

RESEARCH

Andrea Bieberstein

An Investigation of
Women's and Men's
Perceptions and Meanings
Associated with Food Risks

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Andrea Bieberstein

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List of Abbreviations

AIDS	acquired immunodeficiency syndrome
BSE	bovine spongiform encephalopathy
CES	Consumption Emotion Scale
DNA	deoxyribonucleic acid
<i>e.g. lat.</i>	<i>exempli gratia</i> (for example)
EHEC	enterohemorrhagic <i>Escherichia coli</i>
<i>et al.</i>	<i>lat. et alii</i> (and others)
HVM	hierarchical value map
<i>i.e. lat.</i>	<i>id est</i> (that is)
LTM	long-term memory
STM	short-term memory
MEC	means-end-chain
S&T	science and technology
US	United States
USTM	ultra short-term memory

1 Introduction

1.1 Statement of Problem

How people perceive and judge risks and what kind of risks motivate their behavior in which way, are crucial questions in consumer research (Mitchell, 1999). This is also the case in the food sector. People's perceptions of risks related to food products are important determinants of food choice, attitude towards technologies used in the food and agricultural sector, as well as behavior related to safety practices during the preparation of food (Frewer and Miles, 2001; Knox, 2000).

Risk and risk perception with regard to food is not a new phenomenon. Human beings are and have always been confronted with the choice between exploring new foods and avoiding foods that are unsafe in order to survive. This has become known as the omnivore paradox (Fischler, 1988; Rozin, 1976). Additionally, writings of the ancient Greeks show that concern about food safety is also historically an old phenomenon (Hohl and Gaskell, 2008; Zwart, 2000). However, for a long time, concern about food hygiene and availability of food was predominant (Knox, 2000) and these concerns were encountered with the development of local food customs that increased consumers' familiarity with and confidence in food (Buchler, Smith and Lawrence, 2010). This confidence in food seems to have eroded and concern about the safety of food is widespread (Hohl and Gaskell, 2008). Reasons for this development are diverse: Due to technological change the agricultural sector changes from small-scale labor intensive farming to large-scale industrialized farming. This development created distance between the production and consumption of food, bringing about a decrease in consumer knowledge about production processes and products and lack of control (Campbell and Fitzgerald, 2001; Gupta, Fischer and Frewer, 2011). Linked to that, complex technologies are increasingly applied in food production, confronting consumers with the possible risks from e.g. pesticides, irradiation, genetic modified foods or foods produced by means of nanotechnology. Moreover, several food scares such as bovine spongiform encephalopathy (BSE)

in the United Kingdom in the mid-1990s and in several European countries in 2000/2001, the dioxin scandal in Belgian eggs in 1999 or entero-hemorrhagic *Escherichia coli* (EHEC) infections in Germany in 2011 increased consumer worries about the safety of food and undermined consumer confidence in the food industry and in public authorities responsible for the safety of food (Frewer and Miles, 2001; Knox, 2000). Furthermore, during the 1990s, the media and the academic world put food safety on their agenda (Buchler, Smith and Lawrence, 2010; Hohl and Gaskell, 2008).

Whereas concern about the safety of food seems to be a general phenomenon in many countries (Hohl and Gaskell, 2008), it has been found that people differ in their judgments about food risks. Since the 1960s, research in diverse scientific disciplines such as psychology and sociology has been conducted in trying to understand factors underlying risk perception, mainly concerning technological and environmental risks, and attempts have been made to explain differences of perceptions and judgments between different groups of people.

Scientists studying risk perception are not surprised when they find that women rate many risks higher than men. They can cite dozens of studies with similar findings to support their results. This is also the case in studies investigating food risk perception. However, the findings by Davidson and Freudenburg (1996) caution against accepting the gender¹ gap in risk perception as common sense. In their systematic literature review about gender and the perception of environmental and technological hazards, they found that in the majority of the studies women perceived risks as higher than men, but that the gender gap is very small in some cases. Moreover, their review shows that the gender gap is much more prevalent when the studies focused on risks that directly affect respondents' life or close environments in contrast to general national or global risks. Hence, the results of the systematic literature review by Davidson and Freudenburg (1996) show that a closer and more detailed look at the gender gap in risk perception is necessary in order to avoid generalizations. This concurs with general criticism by gender theorists. They criticize that commonsense knowledge and stereotypes about differences between men and women are also prevalent in the scientific community, which leads to exaggerated reporting of the gender gap (Lorber, 1991). In addition, systematic investigations that seek to understand the reasons and meaning behind the often reported gender gap in risk perception are sparse and based mainly on quantitative evidence (Gustafson, 1998). This is also the

¹ 'Gender' and 'sex' are used synonymously in this thesis. In general both terms refer to biological sex due to the thesis' focus on explaining differences in risk perception between women and men. For a detailed definition and further discussion of two terms see chapter 3.1.

case for food risks, where empirical evidence on the underlying reasons for the often cited gap in the perceptions of women and men is lacking.

1.2 Statement of Objectives

The overall objective of this thesis is to investigate differences or similarities in food risk perceptions between women and men in a systematic way by uncovering the meanings that women and men attach to various food hazards and by analyzing whether food hazards are differently constructed for women and men. But before investigating women's and men's food risk constructs, systematic knowledge of the gender gap is needed in terms of magnitude and direction as well as of variations with regard to different types of food hazards. This allows getting a deeper understanding of the character of gender differences or similarities in terms of their relevance and in terms of the big variety of food hazards. This understanding helps to avoid generalizations and taking gender differences for granted.

Literature analyzing consumer's perception of food hazards has found that a distinction can be made between natural (such as moulds), technological (such as pesticides) and lifestyle food hazards (such as a high fat diet) (Miles et al., 2004; Roosen, Thiele and Hansen, 2005; Siegrist, 2003). Previous research further reported gender differences in attitude towards science and technology and the acceptance of technology (Fox and Firebaugh, 1992), with women being more skeptical. Moreover, women and men are found to differ in their approach to food (Fagerli and Wandel, 1999). Due to this, it was concluded that different types of food risks are likely to be more or less gendered. Hence, the direction and magnitude of the gender gap in food risk perception is likely to differ for varying types of food hazards, such as technology-based versus natural versus lifestyle food risks.

Thus, the first main objective of this thesis is to find out if there exists a consistent gender gap in food risk perception and if a systematic pattern is prevalent with regard to type of food hazard. E.g., does the gender gap exist for all food hazards and/or is it especially small or large for some kinds of food hazards?

Following a psychological contextualist approach as proposed by Jackson, Allum and Gaskell (2006), the second aim of this thesis is to investigate whether women and men attach different meanings to food hazards.

A psychological approach is followed as it regards the perspective of individuals. In order to investigate gender differences in risk perception, it is important to understand first of all how individuals perceive risks. It is supposed that socialization processes and contexts influence people's self-concepts, identities, world views, preferences, values and expectations (Gustafson, 1998; Wharton, 2005). Thus possible gender differences in norms, values etc. are also expressed at the individual level through e.g. differences in risk perception. This thesis therefore focuses on risk perceptions and risk constructs from the perspective of individuals, which is related to approaches in cognitive psychology.

Getting a broad idea of risk constructs of individuals also demands a contextualist approach. Contextualist thinking in risk perception is derived from sociological approaches to risk perception, and especially recent socio-cultural approaches show that risk has different meanings to people depending on their social context (Zinn, 2006b). Regarding food risks as socially and culturally constructed, the aim is to investigate whether they are constructed differently for women and men.

Focusing on the meanings that women and men attach to different types of food hazards, a twofold approach was chosen:

First, women's and men's most salient concepts with regard to the hazards were investigated. Salient concepts are the first associations to be activated when a person is confronted with a stimulus, and from these concepts or images other cognitions in memory are activated (theory of spreading activation). These 'top of mind' cognitions are considered to be especially important in response-oriented studies (Wiedemann and Balderjahn, 1999), such as quantitative risk-perception studies, and might thus strongly influence consumer's risk evaluations. Furthermore, risk perception is found to be strongly influenced by affect (Loewenstein et al., 2001). The vividness or emotional intensity of the first images consumers have in mind when they are verbally confronted with a hazard is likely to influence people's cognitions and finally judgments about the stimulus (Jackson, Allum and Gaskell, 2006). It is therefore investigated whether there are gender differences in the vividness of the most salient associations.

Second, women's and men's motivational factors are the focus of this thesis. According to the means-end-chain (MEC) theory, knowledge is organized hierarchically in memory and the evaluation of an issue/object is based on how the issue/object is perceived to be related to principal life values (Olson and Reynolds, 1983). While a person's basic values are assumed to be relatively stable (Walker and Olson, 1991), different kinds of values and images are likely to be activated for different stimuli. This thesis analyzes whether women and men associate different kind of images to different food hazards and perceive threats to different kinds of values. Furthermore, the dominant cognitive paths in

the minds of women and men are filtered. In addition to a meaning related to content in terms of individual images, associations, feelings, consequences and values linked to the food hazards, the structure of women's and men's cognitions is also investigated. More complex cognitive structures point to a higher level of involvement for the object or issue in question (Fotopoulos, Krystallis and Ness, 2003).

Finally, from a methodological point of view, this thesis applies a methodology called means-end-chain (MEC) theory and the related method called laddering to studying individuals' risk perceptions. MEC theory has been developed in the context of marketing and product innovation in order to understand why consumers choose products by uncovering the underlying motives of their consumption decisions. Only a few studies applied this methodology to research questions beyond marketing. Only Bredahl (1999), Wiedemann and Balderjahn (1999), Miles and Frewer (2001) and in a somewhat different way Barrena and Sánchez (2010) adopted it to investigate perceptions of risks. Based on these previous studies and problems encountered, this study adopted the laddering method developed for studying specific products to the study of more abstract issues such as food hazards.

The following research questions summarize the aims of this thesis:

- Do previous studies show a consistent gender gap and if so, how does the gender gap vary for different types of food risks?
- What are the differences and similarities of women's and men's most salient concepts and more underlying associations and values they attach to different food risks?
 - in terms of associations, consequences and values
 - in terms of emotional intensity
 - in terms of the complexity of cognitive structures
- How can the laddering method be adopted to the investigation of more abstract issues such as food hazards?

Overall, the investigation of food risk cognitions may contribute to a better understanding of people's risk perceptions in general. Getting to know people's food risk concepts is important for understanding people's risk evaluations and will contribute to research that is interested in explaining individual differences in risk perception. Moreover, people's risk constructs are interesting for risk communication strategies.

Most important, this thesis provides a comprehensive overview of previous work considering gender and risk perception. Based on this, the thesis further offers an approach to better understand women's and men's food risk constructs from a cognitive psychological point of view. According to the idea "that risk is culturally conditioned: what one defines as dangerous depends on where one stands" (Jackson, Allum and Gaskell, 2006: 11), similarities and more important differences in women's and men's risk constructs may further reflect gender relations in our society. What people or groups of people are concerned about and why they are concerned about it can throw light on their role and status in society.

1.3 Organization of the Thesis

In order to meet the objectives described above, this thesis is divided into eight chapters. Following this introduction, chapter 2 gives a comprehensive overview of theoretical approaches to risk perception and empirical work that has been conducted in the field of risk perception research. First of all, definitions and terminologies for risk and risk perception are introduced (2.1). Chapter 2.2 details the cognitive and affective factors and processes that have an impact on how individuals assess risks. The cognitive as well as affective processes are first introduced in the general context of consumer decision making (2.2.1), before the focus is put on their impact on risk perception more specifically (2.2.2). In chapter 2.3 different approaches to studying differences between individuals in risk perception are introduced starting with the psychometric paradigm (2.3.1), followed by the Cultural Theory approach to risk (2.3.2) and more recent approaches that have a more interdisciplinary approach (2.3.3). Chapter 2.4 presents in detail the factors that determine levels of risk perception. Empirical results with regard to the effect of socio-demographic factors such as gender and age, socio-structural factors such as education, socio-psychological factors such as world views and values as well as socio-political factors such as social trust or general scientific attitudes are presented.

Chapter 3 puts emphasis on gender and risk perception. After an introduction on the role gender plays in risk research in terms of how gender is considered and interpreted in chapter 3.1, chapter 3.2 presents results of previous studies on the impact of gender on levels of risk perception. Evidence on differences and similarities between women and men with regard to food risks are described.

Theoretical and empirical attempts to understand the underlying reasons for the often stated gender gap in risk perception are outlined in chapter 3.3.

Chapter 4 presents a systematic literature review of food risk perception studies with regard to the results for gender. Chapter 4.1 outlines its objectives, followed by the methodology (4.2) and results (4.3). Chapter 4.4 discusses the results of the systematic review.

Chapter 5 is devoted to the MEC theory. The MEC theory builds the methodological background of the empirical analysis in chapter 6. Among other theories, the MEC theory models how knowledge is organized in human memory as introduced in chapter 5.1. Chapter 5.1 also introduces network models of knowledge and explains similarities and differences between the two approaches. Before the widely accepted MEC models of Gutman and Reynolds (1979) and Olson and Reynolds (1983) are outlined (5.3), an overview of the historical development of the MEC theory is given (5.2). Chapter 5.3 relates the MEC theory to the theories of the self and involvement and the role that context or situation plays for the activation of self-relevant knowledge structures.

Chapter 6 presents the empirical investigation of women's and men's food risk constructs. After an introduction of the specific goals of the empirical analysis (6.1), chapter 6.2 describes and discusses in detail the design of the study in terms of sample selection (6.2.1), interview techniques (6.2.2 and 6.2.3) and data analysis (6.2.3.2). The results are presented in 6.3. Chapter 6.4 discusses the most important results against the background of general risk research and gender research. It also outlines the strength and limitations of the research and makes recommendations for future research.

Chapter 7 gives a summary of the thesis and its most important findings.

2 Background to Risk Perception

This chapter gives a theoretical and empirical account of risk perception research. Definitions of risk and an introduction to the concept of risk perception are presented in chapter 2.1, followed by an overview of the underlying cognitive and affective processes that affect human perception and decision making (2.2). The subsequent section 2.3 presents the theoretical approaches that have been developed in order to understand differences in risk perception between individuals and groups of individuals, and chapter 2.4 gives a detailed overview of the empirical evidence related to the factors that determine individual differences in the perception of risks.

2.1 The Concept of Risk and Risk Perception

Starting off with a brief introduction to the different conceptualizations of risk (2.1.1), the concept of risk perception and how it has evolved during the last few decades is presented in chapter 2.1.2.

2.1.1 *The Concept of Risk*

‘Risk’ is conceptualized in many different ways across research disciplines. However, most risk concepts are based on the distinction between ‘reality’ and ‘possibility’. ‘Reality’ is related to adverse effects and its consequences and ‘possibility’ refers to the probability of adverse effects (Kogan and Wallach, 1964; Rayner and Cantor, 1987).

This probabilistic viewpoint dates back to Frank Knight (1921), who proposed a distinction between risk and uncertainty. Knight (1921) conceptualized

risk as a measurable probability and uncertainty as a situation with lack of probabilistic information (LeRoy and Singell, 1987). According to Cunningham (1967), consumer decisions are in general decisions under uncertainty as they lack information about exact probabilities. Probabilistic thinking only gained importance when it was introduced in the debates around nuclear reactor safety in the sixties by Farmer (1967) and Starr (1969). Before, risk was mostly described in terms of (a) kind and (b) magnitude of damage following a deterministic approach to risk (Banse and Bechmann, 1998). Approaches solely based on this two-dimensional risk conceptualization are called formal-normative risk concepts that dominated early risk research and were introduced by the seminal work of Chauncey Starr (1969). Starr (1969) widened the approach to include technological risks.

The introduction of ‘probability’ led to a differentiation between ‘risk’ and ‘hazards’. ‘Hazard’ is mostly described in terms of the source of an adverse effect and ‘risk’ refers to the possibility and probability of an adverse effect (Kaplan and Garrick, 1981). Whereas hazard is supposed to have an external cause, risk is internally produced by the acts and omissions of individuals (Ulbig, Hertel and Böl, 2010). In a similar way, the sociologist Niklas Luhmann differentiated between ‘danger’ and ‘risk’. Whereas ‘danger’ is attributed to an external cause, ‘risk’ is produced inherently in the system itself (Luhmann, 1993). However, for Luhmann ‘risk’ is not necessarily related to the behavior of an individual, but the concept of risk entails a distinction between ‘decision makers’ (those who take risks) and those who are affected by the decisions of others (Japp and Kusche, 2008). Furthermore, the concept of ‘probability’ entails aspects of insecurity and uncertainty that are strongly linked to risk (Schütz et al., 2003). Taking ‘uncertainty’ into account, Rosa (2003: 56) defines risk as “a situation or event where something of human value (including humans themselves) is at stake and where the outcome is uncertain.”

In addition to probabilistic approaches to risk, other conceptualizations of risk follow a contextualist approach (Thompson and Dean, 1996). The contextualist viewpoint treats probabilities as only one attribute among many others and focuses on the meaning of hazards for individuals and groups. For Mary Douglas (1990) risk, is, in addition to probability, determined by the meaning and value that is given to the outcome and consequences that depend on political, aesthetic and moral viewpoints. Accordingly, risk is associated with several risk characteristics such as familiarity or personal danger. Hence, the probability of occurrence is only one, albeit important, risk attribute among several others (Jackson, Allum and Gaskell, 2006; Thompson and Dean, 1996).

In addition to the probabilistic versus contextualist conceptualization of risk, a further helpful classification is built by Zinn (2008a). He classifies risk

definitions and the related theoretical approaches on a continuum from whether risk is regarded as having an objective existence to being socially mediated/constructed independent of its objective existence. Approaches that presuppose the objective existence of risks regard risk as real dangers. These objective dangers either exist independently of social factors or are subjectively perceived by individuals. Other approaches assume that real dangers are socially transformed into risks for the organization of society or that the subjective experience of a real danger is mediated by social factors. In addition, approaches that follow a constructivist view deny the existence of any objective risk and conceptualize it as a result of social processes.

Beck (1986; 1992) distinguishes three different kinds of risks according to time era: in pre-industrial societies, risks were conceptualized as hazards and regarded as coming from external forces such as gods or demons. In classical industrial society, the notion of hazards changed to the notion of risks that are taken voluntarily such as smoking and that can be calculated. Today, in what Beck (1986; 1992) calls 'risk society', risks are "man-made side effects of modernization". He characterizes these new risks as techno-scientifically produced risks that, compared to earlier risks, cannot be managed with the established scientific control strategies. New risks cannot be limited in time or place, questions of causality and liability are in general unanswerable, and thus compensation and insurance against these new risks is not possible (Banse and Bechmann, 1998; Beck, 1986; 1992; Zinn, 2008b). Thus, today's decisions are to an increasing extent decisions that have a probable but uncertain impact in the future (Banse and Bechmann, 1998). Linked to that, many decisions in our modern times are decisions under uncertainty as already claimed in the definition by Rosa (2003).

2.1.2 The Concept of Risk Perception²

Research into risk perception in the 1960s draws on the discussion around the evaluation and acceptance of man-made technical risks that are automatically linked to decision making processes (see above: Luhmann, 1993). Thus, cognitive processes that determine perception and evaluation of risks are central aspects of 'modern' risk research (Banse and Bechmann, 1998). Research into risk

² Here, perception is used synonymously for assessment and evaluation. It does not refer to selection processes that play a role when human beings process information that they receive from the environment.

perception was inspired by the observation that experts and lay people often differ in their judgment about how risky hazards are. While experts were assumed to base their risk assessment on the analysis of probabilities, it has been found that lay people judge risks using manifold attributes. Findings in cognitive psychology by Tversky and Kahneman (1974) were critical for research into risk perception. They showed that people face cognitive limitations in dealing with probabilities and therefore deviate from the assumed rational behavior. They further found that people use a “limited number of heuristic principles which reduce the complex tasks of assessing probabilities and predicting values to simpler judgmental operations” (Tversky and Kahneman, 1974: 35).

Out of the assumed differences in risk assessment between experts and lay people arose the distinction between objective risks and subjective risks, with the idea that experts are the representatives of objectivity and lay people have to be supported for example with information to judge risks more realistically. Objective risk perception is the result of e.g. calculating probability distributions such as the probability of being killed in a plane crash, while subjective risk refers to the experiences and perceptions of individuals and thus the meaning of that risk for the individual person (Oltedal et al., 2004).

Whereas the distinction between subjective and objective risks is still made by researchers following a positivist philosophical belief, researchers following a relativist view deny the existence of any objective risks, arguing that risk is always a subjective and thus relative concept (Mitchell, 1999). For most sociologists, risk perception is a social and cultural construction process that reflects and is determined by values, symbols and ideology (Bøholm, 1998; Sjöberg, 2000b; Sjöberg, Moen and Rundmo, 2004). Independently of this philosophical orientation, research into risk perception is interested in people’s subjective judgments and is trying to find out why people differ in their risk assessments (Slovic, 1987).

2.2 Cognitive and Affective Processes in Risk Perception

As the decision-making process itself is not observable, models of consumer behavior generally talk of a so-called Black Box where affect and cognition interact in influencing human behavior. Cognitions and affect also influence people’s assessments of risks. Affects and cognitions are produced by the affective and cognitive system where each of them can react independently to stimuli of the environment, but the two systems are strongly interconnected and influence each other most of the time (Bänsch, 2002; Kroeber-Riel, Weinberg and

Gröppel-Klein, 2009). Organization and working of the cognitive and affective system is first introduced in 2.2.1, before the importance of cognitive and affective processes for consumers' perception of risk is outlined in 2.2.2.

2.2.1 Cognitions and Affect Influencing Decision Making

Dual-process theories of thinking distinguish two different modes by which information is processed (Chaiken, 1980; Chaiken and Trope, 1999; Epstein, 1994; Petty and Cacioppo, 1984; Sloman, 1996): a 'deliberative' and an 'experiential' style of reasoning. The 'deliberative', also called 'rule-based' processing (Sloman, 1996), is an analytical, formal and verbal style of thinking (see e.g. Epstein, 1994). It is a relatively controlled form of information processing and refers to the conscious, cognitive processing of information. The 'experiential' style of processing, also known as 'associative' processing (Sloman, 1996), is characterized as intuitive, automatic, natural, and nonverbal. In contrast to the 'deliberative' system of thinking that is based on conscious logic, the 'experiential' system is supposed to operate according to the principle of similarity and context and is thus quicker and more efficient (Sloman, 1996). According to the principle of similarity, the strength of activation from one concept to another depends on the similarity or strength of association between the concepts. Thus, the stronger the association between two concepts, the more activation is supposed to flow between the concepts. This activation is further dependent on situational context factors (Loewenstein et al., 2001). The 'experiential' system further encodes reality in the form of images, narratives and metaphors to which affect is attached. The 'deliberative' system results rather in cognitive processing, whereas the 'experiential' system results in an affective processing of information.

2.2.1.1 Cognitive Processes and Cognitive Structures

Peter and Olson (2010) define cognition as the thoughts and beliefs produced by the cognitive system (cognitive structures) and all mental processes (cognitive processes) performed by the cognitive system including understanding (interpretation of meanings of stimuli), evaluating (judging a stimuli as positive or negative), planning (developing solutions in order to reach a goal or solve problems),

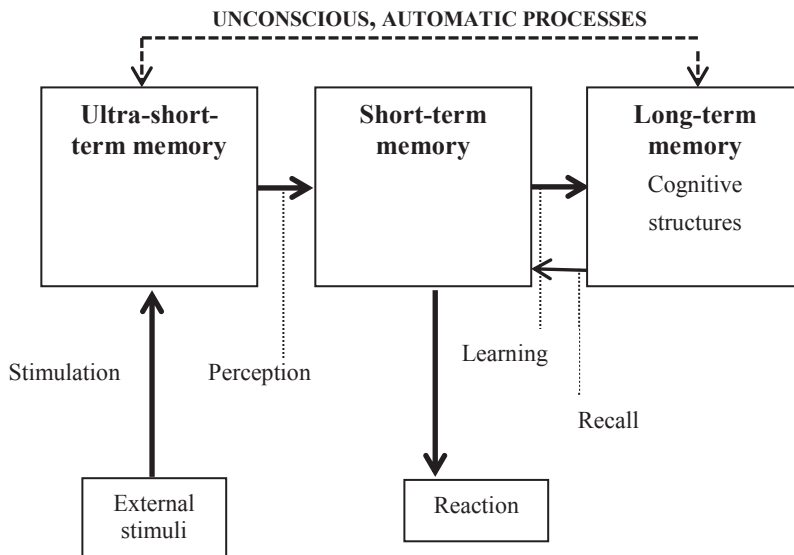
deciding (choice of the best solutions among alternatives) and thinking (cognitive activity necessary for the four processes).

According to approaches in cognitive psychology, human behavior is the result of an interaction between cognitive structures and cognitive processes (Grunert and Grunert, 1995; Peter and Olson, 2010). Consumers are exposed to information in their environment that is then processed by their cognitive system – the interacting cognitive structures and processes – and in turn influence consumers’ decisions and behavior (Kroeber-Riel, Weinberg and Gröppel-Klein 2009; Peter and Olson, 2010). Cognitive structures or so-called knowledge structures define the already memorized knowledge that is the result of past experiences and past information. They are a representation of consumers’ beliefs, values but also feelings (Grunert and Grunert, 1995, Kroeber-Riel, Weinberg and Gröppel-Klein, 2009; Olson and Reynolds, 1983). These knowledge structures are stored in long-term memory (LTM) and are called schemata. Schemata organize knowledge and canalize the perception and processing of information. They are linked with verbal and visual concepts in memory and can be applied to persons (schemata regarding another person or self-schemata), issues and events (Kroeber-Riel, Weinberg and Gröppel-Klein, 2009; Trommsdorff and Teichert, 2011). Cognitive structures strongly influence how people process new information (Olson and Reynolds, 1983). This processing of new information comprises processes through which information is perceived, processed and stored (Kuß and Tomczak, 2007). Cognitive processes change existing cognitive structures as a consequence of new information from the environment. Furthermore, cognitive processes retrieve information from cognitive structures in order to perceive and process new information (Grunert and Grunert, 1995). Thus, consumer decision-making behavior is the result of current, external information and of stored, internal information (memory) (Kuß and Tomczak, 2007).

Figure 1 details the functioning of cognitive processes and the role that cognitive structures play. It is based on the model of human memory by Atkinson and Shiffrin (1968) and describes the interaction between the key components of human’s cognitive system and the processes within (Trommsdorff and Teichert, 2011): the ultra-short-term memory (USTM), the short-term memory (STM) and the long-term memory (LTM). The USTM receives external stimuli, e.g. visual and acoustic stimuli, and stores them for a very short time. By means of selection processes, also called perception, only a part of this information is transferred to the STM. This selection is part of the automatic cognitive processes that are unconscious and is influenced by the cognitive structures of the LTM (Kroeber-Riel, Weinberg and Gröppel-Klein, 2009; Trommsdorff and Teichert, 2011). The STM is the most active part of the cognitive system and works as its processor: it temporarily stores and processes current information (Keller, 1993).

The processes of the STM are part of the strategic cognitive processes and are conscious for humans. These processes refer to mental activities necessary for problem-solving tasks such as the interpretation of stimuli or combination of information in new ways in order to make evaluations and take decisions (Grunert and Grunert, 1995; Schneider and Shiffrin, 1977). By means of cognitive and behavioral processes, part of the processed information is transferred to the LTM, which is defined to be a subcomponent of human memory with an unlimited storage capacity (Dacin and Mitchell, 1986). The LTM is an active network that presents the knowledge structures (cognitive structures) (Kroeber-Riel, Weinberg and Gröppel-Klein, 2009) formed due to past experiences and past information.

Figure 1: Model of Consumer Information Processing



Source: Adapted from Trommsdorff and Teichert (2011)³.

³ The model of consumer information processing is based on the human memory system by Atkinson and Shiffrin (1968).

Information from the LTM is retrieved (recall) and used to process new information (Marks and Olson, 1981) as it provides rules and heuristics that guide people's information processing in the STM and USTM (Greibitus, 2008; Wilkie and Farris, 1976). Also cognitive processes such as risk perception/evaluation are influenced by knowledge that is stored in the LTM (Slovic, 1987).

According to Kuß and Tomczak (2007), knowledge is defined as the information that is stored in memory and that can be retrieved. Two types of knowledge are usually distinguished: procedural and declarative knowledge (Squire, 1987; Trommsdorff and Teichert, 2011). Procedural knowledge contains scripts and skills, the knowledge how to do things, such as riding a bicycle or skiing (Anderson, 2007). This knowledge is unconscious and cannot be verbalized (Trommsdorff and Teichert, 2011). Declarative knowledge is formed by all kinds of stored information about the environment – facts, situations, objects, and causalities etc. It is thus factual and conscious knowledge and can be verbalized (Anderson, 2007). It comprises categories, concepts and associative networks (Brunso, Scholderer and Grunert, 2004). Declarative knowledge is further subdivided into episodic and semantic knowledge. Episodic knowledge refers to a person's experiences and is mainly stored in the form of pictures. Semantic knowledge on the other hand is mainly stored in the form of words and refers to factual knowledge, meanings of words, rules of interpretation and analytical rules for solving problems (Kuß and Tomczak, 2007; Trommsdorff and Teichert, 2011). Semantic knowledge plays an important role in the formation of cognitive structures; due to its structured organization, it can be retrieved relatively fast (Anderson, 2007). Knowledge is assumed to be encoded and stored in LTM in the form of organized structures (knowledge structures) or semantic networks (Greibitus, 2008; Kroeber-Riel, Weinberg and Gröppel-Klein, 2009).

2.2.1.2 Affective Processes

Recent research into human decision making is increasingly interested in the impact of affect (Clore, Schwarz and Conway, 1994; Loewenstein et al., 2001; Zajonc, 1980). According to several authors, affect can be defined as a state of feeling that human beings experience such as 'sadness' or 'happiness' and is often also related to feelings of 'goodness' or 'badness' with regard to an external stimulus (Finucane et al., 2000a; Peters, Burraston and Mertz, 2004; Peter and Olson, 2010; Slovic and Peters, 2006). Affective responses are often linked to bodily reactions, e.g. increased heart rate or tears, and vary in terms of intensity. Peter and Olson (2010) distinguish four different types of affect that differ in

terms of strength and physical reaction: emotions such as joy, fear or love are linked to intense bodily reactions and are very strong affective responses. Specific feelings such as disgust and sadness are linked to somewhat weaker physical reactions and are somewhat less intensive than emotions. Besides, moods such as boredom are rather diffuse affective responses that are not directed to a specific object or issue. Finally, evaluations such as liking and goodness are linked to the lowest level of bodily response and felt intensity (Kroeber-Riel, 1979; Peter and Olson, 2010)⁴. Moreover, in the empirical literature, the term affect is often used as a bipolar item contrasting positive and negative evaluation of an object or situation (Sjöberg, 2007).

Research into the influence of affective responses on judgment and decision making can be distinguished according to whether one is focusing on ‘anticipatory’ or ‘anticipated’ emotions (Loewenstein et al., 2001). Decision making research is interested in the effect of ‘anticipated’ or expected emotions. ‘Anticipated’ emotions are not experienced in the immediate situation, but it is assumed that during the process of decision-making, people anticipate how they would feel in different outcome situations, which constitutes an additional factor influencing decisions. With ‘anticipated’ emotions, the process of decision-making is still viewed as a mainly cognitive one (Loewenstein et al., 2001; Zinn, 2006a). Neuroscience and social psychology have mainly focused on the role of ‘anticipatory’ emotions by examining how immediate emotions (immediate visceral reaction in the decision-making situation) influence human decision-making. Lerner and Keltner (2000) further make a distinction between ‘integral’ and ‘incidental’ affect. Studies focusing on ‘integral’ affect analyze the impact of emotions that are related and relevant to the object of decision-making. ‘Incidental’ affect refers to emotions that are experienced during decision-making and that sometimes have an impact on judgment and choice even though these emotions are not linked to the object on which decisions are taken.

4 Damasio (1994) proposes a different classification. He distinguishes between (1) basic universal emotions such as happiness and anger, (2) subtle universal emotions such as jealousy and embarrassment and (3) background emotions such as wellbeing and fatigue. For Damasio (1994) ‘feeling’ is the experience of emotion.

2.2.1.3 *The Interplay of Cognitive and Affective Processes*

There exist several hypotheses about the interplay between cognitions and emotions, and their order and influence on judgment and choice. Those will be discussed in the following.

Stimulus → cognitions → affective responses → decision-making

Some researchers assume that people first cognitively evaluate a stimulus. This cognitive evaluation results in affective responses that directly influence human judgment and decision making. In other words, it is assumed that the effect of cognitions on decision making is mediated by affective reactions (Cottle and Klineberg, 1974; Damasio, 1994; Loewenstein et al., 2001). According to the ‘somatic marker’ hypothesis by Damasio (1994), emotions are the result of images related to the expected consequences or decision making outcomes. Due to past experiences these images are ‘marked’ by positive or negative feelings that are further linked to somatic states. Positive ‘somatic markers’ are likely to result in a positive evaluation of the outcome consequences, whereas negative ‘somatic markers’ are likely to lead to negative evaluations. These ‘anticipatory’ emotions linked to images of outcomes and consequences were found to guide people’s judgment in an accurate and efficient way (Damasio, 1994) as they present a kind of summary of the likely consequences (Loewenstein et al., 2001). Studies supporting the ‘affect-as-information’ hypothesis found that affect can have a direct influence on decision-making outcome. When feelings during a decision-making process are perceived as relevant to the decision-making task by the person (referred to above as ‘integral affect’ according to Lerner and Keltner, 2000), then these feelings have an impact on the person’s choice (Clore, Schwarz and Conway, 1994; Loewenstein et al., 2001).

Stimulus → affective responses → decision-making

In addition to the ‘*stimulus → cognitive → affective*’ path, affective reactions can also be a direct answer to a stimulus. Zajonc (1980) argues that people can emotionally react to a stimulus without being aware of the stimulus. For Zajonc affective responses are the first and automatic reactions to a stimulus that further