling towards the risk). In this case, the judgement should change if the feeling is influenced and the feeling should change if the judgment is influenced. This was the hypothesis of a study conducted by Finucane, Alhakami, Slovic, & Johnson (2000) and it was confirmed. The four researchers manipulated affect by presenting four different kinds of information about each of three technologies. Figure 2 makes this clear by showing four small figures (A-D) with the four possible forms of the provided information (benefit is high; risk is low; benefit is low; risk is high). Each information changes the affect into a

certain direction (positive and negative) and, via the affect, the perceived risk or benefit (low vs. high) change as well.

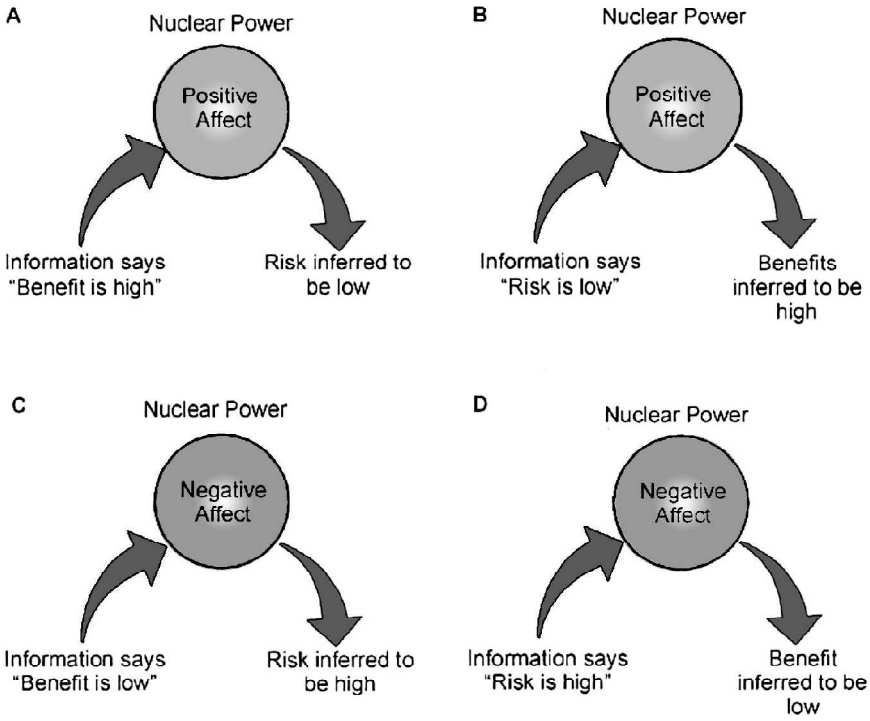

Figure 2: Provided information changes the subjects' perceived benefits as higher (A) or the perceived risk as lower (B). This influences their affect into a positive direction (A&B), which in turn changes the perceived risk or benefits judgement. The risk is than inferred to be low (A) and the benefits are inferred to be high (B). If subjects receive information that says "benefit is low" (C) or "risk is high" (D) their affect changes into a negative direction, which in turn changes their judgement of risk and benefits, again (From "Affect, risk, and decision making " by Slovic, P., Peters, E., Finucane, M. L. & MacGregor, D. G., (2005). *Health Psychology, 24* (4), p. 37).

As already mentioned, changing the perceived risk changes the perceived benefit through changes in affect and vice versa. The authors conclude this, because the relation of risk and benefit without affect would not be logical, as explained earlier in this text (Slovic, 2005). A second study reaffirmed this conclusion. It shows that "the inverse relation between perceived risk and perceived benefits increased greatly under time pressure, when opportunity for analytic deliberation was reduced" (Slovic, 2005, p.36). Unfortunately, Slovic's article does not provide more information about the second study.

Three conclusions are of special interest for this review. First, affect is assumed to influence the judgement directly. This is a part of the discussion about direct or indirect influence of affect on judgements which will come back later in this review, when Bower's *Affect-Priming* mechanism and the *Affect-as-Information* mechanism (by Schwarz and Clore) will be discussed.

Second, the review will come back to the role of *time pressure.* The second experiment already shows that time pressure seems to increase the influence affect has. The factor 'time', as a variable that determines the processing choice reappears in the discussion of Forgas' *Affect Infusion Model*.

The third conclusion is that *related affect* does influence the judgement, because in this study the subjects got information that was related to the target that had to be judged.

2.1.3 Affect-laden images and the influences on risk judgements

The study in this paragraph is presented by Slovic, Monahan and MacGregor (2000). They asked experienced forensic psychiatrists and psychologists "to judge the likelihood that a mental patient would commit an act of violence within six month after being discharged from hospital" (Slovic, 2005, p.37).

The subjects were handed out either an experts' assessments written in terms of relative frequency (for example: "of every 100 patients similar to Mr. Jones, 10 are estimated to commit an act of violence to others...") or they received the information presented in terms of probabilities ("patients similar to Mr. Jones are estimated to have a 10 % chance of committing an act of violence to others")[1].

The results show that the clinicians who got the first description perceived and labelled Mr. Jones as more dangerous than did the second group of clinicians. The authors conclud that

[1] Note that the given content is statistically equivalent.

affect-laden images (“20 out of every 100 patients similar to Mr. Jones are estimated to commit an act of violence,”) are judged as more risky than a situation that is presented in a form of probabilities (“patients similar to Mr. Jones are estimated to have a 20% chance of committing an act of violence”). The *affect-laden image* crates a frightening image of a violent patient. This in turn makes the judge perceive more risk (Slovic et al., 2005, p. 37).

As stated earlier, it is concluded that the presented information does influence the judgment, via *affect*. Furthermore, the content of the information is related to the target that has to be judged.

Slovic (2005) further reveres to a study that presented affect-laden scenarios and anecdotes in a narrative format, but comparable to Slovic’s study the content was again *related to the risk* that has to be judged. The next paragraph explains the *Affect Heuristic* which is invented by Slovic to explain the findings of his studies.

2.1.4 Explaining the findings in terms of the Affect Heuristic

Slovic created the term *Affect Heuristic* to name the reliance on feelings to judge risks, “with the experienced feelings being used as information in the decision process” (Slovic et al., 2005, p.35). He chose for the term *heuristic* because Slovic is of the opinion that people commit mistakes if they rely on their good or bad feeling towards something to make a fast, instinctive and intuitive decision. This opinion is not backed by ever scientist. Bless (2002) e.g. emphasises “the signal function of affective states”. According to him, affective states serve as a signal that makes it possible to react on changing situations immediately without extensive information processing. Therefore, if an immediate and fast reaction to a threat is demanded by the situation relying on affect can even safe lives.

Slovic defines *affect* as the "faint whisper of emotion". He wants to make clear that he does not mean the visceral emotion (such as fear), but "the feeling state" that demarcate "a positive or negative quality of a stimulus." (Slovic et al., 2005, p.35).

Some aspects are especially important for this review. The affective response occurs rapidly and automatically, with or without consciousness and gives information about the goodness or badness of the stimuli (*related affect*). Note also that Slovic does not mean strong emotions by using the term *affect*.

As mentioned earlier, this is different from the definition given by Forgas, wherein *affect* stands for both, emotion and mood. Moreover, Forgas' theory implies *related* and *unrelated affect*. The consciousness about the *affect* becomes interesting later, in this review when the *Affect-as-Information* mechanism is being discussed.

Slovic further states that people do not only rely on their feelings. In addition to the concept r*isk as feeling* people can perceive *risk as analysis*. This part of his theory is based on the dual-process theories of information processing (Cameron & Leventhal, 2003; Chaiken & Trope, 1999; Sloman, 1996), which is also described by Epstein (1994). According to him, people perceive information in two different ways, with two different systems: the *experiential system* and the *analytic system*. Slovic uses these two modes of thinking to explain his two concepts. The *experiential system* perceives risk as a feeling and the *rational system* (or *analytic system,* how Slovic named it) perceives risk as analysis. The first is the "fast instinctive and intuitive reaction to danger". The second is about "logic, reason, and scientific deliberation" (Slovic, 2005, p. 35). The theory further contains that the two systems interact and the second, the analytic system, strongly depends on the experiential system. Affect guides and 'motivates' the analytic thinking. Another term used by Slovic for his theory is the *affect pool*. If people make a judgement, they use their *affect pool*. The *affect pool* includes perceptual and symbolic representations of situations or risks in people's

memories. These images are marked by *affect* (somatic or bodily states) through lifetime of learning. It makes people associate negative or positive feelings with a certain situation if they recall information from the *affect pool* to make sense of a situation (Slovic, 2004). According to Slovic reliance on such feelings can mislead people. That is why the theory is called *Affect Heuristic*. He introduces two ways of mistakes:

1. People can rely on a manipulated affective reaction. Smokers, for example, could perceive the benefits of smoking higher than the risk of smoking if advertising manipulates their feelings towards smoking (Slovic, 2004, 2005).
2. Mistakes can result from the limitation of the system. Slovic gives the example that people can perceive small changes in death (1 death versus 5 deaths), but no big changes in death (500 and 600 deaths).

It could be asked if there is a third form of mistakes: Can *unrelated affect* mistake the perception of risk? A research, conducted by Johnson and Tversky (1983), demonstrated that induced mood influences the estimation of the frequency of undesirable events (like risks). Because the study is very relevant for the purpose of this review, it will be summarized in the next paragraph.

2.2 Unrelated affect and the perception of risk

Eric J. Johnson and Amos Tversky (1983) were interested in the influence of a brief newspaper report on subjects' estimates of the frequency of risks and other undesirable events. They found an effect; but contrary to their expectations the effect was present for both the articles about the hazard and for those that are not related to the judged hazard. The two authors conducted four experiments, which will be the topic of the following passage.

They based their idea for the study on the *primary bias* and the *secondary bias* observed by Slovic, Fischhoff & Lichtenstein (1982). The first one is the observation that people

"overestimate infrequent causes of death while underestimating more frequent causes". The second idea makes this even clearer and refers to the observation that overestimated infrequent causes can be subjectively perceived as dramatic and sensational with many victims (like an airplane crash). The underestimated but more frequent causes are generally events with one victim at a time (Johnson, 1983, p. 20). The bias is then attributed to the *availability heuristic*. This heuristic claims that the perceived frequency of an event depends on how easy it comes to mind (Johnson, 1983, p. 20). Furthermore the two authors mention that judgements about risk have one special characteristic: "They seldom occur in an emotionally neutral context" (Johnson, 1983, p. 20, 21). That is why they wonder which role *affect* does play in risk judgements.

To investigate this, they used newspaper stories, designed to manipulate affect by describing the death of a single person, while giving minimal information about how frequently this hazard happens (in the general population). A Newspaper Reporting Study was designed as a manipulation check to test the effect of the newspaper report on *affect*. This manipulation check was presented as another study. Thus, the subjects were unaware of the importance of this mood manipulation while their risk judgements were measured.

Subjects further had to fill out a 'Perception of Risk Questionnaire', measuring the dependent variable. The first part measured "the level of worry and concern for each of (...) 18 causes of death". The second part asked the subjects "to estimate the frequency of various fatalities" (Johnson, 1983, p. 23). A pre-study was conducted to generate a set of risks and ascertain the perceived structure of these risks. This structure delivered information about the similarities between the risks (Johnson, 1983, p. 21,22).

Statistics tested four possible effects:

- *No increase* in fatality estimates.
- *A local increase*, limited to the target risk.

- *A generalization gradient*, which means that there is an increase in perceived frequency of the target risk and of the other risks according to their similarity to the target risk.
- *A global increase* in judged frequency of all risks in the experimental conditions (Johnson, 1983, p. 21).

In the first experiment, three different stories were presented to three experimental groups. A fourth control group got no hazard report but a non-hazard story.

The experimenters were able to reveal significant effect of the manipulation check. Moreover, the frequency estimates lead to the conclusion that there is a global effect, but no local or gradient effect.

Because the results did not fulfil the expectation the authors designed a second experiment, *more sensitive* to obtain a local and a gradient effect. Again, the results showed that the manipulation was effective and that there was "a global increase and no evidence for a local increase or for a generalization gradient" (Johnson, 1983, p. 26).

A third and a fourth experiment had to give more information about the robust global increase in perceived frequency. The authors further mentioned: "the overriding factor in these increases is not the story told but rather the mood it induces in the reader" (Johnson, 1983, p.25). Wondering if a sad story unrelated to risk has the same effect, the authors had a non-risk but sad story included in the third experiment. Test persons were divided into two experimental and one control group. In the fourth experiment, one further experimental group had to read a story that was supposed to manipulate their mood into a positive direction. The reason for this experiment is the following assumption: if negative mood increases the judged frequency, than positive mood might decrease it.

According to the results the affect manipulation was effective in all experimental conditions. Moreover, the negative mood induced by a sad or by a risk story increased the judged

frequency of a negative event significantly. The manipulation check in experiment four showed a significant decrease in reported worry and, as expected: the positive mood resulted in a significantly lower estimation of the frequency for 20 out of 21 risks.

Figure 3 shows the "increases and the decreases in estimated frequency, relative to control, induced by positive and negative affect for each of the 21 risks" (Johnson, 1983, p. 28).

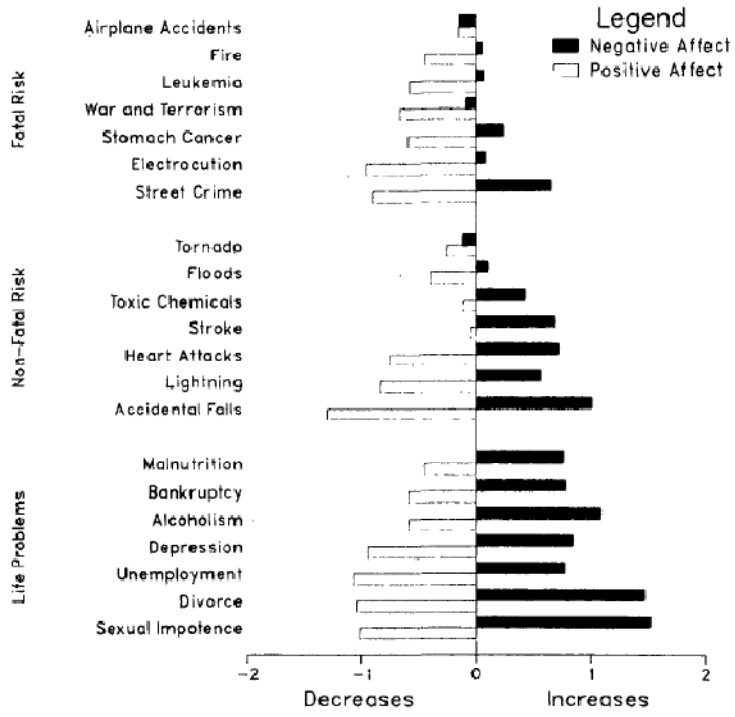

Figure 3: "Increase and decrease (log scale) in estimated frequency, relative to control, induced by appositive or negative affect for each of 21 risks." (From: Johnson, E. J., & Tversky, A. (1983). Affect, generalization, and the perception of risk. *Journal of Personality and Social Psychology*, *45* (1), p.28).

For this review, Johnson and Tversky (1983) discuss two significant interpretations. First, they doubt that their results can be explained by a memory based model, such as spreading activation within a semantic network. Reason for this interpretation is the presence of the global effect and the absence of a local effect or a generalization effect. The model would assume a local effect. This idea will become more clear later in this review when Bower's *Affect-Priming* mechanism will be portrayed.

Second, they hypothesize “that we tend to make judgements that are compatible with our current mood, even when the subject matter is unrelated to the cause of that mood” (Johnson, 1983, p. 30).

To conclude in short, it can be seen as probable that the affect that influences risk perception, as assumed by Slovic, does not have to be related to the target risk. Besides, the study described above shows that positive as well as negative mood can be both manipulated and directly influential, in turn.

2.3 A first conclusion about the Affect Heuristic

Without a doubt, Slovic’s work has been highly important for the field of risk psychology. It discovered that people do not only perceive risk in an objective analytical way. It further proved how important the role of *affect* is when it comes to the perception of hazards or risk situations. Johnson and Tversky wrote that hazards “seldom occur in an emotionally neutral context” (Johnson, 1983, p. 20, 21). It has to be acknowledged that the communication between experts and lay people is far from a communication without misunderstandings, incomprehension, mistrust or critics. To avoid this, it is of special importance for the experts to understand how risk is perceived by laymen. The psychometric paradigm is one possible way to measure, or even to predict risk perception. Similar to many other theories it is not able to cover all introduced questions. That is why Rundmo et al. (2004) wrote:

> “The psychometric paradigm is an interesting and fruitful pioneering effort and it has without a doubt done much to create an interest in important issues. Yet, as so many pioneering efforts, it has raised more questions than it has been able to provide well founded answers to” (Rundmo, 2004, p. 23).

Inter alia, they criticise that the psychometric paradigm gives no answers to the question “how and why individuals differ in their judgements of risk”. There was nearly no distinction between individuals or groups although the risk characteristics were not necessary universal. Above this, the use of mean ratings would overshadow the whole story of individual risk

perception. The only distinction made by Slovic is the one between experts and lay people. This is also criticised by the authors. The statement seems to be based on a study with 15 subjects, judging such a broad range of hazards, that it could be difficult to be an expert in all of them (Rundmo, 2004, p. 17).

To conclude, the psychometric paradigm is not without its problems (for the whole discussion read: Rundmo, 2004). Keeping in mind that the theory of the *Affect Heuristics* is partly based on the psychometric paradigm, it could be asked: is it appropriate to take the *Affect Heuristic* as a basis of one's work? It can be mentioned that besides all his criticism Rundmo recognizes:

> "The basic work in the psychometric paradigm has been replicated many times and it has virtually always been possible to demonstrate that the factor structure is fairly invariant and that perceived risk is well accounted for by the factors "(Rundmo, 2004, p.16).

Second, as already mentioned it is only partly based on the psychometric paradigm. This means that Slovic had not only more studies showing that *affect* does play a role in risk perception, he also explains it by the dual-process theories of information processing which is widely accepted (Cameron & Leventhal, 2003; Chaiken & Trope, 1999; Sloman, 1996).

Furthermore the phenomenon that *affect* seems to be influential in the process of judgement and perception is also recognized by other researchers; for example the *risk-as-feelings* theory, proposed by Loewenstein et al. (2001) or in the earlier describes study from Johnson and Tversky (1983).

Still, it has to be mentioned that the research undertaken by Slovic is relatively limited. But, it is surely the beginning of an observation that has to be taken seriously. Thus, *affect* seems to play an important role in risk perception and it seems to be the case for both: *related* and *unrelated affect*, as shown earlier in this chapter. The criticism that Slovic's theory is not perfectly validated only makes obvious that more research is needed. That is why it is even

more demanded to look beyond the work of Slovic or even beyond the boundaries of risk psychology.

In this review, the first step has already been taken by recognizing the study from Johnson & Tversky (1983). The second step, which follows in the next chapter, is about research that studied the role affect plays in social psychology. These findings will to some extend clarify the role of *related* and *unrelated affect* in risk perception?

3 Judgements of social situations

With his *Affect Infusion Model* (AIM), Forgas aims to explain the role of affective states in social judgements. This review will compare his theory about social judgement to the theory about risk perception. Before, it will be discussed what is meant by *social judgement* especially in comparison to *risk judgement* or *perception.*

3.1 Social judgement and risk perception – a comparison

Social psychology is defined as: "The scientific study of how individuals think, feel, and behave in regard to other people and how individuals' thoughts, feelings, and behaviours are affected by other people" (Brehm, Kassin, Fein, 2005, p.5). In the same book, *Social perception* is defined as: "a general name for the process by which people come to understand one another" (Brehm, Kassin, Fein, 2005, p.96). To resume, both in social psychology and in risk psychology the term *perception* is used to describe more than pure cognitive process of perceiving. Forgas differentiate between the 'sober' perception of a situation and the more subjective judgement. In his description of the AIM, Forgas does not introduce a definition of *social judgement* explicitly. He only writes that "in contrast with physical perception, social judgements usually deal with features that are not directly observable but must be inferred through the use of high level cognitive processes." (Forgas, 1995, p.45).

According to Brewer, Weinstein, Cuite & Herrington (2004, p.125) the construct *risk* "is typically assessed through self-report". Questions in those studies are about how people *judge* a certain risk to assess how they perceive it. In this case, the two terms *perception* and *judgement* do often refer to the same construct. In conclusion, it can be said that the term *perception* of a (risky) situation as it is used by Slovic, seems to be very close to the term *judgement* of a (social) situation, as it is used by Forgas.

Furthermore, it could be mentioned that many risky situations are in fact social situations. If you walk a lonely street by night and a stranger crosses your way, than you have both a *risk perception* and a *social judgement*.

It can be concluded that it is very likely that in both cases the same information processing strategies are used by the perceiver or judge. That is why the theories can and will be compared. First, this review takes a closer look at two definitions of the term *affect*.

3.2 Two definitions of affect

Forgas' definition of *affect* has been mentioned earlier in this review. In short, it says that affect is the generic label for mood and emotion. *Emotions* are short and strong with a "definite cause and a clear cognitive content". *Mood* is a state of affect that can last longer but feels less intense. It is difficult to name the cause for a mood and to give it a clear cognitive content, because of its diffuseness.

To compare the definitions of *affect* given by Forgas and Slovic is not an easy task. First of all, Slovic does not include strong emotions in the term *affect*. It is a weaker form of emotions and stands for a positive or negative quality of its cause (the stimulus). On the one hand, Slovic's affect occurs automatically and rapidly with a definite cause; comparable with Forgas' description of emotions. On the other hand, Slovic's affect is weaker than emotions, which is comparable with Forgas' description of mood. Slovic's affect is "the goodness or badness of a stimulus" and Forgas' mood is "feeling good or feeling bad".

For Forgas, *affect infusion* "is more likely to be associated with moods, rather than specific emotions" (Forgas 1995, p.41) because mood has no clear cause. For Slovic the *affect*, that is associated with his *Affect Heuristics*, has a clear cause, which is the *risk* that has to be judged. Still, it is not the same as the concept of emotions described by Forgas, because it is not that strong. Furthermore, the *affect* that is meant by Slovic can be influential, with and without

consciousness. This strongly contrasts Forgas' model, wherein *affect* (mood) that becomes conscious does minimize the chance of affect infusion, because conscious mood could be a reason for the use of the *motivational processing strategy*, wherein *mood-control* is the primary goal.

These thoughts are important for the comparative part of this review because the two theories do not have to be contradicting or incompatible. Maybe *affect infusion* (with unrelated mood as affect) could influence perception of *risk as a feeling*?

If that was true, the perception of risk would rely on a feeling about the goodness or badness of the stimulus; or the perception of risk would rely wrongly on the *affect* (unrelated mood, feeling good or bad). Furthermore, the following question can be raised: could *affect infusion* take place during recall of information of the *affect pool*?

Maybe the most important conclusion for the last two sections of this review is that there is a strong need in all fields of psychology for clear and prevailing definitions for the terms *affect, judgement* and *perception*. This is especially the case because sometimes one theory can 'learn' from another. To answer the question if the *Affect Heuristic* can 'learn' something from the AIM, there has to be taken a closer look at that model. This will happen in the following chapter.

3.3 The Affect Infusion Model (AIM)

According to Forgas and his *Affect Infusion Model* (AIM), people use four different judgmental strategies, to judge a social situation. Furthermore, only two of these strategies make an *affect infusion* likely to occur. Recall that *affect infusion* means that affect (related or unrelated to the judgemental target) can "influence on and become incorporated into the judgemental process, entering into the judge's deliberations and eventually colouring the

judgemental outcome." (Forgas, 1995, p.39). Fundamentally for his model Forgas (1995) made two major assumptions about the nature of social judgements.

3.3.1 The two major assumptions

The first is named *Process Mediation*. It states that *affect infusion* is more likely in constructive processing and in the active generation of new information that involves substantial transformation than in the easy, fast and passive conservation of given information and in the reproduction of existing cognitive representations. Thus, mood effects on judgements differ in nature and extent, depending on what kind of processing strategy is adopted (Forgas, 2005). This idea of context-dependent processing strategies stands in contrast to the single-process assumptions claimed by the classical information-processing models. The discussion of these two research areas would exceed the purpose of this review (see Forgas 1995 for more information). It is well crucial to note that Slovic assumes more than one processing strategy as well. On the contrary to Forgas, Slovic names only two strategies: the analytical and the experiential. He further assumes that they can operate in parallel and that the analytical system can depend on the experimental.

The second assumption made by Forgas is called *Effort Minimization*. This holds that social actors "adopt the simplest and at least effortful processing strategy as long as it satisfies the minimal contextual requirements" (Forgas, 1995, p.46). Therefore, variables such as features of the target, the judge and the situation define which processing strategy is used. Figure 4 shows the AIM. The first row shows three boxes, each of them stand for one of these three variables. It further names different futures for each variable. Depending on these, one of the four processing strategies is chosen.

3.3.2 The four processing strategies

The AIM differentiates between the following four processing strategies: *direct access, motivated, heuristic,* and *substantive processing*. They are shown in the second row in Figure 4. It further makes clear that the first two are *low infusion strategies.* This means that affect infusion is less likely to colour the judgemental outcome. The last two boxes stand for the *high infusion strategies,* wherein affect infusion is more likely to occur. The two assumptions, which are mentioned above, explain which strategy is used. The strategies are explained in the following.

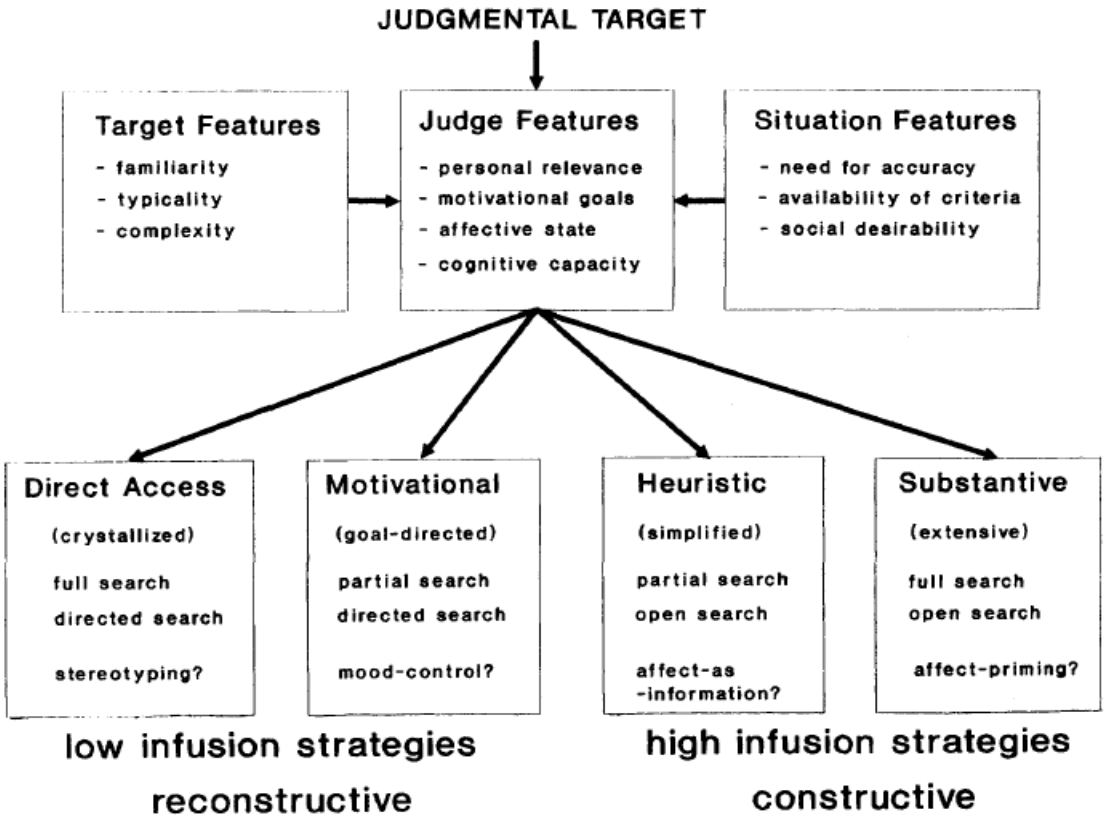

Figure 4. The first row shows the three variables that determine which processing strategy is used. The second row shows the four processing strategies. From: Forgas, J. P. (1995). Mood and judgement: the affect infusion model (AIM). *Psychological Bulletin, 117* (1), p.48.

Direct access involves that people simply use their stored evaluations to judge a given situation. This means that their judgement is fast and does not require much information processing. Imagine for example you are standing in a supermarket to buy a package of eggs. You have been buying the same brand for years so that you have no intent to change it. You would just take the same package as usual without looking for much information to compare the different brands. Therefore, there would be no information processing except searching for the brand and picking the package. Now, transfer this to a risk situation. Eggs can be risky if they communicate salmonellae. In this case you just trust the brand and even will not think about it as a risky situation. You take your stored evaluation to judge this as the best brand.

Stand still at Slovic's (2004) idea of the *affect pool* for a moment. Remember that the "*affect pool* includes perceptual and symbolic representations of situations of risk. These *images* are marked by affect (somatic or bodily states) through lifetime of learning". People can retrieve old *affects* which are stored for similar situations. This has in common with the *direct access theory* that people will not process new information to make a new judgement, but there are differences, as well. The direct access involves that people retrieve the 'cold' evaluation, without any *affect* that marks the image or the representation of the situation. Consequently, the *affect pool* makes the influence of *affect* likely to occur, although it is only about related and not about unrelated affect. Following the AIM, the *direct access* strategy is a *low infusion strategy* and therefore feelings will not be influential.

Motivated processing means that there is a "strong and specific motivational pressure for a particular judgemental outcome" (Forgas, 1995, p. 47). If people process the information this way, their aim is to have a specific result. The processing is not open and constructive, but goal-directed. Imagine for example a risk situation like bungee jumping. Is it possible that a bungee jumper has a motivational reason to go bungee jumping that does not have to do with an appropriate risk judgement? Here, it has to be mentioned that some authors are of the

opinion that a "strong specific motivational pressure" is in fact an *affect* (Haidt, 2002). In this regard it could be incorrect to say that *affect* has no influence in *motivated processing*.

Heuristic processing is a *high infusion strategy* which involves constructive thinking. It happens if people have no stored evaluation, which they can use; nor do they have a reason for *motivated processing*. Still they want to process with as little effort as possible (*effort minimization*) because the target feature, the situation or the judge do not present a reason for a more demanding processing strategy. That is why the judge uses every available shortcut or simplification he can find. One mechanism that can be used is the '*Affect-as-Information*' heuristic. It says that people just ask themselves: "How do I feel about it?" (Schwarz & Clore, 1988, p.45). To use a risk situation as an example again, imagine that you are asked to judge how risky it is for a kangaroo in South Australia to cross the street. Most of the time, this question would not motivate you to use a demanding processing strategy. You will probably not search for information to make a good risk assessment. Forgas, declares that people process with as little effort as possible, because the situation gives no motivation for spending more time on the problem, and therefore people use their *affect* as information. Slovic gives one more reason why this could be the case. According to him, people can be forced to use it because they have no time for long constructive processing. This makes sense because his theory is about *risk situations*. As mentioned in the chapter about Slovic's research the factor *time* seems to have influence on the effect of affect.

Because there is a strong analogy between this part of the *AIM* and the *Affect Heuristic*, the *Affect-as-Information* mechanism will receive more attention later in this chapter.

Substantive processing is the last one of the four judgemental strategies. It requires extensive and effortful constructive processing, with a full and open search for facts and related information that can be used to make a 'good judgement'.

The features of the target, the judge and the situation make this strategy appropriate, because the situation is personally relevant or the target is very complex. The *Affect-Priming* mechanism makes this strategy the most vulnerable to *affect infusion.* An example to explain this strategy is a risk situation wherein something personal or important can be lost. Furthermore you have the time and the cognitive capacity to process the information you receive. Think about a financial risk judgement people make before dealing on the Stock Exchange.

The two mechanisms that make affect infusion possible in the last two processing strategies are respectively: '*Affect-as-Information*' and '*Affect-Priming.*'

The two mechanisms were originally created by the authors Bower and Schwarz and Clore. Their theories are of utmost interest for this review, because it is more interested in an effect of affect infusion.

Therefore, a discussion of the two mechanisms *Affect-as-Information* and *Affect-Priming* will follow.

3.4 The Affect-Priming mechanism

The idea of *Affect-Priming* is based on two principles which were discovered by Bower (1981): the *mood congruity effect* and *the mood-state-dependent memory*.

The mood congruity effect, described by Bower (1981) stands for the phenomenon that the emotional content of the information used in the cognitive process, matches with the mood of the person: According to this, people in a bad mood would process more unpleasant things, facts, memories or information; people in a good mood could think more about pleasant things, facts, memories or information. The more extended the processing is, the greater the mood effects are (Forgas, 1995).

To explain this effect, Forgas names four well known principles, which are also used by Bower (1981). These are: s*elective attentions*, *selective encoding*, *selective retrieval* and s*elective associations and interpretations*. For example: People appear to focus (*attend*) on different information, depending on their mood. Furthermore, the judge will mostly *encode* the information that matches his mood. This mood congruent encoded information will be better remembered in the future, even if the person is in neutral mood at time of remembering. (Bower, 1981). *Selective retrieval* implies that the knowledge that is retrieved by the judge to interpret the situation is mood congruent, too. According to Bower, judges who are in a good mood will retrieve more positive information and will therefore interpret the situation more positive. This effect is supported by the last principle. The *associations* elicited by a stimulus are primed by mood. This in turn influences the *interpretations* about the stimulus.

According to this, the more these processes are used, the greater is the possibility that mood influences the outcome. More extended constructive processing needs more of the processes mentioned above (Forgas, 1995).

The mood-state-dependent memory is the other basic component of the *Affect-Priming* principle discovered by Bower (1981). He and two of his students wondered if was possible to produce *state-dependent learning* by using different emotions (depression, joy, fear and anger). It followed a serial of experiments in which he induced sad or happy mood in the subject by hypnotic suggestion. In his studies, Bower discovered the phenomenon of *mood-state-dependent memory* (in short: *mood-dependence*). He explained his findings with an associative network theory of memory and emotions, which he describes as the following:

> "Human memory can be modelled in terms of an associative network of semantic concepts and schemata that are used to describe events. An event is represented in memory by a cluster of descriptive propositions. These are recorded in memory by establishing new associative connections among instances of the concepts used in describing the event. The basic unit of thought is the proposition; the basic process of

> thoughts is activation of a proposition and its concepts. The contents of consciousness are the sensations, concepts and propositions whose current activation level exceeds some threshold. Activation presumably spreads from one concept to another, or from one proposition to another, by associative linkages between them. (Bower, 1981, p.134).

Furthermore, Bower supposes that all specific emotions have their own node or unit in memory (just like a concept, schemata or event). Aspects of these emotions are linked to them by associative linkages. These aspects could be: autonomic reactions, standard role and expressive behaviours, descriptions of the stimulus situations for each emotion and verbal labels. These emotions are linked to memory and especially to events of life that included a specific emotion. If an emotion is activated by a physiological or symbolic stimulus and above the threshold, activation spreads throughout the associative network (the memory). Consequently, Bower explains the network theory of state-dependent retrieval as in the following. Nodes that are activated by several connections are retrieved more easily. So if an emotion is activated because of the present mood, nodes and events that are linked to this emotion are more easily retrieved. Moreover, a mood can interfere with mood incongruent association, making the recall of these events even more difficult.

It has to be mentioned that Bower's explanation of the *semantic network theory* has much in common with the basic idea of the *affect pool* mentioned by Slovic. Therefore, it could be asked if it is possible that mood can prime which image from the affect pool is used. According to this, people in a good mood could use more positive information and feelings from their affect pool to judge the risk. Note that this affect pool idea starts with the assumption that people already know the risk or a comparable one. Otherwise they would have no stored evaluations about it in their affect pool. The *Affect-Priming* mechanism can be influential in the judgement of a new risk, as well. This is because it can also influence the processing of absolute new information. Besides this, there is one more difference: the *affect*

pool is used to make a quick judgement and reaction possible. The *affect-priming* is influential in a long and constructive way of processing information. That is why it can be concluded that the ideas of the two theories are not compatible. Remember also the study by Johnson and Tversky (1983). They declared that time pressure made affect infusion more likely. This is even contradicting to the *affect-priming* mechanism.

In the next paragraph there will be a short description of the *Affect-as-Information mechanism.* The researcher who invented this theory, originally wanted to demonstrate that the effect of affect is direct and not indirect and that the *Affect-Priming* mechanism can be easily be refuted.

3.5 The Affect-as-Information mechanism

Figure 4 shows that there is a second information processing strategy, which makes affect infusion possible. It is called *heuristic processing.* As explained above, this means that the features of the target, the judge or the situation make it not necessary to have an extensive, full search of information and information processing. Instead, information is processed simplified, fast and easy. Time pressure could be one of the reasons why the judge needs a simplified processing strategy, like the *heuristic processing.*

Forgas' model explained this with the *Affect-as-Information* mechanism, invented by Schwarz and Clore (1983, 1988, and 2003) and further researched by others (Siemer & Reisenzein, 1998; Schwarz, Strack, Kommer & Wagner 1987).

As the name implies, in this mechanism the affect is used as information. This is an important difference to the *Affect-Priming* mechanism, wherein the affect is said to influence the information processing outcome indirectly. If affect is used as information it influences the judgemental outcome directly. The *Affect-as-Information* mechanism can be seen as an answer to Bower's research to show that affect influences judgement directly.

According to the two researchers Schwarz and Core, people ask themselves “how do I feel about it?” (Schwarz and Clore, 1988, p. 45) and use their moods to make an ‘informed’ judgement. The authors further mention that this affect does not have to be related to the target that has to be judged. The researchers have even been able to show that the *unrelated affect* is not always misattributed as information about the target. If subjects are aware of the real reason for their mood, they do not use it as information to judge the target (Schwarz and Clore; 1983, 1988, and 2003). This research results show that *Affect-Priming* can not always be true. Otherwise there would be an influence of *affect* even if people know that their affect is caused by something else. The two authors conducted two experiments with the so called “misattribution manipulation”. It was used in addition to the mood induction. ‘Happiness and satisfaction with life as a whole’ has been used as the dependent variable. The idea of a misattribution manipulation is that the experimenter presents a plausible reason to the subject for the certain mood the subject is in. In the first experiment, a room was used as misattribution manipulation. In the second experiment the authors used the weather as an explanation. Remarkably, while all subjects got a mood induction, only some got the misattribution manipulation. The results showed that “subjects reported more happiness and satisfaction with their life as a whole when in a good mood than when in a bad mood. However, the negative impact of bad mood where eliminated when subjects were induced to attribute their present feelings to transient external sources” (Schwarz, 1983). The authors interpreted this as an argument for a directive function of affective states. The study from Johnson and Tversky, which is described in chapter 2.2 and the study by Slovic which is described in 2.1.2 showed comparable results. In both cases the authors concluded that the influence of affect is direct, and not indirect. After this, it is reasonable to ask why Forgas uses two theories which are not compatible. The answer lies in Forgas assumption of context-dependent processing strategies. It stands in contrast to the single-process assumptions

claimed by the classical information-processing models, which are for example the *Affect-as-Information* or the *Affect-Priming* mechanism. According to Forgas, both theories can be integrated into one model and both mechanisms are possible. Which one is used depends on the judge, the situation or the target.

Note that the *Affect-as-Information* mechanism has much in common with the *Affect Heuristic* proposed by Slovic.

Like Schwarz and Clore, Slovic said that risk can be judged "with the experienced feelings being used as information in the decision process" (Slovic et al., 2005, p.35). In his theory, the affective response occurs rapidly and automatically, with or without consciousness and delivers information about the goodness or badness of the stimuli. Schwarz and Clore propose the possibility that the affective response does not have to be about the goodness or badness of the stimuli, it just has to be interpreted as such. That is why there is no effect of *unrelated affect*, if the subjects attribute their affect to another reason. Furthermore, Schwarz and Clore do not deal with the two different systems (analytical and experiential), like Slovic does.

The two theories further differ in the fact that Slovic assume an *affect pool*, while Schwarz and Clore say nothing about the semantic-network.

3.6 Discussions about the AIM

Unfortunately it would be a review for its own to sum the whole discussion around the AIM. Still it is appropriate to mention some controversies. Some discussions can not show a general accepted truth, yet. As an example there is the question about the direct or indirect influence of unrelated affect (Clore & Tamir, 2002), or the commentary given by Fiedler (2002) who favours a multinomial modelling framework, wherein the different processing strategies can work in parallel. These discussions need more research results to come to a

conclusion. This is only one further reason for risk psychologists to enter the discussion from their perspective.

Another example for criticism is released by Isen (2002) who remarked that he was wrongly quoted in Forgas meta-analysis of former studies. It could also be assumed that the *Affect-Priming* mechanism has become obsolete. Anyway, nearly all authors had to admit that Forgas did a good job, when showing that there is not only need for an integrating framework that brings together the sometimes even contradicting findings but that it is possible, as well. They further have to compliment how extensive Forgas studied the literature about his subject and how well reasoned his own studies are.

That is why for this review, Forgas presents a model that is until now the best way to understand the role of unrelated affect in the process of perception. Still this does not mean that there is no need for further research. If anything, it shows where the risk psychology should start when studying the role *unrelated affect* holds in risk perception.

4 Conclusion

This review is interested in the influence of *unrelated affect* on risk perception? It is chosen for two theories from two different fields of psychology to clarify this influence. The main questions of the review are answered in the following:

1. ***Is it possible to compare the two fields, risk psychology and social psychology according to their theories about the role of affect in judgement and perception?***

Chapter 3.1 shows that the two fields of psychology do not differ significantly according to their understanding of the role of affect in judgement and perception of social situations or risk situations. It even makes clear that some risk situations are in fact social situations, and that it is reasonable to assume that the same information processing strategies are used when people judge or perceive a social or a risk situation.

While it seems to be possible that the two field of research could participate in each others discussions at some point, it is also important to mention that there is a strong need for generally accepted definitions, if researchers really want to communicate in a constructive way. This is not only the case for interdisciplinary discussions but for innerdisciplinary discussions, too. One example could be the AIM itself. Forgas uses different theories for his integrating framework and therefore has to deal with the problem that the different authors that are quoted by Forgas do have different understanding of the term affect. As this is the case for discussions inside the field of social psychology, a discussion between two fields of psychology is even more difficult without the necessary definitions.

In short, it is possible to compare the two fields of psychology according to their understanding of the role of affect in judgement and perception. To make this communication possible there is need for general accepted definitions of the important terms.

2. ***Can the Affect Heuristic theory be extended in its understanding of the role of affect in risk perception by assuming a role of unrelated affect as well as related affect?***

The study by Johnson and Tversky which is the topic of chapter 2.2 shows that not only related but also unrelated affect seems to play a role in risk perception. Furthermore, the conclusion of the first question made it assumable that the two research areas can be compared. Therefore, risk psychology should take into account that research in social psychology shows that affect infusion of unrelated affect seems to be possible. This leads to the next question

3. ***To what extend can risk psychology use the findings from social psychology, which are explained by the Affect Infusion Model to clarify the role of unrelated affect in risk perception?***

There are two parts of the AIM that could be of interest for the Affect Heuristic. These are the high affect infusion processing strategies: *heuristic processing* and *substantive processing. Affect infusion* seems to be likely in these strategies because of the two mechanisms: *Affect-priming* and *Affect-as-information*. The two mechanisms differ in some ways. The first takes place in an effortful and extensive way of information processing. The longer and the more extended the processing is, the greater is the chance for *affect infusion*. Furthermore, the mechanism assumes the influence of *affect* to be indirect. As written earlier in this review Slovic chose the term *heuristic*, because he is of the opinion that people make mistakes if they rely on their good or bad feeling towards something to make a fast, instinctive and intuitive decision. That is why the *Affect-Priming* part of the AIM can not be adopted by the *Affect Heuristic.* Furthermore, the given research from Slovic and his conclusions about the results also show that he assumes the *affect* to have a direct influence. As stated before, there is a second mechanism that can explain the influence of *unrelated affect* on judgement and decision making: the *Affect-as-Information* mechanism. This

mechanism takes place in a simplified form of information processing. It further states that *affect* influences the outcome directly. In other words, both theories assume the judge to use his feelings as valid information about the situation that has to be judged. In both theories this is because the information processing has to be short and without much effort. The difference is that the *Affect Heuristic* only assumes *related affect* to be used and the *Affect-as-Information* mechanism holds that *unrelated affect* can be influential as well as *related affect*. Note that the idea of the *Affect-as-Information* mechanism is consistent with the findings from Tversky and Johnson and with the conclusion under the second question. Thus, it could be concluded that the difference between the two theories is not a real difference but a wrong assumption in the *Affect Heuristic* theory which need to take the influence of *unrelated affect* into account, too.

In short, it can be concluded that the *Affect Heuristic* could adopt the theory of the *Affect-as-Information* mechanism to explain the effect of *unrelated affect* on risk perception. Again this leads to the next question.

4. ***What are the differences between the AIM and the Affect Heuristic according to their understanding of the role of affect in judgement and perception and what do they have in common?***

Both theories assume it to be possible that the judge uses his affect as information about the goodness or badness of the stimulus. Slovic states that this is always the case, that the affect is related to the stimulus, and that the two modes of thinking work in parallel. The last assumption makes clear that he presumes fundamentally that there is one processing strategy, which uses two modes of thinking in parallel. This is the main difference to the AIM, which expects the judge to use context dependent processing strategies. Thereby Forgas tries to integrate different findings from research in one model. Depending on the context, the judge can use one of the four processing strategies, wherein only two offer the possibility of an

affect infusion. Furthermore, unrelated as well related affect can be influential. In conclusion, whereas the *Affect Heuristic* describes the process independently from the context and just looks at the judge and the risk, the AIM sees the judge in his context. It says the judge uses the processing strategy depending on his context, wherein unrelated affect can be influential. Unrelated affect can be understood as an affect that is stimulated by the context and not the target to judge. It could be doubted if it is sensible to describe the judge and his information processing out of context. To go further, is it possible that people perceive something absolutely context free? If the *Affect Heuristic* took the unrelated affect into account, too, it could be possible to see it as one part if the AIM. If that was the case it would be context dependent if the *Affect Heuristic* is used by the judge or another processing strategy. Risk psychology seems to be in the need of an integrating framework comparable to the AIM to describe the whole story of risk perception

In short, it is concluded that the *Affect Heuristic* need to take unrelated affect into account, too. Besides it is not realistic to focus on the judge without any context. Furthermore it can be doubt that there is only one form of information processing in the face of the numerous different kinds of risk situations people can find themselves in. That is why it can be further concluded that there is still need for research with regard to risk psychology and the *Affect Heuristic.* As shown in question one, risk psychology could take a look at the research of social psychology to get helpful suggestions or even answers for further progress in research about the influence of *affect*. The conclusion in question two showed that there is need for a broaden understanding of influence of *unrelated affect*. This can be done by having several experimental, groups answering a questionnaire that measures the perceived seriousness of certain risks. The groups could differ in regard to the experimental manipulation of their mood. Fiedler (2001) presents a well done overview about the different procedures that can be used to manipulate *affect* experimentally. Schwarz' and Clore's (1983, 1988 & 2003)

research shows that it is important that the subjects are not aware of the mood manipulation. This can be done by having them think that they participate in different experiments. To test the conclusion from question three and four an experiment should test the direct versus indirect influence of affect. The Johnson and Tversky study is one example. Furthermore, the misattribution manipulation that is explained in chapter 3.5 can be used for such a study. It should follow a repetition of the psychometric paradigm. This time it could be interesting to differentiate between experimental groups with a positive mood, a negative mood and a neutral mood context.

References

Anderson, J. R. (2005). *Cognitive psychology and its implication – sixth edition.* New York: Worth Publishers.

Barone, M. J., Miniard, P. W., Romeo, J. B. (2000). The influence of positive mood on brand extension evaluations. *Journal of Consumer Research, 26* (4), 186 - 400.

Bower, G. H. (1981). Mood and memory. *American Psychologist 36.* 129 - 148.

Bless, H. (2002). Where has the feeling gone? The signal function of affective states? *Psychological Inquiry, vol. 13.* No. 1, 29 - 89.

Brehm, S. S., Kassin, S. Fein, S. (2005). *Social Psychology – sixth edition*. Boston New York: Houghton Mifflin Company.

Brewer, N. T., Weinstein, N. D., Cuite, C. L. & Herrington, J. E. (2004). Risk perceptions and their relation to risk behaviour. *Annals of Behavioral Medicine, 27* (2), 125 - 130.

Cameron, L. D., & Leventhal, H. (Eds.). (2003). The self-regulation of health and illness behavior. New York: Routledge.

Chaiken, S., & Trope, Y. (1999). Dual-process theories in social psychology. New York: Guilford Press.

Clore, L. C., & Tamir, M. (2002). Affect as embodied information. *Psychological Inquiry, vol. 13.* No. 1, 37 - 45.

Epstein, S. (1994). Integration of the cognitive and the psychodynamic unconscious. *American Psychologist, 49,* 709 – 724.

Fiedler, K. (2001). Affective influence on social information processing. In J. P. Forgas (Ed.), Handbook of affect and social cognition (pp. 163 - 185). New Jersey: Lawrence Erlbaum Associates.

Fiedler, K. (2002) Mood-dependent processing strategies from a meta-theoretical perspective. *Psychological Inquiry, vol. 13.* No. 1, 49 - 54.

Finucane, M. L., Alhakami, A., Slovic, P., & Johnson, S.M. (2000). The affect heuristic in judgements of risk and benefits. *Journal of Behavioural Decision Making, 13,* 1 - 17.

Fischhoff, B., Slovic, P., Lichtenstein, S., Read, S., & Combs, B. (1978). How safe is safe enough? A psychometric study of attitudes towards technological risks and benefits. *Policy Science, 9,*127 - 152.

Fischhoff, B. (1995). Risk perception and communication unplugged: twenty years of process. *Risk Analysis, 15* (2), 137 - 145.

Forgas, J. P. & Moylan, S. J. (2002). Affective influences on self-perception and self-disclosure. In: Forgas J. P. & Kipling D. W. (Eds.). *The Social Self – Cognitive, Interpersonal and Intergroup Perspectives* (p. 73). New York: Psychology Press.

Forgas, J. P., Dunn, E. & Granland, S. (2008). Are you being served…? An unobtrusive experiment of affective influences on helping in a department store. *European Journal of Social Psychology, 38,* 333 - 342.

Forgas, J. P. & Laham, S. (in press). Affect and social motivation - The interaction between affect and motivation in social judgements and behaviour. To appear in: Forgas, J. P., Williams, K. & von Hippel, W. (Eds.). *Social Motivation.* New York: Cambridge University Press.

Forgas, J. P. (1995). Mood and judgement: the affect infusion model (AIM). *Psychological Bulletin, 117* (1), 39 - 66.

Forgas, J. P. (1992). Affect in social judgements and decisions: A multi-process model. In Zanna, M. (Ed.), *Advances in experimental social psychology* Vol. 25, p. 227 - 275. San Diego, CA: Academic Press.

Haidt, J. (2002). “Dialogue between my head and my heart”: affective influences on moral judgement. *Psychological Inquiry, vol. 13.* No. 1, 54 - 56.

Isen, A.M., Clark, M., Shalker, T.E. & Karp, L. (1978). Affect, accessibility of material in memory and behaviour: a cognitive loop? *Journal of Personality and Social Psychology, 36* (1), 1 - 12.

Isen, A.M., & Geva, N. (1987). The influence of positive affect on acceptable level of risk: the person with a large canoe has a large worry. *Organizational Behaviour and Human Decision Processes, 39,* 145 - 154.

Isen, A. M. (2002) Missing in action in the AIM: Positive affect’s facilitation of cognitive flexibility, innovation, and problem solving. *Psychological Inquiry, vol. 13.* No. 1, 57 - 65.

Johnson, E. J., & Tversky, A. (1983). Affect, generalization, and the perception of risk. *Journal of Personality and Social Psychology, 45* (1), 20 - 31.

Loewenstein, G.F., Weber, E.U., Hsee, C.K., & Welch, N. (2001). Risk as feelings. *Psychological Bulletin* Vol. 127; No 2. 267 - 286.

Rayner, S. & Cantor, R. (1987). How fair is safe enough? The cultural approach to societal technology choice. *Risk Anal, 7,* 3 - 9.

Rodrigue, C. M. (2001). Impact of media in risk debates – the controversies over the Cassini-Huygens mission and the Anaheim Hills, California, landslide. *Australian Journal of Emergency Management,* 53 - 61.

Rosa, E. A. (2003). The logical structure of the social amplification of risk framework (SARF): Metatheoretical foundation and policy implication. In N. K. Pidgeon, R. E. & Slovic, P. (Ed.), *The social amplification of risk.* (pp. 47-79). Cambridge: Cambridge University Press.

Rundmo, T., Sjörberg L. & Moen, B. E., (2004). Explaining risk perception. An evaluation of the psychometric paradigm in risk perception research. *Rotunde publikasjoner, 84.*

Schwarz, N., & Clore, G.L. (1983). Mood, misattribution, and judgements of well-being: Informative and directive functions of affective states. *Journal of Personality and Social Psychology, Vol. 45,* No. 3, 513 - 523.

Schwarz, N. & Clore, G. L. (1988). How do I feel about it? The informative function of affective states. In: K. Fiedler & F.P. Forgas (Eds.), *Affect, Cognition and social behaviour*. (pp.44 - 62) Toronto, Hogrefe.

Schwarz, N., & Clore, G.L. (2003). Mood as information: 20 years later. *Psychological Inquiry,* Vol. 14, No. 3 & 4, 296 - 303.

Schwarz, N., Strack, F., Kommer, D., & Wagner, D. (1987) Soccer, rooms, and the quality of your life: mood effects on judgements of satisfaction with life in general and with specific domains. *European Journal of Social Psychology, Vol. 17,* 69 - 79.

Short Jr, J. F. (1984). The social fabric of risk: Towards the social transformation of risk analysis. *Am. Socciol. Rev., 49* (Dec.), 711 - 725.

Siemer, M., & Reisenzein, R. (1998). Effects of mood on evaluative judgements: Influence of reduced processing capacity and mood salience. *Cognition and Emotion, 12* (6), 783 - 805.

Sloman, S. A. (1996). The empirical case for two systems of reasoning. *Psychological Bulletin, 119,* 3 – 22.

Slovic, P. (1987). Perception of Risk. *Science, Vol. 236,* 280 - 285.

Slovic, P., Finucane, M. L., Peters, E. & MacGregor, D. G. (2004). Risk as analysis and risk as feelings: Some thoughts about affect, reason, risk, and rationality. *Risk Analysis, 24* (2), 311 - 322.

Slovic, P., Fischhoff, B., & Lichtenstein, S. (1982). Facts versus fears: Understanding perceived risk. In: Kahneman, D., Slovic, P., & Tversky, A. (Eds.), *Judgment under uncertainty: Heuristics and Biases*. Cambridge, England: Cambridge University Press.

Slovic, P., Monahan, J., & MacGregor, D. M. (2000). Violence risk assessment and risk communication: The effect of using actual cases, providing instructions, and employing probabilities vs. frequency formats. *Law and Human Behaviour, 24*, 271 - 296.

Slovic, P., Peters, E., Finucane, M. L. & MacGregor, D. G., (2005). Affect, risk, and decision making. *Health Psychology, 24* (4), 35 - 40.

Slovic, P. & Weber, E. U. (2002). Perception of risk posed by extreme events. In: *Risk Management Strategies in an uncertain World,* Conference, Palisades, New York, 12 - 13.

Vasterman P., Yzermans, C. J. & Dirkzwager, A. J. E. (2005). The role of the media and media hypes in the aftermath of disasters. *Epidemiol Reviews, 27*, 107 - 114.

Vollrath, M. & Torgersen,S. (2002). Who takes health risks? A probe into eight personality types. *Personality and Individual Differences, 32,* 1185 - 1197.

Wilkins, L. (2001). A primer on risk. *Agbioforum, 4* (3/4), 163 - 172.