

The Influence of Adjustment Processes and Expected Social Impact on Responses to Risk: Towards a Transactional Model

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Johannes Leder

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Gutachter: 1. Prof. Dr. Ernst Hany
 2. Prof. Dr. Tilmann Betsch
 3. Prof. Dr. Andreas Mojzisch

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Zusammenfassung

Diese Arbeit beschäftigt sich mit der Reaktion von Menschen auf Risiko. Risiko bezeichnet das Produkt des negativen Nutzens möglicher Konsequenzen eines Ereignisses oder einer Handlung und deren Auftretenswahrscheinlichkeit. Risikowahrnehmung hängt demnach von der Integration von Wahrscheinlichkeitsurteilen und Urteilen über die Schwere der möglichen Konsequenzen eines Ereignisses ab. Über diesen rein rationalen Ansatz hinaus wurde gezeigt, dass dieser Prozess auch von affektiven Prozessen beeinflusst wird. Das Zusammenspiel von rationalen und emotionalen Prozessen auf die Informationsverarbeitung wird in Zwei-Prozess-Modellen beschrieben. Es wird angenommen, dass die Reaktion auf ein riskantes Ereignis, d.h. die Bewertung für das eigene Wohlbefinden (Risikobewertung) oder auch Entscheidungen zwischen riskanten Optionen (Risikoentscheidung) von der Risikowahrnehmung abhängen. Experimentelle Studien nutzen Risikoentscheidungen oder die Risikobewertung eines riskanten Ereignisses, um auf die zu Grunde liegende Risikowahrnehmung zu schließen. Die vorliegende Arbeit zeigt jedoch, dass sich Personen mit unterschiedlicher Risikowahrnehmung in ihrer Risikobewertung nicht unterscheiden müssen. Diese Inkongruenz von Risikowahrnehmung und Risikobewertung geht möglicherweise auf Anpassungsprozesse zurück. Außerdem wurde in dieser Arbeit beobachtet, dass die Risikoneigung nicht nur von den zu erwartenden Konsequenzen für die eigene Person, sondern auch von Konsequenzen für andere Personen, abhängt. Beide Befunde stellen die Annahme, dass Reaktionen gegenüber Risiken allein auf der Risikowahrnehmung basieren, in Frage.

Der Einfluss von Anpassungsprozessen auf die Risikowahrnehmung wurde bisher nicht betrachtet. Um Anpassungsprozesse und ihren Einfluss auf die Risikowahrnehmung zu untersuchen, wurde eine Interviewstudie mit internationalen humanitären Helfern im Sudan durchgeführt. Die Interviews thematisierten die Wahrnehmung und Einschätzung von Risiken, die individuelle Risikobewertung und persönlichen Anpassungsmechanismen, welche genutzt werden um mit persönlichen Bedrohungslagen umzugehen. Während sich die Risikowahrnehmungen zwischen TeilnehmerInnen unterschieden, war die Sorge um die eigene persönliche Sicherheit bei allen TeilnehmerInnen niedrig. TeilnehmerInnen, die ein hohes Risiko wahrnahmen, schienen sich durch die Aktivierung von selbstregulativen Prozessen an die Situation anzupassen und deshalb nur geringe Sorge für das eigene Wohlbefinden zu empfinden.

Das Model der Assimilation, Akkommodation und Immunisierung wurde als theoretisches Rahmenmodel verwendet, um diese Anpassungsstrategien zu untersuchen. Das Muster der individuellen Bewältigungsstrategien, die Risikowahrnehmung, die Sorge um die persönliche Sicherheit und die Begründungen der Bewertung wurden als Indikator für die Aktivität der Anpassungsprozesse verwendet. Die Muster deuten bei TeilnehmerInnen, welche ein geringes Risiko wahrnahmen, auf die Aktivierung von Immunisierungsprozessen hin, d.h. sie nahmen, trotz objektiver Bedrohungslage, kein erhöhtes Risiko wahr und empfanden daher keine Sorge für die eigene Sicherheit. TeilnehmerInnen, die das Risiko hingegen als hoch einschätzten, zeigten eine Aktivierung von Selbst-Regulation. Die unterschiedliche Aktivierung der zu Grunde liegenden selbstregulativen Prozesse scheint die Beziehung zwischen Risikowahrnehmung und Risikobewertung zu beeinflussen.

Ein weiterer Faktor, der möglicherweise die Beziehung zwischen der Risikowahrnehmung und der Risikobewertung der InterviewteilerInnen beeinflusste, war das Ziel, welches mit der Entscheidung verfolgt wurde, in einem riskanten Kontext tätig zu sein. TeilnehmerInnen mit erhöhter Risikowahrnehmung gaben an, anderen Menschen helfen zu wollen, während jene mit niedriger Risikowahrnehmung dies nicht taten. Dies führte zu der Annahme, dass erstgenannte TeilnehmerInnen auch deshalb wenig Sorge für die eigene Sicherheit empfinden, weil sie, aufgrund der Möglichkeit, anderen zu helfen, bereit sind, die Wichtigkeit der eigenen Sicherheit abzuwerten. In zwei Experimenten wurde daher der Frage nachgegangen, ob Menschen eher geneigt ein Risiko einzugehen, wenn die riskante Handlung einer anderen Person nützt?

TeilnehmerInnen mussten Entscheidungen zwischen riskanten und sicheren Optionen treffen. Dabei betrafen die Entscheidungen in einer ersten Bedingung nur sie allein (individueller Kontext), in einer zweiten Bedingung (within-subjects), sie und eine andere Person (interpersoneller Kontext). Die Auszahlungen im interpersonellen Kontext variierten hinsichtlich der Verteilung der Gewinne zwischen dem Entscheider und der anderen Person. Die abhängige Variable war die Risikobereitschaft, gemessen durch die Anzahl von sicheren Entscheidungen. Im ersten Experiment wurde die Darstellung der sicheren Option (sicherer Gewinn vs. Preis für Ticket zur Teilnahme) zwischen den TeilnehmerInnen variiert (between-subjects).

Es wurde angenommen, dass die Berücksichtigung der Konsequenzen für andere im interpersonellen Kontext zu weniger risikoscheuen Entscheidungen führen würde. Die

Ergebnisse zeigen, dass Personen in interpersonellen Entscheidungen eine höhere Risikobereitschaft haben als in individuellen Entscheidungen. Die Manipulation der Darstellung der sicheren Option hatte hingegen keinen Effekt. Im zweiten Experiment wurde daher die Salienz möglicher persönlicher Verluste erhöht. Dies hatte zur Folge, dass kein Unterschied in der Risikobereitschaft zwischen den Entscheidungskontexten mehr gefunden wurde. Die Salienz möglicher Verluste scheint also pro-soziales Verhalten in interpersonellen Kontexten zu beeinflussen.

Die Befunde im Rahmen dieser Arbeit führen zu der Annahme, dass die Reaktion gegenüber Risiken nicht nur auf der Risikowahrnehmung beruht. Reaktionen auf ein Risiko fußen nicht nur auf der Integration von gegebenen Wahrscheinlichkeiten und Konsequenzen, sondern hängen auch von moderierenden Situationsfaktoren und mediierenden Anpassungsprozessen ab, welche die individuelle Repräsentation der Situation beeinflussen. Um den Zusammenhang zwischen Risikowahrnehmungen und Reaktionen gegenüber Risiken besser zu verstehen, muss der Fokus der Forschung über die Wahrnehmung des Ereignisses oder der Handlung hinaus die Anpassungsprozesse des betroffenen Individuums und den Einfluss situationeller Faktoren untersuchen.

Abstract

This thesis examines the response of people to risk. Risk is defined as the product of an event's disutility and the probability of its occurrence. Risk perception then refers to the integration of perceived probability and subjective value of a consequence. Going beyond this rational approach, the risk-as-feelings-hypothesis posits that risk perception is also a function of the immediate affective reactions to a possible event. A number of dual process theories that aim to integrate these two processes have been brought forward. It is assumed that risk perception determines the response to risk such as the appraisal of risk and decisions about risky options. Studies generally infer risk perceptions from reactions to a risky option such as choice behavior. The present research, however, shows that the same response to risk can be observed in individuals with different risk perceptions, possibly due to adjustment processes. Furthermore, it was found that an individual's propensity for risk-taking depends not only on personal consequences but also on consequences a choice option is expected to have on another person. Both findings question the assumption that responses to risk are exclusively based on risk perception.

In order to examine adjustment processes and their role in risk responses interviews were carried out among international humanitarian aid workers working in the Sudan. There they are faced with objective risks due to ongoing armed conflict. The interviews focused on individual risk appraisals and the adjustment strategies employed by the aid workers in order to function in their working environment. It was found that while risk perception differed between participants, the concern for personal safety did not differ. Those high in risk perception are assumed to rely on self-regulative processes for adjustment and therefore experienced low concern for personal safety.

The model of accommodation, assimilation and immunization processes was used as a theoretical framework to examine adjustment. The coping strategies employed, the risk perception and the concern for personal safety, as well as the reasoning about the degree of personal concern, were used as indicators to infer the activated adjustment processes. The patterns of participants who perceived a low risk indicated a high activation of immunization processes and as a result those participants did not perceive the security situation as a problem and did not engage in self-regulation. The group of participants who perceived a high risk acknowledged the security situation as a problem and engaged in self-regulation.

Another factor identified in the interviews which might explain the relationship between risk perceptions and concern for personal safety was the personal goal for working in a high risk context. The group of participants who reported that the security environment was volatile and risky considered the benefits for others of their risky choices. In contrast, the participants who reported low concern, because they perceived the environment to be generally safe, did not mention the implications of their actions for others. This gave rise to the assumption that participants who view risk-taking as a means for helping devalue the importance of personal safety and as a result experience less concern. This assumption was explored further in two experiments.

Two experiments were carried out in which participants were faced with choices between safe options and lotteries. The dependent variable was the risk attitude of participants displayed in their choices between a risky and a certain option. Participants made choices that only affected themselves (individual choice context) and choices that affected themselves and another person (interpersonal choice context). Experimental groups differed regarding the formulation of the certain option. In one group the certain option yielded a sure gain, in the other group the certain option presented the price to pay to participate in the lottery. It was assumed that if the outcomes of others matter, participants should be less risk averse in choices that affect others and themselves than in choices that only affect them individually. The first experiment found evidence that people consider the outcomes of others in risky choice, and are willing to take higher risks in interpersonal contexts independent of the formulation of the certain option. However, in the second experiment it was found that when payment for the lottery was made salient people ceased to behave prosocially. This leads to the conclusion that the salience of personal loss presents a moderator of the relationship between other regarding preferences in interpersonal risky choices and decision making.

This thesis shows that responses to risk are based not only on the calculation of given probabilities and outcomes associated with an event or object, but also depend on moderating situation factors and mediating adjustment processes. In order to further understand the relationship between risk perception and responses to risk the focus of research needs to move beyond the object or event associated with the risk itself and needs to integrate the reactions and adjustment processes of the individuals affected by it as well as situational characteristics.

Introduction

*If the clouds are full, they will empty
rain on the earth; and whether a tree falls
south or north, the place where the tree
falls, there it is.*

*Those who watch the wind do not
sow, and those who observe the clouds do
not harvest.*

*In the same way that you do not know
what is the way of the wind or how the
bones are formed in the mother's womb, so
you do not know the work of God, who does
all things.*

*In the morning plant your seed and
do not let your hand rest at evening. For
you do not know which will succeed,
whether this or that, or whether both will
do equally well.*

Ecclesiastes 11:3-6

The writer of Ecclesiastes confronts us with a problem we face every day: a world that we cannot fully predict nor control. Our actions and choices are influenced by assumptions about the likelihood and impact of events that can have positive or negative consequences. The term “risk” is used as a measure to express the perceived danger of an object, event or action with multiple possible consequences, as the product of its probability and its perceived disutility (Aven, 2008; Breakwell, 2007). This thesis focuses on the question of how we perceive risk, judge its significance for our personal well-being and take action in the face of risk.

As I am writing this introduction, CNN reports that two humanitarian aid workers from Belgium and Indonesia were killed in Mogadishu, Somalia, while providing medical assistance to the local population (CNN, 2011). While people generally exhibit dislike towards situations with unknown outcomes, it seems that some are willing to work and live in situations that involve the possibility of personal harm. One particular example is

humanitarian aid and relief workers deployed in countries with ongoing armed conflict. According to Stoddard and colleagues (Stoddard, Harmer, & DiDomenico, 2009), 2.4 per 10,000 international humanitarian aid workers became victims of violence in 2006-2008 world-wide. When looking at specific nations in the same period, two stand out: 90 incidents of major violence on humanitarian personnel happened in the Sudan and more than 70 in Afghanistan, which in relative terms is presumed to be about 27 per 10,000 international humanitarian aid workers. The likelihood to experience major acts of violence in those countries is roughly eleven times as high as compared to the rest of the world. Furthermore, in relative numbers the likelihood to be affected by acts of violence is low (0.27%), but considering that the humanitarian community in the respective countries is very connected, it can be assumed that people know others who were affected by violence personally. This is likely to affect how they perceive their safety. How are people able to work and live well in a context of ongoing threat?

This question is particularly important since September 11th, 2001 and the fall of the Twin Towers in New York City. Security within the Western world can no longer be taken for granted. The bombings in Madrid (March 11, 2004) and bombings in London (July 7, 2005) have further increased the feeling of threat. Civilians have increasingly become targets of terrorism. While the probability of becoming victimized is slim, the stakes are high. After experiencing these events that presented major crises, people adjusted their behavior (avoided public transport) and levels of fear and perceived risk increased sharply. These changes only prevailed for a limited amount of time before they returned to a normal level (Burns, Slovic, & Peters, 2011). While the study of Burns et al. (2011) reports the general aggregated behavior, individual psychological processes are not examined. A better understanding of the processes underlying adjustment to an environment that cannot be considered safe but in which possible sudden threats may occur is necessary. Government policy responds to security incidents by attempting to increase public security through new regulation and safety procedures, but is this the only way that people's feeling of safety increases?

It is a widely held assumption that risk is negative and has to be avoided and the term risk-taking (the preference to take a risk rather than to choose a safe payoff of equal value¹) has the connotation of reckless behavior. Perhaps the negative connotation of risk-taking is influenced by the definition of risk as “product of the probability of a negative event and its severity”, which only considers negative outcomes. The question has often been asked why people take risks and choose actions that might lead to negative personal consequences. In this context leisure activities (e.g., mountaineering) or behaviors such as unprotected sex, and smoking can be named as examples of such risk-taking behavior (see Parker & Stanworth, 2005). Another example that is often cited by the media coverage is about people who choose to live and work in countries that are regarded as unstable. The media often conveys the message that people who work in such contexts “receive good payment for their courage, or rather their carelessness” (Dahlkamp & Wassermann, 2007, p. 62, quote translated by the author). The general assumption of journalists as well as their readers seems to be that people who freely choose an occupation which involves risks are either pursuing a “death wish”, are not aware of the situation they are in, or are individuals that are seeking “thrilling” experiences.

In psychological theories the term risk is often used in conjunction with decision making as well as perception. When decisions are made between options whose outcomes depend on probabilities, they are regarded as decisions under risk (Lopes, 1983). This leads to an important distinction of risk perceptions and decision making under risk. While risk perception focuses on how the risk (i.e., the potential harm) of an event or object is evaluated, decision making under risk (risky choice) tries to predict and explain choices between options where at least one option involves consequences that depend on probabilities. Thus, the assessment of personal security is a function of risk perception, while the choice to engage in a specific action is an example of a choice under risk. The choice under risk involves risk perception, but risk perception does not require a choice.

The perception of risk is associated with an event or an object and depends on the associated dread, newness and control (e.g., Johnson & Tversky, 1984; Slovic, 1987; Slovic, Fischhoff, & Lichtenstein, 1984). Emotional reactions associated with an outcome

¹ The value of a given option is assumed to be calculated based on the outcomes affecting only the decision maker.

and experience with a given situation influences the use of probability information when judging a risk. For example, when asking a person about the risk of skiing, it is assumed that the answer will present an estimate for the perceived danger of skiing. The estimate depends on the person's valuation of breaking an arm or a leg in terms of severity as well as on the assumed probability of an accident. The emotional reaction to the outcome breaking a leg can either be neutral or negative, for example a person might dread breaking a leg, and as a result not the likelihood but the mere possibility determines the evaluation of the danger of skiing. The picture becomes more complex when considering that probabilities are not acquired from statistics, but usually shaped by experience. For example, people who ski regularly are more likely to experience skiing as safe, provided their experiences has been accident-free. This example demonstrates that in order to understand risk perception and choices involving risk, one needs to consider the influence of feelings as well as experiences in addition to information concerning outcomes and their probabilities.

When people are confronted with a situation that presents a challenge to them, it is assumed that they adapt either by influencing the environment or by adjusting themselves (e.g., Heckhausen & Schulz, 1995; Karoly, 1993; Rothbaum, Weisz, & Snyder, 1982). However, theories focusing on decisions between risky options define the attractiveness of choice options as a function of its consequences and their probabilities alone (e.g., Kahneman & Tversky, 1979; von Neumann & Morgenstern, 1947). It is important to note that while risk perception is assumed to be influenced by considerations of control and newness, the study of decision making under risk does not consider these aspects explicitly. Furthermore, when assessing risk perceptions in surveys and experiments, people are asked about the subjective probability as well as the perceived severity of possible negative outcomes (e.g., Siegrist & Gutscher, 2006; Weinstein, 2000) but not about ways that they could act upon the possible risk. Thus, while control and newness of risks are identified as crucial components of risk perception, the ways people use strategies and knowledge to limit the impact of risks and how these in turn affect responses to risk have not been examined.

The first aim of this work is to study the relationship between risk perception and responses to risk and how this relationship is influenced by adjustment strategies that people develop in order to feel safe in an environment of ongoing threat. In order to understand the influence of adjustment strategies on the relationship of risk perception and

resulting responses to risk, an interview study among humanitarian aid workers in the Sudan was carried out.

Often decisions involving risk have implications for others, for example politicians make choices that are far reaching or experts recommend certain decisions based on their risk assessment. As a result, risky decisions which affect others (i.e., risky choice in an interpersonal context) should be an important research area. Surprisingly, the research on decision making under risk when it impacts others as well is scarce. The study of decision making under risk generally focuses either on choices people make for themselves or choices they make for others. People's risk-taking in situations when another person is directly affected by the outcomes of one's choices has not been examined.

For this reason the second part of this thesis examines how risk-taking changes when the choice also affects others. The aim is to show that people are willing to take risks in order to benefit others when they perceive the risky option as entailing an opportunity for helping.

Taken together, this work investigates the influence of adjustment and social benefits on risk perception and risk-taking. Current theories of risk perception view risk perception and risk-taking as a result of a one directional judgment process focusing on the event. Internal processes and actions of the individual influencing the event or the situation associated with the risk are not considered. Hence, in order to examine risk perception and risk-taking from a transactional perspective, multiple theoretical perspectives have to be considered and integrated.

First, in chapter two it is argued that adjustment processes and risk perceptions are interdependent when viewing risk perception as a process embedded in the general psychological and physiological functioning associated with the response to challenges in the environment of the individual. However, theories of adjustment and risk perception present two independent lines of thought in the literature, decision making under risk and the adjustment to adversities.

Second, an introduction into decision making under risk will be given in chapter three. Expected utility theory and prospect theory are introduced as models explaining choices as a function of probability and valuation of outcomes. This will be complemented by research showing that experience influences choice, and research showing that risk-

taking is not only a function of probabilities and valuation of consequences in terms of a deliberate process but is also influenced by feelings.

Third, research focusing on the adjustment to adversities is presented in chapter four. The concept of resilience is explained and it is argued that resilience refers to healthy adjustment. It is shown that resilience is influenced by adaptive processes guided by self-regulation. Thus, theories of self-regulation are reviewed and related to resilience by drawing on research into stress and coping.

Fourth, in chapter five an interview study among humanitarian aid workers is reported which examined the role of adjustment for risk perception and risk-taking. The findings from these interviews raised the question of whether the willingness to take risks (in choices) is influenced by possible consequences of those choices for others.

Fifth, to answer this question, literature concerning prosocial behavior stemming from economics and psychology is reviewed in chapter six. This brought about the question of how people's propensity for risk-taking changes when another person is affected by the outcomes of their risky choice option but does not benefit from choosing the certain option, which means to avoid all risk.

Sixth, in order to answer this question two experiments were conducted. The experiments are described and their findings are discussed in chapter seven.

Lastly, the findings of the two experiments and interviews are discussed together in the final chapter.

Towards a Transactional Perspective on Risk Perception and Responses to Risk

The perception of an event which can have multiple consequences with different probabilities is captured by the term risk perception. Theories which explain responses to risk, generally assume that responses to risk are directly related to the perceived risk. Experiments use the measure of responses to risk such as judgments and choices as a measure of perceived risk. Responses to risk can either be manifest in actions or judgments about the significance of the risky event or action. Actions in the face of risk will be referred to with the term risk-taking and judgments will be referred to as risk appraisal. However, risk perceptions are distinct from responses to risk as the research on response to personal threat in ambiguous situations suggests. It is assumed that personal safety is a basic human need (Maslow, 1954). If this need is not satisfied the person experiences anxiety and fear, leading to physiological activation with the goal of being ready to either fight the threat or flee from it (e.g., Lovibond, Craske, Hermans, & Vansteenwegen, 2006). The unspecific activation of the physiological system aimed to adjust to situational demands is called stress. Stress is induced when the homeostasis of a biological system is challenged (Selye, 1991). The literature on stress yields three different perspectives, each of which results in diverse definitions of the term stress: the reaction oriented perspective, the stimulus oriented perspective and the cognitive-transactional perspective. The central characteristics and how the three approaches differ will be described briefly below.

The reaction oriented perspective yields research which focuses on the physiological reaction in response to stimuli and views the increase of corticoids as the central phenomena of stress (Toates, 1995). An example for this perspective is the definition of stress presented above.

The stimulus oriented approach focuses on events that are perceived as stressful. Specific events are examined and ranked according to their stressfulness. An example for this approach is the quantification of stress experienced in specific life events such as the birth of a child, unemployment or death of a spouse (Elliot & Eisdorfer, 1982; Kanner, Coyne, Schaefer, & Lazarus, 1981).

The stimulus oriented as well as the reaction oriented approach cannot explain why people differ in their reaction to the same stressor and why the same person responds differently to the same event at different points in time. Therefore, it was proposed by Lazarus that stress does not depend on the stimulus or on the physiological reaction alone, but on the interpretation of the event through the individual. This is the central idea of the

cognitive-transactional model of stress (Lazarus, 1966). The model assumes that two interdependent processes govern the adjustment to stressors in the environment: appraisal and coping (Lazarus, 1966, 1999; Lazarus & Folkman, 1984). The central function of appraisal is “to mediate the relationship between the person and the environment” (Lazarus, 1982, p. 1019). Appraisal induces emotions in varying intensity as a response to the implications of an event for one’s personal well-being. The appraisal process entails two steps. The first step, referred to as primary appraisal, is the perception and assessment of the event itself. When the event is appraised as threat, stress is induced. The second step, referred to as secondary appraisal, entails the assessment of one’s available resources to overcome the threat. After the situation is appraised, the person responds with coping (Lazarus, 1982, 1999; Lazarus & Folkman, 1984). Coping presents to the response of the individual to the appraised situation; it is “a stabilizing factor that can help individuals maintain psychosocial adaptation during stressful periods; it encompasses cognitive and behavioral efforts to reduce or eliminate stressful conditions and associated emotional distress” (Zeidner & Endler, 1996, p. 25). The model is transactional because it assumes that the person and situation influence one another in a circular process and the experienced degree of stress in a given situation is always a function of appraisal and coping responses together. For this reason, when a person does not experience a situation as stressful, reasons can be found in the person’s primary and secondary appraisal of the situation and/or their coping response.

The cognitive-transactional model of stress presents a meta-theoretical model. The structural components and also underlying processes are supported in empirical studies (e.g., Folkman, Lazarus, Dunkel-Schetter, DeLongis, & Gruen, 1986). The cognitive-transactional model of stress implies that responses to a stimulus are not an immediate consequence of the perception itself, but are influenced by internal processes as well as situational factors. It is assumed that risk perception and responses to risk can be captured from by the cognitive-transactional model as a meta-theory and thereby structurally integrate risk perception, adjustment and responses to risk for two reasons. First, primary appraisal involves the judgments of the likelihood and valuation of possible outcomes and therefore is based on processes described in theories of risky choice. The outcome of primary appraisal is therefore considered to capture what is referred to as risk perception. Second, coping is based on processes of self-regulation (Aspinwall & Taylor, 1997;

Benyamini, 2009; Tesch-Römer, 1997) and leads to adjustment which then again influences appraisal. The response to risk can be found in the coping and the appraisal.

The cognitive-transactional model of stress suggests that the assessment of personal safety (i.e., risk perception) is dependent on judgment regarding the expected course of events, their valuation, and on the coping resources and means available to the individual to control the possible negative course of events. Furthermore, it is implicitly assumed that the adjustment process itself affects the future primary and secondary appraisal which will again influence coping. Hence, when using the cognitive-transactional model of stress as a meta-theory the structure of constructs is as follows. Risk perception is one step in the process which leads to risk responses. When judgments are part of the response to risk concerning the significance of an event or object for the person, they are referred to as risk appraisal. When choices are part of the response to risk and present decisions between objects or events with probabilistic consequences, they present risk-taking. Most importantly, it is not assumed that risk perception is the only predictor of risk responses and risk appraisals do not reflect only risk perception.

In the next chapter theories and insight into how people perceive risk and how they choose under risk will be introduced. Then, in chapter four, theories explaining processes and outcomes of adjustment will be described. Both independent lines of research are integrated in chapter five and research questions will be formulated.

Theories of Risky Choice

Organizations and individuals working in situations yield hazard use ways to manage the risks to their health and functioning in order to avoid or limit harm. Operational security management focuses on the subjective feeling of safety of staff and on the security of the general mission. It is guided by the principal that risk is a function of probability and severity and both are independent. It is assumed that the responses to risk are exclusively based on risk perception and predicted by probability and valuation of outcomes. A possible event yielding a very low probability or events yielding low severity are regarded as negligible and are not considered as relevant for the risk perception of staff (Van Brabant, 2000). This chapter will present the theory behind this assumption and will present literature that challenges it.

Two types of theories about choices involving probabilistic outcomes can be distinguished: normative and descriptive. Normative theories provide a framework of what a rational decision should look like. When knowing probabilities of outcomes and the value of those outcomes, a “rational choice” based on expected utility theory can be proposed if its axioms, which are explained below, are abided by (von Neumann & Morgenstern, 1947). Normative theories, therefore, provide a benchmark to identify violations of normative assumptions since they provide a rationale to make the “right choice” (Eisenführ & Weber, 2003). However, people violate the axioms of expected utility theory, leading to so-called choice anomalies. The introduction of prospect theory by Kahneman and Tversky (Kahneman & Tversky, 1979) provided a theoretical framework accounting for and explaining the violations observed, and presents an example for a descriptive theory of choice. It was shown that the assumptions of expected utility theory were not obeyed by the human decision maker because information processing influenced choice.

Next, expected utility theory and prospect theory will be described. Then, the research focusing on cognitive determinants of choice anomalies will be described. This will be complemented by work focusing on the influence of feelings on decisions involving risk.

Expected Utility Theory

When people choose between two options, it is assumed that they pick the option with the higher value. In order to express value, usually money is used. While generally

apples and oranges cannot be compared, they could be compared if we translate into monetary value what they are worth. For example the value of one kilogram of apples is about 2.00€ and of oranges 3.00€. If both entities are expressed in terms of money, a choice between them is easy and follows the rule “pick the option with the highest value”. This is referred to as *value maximization*. Depending on the decision maker’s preference the value or the amount of money she is willing to spend on a kilogram of apples or oranges will change. However, when the outcome of each option is associated with chance, for example a lottery in which one can win apples or oranges, not only the value of the outcome but also the likelihood of the favorable outcome matters. One way to choose in such a situation could be to weight the value of each outcome with the respective probability. This is referred to as the *expected value model* (Eisenführ & Weber, 2003; Lopes, 1994). The expected value model implies that the value of an option is calculated based on the sum of the outcome values multiplied with their respective probability. For example, a person can choose between two different lotteries determined through tossing a six sided die. In the one lottery, option A, the person wins one kilogram of apples when the numbers 1, 2, 3, 4, or 5 are up. Thus, the likelihood of winning in case of option A is $p = 5/6$. In the other lottery, option B, the person wins two kilograms of oranges if the numbers 1, 2, or 3 are up. Thus, the likelihood of winning in case of option B is $p = 3/6$. In order to decide between option A and B, the expected value (*EV*) should be calculated and the option with the higher value should be chosen, thus $EV(\text{Option A}) = \frac{5}{6} \cdot 2 - \frac{1}{6} \cdot 0 = 1.67$ and $EV(\text{Option B}) = \frac{3}{6} \cdot 3 - \frac{3}{6} \cdot 0 = 1.5$. Under the assumption that people maximize expected value, a person should choose option A. Furthermore, a person should be willing to pay any amount up to the expected value of a given lottery. In case of a lottery identical with option B, the person participates up to a price of 1.5€.

This model was challenged by the so called *St. Petersburg Paradox*. In a hypothetical game people are faced with a fair coin toss. In case of tails the coin will be thrown again and when heads come up the game will end. In whatever round n the game ends the player will be paid 2^n ducats. The game proposed in the St. Petersburg paradox yields an infinite expected value since $EV = \sum_{k=1}^{\infty} 2^k \cdot \frac{1}{2^k} = \infty$. Given that the expected value of the presented gamble is infinite, it was surprising that when Bernoulli asked people how much they would hypothetically pay to participate in such a game, most people were only willing to pay a low fee to participate. This observation is a paradox under the

assumption that people strive to maximize expected value. For this reason, Bernoulli proposed people do not maximize expected monetary value, but a function of *expected utility* over the monetary value. It is assumed that utility functions capture the relationship between a physical magnitude of a given entity and the associated subjective value. For example, utility over money captures how the subjective values of monetary gains correspond to increasing amounts of money. Three different shapes of utility functions can be distinguished: linear utility functions, negative logarithmic utility functions and power utility functions (see Figure 1).

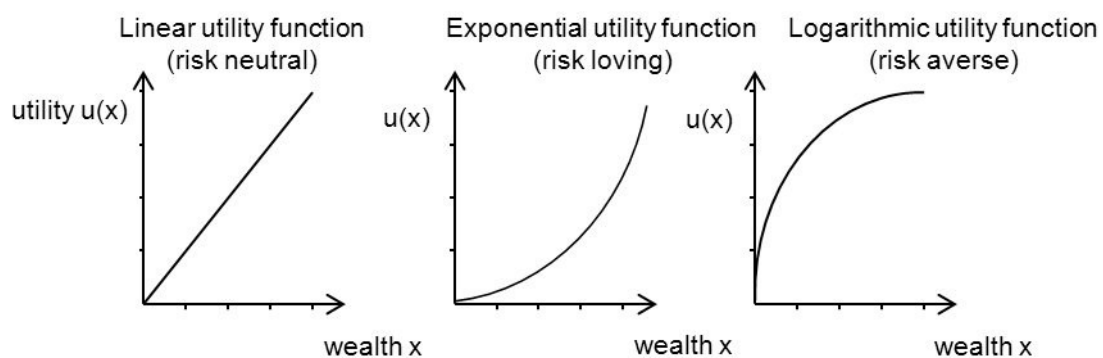


Figure 1: Examples of utility functions.

The shape of the utility function reflects assumptions about the characteristics of utility. Given a logarithmic utility function, a person with an additional gain of 5€ with an initial wealth of 10€ leads to a higher increase of utility than an additional gain of 5€ for a person who already owns 1000€. Given a linear utility function there is no difference in the rate of increasing utility depending on the initial wealth for a person. For a logarithmic utility function this results in the so called “marginal decreasing utility of wealth”, which implies a lower rate of increasing utility for a given increase in wealth, while a linear utility function implies that utility increases at the same rate independent of wealth. By assuming a logarithmic utility function over expected outcomes, the expected utility becomes finite, limiting the price people would pay to play the game. On this basis Daniel Bernoulli was able to solve the paradox (Lopes, 1994).

The concept of utility maximization was formalized by von Neumann and Morgenstern (1947), under the name of *expected utility theory*. Options involving probabilistic outcomes are referred to as lotteries or gambles. A lottery or gamble L_i is characterized by a combination of possible outcomes and their probabilities of occurrence $(x_1, p_1; x_2, p_2; \dots; x_n, p_n)$. It is assumed that the number of possible outcomes is finite ($X \equiv x_i = 1, \dots, I$) and as a result, the sum of all probabilities assigned to these

outcomes x_i is 1 ($\sum_{i=1}^I p_i = 1$). Each outcome x_i has a specific utility $u(x_i)$ and a probability of p_i . The probabilities and outcomes are objectively known. The shape of the utility function reflects assumptions about the characteristics of utility which are not known but are inferred upon based on preferential choices. When outcomes of a lottery have lotteries as a consequence, then they present a compound lottery. An example for a compound lottery is the game proposed in the context of the St. Petersburg Paradox.

According to expected utility theory it is now possible to rank all possible outcomes according to their utility, which results in a so-called utility function. In order to establish a rank order over the options and derive a utility function for a given individual, the following assumptions have to be fulfilled (von Neumann & Morgenstern, 1947):

The set of choice options and the related outcomes have to be known to the decision maker and a person has to be able to create a rank order of the options. If a person strictly prefers lottery L_1 over lottery L_2 it is expressed as $L_1 \succ L_2$. But if both $L_1 \succ L_2$ and $L_1 \preceq L_2$ are true, the person is indifferent between both lotteries, expressed as $L_1 \sim L_2$.

In order to ensure a consistent ranking of more than two options, the ranking has to be transitive. Transitivity refers to the assumption that for any set of options L consisting of $L \equiv \{L_1, \dots, L_3\}$ it has to hold that if $L_1 \succ L_2$ and $L_2 \succ L_3$, then $L_1 \succ L_3$.

For all lotteries $L_1, L_2, L_3 \in L$, there exists a scalar or probability $p \in [0,1]$ such that $L_2 \sim pL_1 + (1-p)L_3$. This implies that for any Lottery L_2 between L_1 and L_3 a combination of L_1 and L_3 can be found that is as good as L_2 , and the lotteries are continuous.

If $L_1 \succ L_2$ is true, then adding another outcome L_3 to both lotteries should not change the preference order. By adding L_3 a compound lottery is created. The added lottery L_3 must be irrelevant for the choice between L_1 and L_2 , because for all probabilities p_i , with $p_1L_1 + (1-p_1)L_3 \succ p_2L_2 + (1-p_2)L_3$ is true, and the choice is independent of L_3 . This axiom of independence is also called the axiom of substitution, since a lottery can be substituted by another lottery if a decision maker is indifferent between the two lotteries yielding equal outcomes with equal probability.

A lottery that yields a higher probability of a preferred outcome is preferred over a lottery that assigns a lower probability to the same outcome if the other outcomes of the lottery do not change. If this is true, the monotonicity axiom holds.

If all these assumptions are fulfilled, then a decision maker who chooses lottery L_1 over L_2 only if $u(L_1) \geq u(L_2)$ maximizes expected utility.

Utility is calculated based on absolute and not relative changes of monetary wealth. Thus, depending on the initial point of wealth, the same increase of wealth can lead to different increases of utility. For example a logarithmic utility function implies that the utility of a certain payoff $x \in \mathbb{R}_+$ results in a utility calculated with $u(x) = \ln(x)$. If a person has an initial level of wealth $w_i = 0$, then gains $x = 1000$, the utility is $u(x) = \ln(1000) = 6.91$. For the same person the gaining of another $x = 1000$ would result in a final wealth of $w_i = 2000$ and would lead to an increase of utility with $u(x) = \ln(2000) = 7.60$. Thus, the increase of utility is lower than the increase of additional wealth. This is referred to as the diminishing marginal utility of wealth. An important implication of expected utility theory is its implied assumption concerning the risk attitude of a given individual and that the risk attitude depends on the curvature of the underlying utility function.

Which of the two options L_1 and L_2 with L_1 leading to a certain payoff of $x_1 = 100$, and L_2 leading to $x_1 = 50$ with $p_1 = .5$ or to $x_2 = 150$ otherwise should a person choose? Assuming a logarithmic utility function under the assumption that the marginal utility of wealth decreases, the lotteries utility is calculated as $u(L_2) = \ln(x_1)p + \ln(x_2)(1 - p)$ and $u(L_1) = \ln(x_1)$. While the expected value of both options is equal $EV(L_1) = EV(L_2)$, the utilities are not, we find that $u(L_1) > u(L_2)$. Thus, the certain payoff with the same expected value yields a higher expected utility. The person with such a utility function is therefore risk averse and will prefer L_1 over L_2 . This example shows that the individual's risk attitude depends on the underlying utility function. The shape of the utility function can be concave (risk averse), convex (risk seeking), or linear (risk neutral). The risk attitude determines the preference for risky options in choices, which is referred to as risk preference. The risk preference in choices is used to measure the underlying risk attitude.

Turning back to the question of operational security this means that when a situation is assessed as yielding a low risk of security incidents, then a person following the above described rational rules should feel safe. The choice to expose oneself to a possibly negative event can either be explained based on the person's risk attitude, or the valuation of the associated positive outcomes. In any case, after making the choice the person choosing the risky option should not feel any regrets or be concerned about personal safety if the risk of a given situation is not exceeding the previously agreed on threshold. To

argue on an empirical level if this is true or not seems rather difficult since to my knowledge no studies exist. However, the hypothesis underlying operational security management was falsified. Empirical studies show that rational choice rules which are assumed by expected utility theory seem inadequate to capture the outcomes of choices (for a review see Edwards, 1954). One prominent example of the violation of the independence axiom was pointed out by Allais (Allais, 1953). He shows that people seem to prefer certain outcomes over risky outcomes with the same expected value (the certainty effect). Another example are preference reversals, depending on the evaluation scale used for a given set of options, for example whether an option is chosen or priced (Hsee, Loewenstein, Blount, & Bazerman, 1999). Prospect theory was formulated to capture some of these phenomena and to explain why choice behavior of humans does not correspond with the choices predicted by expected utility theory.

Prospect Theory

In order to create a theory that is more adequate to describe actual choice processes Kahneman and Tversky developed prospect theory (Kahneman & Tversky, 1979). Prospect theory explains violations of expected utility theory in choices between risky prospects with a limited number of outcomes. Prospect theory moved beyond the “black box” model of expected utility theory by making assumptions about underlying information processes leading to the final choice.

According to prospect theory the choice process entails two phases: editing of prospects and evaluation of prospects. The simple prospects used here have the form $(x, p; y, q)$; thus, one receives x with the probability p and y with the probability q . In the editing phase the options are organized and reformulated, this involves different transformations such as coding outcomes as losses or gains depending on a reference point, combining the probabilities that are identical within a prospect and discarding outcomes that are shared by all considered prospects. After editing the prospects, their value is calculated in the evaluation phase.

The major differences from expected utility theory are: first, while expected utility theory assumes that final wealth determines utility of a gamble, prospect theory states that the value of a gamble is dependent on the relative change of wealth in respect to a reference point. Second prospect theory features two main elements that determine the value of a gamble: (1) the value function which is concave for gains and convex for losses and steeper for losses than for gains, and (2) the assumption of decision weights, which

imply a non-linear transformation of probabilities that overweights small probabilities and underweights moderate and high probabilities. The decision weight is not an expression of subjective probability but it is inferred from final choices and reflects the impact an outcome has on the decision.

Prospect theory assumes that the value, denoted as V of each prospect is the product of the value of an outcome $[v(x)]$ multiplied with the weighted probability $[\pi(p)]$. The value of a prospect (x, p) is calculated with $V(x) = v(x) \cdot \pi(p)$. This means that the value of a prospect depends on the likelihood of its occurrence and the weighting factor associated with the given probability.

Prospect theory was extended in order to capture decisions involving more than two outcomes and became cumulative prospect theory (Tversky & Kahneman, 1992). By replacing the individual weighting function of each outcome with a cumulative one, the scope of the theory broadened and captured uncertain prospects as well as multiple risky ones. Further, cumulative prospect theory relaxed the assumptions regarding the decision weights: while they have to be equal for gains and losses in prospect theory, they can differ in cumulative prospect theory. Because neither the general assumptions, nor the general predictions of the theory changed for prospects with two outcomes, the following description will refer to prospect theory as described in the 1979 paper (Kahneman & Tversky, 1979) rather than to cumulative prospect theory (Tversky & Kahneman, 1992).

Prospect theory is made up of two elements, the value function $[v(x)]$ and the weighting function $[\pi \cdot (p)]$, which leads to a fourfold pattern of risk attitudes being predicted. If probabilities are moderate or high, the shape of the value and weighting function implies risk aversion for gains, risk seeking for losses. In the case of small probabilities, the weighting function implies risk seeking for gains and risk aversion for losses. It is important to consider the significance prospect theory places on the reference point, since it determines whether the choice is in the domain of losses or gains. As a result, prospect theory assumes that the formulation of the choice problem as gain or loss can severely influence the preference order. This was shown in the Asian Disease paradigm, where participants were asked whether they wanted to use a vaccine in order to prevent an outbreak of a disease. People's preference for the vaccine, which saved people with a given probability, was dependent on whether the number of people saved or killed was presented as a sure outcome (Tversky & Kahneman, 1981). This finding presents a

violation of the invariance axiom, according to which choices with the same outcome should lead to the same preference order.

The value function and the weighting function are the two cornerstones of prospect theory and enable it to capture the phenomenon that people prefer certain outcomes over uncertain outcomes with the same value (certainty effect) and the phenomenon that people seem to become risk seeking when they are faced with sure losses (reflection effect). For this reason both are described in more detail below.

The value function.

Expected utility theory assumes that the subjective value (utility) of a given option is based on final states of wealth. Prospect theory proposes that the subjective value depends on the change of wealth in relation to a reference point. To make the difference between the two clear consider the following hypothetical problems that Tversky and Kahneman presented to students and the resulting choices of the participants which are presented in the brackets below. The numbering of the problems follows Tversky and Kahneman (1979).

Problem 13:

A:	6000 with probability	.25	B:	4000 with probability	.25
				2000 with probability	.25
N = 68	[18%]			[82%]	

Problem 13':

A':	- 6000 with probability	.25	B':	- 4000 with probability	.25
				- 2000 with probability	.25
N = 64	[70%]			[30%]	

The choices of the student sample reported in Problem 13 and 13' violate expected utility theory because a person choosing A should also choose A' or if choosing B should also choose B'. However, the choices are in accordance with prospect theory, and reflects the hypothesized concave shape of the value function in case of gains and the convex shape in case of losses. A hypothetical value function is depicted in Figure 2.

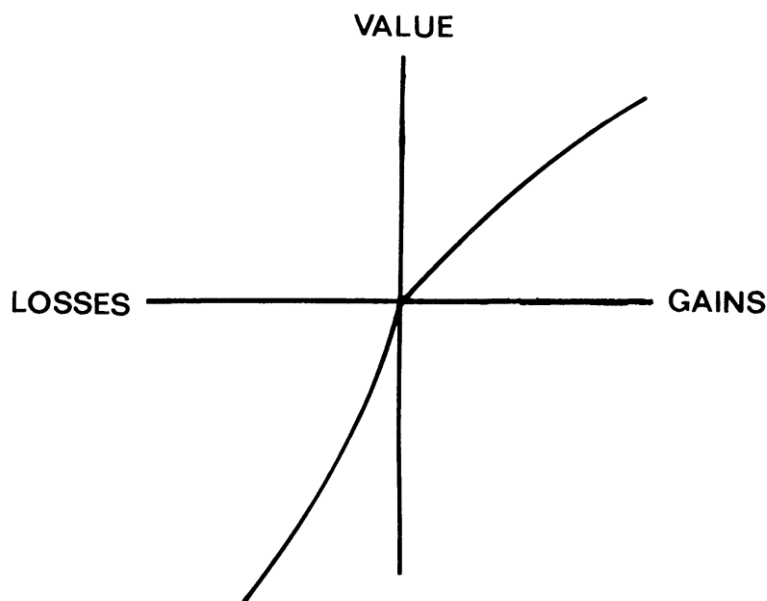


Figure 2: A hypothetical value function (taken from Kahneman & Tversky, 1979, p. 279).

Depending on how far we move away from the reference point, the value associated with the outcome changes. If the relative value is lower than the reference point, then it is treated as a loss, if higher as a gain. Therefore, the shape of the function is concave above the reference point, and convex below the reference point. Furthermore, it is assumed that people place a higher value on losing a specific amount than on gaining the same amount. Thus, the change in value is steeper for losses than for gains.

The weighting function.

The introduction of a weighting function represents another crucial issue when comparing expected utility theory and prospect theory. While expected utility theory assumes that the utility of an outcome is weighted with its probability, prospect theory assumes that not only the value of outcomes is weighted using the probabilities, but that the probabilities of the event itself are weighted with a decision weight $\pi(p)$. As a result, the weight of events is based on a subjective factor π . “Decision weights measure the impact of events on the desirability of prospects, and not merely the perceived likelihood of these events. The two scales coincide, i.e., $\pi(p) = p$, if the expectation principle holds, but not otherwise” (Kahneman & Tversky, 1979, p.280). A hypothetical weighting function displaying the described characteristics is depicted in Figure 3.

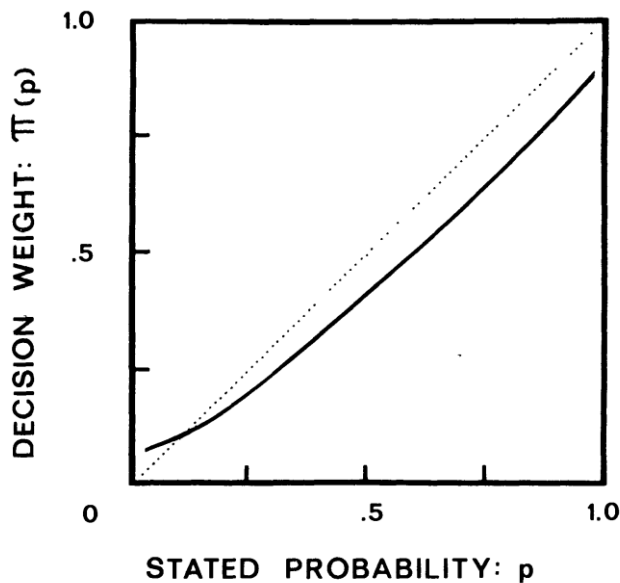


Figure 3: A hypothetical weighting function (taken from Kahneman & Tversky, 1979, p. 283).

It is assumed that π is an increasing function of p , with $\pi(0) = 0$ and $\pi(1) = 1$ and low probabilities are overweighted $\pi(p) > p$, while high probabilities are underweight $\pi(p) < p$. As a result “the slope of π in the interval $(0,1)$ can be viewed as a measure of the sensitivity of preferences to the changes in probability” (Kahneman & Tversky, 1979, p. 282). Small changes on the low end have a larger impact on judgment than the same absolute change on the higher end. Prospect theory proposes that people are more sensitive towards changes in little gains, losses and low probabilities than towards changes in big losses, big wins or high probabilities (Kahneman & Tversky, 1979).

The weighting function is unclear in the areas of extreme probabilities. The theory stated that due to “limited abilities to comprehend and evaluate extreme probabilities, highly unlikely events are either ignored or overweighted, and the difference between high probability and certainty is either neglected or exaggerated; consequently, π is not well-behaved near the end-points” (Kahneman & Tversky, 1979, p. 283). It is important to distinguish overweighting and underweighting from over- or underestimation of probabilities. In the experiments testing prospect theory the probabilities were always given; thus, the estimation could not have had any influence.

Two assumptions are central to prospect theory: first, prospects with small probabilities are overweighted in decisions due to the shape of the weighting function π . Second, the framing of a choice as a loss or a gain shapes risk attitudes because they determine the shape of the value function v , because losing a specific amount is associated

with the same value as gaining it. “According to the present theory, attitudes toward risk are determined jointly by v and π , and not solely by the utility function” (Kahneman & Tversky, 1979, p. 285).

Implications for decision making under risk.

Prospect theory suggests that the risk perception of an individual, and as a result their perception of security in a given situation (risk appraisal), should take into consideration how the possible outcomes of prospects are formulated. If people differ in regard of whether they perceive a situation or choice as a choice between losses, then they are more likely to opt for an option that involves risks than for the sure loss. An example in the humanitarian sector would be the choice between to enter or not to enter a specific area which is considered dangerous. If the choice options are formulated as one option A being the sure loss of life if nothing is done and another option B yielding a high probability to loose no lives and only a low probability to personally be harmed then people would be more likely to choose option B. In this case the person would choose a risky option. Furthermore, prospect theory suggests that people do not neglect events with a very low probability as one could assume when viewing risk perception as a result of probability and valuation of outcomes but rather overweight them in their choice and risk perception. This would explain why events that involve very negative outcomes (e.g., major acts of violence) lead to a high degree of perceived risk even if they are rare. In both cases described the individual staff member would behave more risk seeking (in the first example) are more risk averse (in the second example) than institutional analysis would suggest leading to a higher likelihood of security incidents in the first example and increased stress in the second example because the institution assessed the risk based on a rational principle which diverges from the way how people actually perceive risks.

One important limitation of empirical tests of prospect theory is that payoffs were hypothetical and probability as well as outcome information was provided to the participants. This limitation is result of the gambling paradigm employed. The gambling paradigm studies decision making in a risky context by observing lottery choices. Decisions are referred to as decisions from description. Another approach to study decisions involving risk is to allow participants to make repeated decisions without prior knowledge, and thereby learn the underlying distribution of the outcomes through feedback. Decisions based on learning through feedback are called decisions from experience.

When probability information was gained through experience, decisions did not follow the patterns predicted by prospect theory which adds an important boundary condition to prospect theory (e.g., Barron & Erev, 2003; Barron, Leider, & Stack, 2008; Hertwig, Barron, Weber, & Erev, 2004). The perception of risk in “real life” is generally based on descriptive information as well as experience. Therefore the next chapter will introduce research findings giving insight into how experience shapes choice and how decisions are affected when experience-based information and description-based information is available.

Decisions from Experience vs. Decisions from Description

To examine experience-based decision making in experiments, the decision maker has to carry out repeated decisions. Each decision is referred to as one trial. One way to study experienced based decisions is the click paradigm. Participants are required to choose between at least two unmarked buttons and after pushing one of the buttons they receive feedback about the result of the choice (Barron & Erev, 2003). Can prospect theory account for those possible boundary conditions?

One feature of the value function implied by prospect theory is loss-aversion. Loss-aversion refers to the effect that “the disutility of giving up an object is greater than [*sic*] the utility associated with acquiring it” (Kahneman, Knetsch, & Thaler, 1991, p. 194). Loss aversion is supported by the status quo bias that people dislike giving up what they have, and the endowment effect that people attach higher value to a given entity when they own it than when buying it (Kahneman et al., 1991; Thaler, Tversky, Kahneman, & Schwartz, 1997). The effect of loss-aversion is also found in studies when people make decisions based on experience. It is observed that people choose options less than sometimes lead to negative payoffs even if this event is very rare (Barron & Erev, 2003; Erev, Ert, & Yechiam, 2007).

Due to the value function and the weighting function, prospect theory predicts risk seeking when faced with sure losses and risk aversion when faced with gains. Kahneman and Tversky (1979) found that more than 50% of their participants changed their risk attitude when switching from a loss to a gain framing. When choices were between hypothetical payoffs, as was the case in the studies presented by Kahneman and Tversky, the reflection effect was replicated (Hershey & Schoemaker, 1980; Tversky & Kahneman, 1981); yet, when payoffs were real, the evidence was less convincing (Laury & Holt, 2005). The reflection effect was not found in studies where participants learned

probabilities and choice outcomes through experience instead of receiving them in descriptive form, but participants were also risk seeking when in the gain domain (e.g., Erev et al., 2007; Hollenbeck, Ilgen, Phillips, & Hedlund, 1994).

The assumptions of the weighting function of prospect theory implies that rare events are overweighted compared to their objective probability of occurrence, which has been supported by a number of studies using hypothetical as well as real payoffs in lottery choices (e.g., Camerer, 2001; Kachelmeier & Shehata, 1992; Kahneman & Tversky, 1979; Tversky & Kahneman, 1992). But in studies examining risky choices from experience, rare events were not overweighted as assumed by prospect theory, but underweighted (Barkan, Zohar, & Erev, 1998; Barron & Erev, 2003; Erev & Barron, 2005; Hertwig et al., 2004; Hertwig, Barron, Weber, & Ido, 2006).

The empirical evidence suggests that loss-aversion seems to hold independent of whether decisions are made from experience or description. However, the impact of framing a choice option as loss or gain did not lead to the reflection effect in cases where decisions were based on experience. The same was found for the assumption of overweighting rare events, questioning the shape of the weighting function. But why does experience alter choice behavior? The difference is suggested to be found in the cognitive processes. It is assumed that the order of experiences and characteristics of the distribution from which information is sampled, leads to the observed discrepancy (Barron & Erev, 2003).

The distribution of outcomes influences choices because the likelihood to experience all outcomes of an option is dependent upon the number of trials. When the number of trials is low the subject will on average not experience prospects that have a low probability, which are by definition rare. The observed distribution will deviate from the true distribution and the rare event will be underweighted in the choice (Hertwig et al., 2004; Hertwig, Barron, Weber, & Erev, 2006). In cases where experience is limited (i.e., a low number of trials was carried out) people seemed to underweight rare events in their choices. But when the value of the gamble is calculated on the basis of the observed outcomes, the choices reflect the maximization of the expected value principle (Hertwig et al., 2004). Thus, when increasing the number of trials, choice behavior converges towards the prediction of the maximization principle, which was violated in the findings of the gambling paradigm.

Furthermore, it is argued that recent outcomes determine subsequent choice because recent experiences are more readily available. Studies find support for recency, showing that choice between options depends on the most recent outcomes, and because rare events have a low probability they are less likely to be among the recent experiences, and as a result will be underweight in decisions from experience (Erev et al., 2007; Halpern-Felsher et al., 2001; Hertwig et al., 2004; Yechiam, Erev, & Barron., 2006).

The finding that recent experience and the distribution of outcomes shape decisions can explain why people often are hesitant to use safety devices, such as seat belts, or remove their radios from parked cars. They generally do not experience the “bad” outcome associated with those actions and therefore do not acknowledge the risk associated with their choices. Can warnings help to increase the use of safety devices? To receive a warning means to receive information from description. Particularly in cases where people have information stemming from experience as well as description, the order when the information was received matters. In study examining the impact of warnings on experience-based choices it was found that warnings had a stronger effect on risk-taking behavior when it was given before the actual experience any choices were made. If the subject showed the risk-taking behavior before and received a positive payoff, the warning also lead to lower risk-taking in subsequent choices; however it was still significantly higher than in the other group (Barron et al., 2008). The finding that increased experience can lead to a decrease of security awareness and increase the likelihood of accidents is supported in field studies and surveys (Barkan et al., 1998; Musahl, 1997; Teigen, 1998). Although, if people had experienced the negative outcome, they became very aware of potential risks associated with a given option or event and use protective measures or do not choose the respective option (Benight, Cieslak, Molton, & Johnson, 2008; Bereby-Meyer & Erev, 1998; Weinstein, 1989).

The consideration of whether the information about choice options was based on experience or description and the associated principles of learning can explain well the underweighting of rare events in decisions from experience, but not why people tend to overweight them in decisions from description. Perhaps a reason can be found in the outcome itself rather than its probability.

So far mostly research considering the likelihood of the events, learning and the outcome in terms of monetary value was presented. However, an important underlying assumption of the presented models is that outcome quality does not matter. What happens

if outcomes do not differ regarding their monetary value but regarding their affective valence? The next section will argue that feelings associated with outcomes of a given prospect can influence choices directly.

Risk as Feelings

Johnson, Hershey, Meszaro and Kunreuther (1993) examined the willingness to pay for insurances in the context of flying and discovered that insurances against terrorist acts were sold at a higher price than insurances against “all possible causes”. The finding is surprising since the insurance against all possible causes obviously covers more instances than just the insurance against negative events caused by terrorist acts. The authors argue that the reason people are willing to pay more for insurances covering only one event is due to the vividness of their image compared to the abstraction of all possible causes. As a result the negative event associated with a terroristic act is assumed to induce a stronger emotional reaction and therefore, this particular insurance has a higher likelihood of being purchased. “Emotion consists of neural circuits (that are at least partially dedicated), response systems, and a feeling state/process that motivates and organizes cognition and action. Emotion also provides information to the person experiencing it, and may include antecedent cognitive appraisals and ongoing cognition including an interpretation of its feeling state, expressions or social-communicative signals, and may motivate approach or avoidant behavior, exercise control/regulation of responses, and be social or relational in nature” (Izard, 2010, p.367). The research focusing on the influence of emotions on risk focuses on the phenomenological aspect, the subjective feelings evoked by a stimulus and how it influences decision making. Mood and affect present two forms of feelings. While affect is linked to the specific situation and relatively short lived and not necessarily mediated by cognition (Zajonc & Markus, 1985), mood is considered rather diffuse since it can last over longer periods of time and as a result does not depend on a specific present stimulus (Bodenhausen, Sheppard, & Kramer, 1994). Judgment and decision making is influenced by two distinct types of emotions: immediate emotions and anticipated emotions.

Anticipated emotions present an outcome of a decision and are not present during the judgment and the decision process. They are considered part of the value of a specific outcome and not experienced during the decision making process (Loewenstein & Lerner, 2003; Loewenstein, Weber, Hsee, & Welch, 2001).

Immediate emotions are experienced during the decision making process and can either be incidental or anticipatory towards possible outcomes. An example for the effect of incidental emotions is the influence of moods on decisions (Loewenstein et al., 2001). It was found that a good mood leads to optimistic judgments while bad mood leads to pessimistic judgments (Bower, 1991; Johnson & Tversky, 1983). Furthermore, mood impacts social judgment (Bodenhausen, Kramer, & Süsser, 1994; Bodenhausen, Sheppard et al., 1994; Bower, 1991), depth of information processing (Bless et al., 1996), and attention focus (Bower, 1991; Frijda, 1988; Zajonc, 1980).

Anticipatory emotions are emotions present during the judgment and decision making process and are evoked by the potential consequences. The risk as feelings hypothesis postulates: “responses to risky situations (including decision making) result in part from direct (i.e., not cortically mediated) emotional influences, including feelings such as worry, fear, dread or anxiety” (Loewenstein et al., 2001, p.270). Characteristics of a choice situation that have little or no impact on cognitive evaluations can influence emotional reactions and thereby influence choice outcomes. Examples of such factors are immediacy of a risk (Wu, 1999), vividness of consequences (Elster & Loewenstein, 1992) and affective valence of outcomes (Hsee & Rottenstreich, 2004; Rottenstreich & Hsee, 2001). The emotional account can explain why waiting longer for the occurrence of a hazard leads to a decrease of fear (Monat, 1976) or why fear increases immediately before the moment of truth (Welch, 1999).

The model of risk as feelings exceeds previous models in two points. First, it proposes that feelings can arise directly from probability and outcomes without cognitive antecedents. Second, cognitive evaluations are partly mediated through affective responses.

Rottenstreich and Hsee (2001) carried out three experiments to test whether affective valence of outcomes influences choices directly. In the first experiment they asked participants to choose between kisses and money. It was varied between-subjects, whether the choice was between sure outcomes or between outcomes with a low probability. It was found that students preferred money when there was guaranteed payoff, but preferred kisses when they were merely probable. The findings were replicated in a second study, showing that students were willing to pay more for a lottery possibly leading to a vacation than for a scholarship of equal value. In a third experiment the price of gambles involving strong negative affective valence were found to be relatively insensitive to changes in probability, while this was not the case with neutral gambles. The results indicate that

when choices involve small probabilities they are more likely to be affected by the affective valence of outcomes and, second, in outcomes yielding high affective valence, the mere possibility not the probability determines choice (see Hsee & Rottenstreich, 2004; Slovic, 2007; Slovic, Peters, Finucane, & MacGregor, 2005).

The risk as feelings hypothesis tries to explain the role of feelings during the processing of probabilities and thereby affecting choices. A more direct relationship of feelings and choice is proposed by the affect heuristic. The affect heuristic assumes that the affect induced by a specific stimulus shapes both the perceived benefit and the perceived risk (Slovic, Finucane, Peters, & MacGregor, 2004; Slovic et al., 2005). A study from Alhakami and Slovic (1994) found an inverse relation between the perceived risk and the perceived benefit of an activity. The results were linked to the affective judgments of the activity. If affect is positive, benefit is judged as high and risk as low, whereas if affect is negative, the effect is reversed. Finucane and colleagues (2000) tested the affect heuristic by comparing two experimental groups, time pressure vs. no time pressure. It was found that without time pressure the analytical process would govern the judgment rendering the correlation between risk and benefit low, while time pressure would lead to the use of the affect heuristic which would lead to a high correlation between risk and benefit. In a second experiment the same authors showed that affect was determined by either benefit or risk. The results of the study support the assumption that “positive and negative affect is attached to the images that people associate with hazards and is available when risk and benefit are judged” (Finucane et al., 2000, p.14).

It is assumed that the more vivid, emotional laden pictures are associated with a specific outcome, the more easily they are recalled and lead to an overweighting of such outcomes in choices (Loewenstein et al., 2001; Slovic et al., 2004; Slovic et al., 2005). One way that emotions can be induced when judging risks can be the format of how probabilities are presented (Slovic, 2007). For example, warnings were more effective when associated with vivid affect-laden scenarios rather than just numbers (Hendrickx and Oppewal, 1989). Slovic, Monahan and Mac Gregor (2000) found that describing events in probabilities rather than frequency formats lead a lower risk perception of acts of violence and a lower affective activation. It is assumed that frequency formats activate mental images while probabilities do not. When the presentation of probabilities exceeds one (1 in 100 instead of 0.1 in 10), the low probability events are overweighted (Koehler & Macchi, 2004). In their exemplar cueing theory Koehler and Macchi (2004) assume that people

become more sensitive to low-probability events when descriptions of those events make exemplars more readily available. The exemplars are triggered by presentations in frequency format where the numerator is equal or greater than one. This suggests that frequency formats make vivid pictures of events more easily available, the pictures induce affect which then influences the cognitive process and behavior. The observation that emotions impact decisions involving risk directly leads to an important question: how do both cognitive and emotional processes interact?

Feelings or Analysis: Two Processes Competing to Guide Risky Choice?

It is assumed that two modes of information processing systems guide decision making under risk. One is a rational, analytical system which is based on deliberate cognitive analysis and is referred to as “risk as analysis”. The other is the intuitive system which is governed by emotions, referred to as “risk as feelings” (Epstein, 2003; Loewenstein et al., 2001; Slovic et al., 2004; Slovic et al., 2005; Zeelenberg, Nelissen, Bregelmans, & Pieters, 2008).

Yechiam, Barron and Erev (2005) show that the responses of residents living in areas in which terrorist attacks occur differ from those of tourists travelling to these areas. Tourist behavior is more affected by the occurrence of terrorist attacks than the behavior of residents. Yechiam et al. (2005) argue that the residents are less sensitive to the terrorist attacks because they grew insensitive to them through not suffering bad consequences from unsafe choices (i.e., going to a restaurant or café). The residents’ knowledge is shaped through experience, but the tourists’ knowledge about terrorist acts is shaped by description through media and word of mouth and not experience. The findings of Yechiam et al. (2005) could also be explained from the perspective that assumes an interaction between risk as analysis and risk as feelings. The descriptive information, received by tourists through the media, most probably led to an activation of the affective system resulting from the fact that media coverage usually uses vivid pictures, which evoke emotional reactions (Bond, 2008). As described above, if the rare event is affect-laden, not its probability but its mere possibility shapes behavior (e.g., Rottenstreich & Hsee, 2001). The residents who do not experience the rare event, might rely more on their experiences and judge the threat according to its objective risk and are therefore not afraid to go on with life as usual since the rare event is not affect-laden. The experience as second source of information might function as a buffer against the affect induced by the media coverage, which is also available to residents.

A recent study examined the role of emotional and cognitive processes on choice. Using fictitious scenarios that involved threats to the subject, participants reported how great they perceived a risk to be in analytical terms and they reported the affect that they would feel in this specific situation. This was followed by a measurement of risky behavior, in which participants had to indicate their behavior in terms of likelihood of a certain behavior and certainty about their choice (van Gelder, de Vries, & van der Pligt, 2009). The study was based on three experiments and the results supported the assumption that: (1) risky choice is dependent on negative affect as well as perceived risk, (2) that negative affect and perceived risk are correlated and (3) that if the information about the situation is represented in a cognitive or affective manner, it influences the weight of negative affect and perceived risk on the risky choice.

The relationship between the analysis based information processing and affective based information processing is particularly relevant in the face of dread risks, which have a low probability of occurrence but severe consequences (Slovic, 1987). Through the induction of emotions, the perception of probabilities and the weight of prospects is altered; thus the analytical processing is influenced by factors that are not within the theoretical scope of the theories focusing only on the cognitive processing of risk (Finucane, Alhakami, Slovic, & Johnson, 2000; Loewenstein & Lerner, 2003; Loewenstein et al., 2001; Rottenstreich & Hsee, 2001; Slovic & Peters, 2006; Slovic et al., 2005).

The relationship between cognitive and emotional processes seems to be influenced by a person's characteristics. For example, medical professionals see risk as a function of the statistical probability, which is influenced by the analytical thought; lay-persons' knowledge concerning specific risks is limited and thus risk perception is more strongly influenced by emotions (Reventlow, Havas, & Tulinius, 2001). It was found that experts judge risks of biotechnology lower than laypersons. The best predictors of the risk judgment of experts were their knowledge and experience level within a specific situation whereas for lay persons it was the affect associated with biotechnology (Savadori et al., 2004). When people gain experience in a specific field in which the judgment of risks is important, the influence of the emotional system on risk estimates decreases (Fetherstonhaug, Slovic, Johnson, & Friedrich, 1997). One reason why emotions lose their grip on risk perception with increasing experience might be the development of strategies of emotion regulation. Before turning to the role of adjustment from a developmental perspective, the next section will argue that one possible factor influencing the changing

risk estimates of experts could be their knowledge about emergency procedures and other ways to mitigate the negative impact of when a risk turned into danger.

Risk Defusing Operators

In natural contexts probability information is not always available and the outcome of an option is uncertain. The decision maker can influence probabilities and the severity of outcomes through their own actions. To identify which information is guiding the decision between two alternatives in a quasi-naturalistic context the active information search paradigm is applied (Huber, Beutter, Montoya, & Huber, 2001). In this paradigm, the participant can ask the experimenter questions to receive information about the action alternatives.

Huber, Wider and Huber (1997) report experiments questioning the assumption that people primarily search probability information when faced with a risky choice. They argue that individuals actively search for ways to reduce the possibility of a negative event or influence the negative outcome through risk defusing operators. “A risk-defusing operator is an action, performed additionally to a specific alternative, which: may prevent the negative event, interrupt the causal chain between event and negative outcome, or transform the negative outcome into an outcome state, which is more acceptable” (Huber et al., 2001, p. 410). Three global types of risk defusing operators are distinguished: (1) worst case plans, (2) control and (3) precaution. It is assumed that risk defusing operators try to manipulate the two central components of risk: probability of the event occurrence and the negative utility of the negative outcome. For example worst case plans aim to avoid the negative consequences if a negative event occurs, and as a result the negative utility is reduced or even removed. It was shown that risk defusing operators are risk type specific (Wilke, Haug, & Funke, 2008). The existence of time pressure leads to an increased search for risk defusing operator but to a lesser information search in general compared to a no time pressure condition (Huber & Kunz, 2007). However, justification pressure increases general information search and search for risk defusing operators (Huber, Bär, & Huber, 2009). Generally the information search behavior and risk defusing operator choice are shaped by the expectations concerning the possible detection of the negative event in time to defuse it, and expectations about the possibility to find a functioning risk defusing operator (Huber & Huber, 2008).

Risk defusing operators aim to impact the two central components of risk: the probability of the event occurrence and the negative utility of the negative outcome. For

example, worst case plans aim to avoid the negative consequences of a negative event should it occur. As a result, the negative utility associated with an option is reduced or even removed. Risk defusing operators are a mean to choose an option which has outcomes that one desires as well as outcomes that are detested, if the latter can be influenced. The consideration of risk defusing operators as factors influencing the response to risk moves beyond the assumption of a human decision maker as responder to an event, which is implied by the assumption that risk perception is directly reflected by the risk response. Rather the decision maker becomes an active agent shaping the environment.

Conclusion

In the previous chapter two traditions that inform decision making theory were introduced. First a normative theory of choice under risk, expected utility theory was introduced. Second, in order to account for the violations of expected utility theory in human choices, prospect theory was introduced as a descriptive psychological choice model. Prospect theory presented theoretical assumptions as to why people deviate from normative standards. Choices among prospects that involve rare events seem to be particularly prone to judgment anomalies. It was found that the probability and overweighting or underweighting of the rare event is dependent on the informational source (Barron, 2008; Barron & Erev, 2003; Hertwig et al., 2004; Kahneman & Tversky, 1979) and the level of affect or emotions evoked by the outcomes present during the judgment process (Finucane et al., 2000; Loewenstein, 2006, 2007; Loewenstein et al., 2001; Rottenstreich & Hsee, 2001; Slovic & Peters, 2006).

The research on risk perception gives insight into general human functioning and points out important factors influencing risk perceptions and final responses to risk such as risk appraisals and risky choices. Probability and severity estimates influence how people perceive risks. Prospect theory and empirical studies suggest that both measures are not independent, but particularly when outcomes are affect-laden and lead to severe negative outcomes and/or have a low probability, information processing will be influenced by the emotional reactions to risk as well as experience. As a result, the analysis of situational appraisal needs to focus not only on risk estimates expressed as product of severity and probability but also on the emotional valence associated with possible outcomes of the prospects involved and whether a person learned about the uncertain events through experience or through description.

The research focusing on risk perception introduced above gives insight into general mechanisms of information processing without examining differences between individuals. The influence of an agent's action on the probability and the outcomes of the risk and how this changes possible risk appraisal are not part of the theories. As a result the experimental conditions under which the studies cited above were carried out did not involve risks that could be influenced by the participants. Differences in how individuals perceive the situation are not considered. The next chapter will point out that risk appraisal might not only be a function of the risky event alone but also of the person facing the situation and coping with it. Theories focusing on differences between individuals, so called inter-individual differences, regarding adjustment are introduced.

Theories of Adjustment to Adversities

Living in a context of ongoing threat is assumed to present a challenge to the organism because two conflicting goals have to be balanced. The first goal is feeling safe when living in a context that yields ambiguous security. The second goal is acting safe which entails the necessity to acknowledge risks for personal safety in the environment in order to adjust behavior to it. As a result people have to balance both goals through development of strategies to feel safe and reduce feelings of personal threat while at the same time remain aware of threats to their person. To experience personal threat due to a lack of personal safety leads to anxiety and fear (Frijda, Kuipers, & ter Schure, 1989). Anxiety and fear are associated with stress and its persistence over longer periods will have negative effects on the human physical and psychological functioning (Toates, 1995). Stress is also linked to anxiety and depression (Arborelius, Owens, Plotsky, & Nemeroff, 1999), which in turn leads to low sleep quality (Palma, Suchecki, & Tufik, 2000; Wheatley, 1993). For these reasons, it is assumed that feeling unsafe over longer periods of time has negative effects on well-being and performance. How do people adjust to ongoing threat? Different lines of research try to answer this question. The first concept is coping, meaning the response and adjustment to stress. Second, one could argue that people working and living under conditions that yield ambiguous security need to be resilient. Resiliency is the ability to remain healthy despite adversities (Bonanno, 2005).

This following section will introduce the concept of resilience. The degree of resilience of an individual presents a way to infer on successful adjustment. Research focusing on strategies of adjustment and their implications will then be portrayed. Then theories about the underlying processes of adjustment are presented. Finally, in the conclusion of this section, processes and strategies of adjustment are integrated in order to pave the way towards an understanding of how individuals become resilient.

Resilience

Research among high risk children (i.e., children who are facing developmental challenges such as low social economic status or an abusive home) led to the surprising finding that most of the children do well despite adversities and are considered resilient (Luthar, Cicchetti, & Becker, 2000). Two criteria have to be fulfilled in order to call somebody resilient: they have to have experienced substantial threat and the adjustment to it must have been successful. Resilience is therefore an outcome of successful adjustment.

Possible criteria of successful adjustment are: the completion of developmental tasks, or adherence to cultural expectation (e.g., Masten, 2001).

Yet not only children but people in general face adversities in the form of life changes or loss over their life span. For example accidents or the loss of a relative can be potentially traumatic. An event is considered traumatic when it fulfills two criteria according to the *Diagnostic and Statistical Manual of Mental Disorders* ("Diagnostic and Statistical Manual of Mental Disorders: DSM-IV,"): first, the event entails witnessing or experiencing the threat of death, serious injury or the damage of physical integrity to self or other. Second, the person reacts to this event with a feeling of fear, helplessness, and/or horror. After experiencing a traumatic event and not being able to cope with it, people can develop a *post-traumatic stress disorder* (PTSD). Individuals are diagnosed with PTSD when they fulfill three criteria ("Diagnostic and Statistical Manual of Mental Disorders: DSM-IV,"): unwilling revisitation of traumatic events in flashbacks or nightmares, hypervigilance, and retreat from life and relationships. However, people who after a "potentially highly disruptive event, such as the death of a close relative or a violent or life-threatening situation, [...] maintain relatively stable, healthy levels of psychological and physical functioning" are considered resilient (Bonanno, 2004, p. 20).

Adults are faced with a number of possibly traumatic events in their lifetime and show very different adjustment trajectories (Ozer, Best, Lipsey, & Weiss, 2003). Four typical trajectories can be distinguished for the disruption of normal functioning (i.e., increased sleep disruption, health problems, and difficulty concentrating): delayed onset, chronic, recovery and resilience.

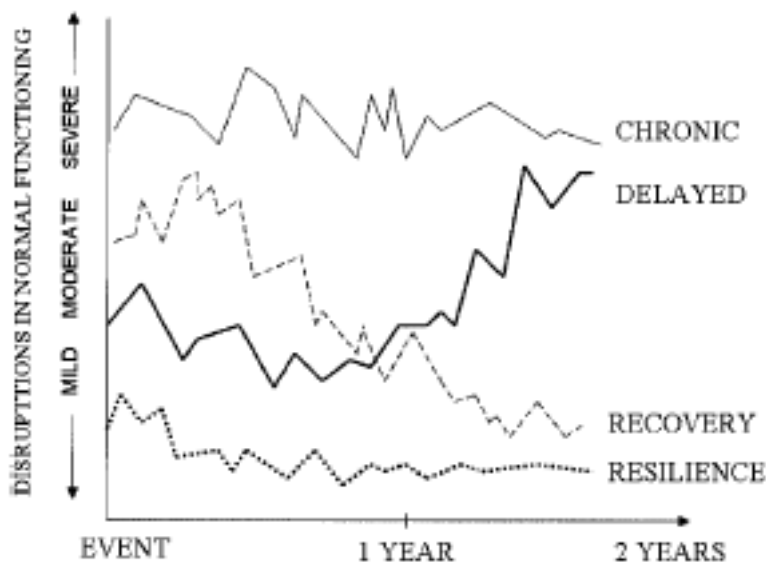


Figure 4: Prototypical patterns of disruption in normal functioning (taken from Bonanno, 2004, p. 21).

People who follow the delayed or chronic trajectory of adjustment after traumatic events still experience severe functional disruption two years later. While people with adjustment trajectories characterized as recovering or resilient show a return to normal levels of functioning after about one year following the traumatic event. Two important differences can be observed between the recovery and resilience trajectory: 1) the disruption of functioning and the experience of emotional distress are lower on the resilient trajectory than on the recovery trajectory, and 2) the trajectory of resilience indicates a quicker return to normal levels of functioning than the recovery trajectory (Bonanno, 2004, 2005).

It has long been assumed that resilience is some kind of trait that only a limited number of “special people” possess for two reasons. First, trauma research focused mostly on participants who show delayed or chronic adjustment trajectories of functioning after the experience of traumatic experiences and second, the grief work hypothesis, according to which in order to avoid delayed negative health outcomes people have to actively work through negative emotions (Bonanno, 2004, 2005; Masten, 2001).

Contrary to the grief work hypothesis, people who do well after a loss or traumatic experience do not necessarily suffer from elevated risk to experience negative health outcome later in time (Bonanno, 2004; Stroebe, 2008). For example after terrorist attacks in September 2001 in New York the level of symptoms indicating PTSD was relatively low (Fredrickson, Tugade, Waugh, & Larkin, 2003). Similarly, when investigating a large sample of peacekeepers, 70% showed no increased symptoms of PTSD (Orsillo, Roemer,

Litz, Ehlich, & Friedman, 1998). Among humanitarian aid workers with potentially traumatic experiences 81-85% showed only low symptoms of traumatization (Eriksson, Kemp, Gorsuch, Hoke, & Foy, 2001; Jones, Müller, & Maercker, 2006).

The picture changes when resilience is studied in situations of ongoing threat. A longitudinal study among Gulf War veterans with two point of measurement (Benotsch et al., 2000) examined the change in distress and coping resources. It was found that people who employed less avoidant coping, scored high on the hardiness scale and received social support were more likely to display low levels of distress during the second measurement. However, participants showing high levels of distress during the second measurement seemed to be employing less advantageous coping and reported a decrease of social support. This indicates that resilience is dependent on adjustment strategies. Hobfoll et al. (2009) examined the four different trajectories of adjustment (resilience, recovery, delayed onset, chronic) among residents in Israel during the second Intifada 2004/2005. They discovered that about 54% of the sample suffered from chronic distress while another 10% showed a delayed stress onset. The low number of resilient participants is explained by the decrease of psychosocial resources, such as social support and economical resources as well as social status, and the lack of post-traumatic growth. Post-traumatic growth refers to the experience of mastering a difficult situation, and this experience is unlikely, because the threat is ongoing.

The duration of the threat influences whether people are resilient, because when adversities grow and resources decrease people cease to be able to adjust well and their healthy functioning is jeopardized. Thus, strategies that allow adjustment and conservation of resources are essential for resilience. This leads to an important question: what enables people to do well in contexts of ongoing threat?

In the literature at least two explanations can be found. First, it is assumed personality traits, such as hardiness, are associated with resilience (Kobasa, Maddi, & Kahn, 1982). A hardy personality (Maddi, 1999) is committed to finding meaning and purpose in life and a high feeling of control over environment and outcomes, and is open to learning from positive as well as negative experiences. Furthermore, hardy people use active coping and social support (Maddi & Hightower, 1999). They employ strategies of self-enhancement, exhibit an optimistic bias and an exaggerated sense of control and are more likely to employ repressive coping and show positive emotion and humor during or shortly after traumatic events. The first three are cognitive strategies and the others focus

on emotions. It is found that hardiness functions as a buffer for stress and permits healthy functioning despite adversities (e.g., Bartone, 1999; Maguen, Suvak, & Litz, 2006; Westman, 1990).

The second explanation does not rule out the first, but provides a process perspective. It has been proposed that people generally adjust well due to an “adaptational system” inherent in human functioning (Masten, 2001). For example people who are resilient seem to apply paradigmatic coping (i.e., doing what is necessary), and have the ability to effectively enhance or suppress emotional expression when necessary (Bonanno, 2005). It has been observed that people employ a number of mechanisms (consciously and subconsciously) to overcome negative affective states and to experience positive emotions that supposedly foster positive development (Fredrickson et al., 2003; Hobfoll et al., 2009).

Before turning to the “adaptational system,” different responses people use to cope are going to be presented in the next section.

Coping

When examining coping responses it was discovered that some strategies are adaptive while others were not. As a result coping was used as a term for adaptive behavior, while non-adaptive behavior was labeled as defense (e.g., Haan, 1977). Folkman and her colleagues point out that these distinctions “that define coping in terms of a value or outcome tend to create a tautology, whereby the coping process is confounded with the outcomes it is used to explain” (1986, p. 993). According to this clarification coping does not automatically refer to functional adjustment, but refers to any way of adjustment. The adjustment process is the focus of research on coping. Two questions guide the research: first, what determines the individuals chosen strategy and second, how do specific strategies correspond with functional adjustment.

The question of what determines the coping behavior in response to a given stressor is approached from two angles: exploring coping styles and investigating the process of coping which means examining the situation and the modes of coping and appraisal simultaneously. It is assumed that coping styles present tendencies of how people respond to stressors and that people have a specific coping repertoire which they learn and use. The conception of coping styles is similar to the trait concept. One early example of how coping behavior was explained based on traits was developed by Byrne (1961). Byrne assumed that people differ in regard to their sensitivity to threatening information and they

can be placed on a continuum between people who are sensitive to threatening information (sensitizers) and people who avoid threatening information (repressors). Self-report measures were used to distinguish between the two types. Neither the trait nor the coping reactions are tied to a specific stressor and as a result the relationship between the person and situation is not considered. This approach is grounded in the assumption that coping behavior is stable within individuals across situations.

A current approach to coping that criticizes but also builds upon the repression-sensitization model is the model of coping modes proposed by Krohne (1993). The model of coping modes distinguishes two independent processes: avoidance and vigilance. Avoidance refers to strategies that turn attention away from threatening cues; vigilance refers to strategies that orient attention towards the threat.

Research interested in coping styles explores how inter-individual differences can explain variation of coping strategies, the outcome of coping and adjustment success are not of importance (e.g., Hock & Krohne, 2004; Hock, Krohne, & Kaiser, 1996; Krohne, 1993). Because the present work focuses on the influence of a given coping strategy on the individual's success at adaptation a process perspective is taken.

The model of the coping process is rooted in the cognitive-transactional model of stress. It assumes that the degree of perceived stress induced by an event depends on the appraisal of the potential stressor (primary appraisal) as well as on the appraisal of available resources to cope with the stressor (secondary appraisal) and the coping strategy (Lazarus, 1999). The theory proposes three components of primary appraisal: goal relevance of the event, its goal congruence and the ego involvement. The goal relevance refers to the degree to which the event is actually related to any personal goals. Goal congruency captures if the way it is affecting the goal is in accordance with the goal. Ego involvement refers to the importance of the goal to the person. Secondary appraisal is influenced by the attribution of the cause of the event, the assessed coping potential to direct the course of the event in a desirable direction, and the future expectations about the course of events. Depending on those characteristics of primary and secondary appraisal, different emotional patterns arise, which in turn influence how the event is appraised (Lazarus, 1999; Lazarus & Folkman, 1984). An event can be appraised as "threat (containing the possibility of harm or loss), or challenge (holding the possibility of mastery or benefit)" (Folkman et al., 1986, p. 993). Coping behavior is a response of the individual to a threatening event and aims to stabilize the individual and limit the emotional reaction

by either removing the threat (problem-focused coping) or by influencing the emotional reaction (emotion-focused coping) (Lazarus & Folkman, 1984). The two ways of coping are complemented by avoidant coping, which refers to strategies trying to avoid the threat such as suppression of thoughts about the threat or distraction (Zeidner & Endler, 1996).

What is the value of different ways of coping after experiencing violent or life-threatening situations? A study among university students incidentally measured coping and appraisal once before and twice after a bomb attack on a bus. It was observed that participants who directly experienced the incident, and indicated high levels of perceived threat and applied avoidant coping were more likely to suffer symptoms of PTSD six months after the event (Gil & Caspi, 2006). The negative effect of avoidant coping is also found among policemen where emotional inhibition after traumatic experiences was associated with a higher likelihood of suffering from symptoms of PTSD (Davidson & Moss, 2008). In a study among peace keepers it was found that social support decreased the probability of symptoms of PTSD, while negative social interactions increased it. Individuals engaging in wishful thinking and taking personal responsibility (emotion-focused coping) were more likely to suffer from symptoms of PTSD, than the ones who engaged in problem solving and seeking support (problem-focused coping) (Dirkzwager, Bramsen, & van der Ploeg, 2003). Another study found that repression, the non-experience of emotional distress while experiencing physiological arousal, had to be distinguished from deliberate avoidant behaviors associated with emotion regulation through suppression, which involve the “pushing away” of negative emotions (Coifman, Bonanno, Ray, & Gross, 2007). People who applied repressive coping experienced less distress after loss. Repressive coping was associated with fewer psychological symptoms and showed better long-term adjustment. It seems that automatic emotion regulation might lead to adaptational advantages since no links to negative health costs were found. Possibly repressors can more easily re-focus and re-direct their attention away from the threat towards positive aspects and thereby increase their capacity to experience positive affect. This means that the repression of negative emotions, which alone could be unhealthy, might lead to the ability to refocus and engage in planning in order to remove the stressor. Generally studies among war-veterans found that the absence of avoidant coping strategies was associated with fewer symptoms of PTSD (Solomon, Mikulincer, & Avitzur, 1988), while self-isolation and wishful thinking (examples of avoidant focused coping) were associated with more symptoms of PTSD (Ozer et al., 2003).

Data indicates that emotion-focused coping does not generally lead to negative adjustment, while avoidant coping does. Furthermore, problem-focused coping generally is associated with a lower level of functional impairment. However, particularly in the realm of emotion-focused coping the results of the cited studies are contradictory. The reason could be that concepts are often not clearly distinguished. Strategies that are considered emotional coping in one study are classified as avoidant coping in another, and strategies are sometimes differentiated according to processes of coping, and at other times according to the focus of the coping activity. Therefore, one of the central goals of research on coping is the creation of a taxonomy of coping (Skinner, Edge, Altman, & Sherwood, 2003). Is there a way to structure the numerous different coping behaviors within a broader but more precise framework?

When individuals are faced with a changing environment and challenges, they often remain stable functioning. The observed stability is achieved through the use of coping strategies which are based on self-regulation. Self-regulation is viewed as the regulation of the self (i.e., the individual). “The internal and external experience of stability is the result of adaptive processes that compensate for any changes such that the subjective and objective impression of being one and the same person is maintained, through change and dynamic processes are in fact the determining factors. The necessity of remaining flexible throughout our lives and the need to remain stable at the same time can be fulfilled by a dynamic system which is usually called *the self*” (Greve, 2005, p. 49). Theories and concepts of describing this process of self-regulation will be introduced in the next section.

Self-Regulation

In the context of developmental adjustment, “...self-regulation refers to those processes, internal and/or transactional, that enable an individual to guide his/her goal-directed activities over time and across changing circumstances (contexts). Regulation implies modulation of thought, affect, behavior, or attention via deliberate or automated use of specific mechanisms and supportive meta-skills. The processes of self-regulation are initiated when routinized activity is impeded or when goal-directedness is otherwise made salient (e.g., the appearance of a challenge, the failure of habitual action patterns, etc.). Self-regulation may be said to encompass up to five interrelated and iterative component phases: 1) goal selection, 2) goal cognition, 3) directional maintenance, 4) directional change or reprioritization and 5) goal termination” (Karoly, 1993, p.25).

Two meta-theoretical frameworks of adaptive processes are distinguished by Vancouver (Vancouver, 2000): the cybernetic approach and the decision making approach. The cybernetic approach is rooted in engineering science and system theory. The theories following the cybernetic tradition generally focus on the micro level of self-regulation, while theories stemming from the decision making approach to self-regulation focus on the macro level and are interested in regulatory process based on goals that shape individual development and adjustment (Bayer & Gollwitzer, 2000).

The metaphor of the cybernetic approach is the regulatory circle which is based on control through feedback and adjustment according to a specific standard of functioning. The goal of the theories is to explain how systems regulate themselves when facing changes in the environment by analyzing the hierarchical structure of the regulatory process. The subject of interest is not goal content and its influence on regulation, but the regulatory system and its functioning (Lewis, 2000; Vallacher & Kaufman, 1996). Authors in this tradition (e.g., Carver & Scheier, 1998, 2000, 2002; Kuhl, 1983; Rothman, Baldwin, & Herte, 2004) try to capture the complexity of the regulatory process, and the models integrate affective, cognitive and motivational assumptions. Goals are regarded as behavioral standards, and are not shaped by individual desires and needs. While this allows the integration of goals into the model as structural components it does not make assumptions about behavioral implications of specific goals (Grant & Dweck, 1999). As a result theories focusing on the micro level of self-regulation cannot explain adjustment nor do they capture the ways people might differ regarding their self-regulation or the resulting quality of adaptation (Ryan & Deci, 1999).

The decision making approach to self-regulation examines processes associated with goal content while structural components as well as dynamics of the self-regulatory process on the micro level are neglected. Goals are not regarded as fixed reference points but as cognitive representations of aspired states, which are developed, implemented and can also be revised by the individual (Emmons, 1996). The assumption that the person is the agent of regulation is central. Self-regulation is seen as crucial for the stability of the self-concept (Greve, 2005). The self-concept is the sum of all self-related knowledge and the resulting appraisal of them (Mummendey, 2006). Personal goals capture goals that are part of the self-concept and rooted in the possible selves, which capture how the person would like to be (Emmons, 1991; Hoyle & Sherrill, 2006; Markus & Nurius, 1986; Oettingen & Gollwitzer, 2002; Oettingen & Mayer, 2002). Personal goals influence

development and well-being (Brunstein, Maier, & Dargel, 2007). Particularly, the adjustment of personal goals and their pursuit in a changing environment is an important area of research within developmental psychology (Baltes & Baltes, 1990; Brandtstädter & Wentura, 1995; Heckhausen & Schulz, 1995). Theories of self-regulation in the context of development are originally intended to examine the stability of the self over time. For example an important question is the how with increasing age people remain a positive self-concept and do not develop symptoms of depression despite the loss of personal abilities which are central to the self-concept (e.g., Brandtstädter, Rothermund, & Schmitz, 1998). However, the processes identified that shield the self against disruption are also found to explain general coping behaviors and outcomes (Rothermund & Brandtstädter, 2003; Wadsworth, Santiago, & Einhorn, 2009; Wahl, Becker, Schilling, Burmedi, & Himmelsbach, 2005).

Over their life span, people have to adjust to a number of changes. The goals and strategies employed will shape the outcome of this adjustment process. Three theories will be described next explaining how people adjust to changing environmental demands to ensure stability of the self-concept. First, the theory of selection, optimization and compensation, second, the theory of optimization, primary and secondary control and last, the model of accommodative, assimilative and immunization processes.

The theory of selection, optimization and compensation.

The theory of selection, optimization and compensation is a meta-theoretical framework to describe development over the lifespan (Baltes & Baltes, 1990). The model defines successful development as the maximization of gains and the minimization of losses, which are defined through personal and cultural expectations associated with a specific age.

The model involves three processes that are related: *selection*, *optimization* and *compensation*. The first process, selection, refers to the selection of goals and their structure (i.e., relationship between goals) as well as contexts in which they are pursued. The direction of development is shaped by the possibilities offered in the environment, personal capacities, incompatibility of goals and age related changes of the physiological functioning. As a result the selection of developmental paths either stems from the election of one possibility among others or it follows from the lack of possibilities and therefore is loss based (Baltes & Staudinger, 1999). An example of selection is the decision to learn to play the piano of a child brought up in a music-loving family. The opportunity to learn an

instrument is presented by the environment. The piano is one choice among others, thus learning to play the piano is based on the election of one possible instrument instead of others. Thus, the choice to learn the piano presents an example of elective selection.

The second process, optimization, entails the allocation of means to achieve a certain goal and the enhancement of the existing means. For example, optimization can involve the increase of practice or the development of strategies in order to reach an aspired level of performance. Continuing in reference to the example of the piano, daily practice would result in mastering the instrument. When the child does not attain the level of mastery he/she aspires with regular practice, then the third process, compensation is activated (Baltes & Staudinger, 1999).

Compensation refers to the process triggered in order to minimize or avoid losses in order to remain functioning. Two tactics are available when a selected goal cannot be attained: acquire new means that enable the continuing pursuit of the goal or, if new resources are not available and the goal seems unattainable, disengage from the selected goal (Baltes & Baltes, 1990; Baltes & Staudinger, 1999; Freund, 2007; Staudinger, 2000). In the case of the child playing the piano, an increase in schoolwork might lead to a decrease of free time and therefore less practice. This threatens the goal of becoming a piano master. The child can compensate for this loss of resources by either detaching from the goal to become a piano master or by increasing the available time for practice through decreasing the aspiration level in school.

The theory of selection optimization and compensation presents a meta-theory in order to capture different adjustment processes and to locate them within a functional framework. The theory of selection optimization and compensation is relatively vague in terms of how the adjustment is actually carried out. The theory of optimization in primary and secondary control presents an approach focusing on the underlying mechanisms of adjustment.

Optimization in primary and secondary control.

The theory of optimization in primary and secondary control assumes that people experience the need to be in control and feel able to shape their surroundings. This is referred to as *primary control*. Associated with this assumption is the notion that people dislike losses and experience negative affect if losses cannot be avoided or their likelihood of occurrence is beyond one's personal control (Heckhausen & Schulz, 1995; Heckhausen,

Wrosch, & Schulz, 2010). The theory of optimization in primary and secondary control is grounded in the theory of perceived control proposed by Rothbaum, Weisz and Snyder (1982). They distinguished *primary control*, the ability to change the situation according to one's preferences, and *secondary control*, the ability to change according to the situational demands. *Optimization* refers to the process of goal setting. Optimization in primary control involves mainly actions aimed at the environment, while optimization in secondary control is rather cognitive and aimed at the self (Heckhausen & Schulz, 1995)².

It is assumed that if primary control is possible, it is employed; otherwise secondary control is exerted to regain primary control. When primary control is possible but secondary control is exerted, the adjustment is dysfunctional and secondary control is likely to be dysfunctional when goal attainment is possible. If the goal is not attainable, secondary control is functional. The likelihood to actually attain a goal determines the right balance of secondary and primary control and whether future primary control is likely to be successful or not. Expectations about the ability to achieve a goal or to gain primary control should shape the selection of control strategies (Heckhausen & Schulz, 1995; Heckhausen et al., 2010).

The theory assumes “functional primacy of primary over secondary control” (Heckhausen & Schulz, 1995, p. 286), because ultimately secondary control presents a means to regain primary control by minimizing losses and to adjust in order to regain or increase primary control. Secondary control can aim at expectancy of goal attainment, goal value and attribution of causal link with behavior. Other motives as control are accepted, but the adjustment response is assumed to be aim at control over the situation if shifts or threats of shifts in primary control occur.

2 Primary and secondary control can either be based on selection or compensation. Primary selective control refers to the use of personal resources (e.g., effort and time) toward the pursuit of goals. Compensatory primary control, the reliance on external resources, represents another mean to gain primary control when the resources of the individual are not sufficient. Selective secondary control involves the increase of effort or the devaluation of alternatives in order to increase the value of the goal. Selective secondary control is used to stay on track when pursuing a primary control goal. In the face of difficulties or when a goal becomes impossible to reach, compensatory secondary control, the devaluation of the goal or comparison in order to limit self-blame, is likely to be activated. Compensatory secondary control is a mean to regain primary control, because through disengagement resources are made available to pursue other goals (Heckhausen et al., 2010).

The theory of selection optimization and compensation and the theory of optimization in primary and secondary control put forth a hierarchical view of self-regulation, assuming that control over the environment is superior to adjustment to the environment. This view seems biased, because the regulatory success of striving for control can be limited in some situations where only adjustment to the environment might be functional (Rothermund & Brandtstädter, 2003). Incorporating the possible limitation of control, a complementary perspective as proposed by the model of assimilative and accommodative processes might prove beneficial to explain successful adjustment in contexts where control of the environment might be impossible.

The model of assimilative, accommodative and immunization processes³.

Over the course of their lives people repeatedly face discrepancies between their goals and their achievement. Two complementary processes of adjustment to such discrepancies are proposed: accommodative and assimilative processes (Brandtstädter, 2007; Brandtstädter & Renner, 1990b; Brandtstädter & Wentura, 1995; Rothermund & Brandtstädter, 2003). Before accommodative and assimilative processes are activated, discrepancies between the aspired and the present state have to be perceived as relevant by the individual. This requires that self-defense mechanisms have to be overcome, which prevent the perception of discrepancies. These self-defense mechanisms are subsumed under the processes of immunization (Brandtstädter, 2001; Greve, 2000).

Processes of immunization operate on the conceptual or data level (Brandtstädter, 2001). To modulate the information available presents a way of data-focused immunization and are seen as a first line of defense against the perception of discrepancies (Greve, 2000). One example of an immunization process is to call into question the validity of information presented as evidence for a discrepancy. This is observed in studies showing that people do not believe test scores because they doubt the procedure in order to reduce discrepancies between their self-perception and the feedback from others (e.g., Markus & Wurf, 1987). On the other hand concept-focused immunization refers to the reinterpretation of the

³ The current models of accommodative and assimilative processes (see Brandtstädter, 2007) are presented as two factor models, however earlier publications (e.g., Brandtstädter, 2001) included immunization processes as well. Because immunization might play an important role in risk perception the earlier version of the model is introduced here.

standard and basis of the comparison (Greve, 2000). While processes of data-focused immunization are clearly distinguishable from processes of accommodation or assimilation on an empirical level, processes of concept-focused immunization can be difficult to distinguish from accommodative processes without a longitudinal approach. Immunization processes are assumed to be activated when people do not perceive a discrepancy as a problem. Immunization therefore presents a way to overcome discrepancies by eliminating aversive emotions without the use of self-regulation (Brandtstädter, 2001; Greve, 2000).

Accommodative and assimilative processes are activated to resolve discrepancies between the aspired and the factual goal state which are regarded as significant by the individual. The underlying goal of both is “achieving consistency between actual and intended courses of development” (Brandtstädter & Renner, 1990, p. 59). Both processes aim to reduce the discrepancy, though they employ different mechanisms according to their foci (Brandtstädter & Rothermund, 2002). While assimilative processes aim to change the environment according to one’s preferences, accommodative processes target adjustment of individual preferences according to the context (Brandtstädter, 2007; Brandtstädter & Renner, 1990b; Brandtstädter & Wentura, 1995; Rothermund & Brandtstädter, 2003; Wahl et al., 2005). Thus, the motive guiding assimilation is controlling the environment, while the motive guiding accommodation is integrating oneself into a given environment (Skinner, 2007).

If the assimilative process is activated, the information processing system is focused on the goal. The individual tries to shield herself from distractions and suppresses potentially threatening information (Rothermund, Wentura, & Bak, 2001), and the personal agency is likely to be perceived greater than it really is (Taylor & Gollwitzer, 1995). While these measures are directly aimed at the goal, it is also possible that the assimilative process involves the consideration of alternative ways to achieve the goal due to the goal’s equifinality structure (Shah, Kruglanski, Boekaerts, Pintrich, & Zeidner, 1999). If compensatory strategies cease to be effective or if the individual perceives the continued pursuit of the goal as futile the accommodative process is activated (Brandtstädter & Wentura, 1995).

When the accommodative process is activated, the person is more likely to withdraw attention from the current goal in order to disengage from it (Brandtstädter & Renner, 1990b; Rothermund et al., 2001). People engage in reappraisal of a perceived discrepancy and try to find a positive meaning in adversities (Frijda, 1988). The activation of

assimilative processes associated with tenacious goal pursuit, such as focus on goals as well as high feelings of control, and simultaneous activation of accommodative processes, such as devaluation of goals and information search regarding new goals, can lead to regulatory conflict, since both processes are independent (Bak & Brandtstädter, 1998). It is important to note that the theory does not assume that people deliberately choose to disengage from a specific goal (i.e., engage in accommodation), but rather the accommodative process is unconsciously activated and leads to a change in preferences which in turn enable disengagement or the reasoning of pros and cons in order to facilitate disengagement (Brandtstädter & Rothermund, 2002).

Conclusion.

The three theories presented describe development and adjustment to challenges. According to Boerner and Jopp (2007) each model has its merit, because they differ in their theoretical scope (see also Riediger & Ebner, 2007). The theory of selection optimization and compensation is developed as a meta-theory. It describes the general process of goal setting and pursuing (Freund, 2007). The theory of optimization in primary and secondary control specifies how individuals optimize control over the lifespan and are able to control their environment. At first sight overlap exists between accommodation and some types of secondary control (Boerner & Jopp, 2007). Does the similarity of mechanisms imply congruence of processes? The theory of optimization in primary and secondary control assumes primacy of external control; adjustment with the final goal of achieving integration within a given situation is not part of the model. It is first important to note that secondary control aims to reestablish primary control, while accommodation focuses on adjustment and integrating within a given context (Skinner, 2007). As a result the concept and term accommodation should be used for strategies aiming at integration into a given environment, instead of secondary control. Secondary and primary control rather present constructs which distinguish whether the focus of adjustment is on the self or the environment but not whether the processes aim at controlling the situation or accommodating to it.

The model of assimilative, accommodative and immunization processes does not assume a hierarchical structure of adjustment strategies and the underlying motive is not control but consistency. As a result the model of assimilative and accommodative processes seems more suitable to capture adjustment to an ambiguous context on the highest level of abstraction since it allows the integration of strategies focusing on

controlling the environment as well as strategies that aim to integrate within a given environment. The model of accommodative and assimilative processes presents a higher level structure of self-regulation. On a lower level of self-regulation specific behaviors and mechanism can be identified, and these mechanisms and behaviors are examined in the context of coping.

Self-regulation, Coping and the Adjustment to Ambiguous Security

How can the described theories explain how people adjust to living in an ambiguous security situation? The fields of coping and self-regulation in development are interested in similar processes, but the integration of both fields seems limited (Aspinwall & Taylor, 1997; Leipold & Greve, 2009). It appears promising to integrate coping into a theory of self-regulation in order to provide process and structural models which can explain goal directed behavior. Processes underlying self-regulation such as goal pursuit and goal disengagement are empirically linked to coping, and coping strategies mediate the positive effect of goal adjustment on subjective well-being (Wrosch, Amir, & Miller, 2011). Coping research, however, focuses on adjustment strategies and their outcomes, and not the underlying processes (Costa, Somerfield, & McCrae, 1996). The research interested in developmental self-regulation investigates the general adjustment process. Both lines of research explore how people overcome challenges (Leipold & Greve, 2009). The empirical findings show that it is not generally tenacious goal pursuit which leads to successful adjustment, but that flexible adjustment and acceptance of a given situation is required. Resilience could function as a bridge that connects developmental self-regulation and coping, since it infuses meaning into coping and direction into self-regulation (Folkman & Moskowitz, 2000; Leipold & Greve, 2009). “Explaining the phenomenon of resilience, not only do risk markers and personality and situational aspects (the resilience constellation, as it were) need to be included, but also the micro processes involved in adjustment (e.g., coping), that is, the diachronically (developmental) perspective on resilience” (Leipold & Greve, 2009, p.48).

Leipold and Greve (2009) propose three processes of coping: assimilation, accommodation, and defensive processes (i.e., immunization processes). No single strategy leads to coping well but the mix of coping strategies which are functional in a given situation or social constellation can lead to resilience. Adjustment is successful when it ensures continued functioning and when it enables the person to overcome problems in the future. What leads to resilient individuals? The answer of Leipold and Greve (2009) is to

integrate coping theories and developmental approaches in order to explain resilience. In their perspective, resilience is the outcome of specific constellations of coping responses. This should result in the analysis of interactions between coping strategies instead of the general use of bivariate correlations in order to identify which strategies are functional and which are futile.

An example of where a “constellation approach” was applied is a study conducted among individuals who were displaced after a natural catastrophe (Wadsworth et al., 2009). Four groups of participants were formed based on their adjustment patterns: resilient, delayed on set of depression, chronically depressed, recovering after depression. The use of primary and secondary control, coping efficacy, and religious coping were analyzed as predictors of which of the four groups a person would fall into. The interaction between primary and secondary control predicted group membership best. Only when primary and secondary control were both used, people were likely to be in the resilient group; the use of secondary control alone was associated with higher levels of depression and distress.

While research on coping and adjustment can predict which individuals are more likely to be resilient, it does not examine how individuals change their perception of the threatening event that they experienced. But it seems an important question how adjustment influences future risk perception, because risk perception shapes future choices. Although the transactional model of stress states a theoretical relationship between risk perception and coping strategies, studies examining this relationship are not to be found. Are risk perception and adjustment processes related?

Risk Perception, Adjustment and Ongoing Threat

In this section the research focusing on theories of risk perception and theories of adjustment to adversities are going to be integrated. Each field of research will be summarized briefly and then they will be synthesized together. Finally, the methodological challenges and their solution will be presented in order to explore the relationship between risk perception and adjustment processes empirically.

Risk Perception

Chapter three established that risk perception and decision making involving risk is influenced by the information processing of the value and probability information of the respective outcomes. In cases when options involve outcomes with a very low probability, risk perception will be influenced by whether the person has gained information about the risk through experience or by description. When people have gained information about the choice options through experience they choose as if they underweight the rare event. On the other hand, people who receive information from description tend to choose as if they overweight rare events.

Another factor influencing information processing when judging risk is affect. If an outcome of a risky choice evokes strong affective reactions, then people choose as if probability information becomes neglected and mere possibility shapes choices. This suggests probability judgments may be biased in contexts where people are faced with threats to their personal safety when these induce emotional reactions and have a low probability.

However, in quasi naturalistic settings people do not primarily search for information about the choice options outcomes and their probability, but look for ways to mitigate the possible negative consequences of a given choice. This shows that final response to risk does not only depend on the probability and valuation of outcomes as suggested by theories of risk perception but also on the available ways to act upon the consequences and the risky event. One characteristic of theories concerning risk perception is that they do not consider changes on the level of the individuals due to adjustment and its impact on responses to risk. Research focusing on self-regulation of adjustment suggests that adjustment is bi-directional – adjustment of the person (the self) and the event (the situation).

Adjustment

It was argued in the fourth chapter that people use different strategies to adjust to threatening events, and those differences are influenced by the underlying processes of adjustment. Three processes are assumed to guide adjustment, one leading to an increase of flexibility of adjustment (accommodation) and the second associated with tenacious goal pursuit and striving for control (assimilation); however, those two processes of self-regulation are only activated if the need of adjustment is perceived which is hindered by immunization processes. Successful adjustment is the result of the balancing of those processes according to situational demands. Adjustment strategies are distinguished according to their focus and then at the lowest level according to their function. The adjustment focus can either be on the environment (the situation), referred to as primary control, or on the person (the self), which is referred to as secondary control. The function of adjustment can be the regulation of emotions or the adjustment of the threatening event. Studies show that depending on the strategies applied, people differ in their response to traumatic events. It was found that generally a combination of strategies leads to resilient adjustment, guided by the complementary activation of assimilation and accommodative processes. However, people who show a high degree of general functioning and indicate a low level of stress could not use self-regulation for adjusting to the situation, because immunization processes are activated and as a result these individuals do not perceive a need for adjustment. To identify whether people engage in self-regulation of adjustment or not, requires to move beyond outcome measures (stress or depression) and needs to consider on the individual's experience of the respective situation.

Synthesis

Risk perception and adjustment can be integrated into the cognitive-transactional model of stress explaining emotional activation in the face of threat. The cognitive-transactional model of stress assumes that the degree of perceived stress induced by an event depends on the appraisal of the potential stressor (primary appraisal) as well as on the appraisal of available resources to cope with the stressor (secondary appraisal) and the coping strategy (Lazarus, 1999). Accordingly, it is assumed that the perception of personal safety in ambiguous security contexts is dependent on the processes described in the theories of risky choice as well as on processes described in the theories of adjustment to adversities. One characteristic of an ambiguous security situation is that the probability of a threatening security incident is low. Consequently the appraisal process implies decisions

with prospects involving rare events. Decisions involving rare events are prone to judgment errors due to the difficulties humans encounter using information concerning low probabilities (e.g., Hertwig et al., 2004; Kahneman & Tversky, 1979; Slovic & Weber, 2002; Yechiam et al., 2005). Information processing is influenced by affect and experience. In conditions in which rare events are associated with strong affective notions choices appear as if the probability information is underweighted or even disregarded (e.g., Rottenstreich & Hsee, 2001; Slovic & Peters, 2006; Slovic et al., 2005). Under conditions of high arousal emotional regulation influences decision making, while under conditions of low arousal decision making is governed by cognitive regulation (Séguin, Arseneault, & Tremblay, 2007). It can be assumed that the use of coping strategies alters the negative affect induced by the possible outcome. However, strategies differ regarding their effectiveness in regulation (Gross, 1998a; John & Gross, 2004) and as a result people differ in their ability to regulate emotions (e.g., Gross & John, 2003). This might explain differences between people in their tendency to overweight rare events with affect laden consequences and leads to the question of whether or not inter-individual differences of self-regulation can explain differences in risk perception under conditions of strong affective activation.

Self-regulation and risk perception seem dependent on one another. They could be influenced by inter-individual differences in the perception as well as the capacity of self-regulation, and in order to understand the assessment of personal safety under ongoing threat, risk perceptions and well as adjustment should be examined simultaneously. To date, both traditions are pursued not only in two different theoretical lanes but also with two different methodologies. In the next section, the difference in methodologies will be pointed out.

Methodological Challenge and a possible Resolution

Studies informing the construct of risk perception reported in chapter three, generally used experiments. In these experiments data was analyzed regarding differences between experimental groups, but inter-individual differences within groups such as strategies to lower the emotional impact of a given stimulus were not examined. The research on risk perception and decision making under risk is often based on experimental designs with a limited number of variables. The studies are interested in what factors lead to differences between judgments and choices. This is contrasted by studies which examine adjustment. They generally focus on the inter-individual differences regarding the strategies used and

the associated outcomes simultaneously. Situational and person-specific variables are scrutinized and it is asked how they interact and lead to specific adjustment trajectories.

To gain insight into the adjustment to ambiguous security contexts a laboratory experiment does not seem suitable because the subject cannot be kept in the laboratory for a long period of time and the negative stimuli used in laboratory experiments can hardly involve physical threats. Furthermore, one goal of using an experimental setting is the limitation of independent variables in order to ensure the possibility for a causal interpretation and maximize control over the dependent variable. The direction of research laid out above rooted in different areas of research in order to capture the complex process of adjustment to ambiguous security involves more variables of interest than suitable for an experiment. The research on decision making under risk as well as on coping is often done applying quantitative methods. While quantitative studies aim to detect differences in the distribution of an attribute or test a hypothesis about the relationship between variables, qualitative studies aim to gain insight into the variations of a phenomenon. It is not the description of a group or a person, but the description of a phenomenon that is of interest (Madill & Gough, 2008; Polkinghorne, 2005; J. A. Smith & Dunworth, 2003). The decision as to whether or not a qualitative or quantitative approach is preferred in order to investigate a phenomenon ultimately depends on its characteristics (Valsiner, 2000). Because the individual's adjustment and interpretation of the threatening situation is of interest and not only a final choice or situational appraisal, a qualitative approach seems promising to gain insight into the relationship between risk perception and adjustment.

Qualitative Interview Study

Introduction

In the present study the focus is how people perceive the security situation, how they judge their personal risk and especially why they judge the situation the way that they do. The use of interviews is suitable, because the central purpose of qualitative research is to understand experience and how it is constituted in the person's awareness (Marchel & Owens, 2007). While the interviews were exploratory; the questions asked were guided by research questions formulated based on theories of decision making under risk and adjustment. The goal of the interviews was to explore the different adjustment patterns to ongoing threat.

Research questions.

First, the interview needs to clarify the perception of personal safety of the participants. This leads to three questions regarding risk perception:

1. How do people who work and live in a volatile context with regards to security appraise their personal safety and the general risk of security incidents?
2. What is the relationship between the general security situation and personal perceived risk?

Second, strategies of coping behavior and their underlying processes need to be identified in order to answer the following questions:

3. What strategies do people use to cope with ambiguous security situations?
4. Are differences in the coping strategies related to differences regarding the degree of activation of accommodative, assimilative and immunization processes?

Third, while appraisal and coping are structurally distinct, they are viewed as interdependent (e.g., Lazarus, 1999) and both are assumed to be governed by self-regulative processes, which leads to the question:

5. Is there a relationship between risk perception and the accommodative, assimilative and immunization processes?

To understand the impact of security incidents and ongoing threat on humans one can turn to examining people that already work in such contexts: humanitarian aid workers. The UN and numerous international *non-governmental organizations* (NGOs) respond to countless humanitarian disasters around the globe. The nature of the events makes it

necessary for staff to be deployed in areas that yield a security environment that, at best, could be characterized as ambiguous, and the work and living environment during the deployment involves the possibility of victimization.

Describing the environment of the interview participants.

The work environment of humanitarian aid workers is similar to that of military peacekeepers, but humanitarian aid workers lack military training and safety equipment to engage threats (ECHO, 2004; King, 2002; Runge, 2004; Sheik et al., 2000; Slim, 1995; B. Smith, 2002). Relief work is often carried out in camps of displaced people where the security situation is highly uncertain. In order to reach areas to deliver aid, it is often necessary to travel through areas that are considered “law free” in which ambushes, kidnappings and car hijackings can occur. Even the compounds of humanitarian aid organizations do not represent safe harbors; they become targeted by robbers or violence deliberately aimed at foreigners (Danieli, 2002, Sheik, 2000 #457). Humanitarian aid workers are targeted in armed conflicts, because they are assumed to support the opposing group in a conflict by providing aid or their assets are valuable to the parties involved in the conflict (Stoddard et al., 2009; Stoddard, Harmer, & Haver, 2006).

A study focusing on the perceptions and the reactions of humanitarian aid and relief workers to the security situation during deployment analyzed the influence of demographic variables, country of deployment and experiences during the deployment on the perception of security and personal safety. Overall the sample participants generally felt unsafe, and the perception of safety was not dependent on the security situation of the country, but on personal experiences (Fast & Wiest, 2007).

Turning to the number of security incidents in the period from 2006-2008, if Somalia, Afghanistan, and the Sudan are excluded from the analysis, 2.4 in 10,000 humanitarian staff members became victims of violence per year worldwide. For the same period an attack rate of 408 per 10,000 humanitarian staff members in Somalia, and in the Sudan’s Darfur area 27 per 10,000 was observed (Stoddard et al., 2009).

For the statistical analysis and comparison of countries relative numbers are informative. But to capture the psychological meaning of numbers in terms of experience it seems more pertinent to look at absolute numbers. They reflect how often the humanitarian aid worker will be confronted with the stories told by his colleagues and rumors about latest incidents. In the Sudan about 90, in Afghanistan about 78 and in Somalia about 67

incidents of major violence targeting humanitarian aid workers are reported. In all three countries armed conflicts are ongoing frequently covering large areas, and aid is delivered to the victims of these conflicts. As a result people working for NGO's deployed in Afghanistan, the Sudan and Somalia were likely to be confronted with news about incidents affecting a colleague.

An indicator of the psychological impact of the security situation is the development of PTSD among humanitarian aid workers. Individuals are diagnosed with PTSD when they fulfill three criteria: unwilling revisitation of traumatic events in flashbacks or nightmares, hypervigilance, and retreat from life and relationships ("Diagnostic and Statistical Manual of Mental Disorders: DSM-IV,"). Civilian interpersonal violence, the kind that humanitarian staff commonly experience, was likely to carry greater risk for PTSD than other traumatic events (Ozer , Best, Lipsey, & Weiss, 2003). This claim is supported by studies assessing the prevalence of PTSD syndromes after the deployment of humanitarian aid and relief personnel (Eriksson et al., 2001; Jones et al., 2006; McFarlane, 2004; Salama, 1999). The studies show a positive correlation between the experience of traumatic events and cumulative stress with the prevalence of post-deployment PTSD symptoms. Within the samples of the studies, 16% to 29% of the participants showed at least two of three symptom clusters of PTSD, which indicates they suffered at least from a partial PTSD (Eriksson et al., 2001; Jones et al., 2006; McFarlane, 2004; Salama, 1999).

Method

Study participants.

The interviews were carried out with expatriate humanitarian aid and relief workers working in the Sudan. The participants were employed by different agencies, and worked in two different areas: the capital, Khartoum, and the region of Darfur. The two regions differ regarding their security and living standard. Khartoum is considered one of the safest cities in Africa. However, after the death of John Garang, leader of the SPLM and vice president of the Sudan on the 30th of July, 2005 riots broke out. During the riots, fighting occurred between the internally displaced people from the south and local residents of Khartoum. In the course of the conflict at least 84 people of both sides lost their lives and about 800 were injured (BBC, 8/3/2005). In another incident, rebels attacked the city of Omdurman, which is part of Khartoum. The attack took the government by surprise, resulting in the rebels quickly advancing to the city center and being repulsed after three

days of fighting (Henshaw, 2008). Those two events demonstrate the fragility of the security situation in Khartoum, despite being considered safe.

In Darfur the situation varies greatly depending on the specific location within the region. Areas outside of major cities can experience heavy fighting between rebel groups and government soldiers. Many humanitarian aid workers have projects situated within these regions. The areas outside of city limits are considered “lawless,” and traveling in those areas can end in security incidents such as ambushes. Banditry and conflicts between militant groups also occur in the cities. The situation is closely monitored by the UN and therefore expatriates are usually informed about past incidents, ongoing fighting or areas of expected insecurity on a daily basis.

The interviews were conducted at the offices of participating organizations in Khartoum and a city in Darfur. The sampling was network based, and selection was carried out so that participants were from two areas of deployment, differed in regard of personal experiences with security incidents and their time spent in the country. The first participants interviewed were heads of agencies which were deployed in the capital. The managing directors then established contact with their colleagues in the Darfur region. The sample characteristics are depicted in Table 1.

Table 1: Participants.

Region	Male	Years spent in the country	Age	Experienced security incidents
Darfur (N=17)	76.5% (N = 13)	3.1 (2.2)	36.1 (8.4)	52.9% (N = 9)
Khartoum (N=7)	71.4% (N = 5)	11.5 (9.1)	59.9 (10.0)	57.1% (N = 4)
Total (N=24)	75.0% (N =18)	5.7 (6.9)	41.1 (11.2)	54.2% (N= 13)

Experience in the country, age and region of deployment were correlated. This is likely to confound the relationship between adjustment strategies and risk perception, which would make the interpretation of the data difficult if examining group differences. However, the current study is interested in each individual’s subjective experience of risk as well as their adjustment strategies, so this correlation is not regarded as problematic.

Interview procedure.

To ensure that the topics of interest were raised during the interview, an interview schedule was developed (see Table 2).

Table 2: Interview schedule.

Topic	Sample Questions
Security situation	How do you define risk? How would you characterize the security environment that you work in? What threats are present in your working environment? How do you perceive your current personal safety?
Risk perception	What dimensions do you personally consider when thinking about the risk of a specific threat? What role does risk and security play in your life? Do you ever think about the possibility of losing your life? When?
Coping	How do you react to the security risks that are present in you work environment? When do you worry about your own safety? What do you do when thoughts of concern and worry come up in your mind? To what extent is risk-taking part of your work? What makes you feel safe? All risks are ultimately controllable. - What do you think about this statement?
Reason for risk-taking	Why do you risk your life working here?

The interview process started with the clarification of the interview procedure and intention. Then participants were asked permission to record the interview. The interview itself commenced with questions about demographic information and personal information concerning the posting. Then questions concerning risk perception and the general security situation were asked. This led to detailed descriptions of personal experiences of security incidents, the influence of the security situation on the daily life, strategies developed to cope with the security situation and arguments for personal increased safety compared to

the average person. After describing the security situation participants were asked about their justification of personal risk-taking.

The interview process was semi-structured, but the order of questions and their exact formulation differed depending on the topics brought up by the participants. The interviews lasted 30 to 60 minutes. In one case a married couple was interviewed together, all other interviews were carried out individually.

The process of data analysis.

The recorded interviews were transcribed⁴ and then coded using the software package MaxQDA 2007. Before the interviews were analyzed, thematic codes were formulated. After distinguishing the main themes and coding the transcripts segments, the next layer of codes was developed. First, the segments belonging to each theme were read and annotated using memos. Second, the different facets of how participants described the security situation and their appraisal and adjustment were marked and collected. Then the different segments belonging to each theme were compared and theoretical constructs of previous research were used to structure the data. The analysis resulted in a hierarchy of categories with three levels. The main theme became the highest order category under which the data is structured; the second order categories capture the segments that reflect variables derived from the related theoretical construct and on the third level, the specific characteristic of the construct variables are coded.

Two main themes were identified: appraisal of the security situation and adjusting to the security situation. Within the main theme, appraisal of the security situation, five categories were formulated: perceived risk, specific threats, number of threats named, negative affect experienced and the degree of concern about the security situation. Within the main theme adjustment two sub-themes were identified: answers describing adjustment strategies and arguments for their adequacy. This resulted in two distinct categories: self-regulated responses to threat and reasoning about personal security. Segments of interviews were coded as self-regulated responses to threat when they answered the question: what do participants do in reaction to life threats in their environment? Answers

⁴ The transcripts can be requested from the author. They are not made available in the general appendix because the information given is confidential and cannot be fully anonymized.

were coded as representing the category reasoning when they answered the question: how do the participants argue about their personal safety and the risks they face?

The goal of the analysis was to capture how people experience a situation involving security risks that can lead to personal harm over an extended period of time. For this reason, the interpretative phenomenological analysis was applied. In the interpretative phenomenological analysis, the focus is on "...how people think about and understand significant events and people in their lives. These themes include a focus on participants' meaning-making and interpretation, a concern with identity and a sense of self and an attention to bodily feeling within lived experience" (J. A. Smith & Eatough, 2007, p. 37). The interpretative step in the analysis involves the use of the experience of the researcher through drawing on psychological theory in order to "make sense" of the participant's experience. The interpretation of the accounts given by the interviewees was guided by psychological theory. Interpretation refers to the act of grounding the accounts of the interviewees' in psychological constructs. The findings of the interviews present a structured view on how the interviewees experienced ongoing threat due to an uncertain security situation.

Findings

In each part of the analysis a sequence of three steps will be followed. First, the respective categories will be described along with their definition and theoretical underpinning. Second, the range of values will be designated in individual categories. Third, the data will be interpreted.

Appraisal of the security situation.

The first step of the analysis was to characterize how the humanitarian aid workers viewed their security situation. The category perceived risk captures statements referring to the likelihood of incidents. This included the general likelihood of security incidents as well as specific security incidents mentioned by the participants. The different threats are reported along with how many threats are named. When respondents spoke about their affective response to the possible consequences of security incidents their statements were coded with the category negative affect. Segments referring to how strongly the security situation influences the person's life were captured in the category concern.

In order to assess how participants perceive the general security situation they were asked: "how do you perceive the general security situation?" The measure is assumed to be

unconditional because it did not ask for the personal risk. The consideration whether the risk perception is conditional or unconditional is important because differences in the answer might only be caused by the fact that some participants consider that it is their own actions that lower the risk while others refer to the risk independent of their actions (Brewer et al., 2007; Halpern-Felsher et al., 2001; Weinstein & Nicolich, 1993). The likelihood of security incidents was categorized in four sub-categories: high risk, medium risk, low risk and situation specific. The frequencies are displayed in Table 3.

Table 3: Ratings of ambient risk.

Likelihood of security incidents	Darfur		Khartoum	
	n	%	n	%
high	8	47.1%	1	14.3%
medium	3	17.6%	2	28.6%
low	5	29.4%	1	14.3%
situation specific	1	5.9%	3	42.9%
Total	17	100%	7	100%

From the above table it is apparent that the perceived likelihood of security incidents differs depending on the region the participant is deployed in. Participants in Darfur characterized the likelihood most often as high. Participants from Khartoum perceive it mostly as low, but when they travel as high. The frequency of how often participants named a specific security incident is represented in Table 4.

Table 4: Type of negative events and frequency of reporting by participants.

Type of incident	Darfur		Khartoum	
	n	%	n	%
crime	8	47.1%	1	14.3%
carjacking	2	70.6%	1	14.3%
kidnapping	8	47.1%	1	14.3%
crossfire	10	58.8%	1	14.3%
other accidents	1	5.9%	1	14.3%
direct attack on NGO	7	41.2%	2	28.6%

The specific security incidents named by the participants can have severe consequences and are mostly linked to criminal acts. It is important to note that 53.0% of the participants (N = 9) assume that humanitarian aid and relief organizations can become explicit targets of violence.

The individuals differed regarding the number of threats mentioned. The number of different threats was counted and is depicted in Table 5.

Table 5: Number of negative incidents stated by each participant.

Number of threats named per person	Darfur		Khartoum	
	n	%	n	%
0	0	0	2	28.6%
1	2	11.8%	3	42.9%
2	5	29.4%	2	28.6%
3	6	35.3%	0	0
4	4	23.5%	0	0

Participants are aware of possible negative events in their working and living environment and participants name multiple possible threats. Particularly in Darfur, the overall answers show that the participants mostly appraise the general security situation as tense.

The findings up to this point refer to rather analytical aspects of the risk appraisal, but during the interview it was also asked whether the participants experience negative affect associated with the possible consequences of these incidents.

In order to assess the security perception from an affective angle, negative affect related to the security situation was a subject of inquiry. The term negative affect is broad; in the literature concerning risk perception and judgment it is often used to refer to specific states such as worry, fear, and uncertainty (van Gelder et al., 2009). Negative affect was used to refer to any negative feeling related to the security situation; this entails feelings of uncertainty and frustration as well as anxiety and fear. Statements answering the question “How do you feel about the possibility of security incidents?” or statements referring to affective responses were considered. In Table 6 the frequency of participants who experienced negative affect as a result of the security situation is displayed.

Table 6: Participants experiencing negative affect.

Experience of negative affect	Darfur		Khartoum	
	n	%	n	%
yes	7	41.2%	0	.0%
no	10	58.8%	7	100.0%

Seven of the participants experienced negative affect associated with the security situation. Only individuals who were deployed in Darfur reported negative affect related to the security situation.

While the above information reflects how the participants perceive the situation, it does not capture to what degree the security situation influences their daily life. Accounts referring to the influence and importance of these adversities, and the degree to which the security situation presents a threat, the risk appraisal, are coded with the category “concern”.

As shown above the participants are aware of the existence of personal threats in their working and living environment. The degree of concern among the participants is portrayed in Table 7.

Table 7: Concern about the security situation.

Concern about security	Darfur		Khartoum	
	n	%	n	%
high	2	11.8%	0	.0%
medium	4	23.5%	0	.0%
low	8	47.1%	6	85.7%
situation specific	3	17.6%	1	14.3%
Total	17	100%	7	100%

It is particularly interesting that in Darfur the majority of participants did not show a high degree of concern, since the risk perception indicated a medium or high risk for the majority of participants. Only two accounts of participants indicated increased occupation with possible security incidents.

During the interviews the participants were asked about the strategies that they apply and follow for their security. All participants stated that the existence of security measures

was important in order to be able to work in this insecure environment and decrease the risk of security incidents. The strategies focusing on the negative event aim to gain control over the environment. It is shown in different studies that controllability of a risk is an important factor in risk perception and it is shown that controllable risks are perceived as less severe (Harris, Griffin, & Murray, 2008; Klein & Helweg-Larsen, 2002; Weinstein, 1984). How do people develop a feeling of control over a situation which is highly uncertain? In the following section different accounts of interviewees strategies will be presented and the strategies will be categorized.

Adjusting to the security situation.

Adjustment is guided by coping behavior. Coping behavior refers to actions that attempt to ensure functioning in the face of a changing environment. Coping behavior has two routes: adjustment of the organism or adjustment of the environment. To distinguish strategies along these lines is similar to the concept of problem-focused and emotion-focused coping in the transactional model (Lazarus, 1991, 1999), and primary (focusing on the situation) and secondary control (focusing on the self) in the literature concerned with developmental adjustment (Heckhausen & Schulz, 1995; Heckhausen et al., 2010). For this reason two distinct categories were formulated to capture adjustment strategies: strategies focusing on the negative event and strategies focusing on the self.

Strategies focusing on the negative event.

The participants named a number of strategies they used in order to influence the possible negative event. These strategies come very close to what is defined as risk defusing operators (Huber et al., 1997). “A risk-defusing operator is an action, performed additionally to a specific alternative, which: may prevent the negative event, interrupt the causal chain between event and negative outcome, or transform the negative outcome into an outcome state, which is more acceptable” (Huber et al., 2001, p. 410). The strategies, their characteristics and examples are displayed in Table 8.

Table 8: Strategies focusing on the negative event.

Strategy	Definition	Example excerpt
change of behavior or appearance	In order to reduce the likelihood of becoming victimized, the person changes behavior in a specific way or stops performing an action that is considered risky.	Oh the carjacking? Uhm, yeah a little bit. - Yes, uhm, but, we ended up putting that car away and we had not used the Land cruiser anymore. So I really feel that because of the type of vehicles we've chosen, that it's very small the possibility that a carjacking could happen again. (20090525-4, 314-317)
strive for acceptance of locals	The person tries to become accepted and respected by the local population.	To get to know people in the community around me, to try to learn the language, to try to be sensitive to, the local culture and people. And I do think that that adds an extra layer of protection. It may only be sludge, uhm but I think that also contributes to my, uhm not feeling threatened. (20090527-5, 128-131)
monitoring	The person tries to be informed about possible sources of threats and actively tries to avoid situations that he considers to be dangerous.	Even if you have been told the situation is ok. Once you arrive in such a place which has had the high security risk, then äh the first thing to do is try to gather as much information as possible!. (20090407-2, 340-342)
protection	Taking protective measures, which are intended to reduce the likelihood of a negative event or to reduce the impact a	After this incident we did all this crap with the electric fence, oh no, I guess we already had that. I don't know what else we did. We have the electric fence and barbed wire and stuff. I think nobody can get in easily (translated from German).

Strategy	Definition	Example excerpt
	negative event.	(20090527-3, 120-124) We also have tried to do target hardening, where if by the, the most commonly weapon here is the AK-47. Just make it that the shots with the AK-47 will not reach you. Put up a sand bag and that kind of thing yeah, so. (20090421-1, 268-271)
worst case plans	Planning responses in case a negative event occurs, in order to limit the negative effects.	I have a plan. I wanna make sure that we have, we make sure that we have enough supplies to last for a few days if we need to stay inside. (20090415, 238-239)

The strategies functioning as risk defusing operators affect the two central components of risk: the probability of the event occurrence and the negative utility of its possible negative outcome. The likelihood of a security incident may be decreased through a change in behavior or appearance, monitoring of the security situation and striving for acceptance among locals in order to be less likely to be targeted. Strategies that reduce the impact of a security incident are actions such as putting up sandbags or storing food and water. Protective strategies can reduce the likelihood of a security incident as well as the possible negative impact.

The strategies focusing on the negative event present ways to control the environment. The participants argue that through specific conduct they shape the situation, and reduce their personal risk in a context which was mostly acknowledged as risky. This shows that adjustment strategies focusing on the environment present an important means to adapt to an ambiguous security context and increase the feeling of safety by reducing the risk of security incidents or their impact. Another way to shape how a situation is appraised can be the change of internal values and goals, which present coping strategies focusing on the self.

Strategies focusing on the self.

Strategies focusing on the adjustment of internal processes and representations are found in the coping literature (e.g., Carver, Scheier, & Weintraub, 1989; Lazarus, 1999;

Skinner et al., 2003) and also in developmental psychology (e.g., Baltes & Staudinger, 1999; Heckhausen & Schulz, 1995; Rothbaum et al., 1982). Strategies aiming to adjust the person in accordance with a given situation are referred to as strategies focusing on the self. These strategies described by participants do not seem to actually decrease the risk of security incidents but help the participant to experience safety. For example one participant said:

I think you use probably false rationalizations like: 'it`ll never happen to me because, yeah you know I`m more alert or you know I`ll see I`ll somehow see the perpetrator before they see me and respond correctly or my neighbors love me and they never let anybody you know [laughs] come into the house' or you know things like that. This this kind, short rational narratives which you tell yourself, to try to make yourself feel safer. I certainly have employed those in other [?theaters] I have employed them here to a certain degree,....

20090527-5, 114-122

Four strategies focusing on the self were distinguished, two captured ways of cognitive and emotional control, and the other two captured whether or not the participant reflected the possible consequences of the security situation. Table 9 below lists the strategies found, their definitions and examples.

Table 9: Strategies focusing on the self.

Name	Definition	Example
suppress emotions/ thoughts	The deliberate suppression and avoidance of thoughts concerning the possible negative consequences or suppresses negative feelings.	Interviewer: Do you think about, what happened to your staff when you travel that it could be you next or-? Person 1: I don`t want to be next. Yeah. So, I don't even want to think about it. Yes. (20090421-3, 131-135)

Name	Definition	Example
reappraise emotions/ thoughts	The reflection of thoughts concerning the possible negative outcomes or negative affect. The thoughts and feelings are considered and not avoided, but are reappraised based on the knowledge about the general situation.	I think first I try to listen to them and try to see if there is wisdom in 'em somewhere you know [laughs]. And then if it's, if it's your brain being wiser your spirit being wise to tell you to be careful in the situation then I'm gonna be careful. If it seems, and I also will evaluated to see if it's just - scared 'cause you don't know or, whatever. I think then I, I find a way to, not let that thought . to at least dominate me. (20090524, 187-191)
reflection of consequences	The possible negative outcomes are known and considered. The possible negative consequences influence the evaluation of the security situation.	One because I just recently attended a seminar on äh . field safety and: - there's an increase in carjacking, kidnapping, and that's there were focusing on and that's we focus on, avoiding! and what to do. So maybe naturally that's what's on my mind I don't know. (20090525-3, 126-129)
no reflection of consequences	The possible negative consequences are not considered. The possible negative consequences do not influence the evaluation of the security situation.	No not really. I sometimes think about it when I talk about such things, security and stuff, then I think about it, but not otherwise (translated from German). (20090527-4, 131-134)

How participants experience the degree of risk does not only depend on the objective situation, but also on how they self-regulate their internal response to the given situation. Some participants voiced that they do not consider the fact that they could suffer severe negative consequences others stated that they are aware of how they personally could be affected by security incidents. Thus, the first step was to identify whether or not the participants reflected on the possible consequences and then secondly, to examine how they reacted to them. While some participants chose not to reflect on the possibility of incidents and personal victimization, for others the reflection and the “keeping in mind” was important in order to be aware of the context and behave according to the situational needs.

The willingness to reflect the consequences associated with negative outcomes was influenced by whether people relied on strategies of suppression or reappraisal. For example, one participant said:

I think first I try to listen to them [fears] and try to see if there is wisdom in 'em somewhere you know [laughs]. And then if it's (.) if it's your brain being wiser your spirit being wise to tell you to be careful in the situation then I'm gonna be careful. If it seems, and I also will evaluated to see if it's just - scared 'cause you don't know or, whatever. I think then I, I find a way to, not let that thought to at least dominate me. Give it to God or I don't know how you wanna say it but combat! fear with truth. . ."To live with Christ to die is gain". I don't know you know think to your your verses or, or what's important to you but, I don't wanna let fear rule me." (187-194)

[...]

You hear bombing in it three streets over or four streets over. 'Who is it? What is it? Is somebody exploding ordinances because they found some landmines? Is it, bombing coming from REBEL FACTION 2 that is attacking the city? Was it a car backfiring? Is it- ?' You know 'What's, what's the sound? Not knowing!, is the thing that causes, fear. So know as much as you can. Understand as much as you can. And then your fear is appropriate. When you're afraid you should! be afraid. When you don't! know, you can live afraid all the time. So be as informed as you

can, and your fear is gonna be, like fear should be.” (358-365)

20090524

The quote presents an example for cognitive reappraisal as a means to regulate emotional reactions to the situation. The respondent considers the possible negative development of the situation and uses his past experiences to judge its likelihood. One important aspect of cognitive reappraisal is that the immediate emotional response is acknowledged and its validity is questioned. It seems that one precondition to engaging in cognitive reappraisal is to allow the reflection of the possible outcomes of the situation and to consider the different possible courses of action. Reflection and reappraisal involve the acknowledgment of personal vulnerability, which is not the case when thoughts or emotions associated with negative consequences and personal vulnerability are suppressed.

Research on emotion regulation suggests that emotions can be altered through suppression and reappraisal of the situation. Reappraisal involves cognitive processes in order to change the appraisal of a situation and thereby change the emotional response, contrary suppression aims to control the emotional expression (Gross, 1998b). Empirical findings support the assumption that both processes differ and that regulation based on suppression and control is less beneficial than regulation based on reappraisal (Gross, 1998; Richards & Gross, 2000; Gross & John, 2003; John & Gross, 2004). For this reason, how people modulated their emotional responses, as well as whether they allowed themselves to think about the implications of the security situation for them, presented an important difference when capturing strategies focusing on the self.

It seems that both the use of reappraisal or suppression lead to an increased feeling of safety. Although in the case of suppression, this might be more likely to be connected to a lower perceived risk than the actual risk. The perception of safety is more likely to be accurate and according to the level of risk when relying on reappraisal. As a result, adjustment strategies focusing on the self are important determinants for the congruence of a given security situation and perceived safety.

Conclusion.

The previous two sections showed that humanitarian aid workers deployed in an insecure context used different strategies to adjust and to feel safe. It was argued that strategies can be distinguished according to their focus. One class of strategies focuses on the situation and tries to limit the probability of security incidents as well as their severity

in case they occur, while another class of strategies focused on internal adjustment and the individual's reaction to the situation. The verbal accounts show that for the participants the reflection of possible negative outcomes and the regulation of the cognitive and emotional responses to them represent important means to influence how they perceive the situation. Thus, functional adjustment to living and working in an environment yielding ambiguous security not only requires strategies focusing on the negative event but also strategies focusing on the self.

When analyzing accounts focusing on the internal adjustment, it was apparent that the participants differed greatly in their willingness to reflect on the implications of security incidents for them personally. But why do some participants seem to acknowledge the possibility of personal harm while others do not? Some answers to this question were given by the respondents during the interview, when they reasoned about the risk and their personal security situation.

Interpretation

In their answers the participants described their response to the insecure situation, but also gave arguments and justifications for their risk perception as well as their concern about their personal security. It seems that often interviewees did not agree with the assumption of the interviewer that their behavior implies risk-taking. Sections were identified in which the participants talked about how they feel about the risks and to what degree the risks in the environment have an effect on them and why. Different views on the personal risks were apparent in the reasons brought forth to justify the personal feeling of safety. The ways of reasoning will be described in the first part of this section, then it will be argued that the ways of reasoning can function as indicators for the processes underlying coping.

During the interviews different ways of reasoning were found, and are depicted in Table 10. Ways of reasoning were named according to the general content of reasons, for example the account above falls into the category "trust in measures and strategies", then the category is defined and an example presented.

Table 10: Ways of reasoning about personal risk.

Name	Definition	Example
Trust in measures and strategies	The participant argues that through the use of the security measures his/her personal risk is reduced to a minimum. The participant is confident that due to the measures that he/ she is safe. Thus, the deployment is not actually considered risk-taking.	Sure there's a possibility something goes wrong and something happens. You know we've had our areas attacked, we've had, you know maybe four times in the last year maybe more we had a clinic overrun. We thought we had a guard who was killed. I just thought that one guard killed and the second went missing at first and eventually we found out that everybody was ok. You know I mean those are possibilities! and they're weighty! . . . But I think at some level you be smart . you act wisely. But you also trust, then what the results 'cause you can't, control everything. (20090524, 294-300)
Focus on goal	The participant is aware the he/she is taking a risk, but the reason is a higher goal. Thus, the negative event is mitigated.	Again you know you have not to get distracted by this stuff. You have to keep your eye on the goal and not be side tracked. (20090415, 266-268)
Acceptance	The participant argues that he/she is well aware of the risk and the possibility of being victimized. The risk is deliberately taken and the possible consequences are accepted.	People are there, they need the services, but for you to deliver the services you have to take the risk. So, my, the risks I take, are if I kind of see one, child who was shaken with malaria smiling because it has been healed. People who have starved, getting food. That's worth all! the risk. [laugh], Ja ja. So that's it.

Name	Definition	Example
Denial	The participant argues that the perception of the interviewer is wrong, and that the risk to the participant is actually low. Thus, for him/her being in the context is not regarded as taking a risk.	(20090421-1, 300-304) I think if people lose control in Darfur I wouldn't work there. They wouldn't want me there so. My service I'm afraid of death so I wouldn't want myself to get killed there also. But those situations are also not common, right? [laughs]. (20090421-3, 439-444)
Fatalism	The participant voices that the risk is present; however, there is nothing to be done about it and ultimately the chances of becoming a victim is a matter of luck. For this reason the existence of the risk and its implications are not generally thought about.	Interviewer: -- Do you think that you take a risk being here. I mean, for these ... Person 1: Of course, but when I am in Hamburg/Hambach and I cross the street I am taking a risk there too, or if I were sailing that would be a risk too. Risks are everywhere. One has to, I mean I see it very relaxed, I think. (20090525-2, 189-192)

Often one way of reasoning was not exclusive, for example some people stated that they trust in security measures but also stated that they accept a certain degree of risk and see it as part of their work. The following example portrays the relationship between the reasoning about risk and the appraisal of the personal security.

Person 1: Well the risk is always there, you know. But, like what I've mentioned, if the risk is manageable and you know, and . I think I'll be I'll be; because there is always a trigger point wherein your life is really in a real danger and you have to leave. That's that's my personal belief.
(269-272)

[...]

Interviewer: So you would, has your feeling of safety increased because you know, the security measures?

Person 1: No not really increased. But you feel a little bit comfortable. Because you know what! to do. But it doesn't gives you, it doesn't give you the guarantee that you would be safe you know. I know I'm safe here but! it äh gives you a little bit of you know I I you know.

Interviewer: So you feel more comfortable 'cause you know what to do and-

Person 1: You know what to do and things come and this happens you know when when these things happen what to do. Instead of looking for answers.

Interviewer: Did you have security training?

Person 1: Ja, I had one. When I was in Afghanistan.

Interviewer: Did it change did it change your perception and your-?

Person 1: Yeah I [? some of these other things]

Interviewer: What did it change?

*Person 1: Well like, you know. You have, the do's and the don'ts right and you have a - if you are taking hostage what do you do? You know you know. Or how to avoid, I mean, you don't provoke your captors or whatever you know something like that. But at, at the end of the day you also have to, ah, you go to such areas like like this one. You have to prepare yourself. You have to have a mindset. (348-375)
200904021-2*

The account shows that while the participant is aware of the possibility of security incidents, the training and preparation increased the feeling of confidence in the ability to handle these situations and thereby reduced the personal risk of suffering negative consequences in case security incidents occur. Furthermore, the account shows that the use of security measures induces a sense of security and that the analytical reflection of the personal risk mitigates the concern. Participants differed regarding their statements about the effect of security measures. For some it was a way to remove the risk of personal

victimization whereas for others it was only a way to reduce it. Those two different ways of reasoning are reflected in the two following quotes:

*For me personally, I think it is the most probable to walk into a shooting in the market, or when I am too late on the street run into a robbery, because currently there are a lot of robbers stealing mobile phones. And these incidents are probably the most threatening when I have my children along. I still take them along to the market, and so far I have never been afraid and God always protected us that we did not walk into any dangerous situation. It is important to me to still leave the house and that the children see other people and that they do not grow up in fear and confined (translated from German). (28-36)
20090528*

And

Person 1: Uh, quite a few of my colleagues were ambushed on this stretch from Kat to Nyala, and when three or four of them had been, uh, it was kind of like, I mean in those days it had been quite frequent within two weeks [] I think we all got aware that this could happen to anyone, and also because some of them happened not very far out of Nyala, so of course there were a lot of restrictions on how we moved and we tried to protect ourselves [] we got trained in ambush and how to act in those situations, uh, and there was training also organized by WFPM how to handle stress and [], um we tried to protect ourselves also because they were after mobile phones, cash, computers, laptops so when we travelled we tried to have as little as possible [] kind of make sure that you don't have things that you become a target, but in general terms, I don't think, I wouldn't say that I felt insecure when I was in Darfur. (41-52)

[...]

for me it has a lot to do with how you handle situations and we had a really, really good boss and took security very seriously (75-77)

[...]

its really also the rare occasion that something happens to international people, like if you look at the statistics of people or how many are killed

through the year for the (something) figures (didn't understand) ever time it happens, but it's very few times that it actually happens to compared to the amount of people who live there, like in places like perhaps not now in Darfur but like last year or the year, so I guess also there is some kind of like rat-, rationality and also I know that one of, I mean information and have access to analysis of the, understanding the conflict is extremely important... (201-208)

20090414

In the first quote the interviewee acknowledged the personal risk indicated by the affirmation of the likelihood of security incidents, and the randomness of victimization. However, instead of showing high concern about personal safety the goal to “keep calm and carry on” was pursued despite the obvious risks. In the second quote the responder stated that security incidents occur but moved on to explain why they are unlikely to happen to him. From those two quotes, two ways of reasoning stand out. First, the affirmation of personal risk and its acceptance and second, denial of the personal risk due to security measures as way to mitigate the risk and using statistics as a mean to refute the assumption held by the interviewer that the situation involves threats to personal security. Often the interviewees perceive the risk of security incidents and resulting personal harm as controllable:

It is not that they [security incidents, note by the author] happen all the time. You can sense them coming. But with proper planning you can avoid them. (301-303)

20090407-2

All of the participants stated that the risk of a security incident and possible personal harm can be avoided through protective actions and personal adjustment. The participants argue that it is not the perception of the risk per se, but the assessment and reflection of possible responses that determine their reaction to the threat:

I thought I would feel very insecure before I came there, I thought it would be horrible because I had heard so many bad things, but I think it was actually a quite secure environment (56-58)

[...]

I was one of the only international women at the office, and there were very few other international, I mean perhaps 10 international staff and children but lots of local staff, and had a lot of really good support and a lot of information with sharing with them also what was going on (59-63)

[...]

for me it has a lot to do with how you handle situations and we had a really really good boss and took security very seriously and he was firm in his negotiations [?] so in that sense I felt that often our concerns were listened to and acted on. (75-78)

20090414

It is assumed that when discrepancies between aspired end state and present state occur three processes can be distinguished which function as a mean to reduce the perceived discrepancy (for a detailed description see Section 0 where the model of accommodative, assimilative and immunization processes is introduced). Processes aiming to move the present state closer to the aspired state through actively changing the present state are referred to as assimilative processes. Another way to reduce the discrepancy between can be through processes that adjust the aspired end state and thereby remove the discrepancy. However, those self-regulative processes are only activated if the discrepancy is actually perceived as such, which is hindered by immunization processes (Brandtstädter, 2001; Greve, 2000). The pattern of strategies participants reported and their ways of reasoning are used to infer on these three processes, immunization, assimilation and accommodation. It was argued in chapter 0 that strategies used to adjust the self in the face of challenges had to foci: the self and the negative event. While the focus of strategies already give some insight into the processes, particularly the reasoning of the participants about why certain strategies reduce their concern seems insightful to understand how self-regulation might mediate the relationship between risk perception and concern for personal security.

The participants vary regarding their flexibility to change strategies according to situational demands. For example in the case of the category “change of behavior or appearance” some participants indicated that they only avoid an area during specific times and try to adjust their behavior according to their assessment as the following statement shows:

I guess I look at I have this ability what happens and sense security incidents. And I do think about where the risks come from and what they are. Based on that!, I guess it's combination of, what do I see happening to other people, and what do I see happening around me. And then I make deductions based on that. I make deductions from that, you know. 220 carjackings last year. Three weeks ago, in another City two carjackings occurred, one guy shot and killed at his gate, one guy had a carjacking but he wasn't armed. I am processing all that. I am thinking about my situation, "ok sometimes I have a car sometimes I don't". When I drive it into the gate it's a very short turn and the gate is very narrow. I normally have to stop to get out to open it, so it's a very vulnerable, time for a carjacking so that could happen to me. - but then I I consider my surroundings "Do I ever see anybody you know who looks, threatening or do I feel threatened?" you know, yeah. So that's one way". (252-263)

20090527-5

While others state that they never take any risk and therefore restrict their movement in general:

Interviewer: - So you would say Region 1 is actually pretty safe, for foreigners?

Person 1: Yes. It's it's a safe when you you just keep yourself safe.

Interviewer: Hm - which means that that you don't go out you don't-

Person 1: Ja. W- we are careful all the time. We stay within ähm, the green zones. That's all. You'll be ok. (316-324)

20090421-3

Both statements indicate control, but yield an important difference. In the first statement the risk is assessed and the actions taken aim to reduce personal vulnerability to an acceptable level. In the first example, the strategies employed do not eliminate the risk and the participant is aware of this, he chooses to limit the personal risk, but still is willing to take the risk of using a car, but in doing so is aware of the possible negative event. The second statement is different for two reasons: first, it is assumed that specific strategies, in this case limitation of movement, leads to perfect safety. Second, the participant tries to avoid risks, even if this means not leaving the compound, which is referred to as the green

zone. Both strategies show a high level of striving for control. But they differ in respect to the degree of risk accepted as part of the environment. Considering the two processes, accommodation and assimilation (Brandtstädter & Renner, 1990a), it could be assumed that both participants show a high level of assimilation, since both attempt to control the environment. The two participants differ in respect to their level of accommodative processes. While the first participant seems to show a higher level of activation of accommodation, indicated by the acceptance of the increased risk, the second quote indicates that the other participant, while yielding a high degree of assimilation too, by selecting the safe environment indicates a low degree of accommodation. A constellation of strategies proposed to indicate each process is depicted in Table 11.

Table 11: Pattern of strategies and reasoning as indicator of adjustment process.

Process	Strategies of adjustment focusing on		Reasoning
	Self	Situation	
Immunization	Suppression of emotion and thoughts		Denial (+)
	no reflection of consequences		Fatalism (+)
Accommodation	Reappraisal		Acceptance of residual risk (+)
	reflection of consequences		Trust in measures and strategies (-)
	Shifting of personal standards		
Assimilation		Change of behavior	Control (+)
		Protection	Focus on goal (+)
		Monitoring	Fatalism (-)
		Worst case plans	

*. (+) indicates a positive and (-) a negative relationship of the reasoning and the respective process.

Immunization processes are assumed to be activated in the current study when participants do not regard the security as a problem which is indicated by a low rating of risk, even when deployed in the Darfur region. Those participants denied that the security situation could present a problem to them personally and they reacted with fatalism. In those cases it is assumed that neither assimilative nor accommodative processes are activated, because participants do not perceive a discrepancy between their aspired end state and the present state. Only if participants perceived a discrepancy, self-regulation is activated and guided by accommodative and assimilative processes (Brandtstädter, 2001).

When people indicate that on the one hand they regard the risk of security incidents as high but on the other hand do not show a high concern for their personal security then this could be due to a high level of assimilation together with a high level of accommodation. Assimilative strategies mitigate actual personal risk through actions which reduce the personal susceptibility to security incidents and as a result decrease the discrepancy between aspired and experienced security. The activation of assimilation is assumed to be indicated by reasons that focus on the means available to reduce the personal risk. The identification of assimilative processes is straightforward. Assimilative processes involve conscious acts employed to enable the person to achieve an aspired end state. This involves the selection of agreeable environments, using self-control in order to focus attention or to concentrate on goals as well as draw on compensatory means. The identification of accommodative processes is more difficult since they are assumed to be unconscious (e.g. Brandtstädter & Rothermund, 2002). Accommodative processes are manifest in the reframing of goals or standards, as well as the shifting of reference frames and comparison groups and the change of standards can only be observed over time. Thus, without observations over time, the inference on the activity of accommodative processes is tentative. The acceptance of the security situation and statements referring to the shift of personal references due to the security situation are seen as indicators of accommodation. Furthermore, the comparison of participants who left the area due to high concern when at the same time using the same security measures and other assimilative strategies indicate that the low concern for personal security when judging the risk as high might be due to accommodative processes in the group of participants who stayed.

Furthermore participants who demonstrate a high risk perception but indicate lower concern seem to acknowledge the risk of security incidents but employ strategies of self-regulation to limit their concern. On the other hand, some participants ridiculed the

assumption put forth by the interviewer that their working context involves a high risk. One difference between those groups was whether they chose to work in the context of humanitarian aid specifically to help others or not. When looking at the reasoning for the appraisal of the security situation, one finding in the analysis of the interviews indicates a relationship between risk perception, resulting concern about personal security and the implication of risk-taking for another person. The following quote is an example of a participant who considers the benefit of their risk-taking:

Person 1: Why am I here? Ahm -- partly because I wanted to be able to reach out and help people. And so, even if I'm doing finances I feel that I'm part of something that is helping people. - And part of it is to reach out to, ahm, with the news. I'm knowing that I'm part of that. So, kind of the bigger picture is the reason why I'm here. The the how we can, reach out to the needs and the, and what these people need to to to hear and to bring change in their life and all that. So yeah. Yeah that's that's definitely a very, very high benefit bonus thing as to, äh I would take on the difficulties and challenges and the frustrations and the pressures because, being able to bring benefit to people is is really rewarding. (353-362)

20090525-4

On the other hand some participants do not consider the benefit of their risk-taking for other as the following account shows:

Interviewer: Do you, hm. . Why do you why do you do it then? Why do you risk your life?

Person 1: For me it's a career. - [laughs] It's the - ähm I started working as an APO, I don't know whether you know that APO, Associate Professional Officer for the UN, like a junior professional and that was for three years and I was based in Tanzania. Then afterwards when my contract finished, I had to look for, an alternative. International posting and äh this organization called me for this job. (279-290)

20090421-3

To find out whether the view on risk-taking as a way of helping leads to differences in the risk perception and concern , risk perception and concern ratings of participants who

stated helping as an explicit motive were compared to the ones who did not state this. To control for the differences in security risk depending on ambient risk of security incidents as an explanation of differences between participants, only participants from Darfur are examined. Immunization processes are considered to be reflected by a low risk perception, because the risk of security incidents at the time of the interviews was generally high and all participants named threats which can affect them.

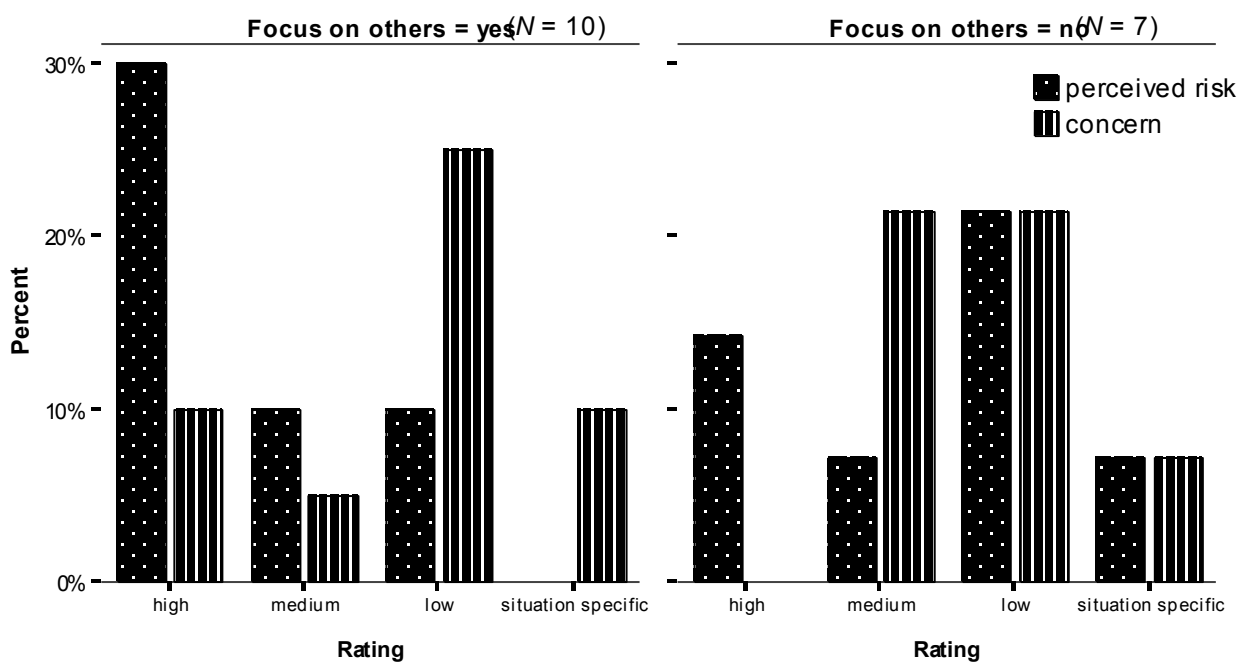


Figure 5: Ratings of perceived risk and ratings of concern for personal safety grouped according to the focus of the goal for participants deployed in the Darfur region.

Figure 5 shows an interesting pattern. It is assumed that the degree of ambient insecurity is the same for all participants deployed in the Darfur. The majority of participants in both groups yield a medium or low concern for personal security. But the difference in ratings of risk perception between the participants who focus on others and those who do not indicates that immunization processes seem more prevalent in the latter group. Are participants who consider the positive outcomes of their risk-taking for others (i.e., who engage in helping) willing to take higher risks than the participants who do not? The interviews seem to suggest that this is the case. Before examining the relationship

between helping and risk-taking closer in the next sections, the findings of the interviews are discussed next.

Discussion

This section will sequentially answer the questions which were guiding the interviews and will relate the findings to the literature. The first two questions were: how do participants who work and live in a context yielding a volatile security appraise their personal safety and the general risk of security incidents? And what is the relationship between the general security situation and personal perceived risk? The interviews show that a substantial number of participants (N = 8) assessed the general security situation yielding a high risk of security incidents. However only two participants deployed in the Darfur region reported high concern while the others (N = 6) reported a low concern for personal security. This group is contrasted by other participants (N =5) who also were deployed in Darfur but stated that the environment is not very risky and argued that security is not a problem that concerns them. To find the asymmetry between the risk perception and the appraisal of the personal safety in the first group was surprising.

The second set of research questions focused on the strategies used to adjust to the context yielding volatile security. What strategies do people use to cope with the ambiguous security situation? Participants use coping strategies which aim to reduce the risk of security incidents and possible negative consequences as well as strategies focusing on their reaction to the environment. The interviews show that coping strategies identified in the literature to cope with stress or general life challenges are also effective means to reduce the negative effect of a risky environment on general functioning. Coping behavior is apparent in the strategies focusing on internal process as well as in strategies focusing on the regulation of the situation. It seems that coping strategies influence the perception of risks that induce strong affect as well as the judgment of susceptibility to risks.

In the interviews some participants indicated that they experience negative affect associated with the consequences of security incidents. Previous studies carried out using an experimental paradigm gave rise to the assumption that affect laden consequences appear to lead to choices that appear as if negative consequences are overweighted in the final choice (Loewenstein et al., 2001; Rottenstreich & Hsee, 2001; Finucane & Holup, 2006; Slovic & Peters, 2006). This general effect is questioned by some interviewees who argue that in order to shield themselves from irrational decisions due to the emotional reaction they engage in emotion regulation (i.e., coping behaviors focusing on the self).

Some participants suppress emotions and they do not experience them, while others use reappraisal. Reappraisal refers to the cognitive reevaluation of the situation given the specific emotional activation. Depending on the additional information available to them they either “follow their gut” or they discount their emotional reaction. The accounts of the participants therefore question the assumption that affect generally functions as a heuristic to judge risks (for an overview see Slovic & Peters, 2006), and suggest it could be limited to instances where no further information about a specific threat is available and personal differences in emotion regulation are not considered. Besides the influence of coping on the emotional component of risk perception, coping or anticipated abilities of coping seem to affect the analytical component of risk perception as well.

The interviewees argued that their personal risk to experience security incidents and suffer from negative consequences of them is not equal to the general risk of security incidents. The participants argued that the personal risk of security incidents is depending on the strategies available of the person to reduce the likelihood of incidents or their severity (i.e., coping behaviors focusing on the situation). This is in line with the findings that people do not only search for information about probabilities and outcomes when judging choice option but also search for ways to affect the threatening event as well in order to be able to choose an option that yields the more advantageous favorable outcome (Huber et al., 2001; Huber & Huber, 2003, 2008).

One goal of the interview study was to identify the proposed underlying processes of self-regulation accommodation, assimilation and immunization (Brandtstädter, 2001; Greve, 2000). The underlying processes were inferred through an interpretation of the individual patterns formed by the reasoning and the reported strategies used. The results have to be treated as preliminary for at least two reasons. First, whether accommodative processes are active or not can only be determined when personal standards, reference points or the importance of goals shift, which is an explicit characteristic of accommodation, since accommodative processes are not initiated consciously (Brandtstädter & Rothermund, 2002). Change can only be observed over time and thus the identification of accommodative processes requires a longitudinal design. This also affects the ability to distinguish between accommodation and immunization. While in the current interpretation of the interviews the denial of risk of security incidents was seen as an indicator of immunization, it might as well be the result of accommodative processes and the resulting downward adjustment of what is considered safe. Second, the use of strategies

which control the personal susceptibility and vulnerability to ambient risks of security incidents was seen as an indicator of assimilative processes. Since the humanitarian aid workers interviewed received pre-deployment staff training and had to abide by security guidelines, it is at least questionable if in all cases this presents a reliable indicator of assimilative processes. These problems were attempted to be tackled by considering the reasoning of the participants as well as the relationship between risk perceptions and concern together with the coping strategies.

The findings suggest that participants who indicated a high activation of assimilation and low accommodation perceived the ambient risk as high and showed high concern for their personal security, even leaving the area of deployment in two cases due to extreme distress. Participants striving for control when assimilative strategies could not achieve control experienced distress. This presents a possible disadvantage of a high activation of assimilation and a low degree of accommodation in contexts where a specific goal is blocked and disengagement is not possible (Brandtstädter & Renner, 1990b; Brandtstädter & Rothermund, 2002; Carver, 1996). Another pattern found were participants which seemed to show a high activation of assimilative and accommodative processes. Those participants indicated that the ambient risk is high, but they experienced low personal concern. They relied on control strategies to limit personal susceptibility to security incidents and at the same time were aware of the remaining risk and adjusted what they considered safe accordingly. Those participants were distinguished from participants that were assumed to show immunization processes based on the appraisal of the ambient risk for security incidents. While the former group admitted the risk was high, the participants assumed to be affected by immunization processes appraised the ambient risk as low, and in turn had no reason to be concerned.

It assumed that a complementary activation of assimilative and accommodative processes leads to functional adjustment to challenges (Baltes & Baltes, 1990; Brandtstädter & Renner, 1990; Brandtstädter & Wentura, 1995). For an activation of assimilative and accommodative processes the activation of immunization processes need to be low to ensure that people perceive a discrepancy between aspired end state and present state (Greve, 2000). If immunization processes are activated people are likely to perceive the risk of security incidents as low as well as indicate low concern. It remains an open question how immunization processes influence adaptive functioning over time.

While immunization could be beneficial to reduce experiences of stress and insecurity, it could also lead to reckless behavior and a lack of vigilance.

It seems an important goal of future research to examine the implication of the processes underlying self-regulation particularly in uncertain contexts involving threats and how they affect adjustment. For example the activation of assimilation is associated with increased feelings of control (Taylor & Gollwitzer, 1995). Feelings of control are associated with an optimistic bias of one's own susceptibility to threat (Klein & Helweg-Larsen, 2002; van der Pligt, 1996; Weinstein, 1984). This could lead to an increase in risk-taking and actually increase the likelihood to experience negative events. On the other hand it was found that when the feeling of control is high more danger signals are attended to (Brandtstädter, Voss, & Rothermund, 2004). This could mean higher levels of stress in an ambiguous situation because situations are more likely to be identified as threat, but also higher vigilance and a lower likelihood to become victimized.

One surprising finding of the analysis of the interviews was that a low activation of immunization was associated with the view that personal risk-taking functions as a way to help others. It was found that when grouping participants according to whether they see risk-taking as a necessary means to help others or not, the second group seems to include more participants who also indicate a high activation of immunization processes. Maybe for participants who saw their work as a means to earn a living the interview activated conflicting cognitions concerning their security situation and their goal of risk-taking which induced a feeling of dissonance (Festinger, 1957). In order to reconcile these conflicting cognitions participants named strategies and reasons why they moved into an objectively dangerous context without experiencing distress or denied the dangers of the context all together. This would suggest that for the participants who saw their risk-taking as a way of helping, the goal was perceived as "more valuable" than just pursuing self-interest. How does a person's willingness to take risk change when one must take a risk to help others? This question will be focused on next.

Prosocial Behavior and Risk-Taking

Do humans dare because they care? The results of the interviews suggest that motives and risk perception are linked and that acting on behalf of another person may lead to a greater threshold for risk. This is in line with the observation of another interview study reporting that the feeling of “being needed” led to higher risk-taking among humanitarian aid workers, such as staying in regions where the security situation is deteriorating (Bronner, 2000). Are people willing to take higher risks when risk-taking is necessary to help another person?

Actions aiming to increase the well-being of others (e.g., helping, sharing and cooperation) are considered prosocial behavior (Bierhoff, 2002). As a result it would be considered prosocial behavior if a person would be willing to take a higher risk in order to benefit another person, than the person would when alone.

Risk-taking to help others presents a special case of prosocial behavior. The research on prosocial behavior has a long tradition in psychology and was influenced by the studies of Latané and Darlene (Latané & Darley, 1968) which examined situational factors for helping in emergency situations. The findings indicated situational factors such as group size, and social influence clarity of responsibility for the well-being of another person were determinants of helping (Latané & Darley, 1968). The studies generally used experiments which involved “real” helping situations. One example for an experiment is that a confederate drops a valet in front of a participant who is attending another experiment and whether the person helps or not is recorded. Using similar studies to explore bystander helping behavior found that helping is most likely to occur when a person cannot deny responsibility for another person, the need for help did not arise as a result of the persons actions, and the cost of helping is lower than the cost of not helping (for an overview see Piliavin & Hong-Wen, 1990). A psychological process increasing the willingness of people to help even if they do not gain from it is empathy (e.g., Batson et al., 1991; Batson, Bolen, Cross, & Neuringer-Benefiel, 1986). However, helping is just one example of prosocial behavior which is contradicting assumption that people only maximize self-interest with personal rewards. Studies focusing cooperation and fairness in economic settings tested the assumptions of rational choice proposed in utility theory directly and found that prosocial behavior is not as uncommon as it was previously assumed (Güth, Schmittberger, & Schwarze, 1982; Kahneman, Knetsch, & Thaler, 1986). In order to build on the research

using economic settings as a way to examine choices, the focus now will be on ways how to explore prosocial behavior using experiments.

First, three experimental tasks (referred to as games) used in behavioral economics to examine prosocial behavior will be described and experimental results will be reported. Second, research aiming to explain prosocial behavior based on personality, internal processes and situational variables will be described. Then other-regarding preferences will be introduced to explain prosocial behavior within the framework of expected utility theory. Finally, research examining choices under risk which affect others will be reviewed.

Prosocial Behavior in Experiments

The influence of others' payoffs on risk-taking will be explored in an experimental paradigm using real monetary payoffs. Experimental tasks are generally referred to as games, and three types of games are commonly used to examine prosocial behavior in experiments: public good games, ultimatum games and dictator games. In a public good game a group is randomly created consisting of n members that have an individual endowment of E_i tokens. Each subject can choose to keep her endowment or contribute it partly to a common project (the public good) g_i with $g_i \in [0, E_i]$. The contributions g_i of the whole group are summed up and then multiplied with an efficiency factor ε with $0 < \varepsilon$ and then split up between the group members. Each member receives a transfer from the collective wealth, independent of her choice to contribute or not. The final payoff of each subject π_i is determined by $\pi_i = E_i - g_i + \frac{\varepsilon}{n} \sum_{i=1}^n g_i$. Consider the following example for a public good game: A group consists of four members ($n = 4$). Each of the members receives an endowment of one ($E_{1,2,3,4} = 1$). The efficiency factor of the group is 2 ($\varepsilon = 2$). If we assume that every member contributes to the public good ($g_{1,2,3,4} = 1$) the following payoff would result for a given member:

To calculate the payoff for participant 1 we take the above stated formula $\pi_i = E_i - g_i + \frac{\varepsilon}{n} \sum_{i=1}^n g_i$, and enter the given parameters. This leads to a payoff for a given member of: $1 - 1 + \frac{2}{4} \cdot (1 + 1 + 1 + 1) = 2$. If the same member would have contributed nothing, her payoff would be $1 - 0 + \frac{2}{4} \cdot (1 + 1 + 1) = 2.5$. If behavior follows the rational maximization criteria of personal payoff the person should not contribute any of her endowment to the public good.

The self-interest hypothesis would predict that nobody contributes to the public good, but takes home the initial endowment plus the amount contributed to the public good by the group members. The dilemma in the public good game is that collective interest and personal interest are conflicting. While on a group level high contributions are efficient, not to contribute at all is efficient at the individual level. Thus, standard economic theory would predict “free riding” which means receiving the benefit from the collective project but not contributing to it. However, empirical data challenges this assumption: voluntary contributions occur and are significantly above 0 (e.g., Fischbacher, Gächter, & Fehr, 2001; Gächter, 2007; Ledyard, 1995). What happens if people are not faced with a choice that influences their group but another person? The ultimatum game captures the behavior of people in a dyadic exchange.

In an ultimatum game two participants are randomly grouped and one is given the role of a proposer and one the role of a recipient. The proposer has to decide how a given endowment should be split between the two actors. The recipient then decides whether to accept or reject the split. If the recipient chooses to reject the offer, both participants receive nothing. Standard economic theory would predict that the proposer offers the lowest possible amount which the recipient would accept. However, it was found that fair splits are proposed and that recipients are likely to reject offers that are very low (Güth et al., 1982). A meta-analysis surveying 37 articles yielding 75 ultimatum games reported that on average 40% of the endowments of the proposers are offered to respondents and 16% of the offers are rejected (Oosterbeek, Sloof, & Van de Kuilen, 2004). It remains unclear if the offer of a fair split is driven by benevolence or by fear of rejection. In order to distinguish both motives the dictator game was developed (Forsythe, Horowitz, Savin, & Sefton, 1994).

In a dictator game the setup is similar to an ultimatum game, the only change being that the recipient cannot reject offers from the proposer. While this set up enables the selfish player to act according to her preference and offer nothing without fear of rejection, it does not limit the benevolent player to offer as much as she wants. Standard economic theory predicts that the proposer keeps the endowment for herself. Challenging this prediction empirical evidence suggests that participants on average give away 25% of their endowment (e.g., Andreoni, Harbaugh, & Vesterlund, 2007; Camerer, 2003).

These findings suggest that the assumption that individuals only gain utility from maximizing personal monetary payoffs falls short of capturing human behavior. How can the prosocial behavior in experiments be explained?

Explaining Prosocial Behavior

A central question of research interested in prosocial behavior is whether the underlying motive is self-interest or altruism. The term altruism goes back to Auguste Comte, and traditionally described behavior that is completely selfless and where the actor does not benefit in any way from the action (Kitzrow, 1998). Contemporary definitions of altruism are less restrictive. Altruistic behavior is now defined based on three characteristics: it is voluntary, intentional and without the expectation of any external rewards (Bar-Tal & Raviv., 1982). Altruism is “a motivational state with the ultimate goal of increasing another’s welfare” (Batson, 1991, p. 6), this definition does not exclude the possibility that behavior driven by altruism can lead to positive feelings and other intrinsic rewards. But when there are no extrinsic rewards to explain behavior (i.e., rewards provided by the environment) the prosocial behavior is referred to as altruistic. Altruism and prosocial behavior are not the same and the terms cannot be used synonymously. Altruism is the motive underlying prosocial behavior, but not all prosocial behavior is necessarily linked to altruistic motives.

Expected utility theory suggests that if prosocial behavior is observed it should be driven by the intention to maximize personal utility over personal monetary payoffs. This perspective is underlying traditional economic thought and shapes the perception of the homo oeconomicus. However, recent theoretical developments in economics suggest that cooperation and other prosocial behaviors, which might not lead to maximization of personal income, can still maximize personal utility.

The findings and explanations for prosocial behavior will be described next. Three foci of explanations can be distinguished: personality, processes and the situational incentive structure. Each will be described individually in this next section.

Personality and prosocial behavior.

When approaching prosocial behavior from a personality psychological direction, the focus is on the question: to what degree can prosocial behavior be explained based on personality dispositions? Factors found associated with the “altruistic personality” were: control attribution of the cause, goals and motives and action readiness as a function of

competency to help, as well as responsible acting in general (Amato, 1985; Eisenberg et al., 1989; Rushton, Chrisjohn, & Fekken, 1981). A number of correlates of the “altruistic personality” were identified by comparing people who protected Jews during the holocaust and those who did not. The two groups could be distinguished based on their current disposition of locus of control, autonomy, risk-taking, social responsibility, tolerance, authoritarianism, empathy and altruistic moral reasoning (Midlarsky, Jones, & Corley, 2005). These studies indicate that generally the disposition for empathetic concern, perceived social responsibility and personal morale convictions correlate with actual prosocial behavior. However, it is questionable if these studies actually inform us as to whether or not the underlying motive of prosocial behavior is altruism. In experiments, personality variables generally associated with altruism do not predict prosocial behavior when controlling for alternative egoistical motives (Kirman & Teschl, 2010; Ma, Sherstyuk, Dowling, & Hill, 2002).

The studies of Amato (1985), Rushton et al. (1981) and Ma et al. (2002) operationalize the personality disposition towards altruistic behavior by assessing general prosocial characteristics as well as past prosocial behavior. For example Ma et al. (2002) used items from the Person Meaningful Profile (Wong, 1998) such as: *I care about other people; I relate well to others; I am liked by others or I contribute to the well-being of others*. The older scales of Amato (1985) and Rushton et al. (1981) assess only past behavior such as *I donated money to an organization or agency which gives assistance to needy people* (Amato, 1985) or *I have offered my seat on a bus or train to a stranger who was standing* (Rushton et al., 1981). While these scales could predict helping behavior in a number of studies (for an overview see Bierhoff, 2002; Carlo, Eisenberg, Troyer, Switzer, & Speer, 1991; Piliavin & Hong-Wen, 1990), when used in conjunction with experiments examining prosocial behaviors such as cooperation or giving, they fail to do so. For example inter-individual variance of contributions in a public good game could not be explained with the personality disposition for empathy. Furthermore participants classified as empathetic were not associated with systematically higher contributions. The high intra-individual variance is assumed to be rooted in the actions of the other and the fluctuation is due to the interactive character of public good games (Kirman & Teschl, 2010; Ma et al., 2002).

When examining the interaction between personality and situational factors it was found that dispositional altruism (i.e., past helping) is correlated with motivational altruism (i.e., helping without expecting anything in return) only in weak situations, and when the

evocation of empathetic concern is strong (Carlo et al., 1991). Since the data leading to the concept of an altruistic personality is based on surveys, it does not allow the control of the situational context and extrinsic incentives for prosocial behavior cannot be ruled out. Furthermore the items used are very specific for the context of helping as one example of prosocial behavior, while in experiments generally other forms of prosocial behavior are exhibited such as cooperation or giving. Using a broader conception to capture inter-individual differences that affect behavior might be fruitful.

It is assumed that personal goals influence behavior and choices (e.g., Ajzen & Madden, 1986; Carver, 1996; Forgas & Vargas, 1999; Oettingen & Gollwitzer, 2002). Personal goals are linked to personal values. Criteria which people use to select and justify actions and judge them are referred to as personal values (Schwartz, 1992). Values serve as standards and values guide the selection or evaluation of actions, policies, events, and people, including evaluation of the self. As bases of self-evaluation, values are central to the self-concept (Rokeach, 1973). At first sight personal values seems similar to attitudes, however while attitudes are situation specific and refer to the valuation of a specific behavior (Ajzen & Madden, 1986), values influence behavior and the perception of situation across contexts (Schwartz, 1992). One central aspect of values is their motivational nature. Personal values lead to the formation of personal goals and thereby shape the perception and selection of actions and situations (Schwartz & Bilsky, 1987).

The theory of basic human values by Schwartz (1992, 1994) proposes ten value types, which are recognized as distinct across cultures: benevolence, universalism, self-direction, stimulation, hedonism, achievement, power, security, conformity and tradition. The validity of the proposed values has been supported in numerous studies analyzing data from 20 countries (e.g., Schmidt, Bamberg, Davidov, Herrmann, & Schwartz, 2007; Schwartz et al., 2001; Vauclair, Hanke, Fischer, & Fontaine, 2011). It is assumed that specific values or specific goals are associated with value clusters which are captured by motivational types. For example social recognition presents a specific value or goal and is considered part of the value cluster of power. Table 12 displays the value types and their associated motivational goals as well as specific values which are held by each individual.

Table 12: Value types, motivational goals and specific values (see Schwartz, 1992, 1996).

Value type	Defining goals	Specific values
Universalism	understanding, appreciation, tolerance, and protection for the welfare of <u>all</u> people and for nature	broadminded, social justice, equality, world at peace, world of beauty, unity with nature, wisdom, protecting the environment
Benevolence	preserving and enhancing the welfare of those with whom one is in frequent personal contact (the 'in-group')	helpful, honest, forgiving, responsible, loyal, true friendship, mature love
Tradition	respect, commitment, and acceptance of the customs and ideas that one's culture or religion provides	respect for tradition, humble, devout, accepting my portion in life
Conformity	restraint of actions, inclinations, and impulses likely to upset or harm others and violate social expectations or norms	obedient, self-discipline, politeness, honoring parents and elders
Security	safety, harmony, and stability of society, of relationships, and of self	social order, family security, national security, clean, reciprocation of favors
Power	social status and prestige, control or dominance over people and resources	authority, wealth, social power
Achievement	personal success through demonstrating competence according to social standards	ambitious, successful, capable, influential
Hedonism	pleasure or sensuous gratification for oneself	pleasure, enjoying life, self-indulgent
Stimulation	excitement, novelty, and challenge in life	a varied life, an exciting life, daring
Self-Direction	independent thought and action--choosing, creating, exploring	creativity, freedom, choosing own goals, curious, independent

Values differ regarding their content and priority. While value content is determined by the associated goals, the priority of values is determined by the individual. Value priority captures the individual importance of each value and the responding value type.

In order to establish the ten value types Schwartz used the method of multi-dimensional scaling in a two dimensional space. Openness to change was contrasted with conservation on one dimension, and on another dimension self-enhancement was contrasted with self-transcendence. This resulted in a circular arrangement of the value types and the associated specific values and reflects an underlying motivational continuum. The compatibility of values and associated goals and behavior are assumed to decrease with growing distance between them. Values at opposing sides of the circle are also assumed to lead to opposing goals and actions. The structure of the basic human values is depicted in Figure 6

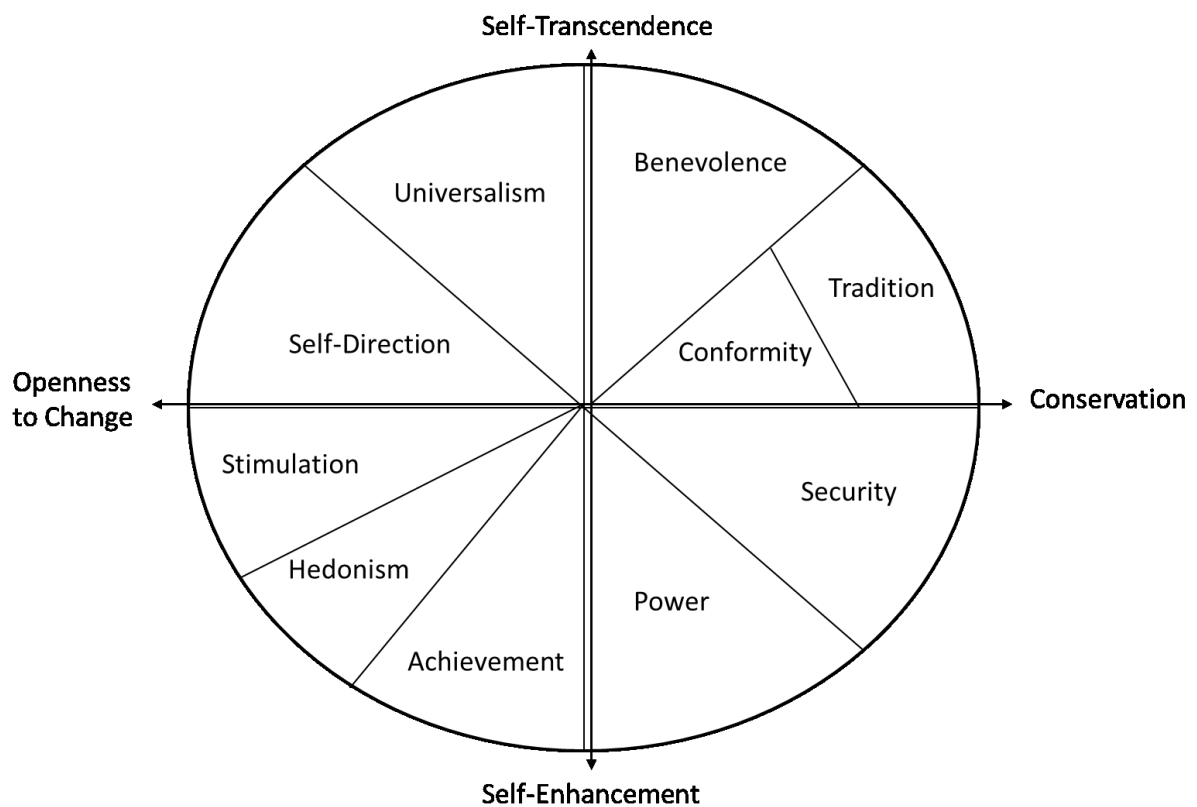


Figure 6: Theoretical structure of value types and underlying motivational dimensions (taken from Schwartz, 1992, p. 45).

Besides assuming the existence of the ten basic human values, the theory also proposes specific relationships between them. Value types can either be conflicting or compatible depending on how the behaviors and goals stipulated by the personal values affect one another. For example behaviors aiming to satisfy the goal of pleasure, which are

associated with the value type hedonism, can evoke behaviors which are contrary to the values associated with universalism, pursuing goals such as social justice. In this case pursuing one value would undermine the likelihood to achieve another.

Personal values are associated in the predicted fashion with political voting (Schwartz, Caprara, & Vecchione, 2010) the perception of ecological risks (Slimak & Dietz, 2006) as well as trait empathy (Balliet, Joireman, Daniels, & George-Falvy, 2008). Furthermore personal values associated with self-transcendence, benevolence and universalism, were found to be associated with more cooperative choices when deciding how to split a given pot of money, while values associated with self-enhancement, power, hedonism and achievement, were negatively correlated (Schwartz, 1996). These findings support the assumption about value priority and its impact on behavior and that personal values influence people's tendency to act prosocially across contexts. But is an individual's tendency to behave prosocially the same in all situations? The next section will introduce one important process that might be triggered by situational characteristics: the ability to experience how another human being feels in a given situation which is referred to as empathy.

Internal processes: Empathy.

In order to explain prosocial behavior a number of emotions are considered as seen in the following quote from Bowles and Gintis: "Prosocial emotions are physiological and psychological reactions that induce agents to engage in cooperative behaviors [. . .]. Some prosocial emotions, including shame, guilt, *empathy*, and sensitivity to social sanction, induce agents to undertake constructive social interactions; others, such as the desire to punish norm violators, reduce free riding when the prosocial emotions fail to induce sufficiently cooperative behavior in some fraction of members of the social group" (2003, pp. 432–433). Batson and collaborators (e.g., Batson et al., 1988; Batson & Shaw, 1991) present evidence in a number of studies that when inducing empathy, empathy being understood as feeling of sympathy for another person, prosocial behavior becomes more likely. Based on empirical evidence Batson argues in a number of articles that the prosocial behavior induced via empathy is based on altruism. He refers to this link as the empathy-altruism hypothesis (e.g., Batson et al., 1991; Batson & Moran, 1999; Batson et al., 1997).

The central question in the discussion concerning the empathy-altruism hypothesis, which lasted over a decade, was if prosocial behavior evoked by empathy is free of self-interest and purely altruistic. A number of alternative explanations for the link between

empathy and prosocial behavior drawing on egoism have been found. For example, the empathy specific reward hypothesis argues that if empathy is induced helping is intrinsically rewarding to the helper, because it relieves the negative state, is norm congruent and therefore positively reinforced by society (Cialdini, 1991; Cialdini, Kenrick, & Baumann, 1982; Cialdini et al., 1987).

The discussion led Batson to clarify that the altruism he refers to is not the only motive present, but it is one of many (Batson & Shaw, 1991). The difficulty of ruling out all other motives and identify a purely selfless giver is hard to test, because to rule out that a prosocial act is intrinsically rewarding seems impossible. For example, giving itself can have intrinsic utility (Andreoni, 1990). For this reason, in the current study when prosocial behaviors appear to be governed by the goal to increase the well-being of the other and extrinsic incentives can be ruled out, it is possible to assume that the underlying motive is altruistic, although impure, because intrinsic motives cannot be ruled out.

Situations and prosocial behavior.

Research focusing on situational determinants of prosocial behavior was begun by Latané and Darlene (1968). The findings indicated that not personality dispositions of helpers but situational factors such as group size, social influence and clarity of responsibility for the well-being of another person were determinants of helping (for a review see Bierhoff, 2002; Kitzrow, 1998; Piliavin & Hong-Wen, 1990).

People might act prosocially in order to look good in the eyes of others (Baumeister, 1982). If others are not present in that moment they might even engage in prosocial behavior to look good in their own eyes. The reason for this is if selfish acts are conflicting with one's self-identity and personal norms, prosocial behavior is chosen, in order to avoid cognitive dissonance (Harmon-Jones & Harmon-Jones, 2007). Image motivation includes both the desire to look good in one's own (self-image) and/ or in another person's eyes (social image). While social image motivation is closely related to impression management, which refers to creating a desirable social image through ones behavior, self-image motivation refers to the motivation to adhere to one's personal desired image, one's self-identity (Tetlock & Manstead, 1985).

Models focusing on self-identity argue that self-image motivation is a cause of prosocial behavior. Whether a person behaves prosocially or not depends on the salience of internalized social norms, rules about what is considered appropriate, and how valuable the

prosocial behavior is to signal personal moral standing. When receiving financial incentives for good deeds, others do not see the behavior as signaling the decision makers' moral standing. Furthermore, the extrinsic incentives crowd out the intrinsic incentive to be considered a good person in one's own eyes, because cooperation could also be explained through the extrinsic reward, thus, not to cooperate does not violate self-identity and cooperation decreases (Bénabou & Tirole, 2004).

The role of social image motivation as motivation for prosocial behavior in experiments is apparent in studies which manipulate whether choices are public or private (Dana, Cain, & Dawes, 2006). If ambiguity about personal responsibility for the outcomes of others exists people use this room to act more selfishly (e.g., Dana, Weber, & Kuang, 2007). Furthermore, it is shown that prosocial behavior in social contexts is influenced by the assumed norm (Andreoni & Bernheim, 2009). Following from the findings related to image motivation, when observing prosocial behavior it needs to be scrutinized whether it can function as a valuable signal for others or for oneself, in order to distinguish altruism from self-interest as motive for prosocial behavior. While one is able to rule out social image motivation as a driving force of prosocial behavior in an experimental setting by creating anonymity and privacy, to completely rule out self-image motivation seems rather difficult.

Another factor leading to prosocial behavior without altruistic motives is reciprocity. Reciprocity is given when a behavior is reaction to a specific action of the other or intends to stipulate a specific reaction of the other (Fehr & Schmidt, 2005). If prosocial behavior is driven by reciprocity, it is therefore dependent on expectations about the other and her reaction. The influence of reciprocity in a public good game can be found if the tendency to cooperate is conditional on the expected rate of cooperation of the other players (e.g., Fischbacher et al., 2001; Gächter, 2007). Another example is the tendency of the proposer in an ultimatum game to propose a split that is close to 50:50, because the responder, whose decision determines the outcome, is expected to honor this "fair" choice by accepting it.

As the summary of findings show people are motivated to behave prosocially when their actions are visible to others or when they are in a reciprocal relationship. However, even when ruling out the influence of reciprocity, by removing the power to turn down the offer by the responder in the ultimatum game and transforming it into a dictator game,

participants still transfer positive amounts to the now powerless recipient. This can be explained through other-regarding preferences.

Other-regarding preferences.

Other-regarding preferences explain behavior that deviates from individual utility maximization when another person is affected by one's choices, which is not in line with the self-interest hypothesis, in a utility theory framework. Fehr and Schmidt (Fehr & Schmidt, 2005) name altruism, spitefulness and envy as other-regarding preferences. These are not bound to any precondition such as actions or intentions, but only dependent on the payoff structure of a given choice. Models of altruism would predict that prosocial behavior is independent of the distribution of payoffs; however, studies show that while participants behave prosocially in one context, they will act as if they are guided by self-interest in another. Fehr and Schmidt (1999) and Bolton and Ockenfels (2000) explain the contradicting findings by drawing on the economic environment and its interaction with the individual's tendency for kindness and envy. The assumption underlying the theory of fairness (Fehr & Schmidt, 1999) is that people not only care about their absolute but also their relative payoffs when in social contexts. These concerns are captured by so called other-regarding preferences. Parameters that capture kindness in order to explain prosocial behavior as well as spitefulness in order to explain anti-social behavior are entered in the utility function. Depending on those traits people gain utility from other people's payoffs. In this manner, concerns about the other person's payoffs can be captured as preferences within a utility theory framework. Other regarding preferences are treated like any other type of preferences and are therefore measurable. Furthermore, they become part of a rational choice model and can be aligned among other preferences.

The theory of fairness (Fehr & Schmidt) explains why people choose to cooperate in one context but compete in another. The general idea within both theories is based on the assumption that people generally dislike inequality. The dislike of advantageous inequality (i.e., feeling discomfort about being richer) is referred to as benevolence or kindness and depicted with β . Disliking disadvantageous inequality (i.e., feeling discomfort about being poorer) is captured by α . It is assumed that $\alpha \geq \beta$, because a person gains more from her own payoff than from the payoff of another person, no matter how nice they are. The utility in a two player game for player i is captured by

$$u_i(x) = x_i - \alpha_i \max(x_j - x_i, 0) - \beta_i \max(x_i - x_j, 0), i \neq j.$$

This means that the utility of a given payoff x_i does not only depend on the absolute value, but also on whether the second player gets more (second term) or less (third term). The utility of a given payoff is maximized if the difference between payoffs is zero (Fehr & Schmidt, 1999, p.822).

The theory suggests that prosocial behavior is not necessarily shaped by altruism, but can also be motivated by equality concerns. This means that it is not the concern for the other that leads to an increase of the payoff for the other person, but the fairness of the distribution is the motivation. However, this model does not capture behavior when people choose distributions where the other receives more than them. This behavior shows a desire for efficient payoffs (Engelmann & Strobel, 2004, 2006) and contradicts the assumption $\alpha \geq \beta$.

When motivated by efficiency concerns, the maximization of joint payoffs will lead to prosocial behavior which maximizes payoffs for passive partners instead of maximizing equality (Charness & Rabin, 2002). In this case it can be difficult to unravel efficiency concerns from altruism, because the behavioral responses are the same.

Conclusion.

Research in economics as well as psychology yields numerous studies that find prosocial behavior. The underlying processes and motives leading to behavior that increases the well-being of another person are the subject of research from both disciplines. Psychologists argue for the influence of personal values, personality traits and empathy, and assume the underlying motive of prosocial behavior is often altruistic. Economists see prosocial behavior as a function of the incentive structure which induces actions that are guided by self-interest but can also lead to prosocial acts, such as cooperation. While in many instances prosocial behavior seems to be guided by self-interest and external rewards, there is still room for altruism as a motive for prosocial behavior where external rewards can be ruled out.

Outcome based other-regarding preferences assume that people care for the outcomes of others. Three reasons why they might care for others can be formulated: they gain utility directly when the well-being of the other is increased (pure altruism), utility partly increases because the increasing well-being of the other produces a good feeling or a “warm glow” (impure altruism), and the utility that one gains depends on the difference between one’s own well-being and that of the other (theories of inequality aversion).

The pure altruism model was criticized because studies examining crowding out still found that people give even when their contributions are not necessary to increase the public good and they could free-ride on the contributions of others, which leads to the assumption that giving itself increases utility and therefore prosocial behavior is not totally self-less or pure (Andreoni, 1990). Psychological studies support the hypothesis that prosocial behavior is at least partly related to negative-state relief, guilt reduction or self-reward (for a review see Bierhoff, 2002). Empirically pure altruism is difficult to identify, since self-interest can never be completely ruled out, so altruism in this thesis will therefore refer to impure altruism.

The research on prosocial behavior focuses on situations that involve certainty or strategic uncertainty. Strategic uncertainty refers to situations in which an actor's personal outcome is not only determined by her choice but dependent on the choice of another player, as it is the case in an ultimatum game or public good game. However, uncertainty can also be structural when it is part of the environment, as in lotteries. How does structural uncertainty influence choices in interpersonal contexts?

Risk-taking in Social Contexts

The theories interested in risky choice generally focus on individual decision making or examine decisions about risky options yielding consequences only for others. For example, in a study participants were asked to choose between different decision tasks which varied in their difficulty. If they had to choose for themselves they picked more difficult problems than when they chose problems for another person. When the choices were made in a group then the problems chosen for others were not easier than the problems chosen for oneself. This finding instigated research on the question whether personal responsibility triggers cautious behavior, while the diffusion of responsibility as given in a group setting does not (Wallach, Kogan, & Bem, 1964). Zaleska and Kogan (1971) observed that when people made choices between gambles where the outcomes affected others, their choices reflected a higher degree of risk aversion than when the outcomes affected themselves. Furthermore, they found that if groups made the decision they displayed more risk-taking. One important factor influencing this shift towards a stronger risk aversion is accountability, because people do not want to be responsible for bad choices influencing others (Tetlock & Boettger, 1994). The findings indicate that being responsible for the outcomes of others leads to more cautious behavior in order to avoid blame. In general participants show a higher degree of risk aversion when deciding for

others than for themselves. The studies examined cases where the risky choice either affected themselves *or* the other, but did not examine conditions where choices affected themselves *and* the other.

Charness (2000) argues for the influence of responsibility if one is performing an action which influences another's outcome. The responsibility alleviation hypothesis assumes that "shifting responsibility for an outcome to an external authority dampens internal impulses toward honesty, loyalty, or generosity" (Charness, 2000, p. 376). Charness (2000) shows that in line with the responsibility alleviation hypothesis, if the responsibility for joint outcomes can be placed on a third person, effort decreases compared to a situation where there is no third party influence. This finding indicates that changes in behavior can be achieved through small changes in perceived responsibility. This finding can also be interpreted in another way: if the actor feels more responsible for the outcomes of the employee, then higher effort is exerted.

Charness and Jackson (Charness & Jackson, 2009) found support for the assumed influence of responsibility by directly examining how feelings of responsibility influence decisions in a strategic environment, where risk-taking influences participants themselves *and* another person. They show in a stag hunt game⁵ that when a subject was making decisions influencing personal payoffs and the payoffs of a silent partner, risk-taking decreased compared to the individual decision.

In the study of Charness and Jackson (2009) both participants formed a group and received the same payoffs, as a result there is no inequality of payoffs. It is assumed that if

⁵ A stag hunt game presents a coordination game. Both players can choose between two options to stag hunt (stag) or to hare hunt (hare). Rousseau explained this game in the following way: If two people agree to hunt stag, they will end up with more food than when each by themselves decided to hunt hare alone. However if you decide to hunt stag and the other hare, you will go hungry. The payoff matrix is:

		Player 2	
		Stag	Hare
Player 1	Stag	9,9	1,8
	Hare	8,1	8,8

In pure strategies two Nash equilibria exist, either both players choose stag or both choose hare. However to choose hare is assumed to be the „riskless“ alternative, since it always has an outcome of 8.

economic decisions involve another party, other-regarding preferences influence choice (Bolton & Ockenfels, 2000). The theoretical construct of other-regarding preferences captures behavior as if driven by envy and kindness, and present a departure from the general assumption that humans act driven by pure self-interest when faced with economic decisions.

Bolton and Ockenfels (2010) carried out an experiment where they presented participants with a safe and a risky choice, the risky choice yielding two payoffs with a 50% probability. The lottery payoffs for each choice problem and the results are depicted in Table 13.

Table 13: Choices option and results of Bolton and Ockenfels (2010).

Choice Problem	Decision maker options and associated payoffs (euros)							Frequency of risk-taking (out of 26 observations)
	Safe		Risky					
	Decision maker	Recipient	50 percent		50 percent			
	Decision maker	Recipient	Decision maker	Recipient	Decision maker	Recipient		
Low safe payoff (L)	1	7	-	16	-	0	-	18
	2	7	7	16	16	0	0	15
	3	7	16	16	16	0	0	19
	4	7	0	16	16	0	0	15
	5	7	7	16	0	0	16	13
	6	7	16	16	0	0	16	20
	7	7	0	16	0	0	16	16
High safe payoff (H)	1	9	-	16	-	0	-	11
	2	9	9	16	16	0	0	9
	3	9	16	16	16	0	0	14
	4	9	0	16	16	0	0	10
	5	9	9	16	0	0	16	7
	6	9	16	16	0	0	16	9
	7	9	0	16	0	0	16	11

The choices presented to the participants differed systematically between-subjects in regard to their distributional equality. The results generally indicated less risk-taking if risk was extended to another person. However, when the certain option was disadvantageous for the decision maker, the risky option was chosen. Overall the study found that in one-person contexts people behave more risk seeking than when the risk also affects another

person. It is found that when the risky option is advantageous for the decision maker the benefit for the other is neglected. In the study of Bolton and Ockenfels (2010) two mechanisms could drive behavior: inequality considerations and responsibility. When taking out inequality considerations by introducing equal payoffs in the safe and the risky option for the decision maker and the recipient, choices indicate a higher degree of risk aversion and support the assumption the responsibility leads to greater caution (Pahlke, Strasser, & Vieider, 2010). Studies show that the choices of individuals change when they yield outcomes for others. When choosing for another person, individual risk-taking decreases. While studies examine risk-taking for oneself *or* another person, it was found that studies examining interpersonal choice in the sense of choosing for one's self *and* another person are rare.

The next chapter will describe two experiments aiming to fill this gap. The first experiment examines how risk-taking changes when people make choices that influence another person. The second experiment examined if empathy can explain the finding of the first experiment. Additionally it is examined to what degree the salience of personal losses in the risky choice influences the propensity for risk-taking in interpersonal choices.

Experiment 1

Do humans dare because they care? The choices examined in the studies cited above do yield safe payoffs⁶ (henceforth certain payoffs, see footnote) which benefit the decision maker as well as the recipient. However, how does risk-taking change when the certain option does not benefit the recipient and leads to inequality? The strongest experimental evidence that prosocial behavior could be motivated by altruism is found in dictator games. In the basic version of the dictator game one player (the dictator) receives an endowment and is asked to propose a split of the endowment between herself and another randomly assigned person (recipient); the recipient cannot reject the proposal. When playing a version of this game the first time under experimental conditions (Kahneman et al., 1986), the surprising finding was that participants chose to give up part of their endowment in such a game without any reciprocity or other explanations. This sparked numerous experiments. A review of the literature up to the year 2010 yielded 129 publications reporting 616 dictator games treatments (Engel, 2010). Across all dictator games the receiver payoff averaged 28.3% of the whole sum of endowments. It was found that 16.74% of the dictators were willing to give up 50% of their endowment, 13.07% gave away even more than 50% and only 36.11% kept everything (Engel, 2010, p. 6). Can these findings also be generalized to the situation encountered by the aid worker?

One major difference between economics and psychology is the way that experiments are conducted (Lopes, 1994; Ortmann, 1997; Ortmann & Hertwig, 2001). There has been an extensive discussion between psychologists and economists on how to conduct experiments so that they have external validity (e.g., Ortmann & Hertwig, 2001). For psychologists the psychological “authenticity” of the situation is necessary in order to achieve external validity. This is achieved through experimental tasks that present a meaningful part of reality, for example through hypothetical scenarios. Because in the current study the payoff structure can meaningful resemble the problem, a behavior economic paradigm is used. For this reason the incentive structure of the real problem is identified and then this specific structure must be reflected by the experimental task in

⁶ The term safe payoff used in previous studies will be replaced by the term certain payoff because certainty is the opposite of risky rather than safety. Furthermore certain payoffs are the outcome of choosing a certain option.

order to ensure external validity. The use of the incentive structure also means that participants receive real monetary payoffs.

In economic experiments, experimental tasks are created by so-called games. In economic games the structure of a given applied decision problem is defined by the payoff structured, the so called incentive structure which guides behavior. In order to examine this question a game which has the defining factors of the situation described in the interviews needs to be created. The necessary components are the agents, the relationship between the agents, and the state of nature influencing them.

The decision maker resembles the aid worker in the interview, while the other person personalizes the beneficiary, which in reality is a group of people. For reasons of simplicity only two agents are considered, the actor (henceforth decision maker) and the other person (henceforth recipient) affected by the decision maker's choices.

The relationship between them is unidirectional and anonymous. In the interviews it was shown that the humanitarian aid worker delivers aid to a group of beneficiaries, who cannot and do not offer anything in return. As a result, the decision maker's choice influences the recipient, but the recipient does not influence the decision maker in any way and anonymity is given.

In the applied context the capacity of the humanitarian aid worker to provide help is constrained by the security situation, which depends on the state of nature. If security incidents occur they affect the humanitarian aid worker directly and also lead to a decrease in aid received by the beneficiaries. However, if the humanitarian aid worker decides not to expose him or herself to the possibility of security incidents, no help is provided. As a result the context yields a choice with two options: a risky one to engage in providing aid in the field which could lead to either success or a security incident depending on the state of nature, or to stay in safety. While the fates of the humanitarian aid worker and the beneficiary are shared in the risky option, because both experience negative outcomes in case a security incident occurs and positive outcomes if not, the certain option yields independent fates. This constellation can be captured by the basic choice between a lottery with two outcomes (risky option) and a certain outcome (certain option), where the risky option and the certain option yield outcomes for the decision maker and the recipient.

The resulting choice situation can be depicted as a gamble with a certain and a risky option yielding two outcomes, one for the decision maker and one for the recipient. In the

applied context the probabilities for the positive or negative course of events are not known and are depicted with p ($p \in [0,1]$). The choice the decision maker faces can then be formulated as the gamble depicted in Table 14.

Table 14: The situation of humanitarian aid workers as gamble.

	Certain Option		Risky Option			
	Certain Outcome		Positive outcome		Negative outcome	
	Decision Maker	Recipient	Decision Maker	Recipient	Decision Maker	Recipient
Outcomes	1	0	1	1	-1	0
Probability	1		p		$1 - p$	

While in the certain option the decision maker receives positive outcomes, the recipient receives nothing and their fates are diametrical. In the risky choice their fate is shared and for both at the same time positive or negative, because they share the same probabilities. While the recipient can only gain from the risky choice of the decision maker, the decision maker himself can actually lose when choosing the risky option. The abstract situation is defined by the interpersonal choice context and the asymmetrical risk.

The structure of a dictator game is similar to the proposed asymmetric risk situation faced by humanitarian aid workers in the field. The decision maker has no obligations towards the recipient, they are anonymous and therefore reciprocity should not exist between them. Furthermore, in the asymmetric risk situation as well as in the standard dictator game, granting payoffs to the recipient leads to shortening one's own final payoffs. However, there is also an important difference between the dictator game and the asymmetric risk situation. In the dictator game whatever is given up and transferred is truly lost, while in the asymmetric risk situation only in case of a negative outcome the decision maker loses parts of the possible final wealth. In case of a positive outcome, he or she receives a higher final payoff as well as the recipient. The game is therefore not a zero sum game as the standard dictator game, where the loss of one is the gain of the other, but a positive sum game. Are decision makers willing to risk personal payoffs in order to benefit an anonymous recipient? The research so far does not give a clear answer to this question.

Previous studies did not assess the degree of risk aversion of individuals but only the proportion of choices on an aggregated level (Bolton & Ockenfels, 2010; Charness &

Jackson, 2009; Loewenstein et al., 1989). In other cases, the procedure used in the interpersonal and the individual task were not paired (Bradler, 2009), raising the question of whether the scores of risk aversion can actually be compared. Thus, it seems promising to combine the approach of Loewenstein et al. (1989) with the use of multiple price lists to evoke certainty equivalents (Andersen, Harrison, Lau, & Rutström, 2006), and to compare lottery pairs, which only differ in the aspect that another persons' payoffs are added while everything else stays the same.

Research Questions

Because the theories of other-regarding preferences are not meant to also predict behavior under risk, no hypothesis but “informed” research questions are formulated.

1. Does the individuals' degree of risk aversion differ between individual risk-taking and interpersonal risk-taking?

According to expected utility theory (von Neumann & Morgenstern, 1947) risk aversion in the interpersonal choice task should be the same as in the individual choice task, because utility is only derived from the decision maker's payoff, which is the same in the individual and the interpersonal lottery. Contrary to this assumption previous studies show that choices lead to an increase of risk aversion when others receive positive payoffs in the risky as well as in the safe choice option (Bolton & Ockenfels, 2010; Charness & Jackson, 2009; Pahlke, Strasser, & Vieider, 2011). In the current study, only the other benefits from risky choices. If the decision maker holds other-regarding preferences, such as altruism or inequality aversion, the risky option should be more attractive in the interpersonal choice and result in prosocial behavior in the form of a lower degree of risk aversion than when alone.

Inequality aversion and altruism lead to the same behavioral response, but the underlying mechanisms differ. If altruism or maximizing joint payoffs is the driving motive, then the risky option is preferred because it yields payoffs for the other person. If inequality aversion drives choices, then the risky option is preferred because the certain option leads to extreme inequality. In the case of expected equal payouts, it cannot be determined if inequality aversion or altruism drives risk-taking in interpersonal choices. However, when expected payoffs are unequal, this can be determined, which results in the question:

2. Does the relative distribution of payoffs in interpersonal choices in the risky option influence choice?

The change in risk-taking should depend on the distribution of payoffs if prosocial behavior is driven by inequality aversion. It is expected that if inequality aversion drives choices over outcomes, then lotteries leading to equal outcomes should be more attractive than lotteries with unequal payoffs. On the contrary, if altruism drives prosocial behavior, then there should be no differences in the changes of degree of risk aversion across the different payoff distributions.⁷

3. Does the framing of the certain option (as price for the lottery vs. as sure gain) influence the risk attitude?

Prospect theory proposes that the framing of a decision problem leads to a reversal of attitudes (Kahneman & Tversky, 1979). It is unclear whether the expression of the certain option as a price of the lottery induces a loss frame or not. If it does not change the framing of the decision problem, no differences should be found between the degree of risk aversion depending on whether the certain option is the price of a lottery or a sure gain.

4. Can the change of risk-taking in the interpersonal choice context compared to the individual choice context be predicted with giving in a dictator game?
5. Does the framing of the certain option influence the strength of association between change of risk-taking and giving in a dictator game?

One problem of studies interested in risky choice in interpersonal compared to an individual context and the relationship with other-regarding preferences under certainty is the frame of the certain option. In a dictator game the question the dictator is asked is, “How much of your endowment do you give to the other player?” and the question requests a decision about how much to lose. In the lotteries, the question asked is, “Which of the two possible gains do you prefer?” and the question requests a decision about how much to gain. The influence of framing on risk aversion has been a major topic of research

⁷ Assuming linear expected utility functions and implementing the proposed utility function of Fehr and Schmidt (1999) with the parameters of $\alpha = 2$ and $\beta = .6$ proposed by Binmore and Shaked (2010) leads to the prediction that if the certain option yields extreme inequality the risky option should always be preferred in case of equal or advantageous expected payoffs. When disadvantageous payoffs are expected then people should even be more risk averse than when deciding only for themselves.

(e.g., Tversky & Kahnemann, 1981). In order to find out how the framing of the choice influences the degree of risk aversion in the individual and the interpersonal choice context, the influence of both frames should be examined. It is expected that when people are aware of possible losses, they become loss averse and are more prone to choose the certain option.

Two exploratory questions focusing on personality are also important. First, how do personal values influence risk-taking in the interpersonal choice context? When judging environmental risks it has been shown that personal values play an important role when judging risks (Slimak & Dietz, 2006). For these reasons personal values will be assessed using items from the Portray Value Questionnaire (PVQ) measure of Schwartz (Schwartz, 1994, 2007). Second, how does the subjective importance of responsibility for the other, the other's payoff and personal payoffs influence risk-taking in the interpersonal choice context?

Method

Participants.

A sample of 120 participants took part in this lab-based study. Due to a technical problem, however, only 90 of those participants were able to fill out the additional questionnaire assessing demographic variables after the computer based experiment was carried out. As a result, behavioral data of 90 participants can be complemented with data from a self-report measure of values and demographic information.

Table 15: Participants.

<i>N</i> = 90	Gender		Age		Monthly disposable income	
	Male	female	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
	20.0%	80.0%	21.41	2.53	418.77 €	308.56 €

Design.

In the experiment each individuals risk attitude was elicited for four individual and four interpersonal lotteries. The interpersonal lotteries led to four different distributions in the risky option (equal, disadvantageous for the decision maker, advantageous for the decision maker and equality of payoffs but high variance). Thus, the experiments yields two within-subjects factors with two and four treatment levels respectively, resulting in four lottery pairs.

The treatments differed between participants regarding two factors: the salience of possible personal losses was varied through the presentation of the certain option as a gain or as price of the lottery. Furthermore, the groups differed as to whether the importance of the outcome of the interpersonal choices was assessed or not in order to control for possible effects on the subsequent measures. The manipulations will be described in detail below.

Choice context.

Participants faced choices between lotteries and certain outcomes in an individual and an interpersonal choice context. In the individual choice context choice options only involved payoffs for the decision maker. The interpersonal choice context involved consequences for the decision maker and for another randomly assigned participant of the

experiment. The interpersonal choice options were created through adding consequences for another person while keeping everything else constant. In order to create a situation involving asymmetric risk, the other person received a payoff of zero in the certain option and a positive payoff in the risky option. When participants faced choices between options that only had consequences for themselves, choices are referred to as choices in the individual choice context. When participants made choices between options that had consequences for themselves *and* another person (the recipient), choices are referred to as choices in the interpersonal choice context.

Distributional equality of payoffs.

By keeping the payoff of the recipient constant across all four choice tasks while the payoff levels for the decision maker changed with each choice task, the distributional equality of payoffs in the interpersonal choice context varied. The risky outcomes in the interpersonal choice task lead to equal (choice task 1), disadvantageous (choice task 2), advantageous (choice task 3) and equal payoffs with higher variance (choice task 4) for the decision maker compared to the recipient. The different payoff levels are depicted in Table 16.

Table 16: Lotteries and distribution of outcomes.

Choice Task	Distribution of payoff	Risky choice	
		Decision maker	Recipient
1	Equal	1500 vs. 2500	1500 vs. 2500
2	Disadvantageous	1000 vs. 2000	1500 vs. 2500
3	Advantageous	2000 vs. 3000	1500 vs. 2500
4	Equal – high variance	1 vs. 3999	1 vs. 3999

Henceforth the term lottery refers to an option with two possible payoffs. In each multiple price list, only one lottery is depicted. The term choice task refers to a multiple price list, and the term decision or choice refers to a row in a multiple price list where the decision maker has to choose between a certain option and a lottery.

Framing of the certain option.

The framing of the certain option was varied between-subjects. If the certain option was framed as a gain, the participants chose between a lottery with a risky outcome and a certain outcome with a certain positive payoff (sure gain). In the case in which the certain

equivalent was framed as price of the lottery, the participants chose between buying a ticket to participate in a given lottery or to “save” the money of the lottery ticket, to keep it as their payoff, and not to participate in the lottery.

Materials.

The study consisted of two main parts: an experiment and a questionnaire⁸. The experiment was carried out in the laboratory, and the questionnaire was administered online three days later.⁹

Dependent Variable Measures

The dependent variable was the individual’s risk attitude. The preference for the risky option in a given gamble is referred to as risk preference. The risk preference is used to measure individual’s risk attitudes. Risk attitudes were measured in choices between options yielding lotteries (henceforth lotteries) and options yielding certain outcomes (henceforth certain options) with consequences for the choosing person (individual choice), and choices between lotteries and a certain options with consequences for the choosing person and another person (interpersonal choice).

In order to identify the risk attitude of a person, the certainty equivalent is used (Eisenführ & Weber, 2003). The certainty equivalent of a given lottery is identified when a person i_i with $i = (i_1, \dots, i_n)$, is indifferent between a lottery L_i with $L = (L_1, \dots, L_n)$, and a certain payoff Y . The lottery has x_i outcomes with $x = (x_1, \dots, x_n)$ and each outcome has an associated probability of p_i with $p = (p_1, \dots, p_n)$ and it holds that $\sum_{i=1}^n p_i = 1$. The certain payoff Y is then regarded as the certainty equivalent of L_i and $Y = CE(L_i)$. It is assumed that the utility of the certainty equivalent is equal to the expected payoff of the lottery, $u(CE(L_i)) = EV(L_i)$.

Arrow and Pratt (Eisenführ & Weber, 2003) assume that the shape of the slope of a utility function mirrors the risk attitude. The shape is defined using the Arrow-Pratt Measure of risk attitude $r(x)$:

⁸ Detailed instructions of the experimental tasks and questionnaire items of the PVQ are presented in the Appendix A - Appendix I.

⁹ It was planned to administer the questionnaire right after the experiment, however, due to technical difficulties this was not possible.

$$r(x) = -\frac{u''(x)}{u'(x)}.$$

The above formula requires that the utility function has at least two derivatives and that the first derivative is different from zero. While the formula above depicts a measure of the absolute risk attitude the relative risk attitude is calculated by multiplying the formula above with the respective consequence. This leads to the measure of relative risk attitude $\dot{r}(x)$:

$$\dot{r}(x) = -\frac{u''(x)}{u'(x)} \cdot x.$$

It is assumed that $r(x)$ is constant across payoff levels; this means the sum of the investment should not influence the risk attitude. Whether this assumption is correct is an important subject of research.

The approach described above makes specific assumptions about the shape of the underlying utility function. For example, the use of the Arrow-Pratt Measure is only possible if the utility function has two derivatives. One example of a utility function that satisfies this requirement would be a logarithmic utility function $u(x_i, p_i) = \ln(\sum_{i=1}^n p_i \cdot x_i)$. While in an individual uncertain choice context this utility function is used often and seems to model utility quite well (Harrison & Rutström, 2008), it is unclear if this is the case in an interpersonal context. The preference for the risky option in a given gamble is referred to as risk preference. The risk preference is used to measure individual's risk attitudes. In order to limit the necessary assumption of the underlying utility function, the approach of Kachelmeier and Shehata (1992) is chosen, because they propose a linear utility function, which is theory free, of the form $u(x) = \sum p_i \cdot x_i$. In this case the risk attitude can be calculated for lottery L and each individual as $r_i(L) = \frac{u(CE)_{iL}}{u(EV)_{iL}}$. Based on the ratio of the expected utility of a lottery and its respective certainty equivalent the individual's choices can reflect three general risk attitudes: for $r(i_L) = 1$ risk neutrality, for $r(i_L) > 1$ risk seeking and for $r(i_L) < 1$ risk aversion (Kachelmeier & Shehata, 1992). A person is assumed to be risk neutral if she is indifferent between a lottery yielding the same expected value as a given certain option. A person is assumed to be risk averse whenever she prefers a certain option yielding the same expected value as a lottery over the lottery itself. If she prefers the lottery over a certain option yielding the same expected value she is considered risk seeking. According to this definition risk aversion and risk

seeking are relative terms, and a decrease in risk aversion is equivalent to an increase in risk seeking.

In order to elicit the certainty equivalent for a given lottery, each lottery and certain options were presented in a multiple price list format. A multiple price list presents choices between alternatives in a list format. In each row of the list the individual has to decide between two options. Due to their convenience, multiple price lists are used in experimental economic research in order to elicit risk preferences or individual's willingness to pay or willingness to accept prices (Binswanger, 1981; Holt, 2006; Kahneman, Knetsch, & Thaler, 1990). For example, a multiple price list can be used to elicit the price of apples. In this case the decider has to choose between two options, money vs. apples, and in each row apples and money are offered. The experimenter could keep the number of apples in each choice constant (each row), while the money offered in each row moving down increases, the point where the decider switches from apples to money will tell us at which point the individual is indifferent between apples and money indicating the value associated with apples. The multiple price list format has three possible disadvantages (Andersen et al., 2006): it can only elicit intervals of values, not precise values, participants can switch back and forth between the two options making it impossible to identify one value and the method might be susceptible to framing effects. However, it has been shown that despite these possible limitations the use of the multiple price list design is robust and reliable to elicit the individual degree of risk aversion (Harrison & Rutström, 2008).

In each multiple price lists eleven rows were presented. In each row of the table the participants had to decide between a lottery with two outcomes determined by a coin toss and a certain outcome. The outcomes and probabilities of the lottery were held constant throughout all eleven choices of one table, while the certain outcome increased with each choice moving down in the table. The certain outcome z for a given multiple price list, increases by 100 points moving down a row r . The rule for the certain payoff was:

$$\text{lowest payoff of the gamble}_L + z; z = (r - 1) \cdot 100.$$

Table 17 presents an example of a multiple price list to elicit the individual's risk attitude. The participant is asked to decide in each row, whether she prefers Option A or Option B.

Table 17: Example of lottery choices presented in a multiple price list format.

Decision Number	Option A	Option B		Do you prefer A or B?
		Heads	Tails	
1	100	100	500	A / B
2	200	100	500	A / B
3	300	100	500	A / B
4	400	100	500	A / B
5	500	100	500	A / B

The point where the participant switches from Option B to Option A indicates the interval in which the participant is indifferent between Option A and Option B and yields the certainty equivalent for the given lottery $L_1 = (100, .5; 500, .5)$. This interval is used to estimate the participants risk preference in the above described manner. The lottery L_1 depicted in the example in Table 17 yields an expected utility of $u(L_1) = 100 \cdot .5 + 500 \cdot .5 = 300$. A risk neutral participant would switch from Option B to Option A in the third decision, a risk averse participant would choose Option A in an earlier decision while a participant switching in a later decision would be described as risk seeking.

Ancillary Measures

Other regarding preferences.

Besides the risk preferences, other-regarding preferences were elicited using a dictator game. In a dictator game, a participant (dictator) is endowed with a sum of money. She then is asked how much of this endowment she is willing to give to another participant (recipient). The recipient cannot decide to take or to leave the offered sum. Dictator games were developed in order to disentangle strategic and altruistic motives that could both lead to fair transfers in an ultimatum game (Engel, 2010). The transfer in a dictator game is considered a measure of altruism because the recipient is powerless and any social control through others of dictator behavior is ruled out and self-interest would dictate to give nothing (Andreoni et al., 2007; Brandstätter & Güth, 2002; Fehr & Fischbacher, 2003).

In the dictator game the participants had to choose how they want to distribute a given amount between themselves and another participant. The action space of a dictator was presented in a multiple price list presenting all possible distributions of a division of

2000 tokens between the dictator and the recipient in steps of 100. The participants had to state which distributions they accepted and which they refused to accept.

Measuring personal values.

In order to assess the personal values, the German version of the Portray Value Questionnaire (PVQ) was used (Schmidt et al., 2007). The questionnaire presents 40 statements describing a person, e.g.: *It is important to him to respond to the needs of others. He tries to support those he knows.* Participants rate their similarity to the described person on a scale from one to six. High values indicate high levels of similarity while low values indicate low levels of similarity.

The Portray Value Questionnaire assesses a person's value priorities among the following ten values: power, performance, hedonism, stimulation, self-determination, universalism, benevolence, tradition, conformism, and security. The score for a personal value is calculated based on the mean score of all portrays considered to reflect a specific value type. Table 18 presents the reliability of the scales measuring each value type and mean scores across the whole sample, showing that the scales of the PVQ yield satisfactory reliabilities.

Table 18: Reliability of scales assessing personal values in Experiment 1.

Value type	Number of participants	Number of Items	Cronbach's Alpha	<i>M</i>	<i>SD</i>
Power	90	3	.76	3.21	1.01
Performance	90	4	.78	4.17	.89
Hedonism	90	3	.79	4.63	.89
Stimulation	90	3	.70	4.10	.95
Self-determination	90	4	.65	4.95	.69
Universalism	90	4	.65	4.47	.75
Benevolence	90	4	.69	4.93	.72
Tradition	90	4	.49	3.17	.78
Conformism	90	4	.55	3.87	.75
Security	90	5	.58	3.94	.73

Measuring subjective importance of situational aspects.

In order to increase the salience of the other person in interpersonal tasks and to activate altruistic motives before the interpersonal choice task a measure of the weight given to the outcomes of the other person was carried out.

The measure consisted of the following three questions which were rated regarding their importance on a six point scale:

1. How important is it for you that your choices in the next task have consequences for another person?
2. How important is it for you to make choices in the next task, which can be particularly advantageous for you?
3. How important is it for you to make choices in the next task which are particularly advantageous for the other person?

Procedure.

The study was conducted at the Hermann-Ebbinghaus-Laboratory at the University of Erfurt. The experiment was programmed using z-Tree (Fischbacher, 2007). Participants were invited using the ORSEE database (Greiner, 2004). Altogether 13 sessions were carried out in which four treatment conditions were examined and participants were assigned randomly to the treatment conditions.

When entering the laboratory all participants were randomly assigned to isolated terminals where they received the same written instructions, stating the general rules and procedures of the experiment. These instructions were read aloud to the participants and questions regarding the procedure were answered. They were informed that their payment at the end of the session would consist of a 2.50 € show-up fee plus the payoff from the experiment paid in real money. The unit of experimental money was Taler and 1250 Taler equaled 1 €. The conversion rate was announced to the participants at the beginning of the experiment. Average earnings amounted to 8.05 € ($SD = 1.43$ €). The participants were seated in separated cabins and were not able to communicate with one another after the experiment started. The experiment consisted of three parts: four interpersonal choice tasks, four individual choice tasks and a dictator game (see Figure 7).

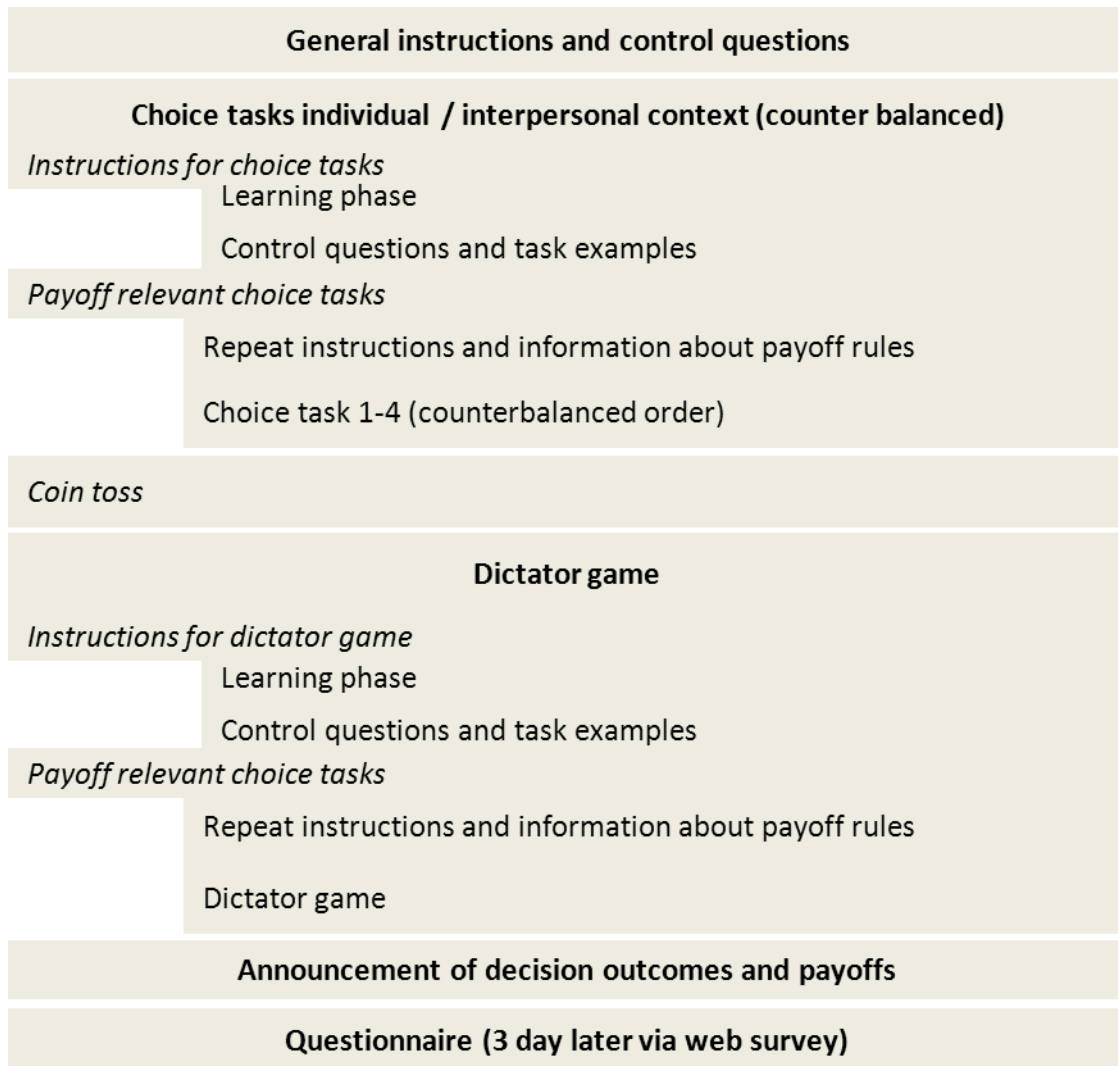


Figure 7: Sequence of events during the experimental session.

At the beginning of the experiment, all participants had to answer two questions to make sure that they understood the general instructions correctly. Each of the three parts of the experiment commenced with instructions presented on the screen. The rules and procedure of the subsequent choice problems were explained. The instructions were followed by control questions, assessing whether the participants understood the rules of the task. After answering all control questions correctly, the participants were informed that they now face choice problems which would determine their final payoffs.

The experiment consisted of interpersonal and individual choice tasks. The order of individual choice tasks and interpersonal choice tasks were counterbalanced. The individual choice tasks and the interpersonal choice tasks were alike, differing in only one respect: in the first, participants were only presented lotteries with a possible outcome for

them personally, but in the second, participants were presented with possible outcomes for themselves and possible outcomes for another participant. The other participant was anonymous and randomly assigned to the decision maker.

All participants first played the role of the decision maker and then became a recipient. They were not aware of that role change when they had the role as decision maker. They were informed about both roles at the end of the experiment.

In order to avoid portfolio effects, the participants were informed that from each part one choice would be drawn randomly and played out. They received the information about their personal payoffs after all parts of the study were completed. After completing one part of the experiment the participants saw a message on their screen telling them that one of the decision problems was picked randomly and its outcome determined by an electronic coin toss.

After making all the choices in the three stages (individual choice task, interpersonal choice task and dictator game) the participants were informed that they were now recipients and would receive a gift from another participant, first in the interpersonal choice task and second in the dictator game. The participants were randomly paired as recipients in the interpersonal choice task and again for the dictator game.

At the end of the experiment participants were informed about the outcomes of the randomly picked choice problem and about their final payoffs. They were asked to create a personal code in order to be able to merge their behavioral data and the data from the questionnaire. Finally, they were paid privately in their terminal and then took their leave.

Three days after completing the experiment an online survey assessed the participants' personal values with the German version of the Portray Value Questionnaire (PVQ) (Schmidt et al., 2007) and their demographic information.

Results

How often a person decided to pick the certain option in each choice task indicates the switching point and thus her certainty equivalent for a given lottery. At choice number six the payoff of the certain option is equivalent to the expected payoff of the gamble. As a result, a risk neutral person would always choose the gamble up to decision number six, be indifferent between the gamble and the certain option for choice number six, and switch to the certain option in choice number seven, resulting in five safe choices (i.e., choices of the certain option).

Each individual lottery and the interpersonal lottery yielding the same payoffs for the decision maker are considered lottery pairs. The proportion of safe choices across all participants for each decision in each choice task were aggregated and are depicted for each of the four lottery pairs, distinguishing the choice contexts (individual vs. interpersonal) in Figure 8 and the classification of participants can be found in Appendix J.

On the y-axis the proportion of safe choices for each decision is plotted, on the x-axis each decision, which is one row in each multiple price list, is plotted. When moving from left to the right on the x-axis, the certain option increases while the lottery payoffs as well as the probabilities were kept constant. Figure 8 shows plots of the proportion of safe choices for each lottery pair and the choices predicted under the assumption of risk neutrality.

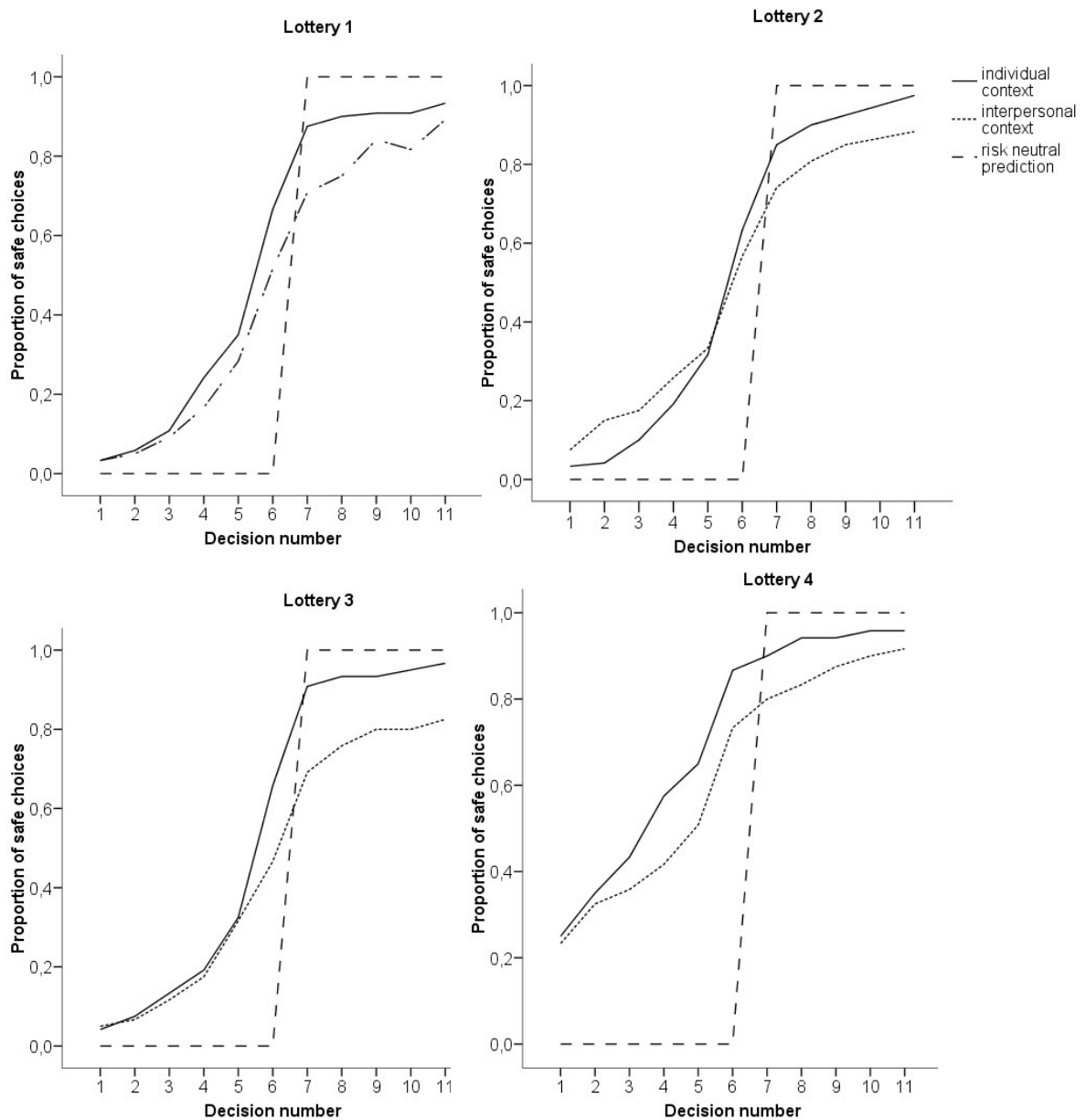


Figure 8: Proportion of safe choices for each paired individual and interpersonal choices and risk-neutral prediction.

The plots show that the majority of the participants made decisions that reflect risk aversion. The proportion of safe choices is lower in the interpersonal lotteries than in the individual ones and the difference between the proportion of safe choices in the individual and interpersonal choice context differs between the lotteries. This suggests that payoffs of another person as well as the distribution of these payoffs among the decision maker and the other person influence the risk attitude of the decision maker.

The frequency of choosing the sure outcome indicates the switching point between the certain option and the lottery. The switching point presents the interval in which the

participant is indifferent between a certain payoff and the lottery which presents the certainty equivalent for the given lottery. The certainty equivalent was used to calculate a parameter for the risk attitude of each individual r_i through standardizing the certainty equivalent of each individual's CE_i for a given lottery L_i using the expected value of the given lottery $EV(L_i)$:

$$r_i = \frac{CE_i(L_i)}{EV(L_i)} \begin{cases} r_i < 1, \text{risk aversion,} \\ r_i = 1, \text{risk neutrality} \\ r_i > 1, \text{risk seeking} \end{cases}$$

Consistency of choices.

One downside when using the multiple price list format as elicitation method is the requirement of consistent responses from the participants. This means that after choosing the certain option, a subject should not switch back to the risky option, if the certain option increases (Eisenführ & Weber, 2003). However, when using the multiple price list format as elicitation method without forcing consistency on participants inconsistencies occur (Harrison & Rutström, 2008). There does not seem to be a general best practice how to handle inconsistent responses to choices embedded in multiple price list designs. While Holt and Laury (2002), who introduced multiple price list designs to measure risk attitudes, propose keeping inconsistent cases and comparing a dataset with and without inconsistent cases. Andersen, Harrison, Lau and Rutström (2006) propose to consider inconsistencies not as mistakes but as expressions of indifference. This would lead to broader intervals of indifference. The general question underlying the problem is whether inconsistencies are mistakes or true preferences. While in the case of mistakes it would seem best to use Holt and Laury's (2002) approach, under the assumption that inconsistency reflects a true preference Andersen et al.'s (2006) method would be suitable, which means viewing inconsistency as an indicator of indifference. This would lead to larger intervals of indifference indicated by multiple switching points.

Inconsistencies can be informative (Tversky, 1969) and in the current study, choice inconsistencies might be due to mistakes or due to strategizing. Mistakes would mean the case when participants clicked on A when they meant to click B. Strategizing would mean the people assume that they could beat chance, which would manifest itself in inconsistencies. Inconsistent choices could be problematic in the present study if they are systematically related to the choice context (individual vs. interpersonal). If strategic

considerations would be guiding choices, the inconsistencies would be observed across all lotteries and would depend on the choice context.

Before the effects of the experimental conditions on the dependent variable were analyzed, the choices were screened regarding their consistency. The sample consisted of 120 participants. In the interpersonal choice task 82.5% of the participants made consistent decisions in the interpersonal choice task. Inconsistent choices in one interpersonal choice task were observed in 10.0% of the cases, inconsistent choices in two interpersonal choice tasks were observed for 3.3%. Furthermore 3.3% made inconsistent choices in three interpersonal choice tasks and .8% chose inconsistently in all interpersonal choice tasks.

In the interpersonal choice task 84.2% participants made consistent decisions in the interpersonal choice task. Inconsistent choices in one interpersonal choice task were observed in 8.3% of the cases, inconsistent choices in two interpersonal choice tasks were observed for 3.3%. Furthermore 2.5% made inconsistent choices in three interpersonal choice tasks and 1.7% chose inconsistently in all interpersonal choice tasks (tables are presented in the Appendix K and Appendix L). The choice context did not significantly differ regarding the frequency of inconsistent choices, a Wilcoxon signed rank test yielded, $Z = -.252, p = .800$. Because inconsistent choices are unsystematic they are viewed as mistakes. This means in order to control for the possible mistakes of participants, but also prevent the reduction of the sample, the statistical analysis of the results will be carried out twice. This approach is the same as reported by Holt and Laury (2002).

Analysis of treatment effects were conducted twice, once for a complete sample and once for a sample in which inconsistent choices in one lottery were coded as missing values. In the first step the mean risk attitudes of the consistent and inconsistent sample are compared. The mean risk attitudes of the corrected and the original sample were compared and analyzed with a MANOVA. On average the risk attitudes in the sample consisting only of consistent cases was generally 0.1 – 0.2 points lower than the average risk attitudes in the whole sample and yielded no significant differences regarding the mean risk attitude in any choice task (see Table 19).

Table 19: Sample means of risk attitude with and without inconsistent cases.

Choice context	Choice task	Only consistent cases	<i>N</i>	Descriptive Statistics		MANOVA		
				<i>M</i>	<i>SD</i>	<i>F</i>	<i>p</i>	η_p^2
Individual	1	Yes	92	0.91	0.12	0.54	.464	< .01
		No	120	0.92	0.11			
	2	Yes	92	0.89	0.16	0.46	.498	< .01
		No	120	0.91	0.17			
	3	Yes	92	0.93	0.10	0.44	.508	< .01
		No	120	0.94	0.10			
	4	Yes	92	0.79	0.17	0.56	.454	< .01
		No	120	0.81	0.17			
Interpersonal	1	Yes	92	0.97	0.16	0.67	.416	< .01
		No	120	0.99	0.16			
	2	Yes	92	0.91	0.27	0.37	.546	< .01
		No	120	0.93	0.27			
	3	Yes	92	0.98	0.14	0.51	.478	< .01
		No	120	1.00	0.14			
	4	Yes	92	0.86	0.20	0.34	.561	< .01
		No	120	0.87	0.21			

Results of the based on the original sample without corrections will be presented in the text, the “corrected” analysis in foot notes.

The Influence of choice context and framing of the certain option on risk attitudes.

In order to establish whether these effects are significant and how the framing of the certain option affected the individual choices, individual risk attitudes were calculated and

compared within a Mixed Design ANOVA (Tabachnick & Fidell, 2001).¹⁰ The within-subjects factors entered were the choice context (interpersonal vs. individual choice context) and distribution of risky payoffs in the interpersonal lottery (equal vs. worse off vs. better off vs. equal/ variance high). The presentation of the certain option (sure gain vs. price to pay) was entered as between-subjects factor.¹¹ The descriptive statistics are depicted in the Appendix M. Effect sizes are reported as η_p^2 . The rule of thumb in order to qualify the effect is according to the following classification: $\eta_p^2 < .01$ small effect, $.01 < \eta_p^2 < .1$ medium effect, and $\eta_p^2 > .1$ a large effect (Kinnear & Gray, 2004, p.250). Effects with a medium size that are not significant will be reported.

The results are graphically depicted in confidence intervals. Confidence intervals involve distributional and statistical information. The length of the error bar depicts the 95% confidence interval of the mean. The overlap of less than 25% of the error bars indicates a significant difference at $\alpha \leq .05$ (Cumming & Fidler, 2009; Cumming & Finch, 2005; Masson & Loftus, 2003).

On the left side of the graph the confidence intervals of the individual risk aversion parameter are depicted for choices where the certain option was presented as a sure gain. On the right side are listed the individual risk aversion parameters elicited in choices where the certain option was presented as a price to pay. The y – axis depicts the mean individual degree of risk aversion. On the x-axis choice tasks are depicted and are labeled according to the choice task number and in the interpersonal choice task they lead to different payoff distributions between the decision maker and the recipient. The risky outcomes in the interpersonal choice task lead to equal (choice task 1), disadvantageous (choice task 2), advantageous (choice task 3) and equal payoffs with higher variance (choice task 4) for the decision maker compared to the recipient. The confidence intervals for the mean risk attitude in decisions of lotteries in the individual choice context are depicted with solid

10 Whether the measure of the importance of situational aspects was carried out before the interpersonal choices or not, did not affect individuals risk attitude, $F(1,105) = 0.22, p = .639, \eta_p^2 < .01$. For this reason it was left out as a factor in the analysis.

11 Mauchly's Test indicates that the assumption of sphericity has to be refuted for the within-subjects factor distribution of payoffs, $\chi^2(5) = 39.34, p < .001$. As a result the degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity for the main effect of the distribution of payoffs and for the interaction of distribution of payoffs and choice context.

bars and the confidence interval for the mean risk attitude in decisions involving lotteries in the interpersonal choice context is depicted with dotted lines. The 95% confidence intervals were calculated based on the between-subjects variance in each respective condition.

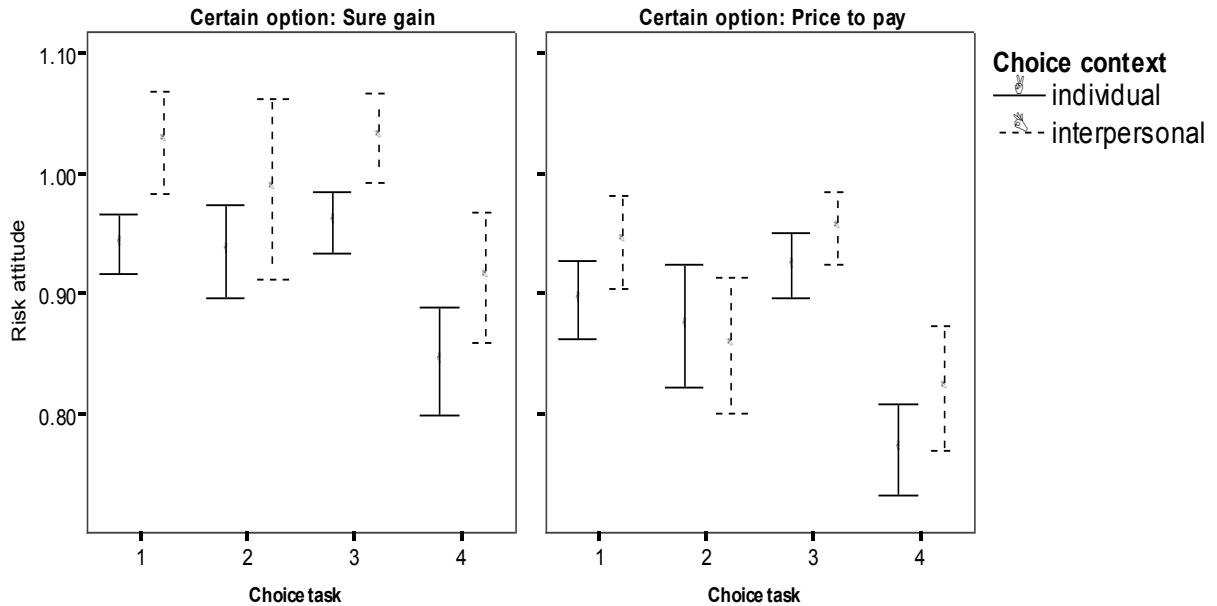


Figure 9: 95% Confidence intervals depicting mean risk attitude depending on the choice context and the distribution of payoffs. Confidence intervals were calculated based on the between-subjects variance in the respective condition.

The first research question was: *Does the degree of risk aversion differ between individual risk-taking and interpersonal risk-taking?* The findings show that when comparing all choice tasks, participants were significantly less risk averse in the interpersonal choice context than in the individual choice context, $F(1, 118) = 13.67, p < .001, \eta_p^2 = .10$.¹² An interaction with a medium effect size of the choice context and the framing of the certain option was not significant, $F(1, 118) = 2.39, p = .125, \eta_p^2 = .02$.¹³

¹² The choice context yielded a significant main effect, $F(1, 90) = 9.20, p = .003, \eta_p^2 = .09$.

¹³ The interaction effect of frame of certain option and choice context was not significant, $F(1, 90) = 1.08, p = .301, \eta_p^2 = .01$.

The second question was: *How does the relative distribution of payoffs in interpersonal choices in the risky option influence choice?* The mean risk attitude differed significantly depending on the distribution of payoffs between the decision maker and the recipient in the lotteries, $F(3, 354) = 41.74, p < .001, \eta_p^2 = .26$.¹⁴ In the individual choice context the three lotteries yielding equal variance of payoffs overlap. This was not the case in the interpersonal context. Here the degree of risk aversion in lotteries leading to equal or advantageous payoff distributions participants was lower than in interpersonal lotteries which lead to disadvantageous payoffs for the decision maker. Furthermore, when participants were faced with lotteries that yielded a high variance in payoffs, but equality of the distribution in the interpersonal lottery, they were generally more risk averse, but also willing to take a higher risk in the interpersonal choice. However, the interaction between the choice context and distribution of payoffs was not significant, $F(3, 354) = 1.95, p = .120, \eta_p^2 = .02$.¹⁵

The third question was: *Does the framing of the certain option (as price for the lottery vs. as sure gain) influence the risk attitude?* The experimental groups differed in their general degree of risk aversion depending on the frame of the certain payoff in the certain option. When in the certain option the certain payoff was depicted as sure gain, average risk aversion was significantly lower across all lotteries than when it was depicted as price to pay for the lottery, $F(1, 118) = 14.11, p < .001, \eta_p^2 = .11$.¹⁶ The means and standard deviations of the individual risk attitude for each factor level are depicted in the Appendix M for uncorrected data and Appendix N for the corrected data.

Relationship between individual risk attitudes and person specific variables.

As shown in the previous section a significant difference was found between risk attitude in the interpersonal choice context and individual choice context. In order to

14 The distribution of payoffs had a significant effect on the mean risk attitude, $F(3, 270) = 37.60, p < .001, \eta_p^2 = .30$.

15 The interaction between the choice context and distribution of payoffs was not significant, $F(3, 270) = 2.07, p = .105, \eta_p^2 = .02$.

16 The experimental groups differed significantly in their mean risk attitude depending on the framing of the certain option, $F(1, 90) = 9.86, p = .002, \eta_p^2 = .10$.

examine the influence of person specific variables on the propensity to take higher risks when others are affected a change score was calculated for each individual. The change of risk attitude was expressed as percent of change in the interpersonal choice context compared to the risk attitude in the individual choice context for each choice task. As a result the change score is calculated as change in percent according to the following formula:

$$\frac{r_{i,interpersonal\ choice} - r_{i,individual\ choice}}{r_{i,individual\ choice}} \cdot 100 = \Delta r \text{ and } \left\{ \begin{array}{l} \Delta r < 0, \text{ less risk taking,} \\ \Delta r = 0, \text{ constant risk taking} \\ \Delta r > 0, \text{ more risk taking} \end{array} \right\}.$$

For example a participant with $\Delta r = 10$ yields a 10% higher risk attitude in the interpersonal context of a given choice task than in the individual context of the same choice task of the given expected value.

Results from the dictator game.

The proposed split in a dictator game (i.e., giving) presents a measure of fairness or altruism (Engel, 2010; Forsythe et al., 1994; Kahneman et al., 1986). The results of a dictator game and their relationship with the change of risk aversion are examined. The relative frequency for all possible splits is depicted in Appendix O. In Figure 10 on the x-axis the proportion of endowment given to the recipient is portrayed in steps of 5%. The y-axis captures what percentage of participants proposed a given split. For example, 3.7% of the participants gave 25% of their endowment to the recipient.

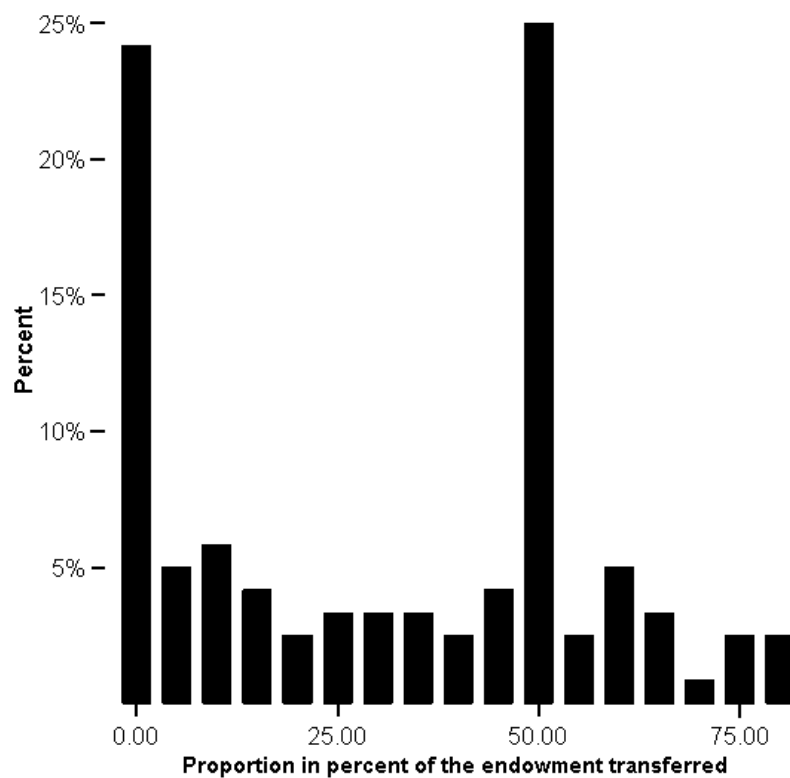


Figure 10: Relative frequency of the pie-size transferred to the recipient.

The results show that the participants differed greatly in their willingness to share their endowment with the recipient assigned to them in the dictator game. It was found that 24.8% of the participants were willing to give half of their endowment to the recipient while another 24.8% transferred nothing. Furthermore 16.5% were willing to give even more than half of the endowment to the recipient.

The third research question was: *Is the change of the risk attitude in the interpersonal choice context compared to the individual choice context related to giving in a dictator game?* In order to answer this question a linear regression was carried out. The predictor was the proportion expressed in percent of the endowment given to the recipient, the change of the risk attitude in each lottery pair was the criterion. The regression was carried out individually for the experimental group in which the certain option was portrayed as sure gain and the group in which the certain option was portrayed as price to pay to participate in order to identify whether the framing of the certain payoff in the certain option influences the predictive value. The unstandardized Beta's, standard errors, R^2 and p values are depicted in Table 20. Scatter plots with regression slopes can be found in the Appendix P - Appendix W.

Table 20: Regression coefficients for the change of risk attitudes with giving in the dictator game for each .

Distribution of payoffs in interpersonal lottery		Framing of the Certain Option	B	std. Error	R ²	sign.
equal		Sure gain	.34	.09	.184	.000
		Price to pay	.10	.10	.019	.324
Disadvantageous		Sure gain	.36	.22	.042	.098
		Price to pay	-.01	.16	.000	.959
Advantageous		Sure gain	.10	.09	.017	.293
		Price to pay	.07	.04	.045	.123
High variance - equal		Sure gain	.11	.16	.007	.493
		Price to pay	.04	.11	.003	.711

When the certain option is framed as sure gain then the percentage transferred to the recipient in the dictator game can significantly predict the change of risk-taking in the impersonal choice task where the risky option leads to equal payoffs. The data suggests that the framing of the certain option as well as the distribution of risky outcomes influences the predictive value of giving in a dictator game for changes in risk-taking in interpersonal contexts.

In the next section the results of the self-report measures for the subjective importance of situational aspects in the interpersonal choice context, and general personal values are reported.

Self-report measures.

Personal values of each participant and the importance of situational characteristics were assessed in order to find out to what degree these person specific variables can explain variation of risk-taking. In order to examine the relationship the change score described above was used. A positive relationship indicates that a high score on the personal variable is associated with a higher positive change of the risk attitude (i.e., more risk seeking).

Half of the participants had to respond to three questions concerning the lottery in the interpersonal choice context between the stages where they learned about the choice task

and before they made their actual choices. This measure is referred to as importance of situation aspects. The items measured the subjective importance of situational aspects on a six point Likert-scale; the importance increased with increasing value. The mean scores indicate that in the interpersonal choice context the importance of a high individual payoff ($M = 4.08, SD = 1.08$) was on average more important to the participants than the responsibility for the other person ($M = 2.69, SD = 1.45$) and her payoff ($M = 2.06, SD = 1.38$). A bivariate correlation was calculated for the score on each of the three items and the change of risk attitude in the interpersonal lotteries. In the experimental group, where the certain option was portrayed as sure gain, a positive correlation between the importance of the payoff of the recipient and the change of risk attitude was found for the first ($r = .39$) and second choice task ($r = .47$). When the certain option is framed as a sure gain and payoffs lead to equality or disadvantageous inequality then decision makers who place importance on the payoffs expected to be received by recipients are associated with an increase of risk-taking. The correlation matrix is depicted in the Appendix X and Appendix Y for each data set (uncorrected and corrected).

In order to assess the personal values the German version of the Portray Value Questionnaire (PVQ) from Schwartz was used (Schmidt, Bamberg, Davidov, Herrmann, & Schwartz, 2007). In the questionnaire 40 different portraits of people are described and the participant is asked to rate how similar they are to the described person. In the questionnaire ten personal values were assessed. Participants had to rate how similar they are to the portrayed individual, prototypical for a specific value, on a scale from one to six. High values indicated high levels of similarity while low values indicate low levels of similarity. The score for a personal value was calculated based on the mean score of all portraits considered to reflect a specific value type.

A correlation analysis was carried out between the change of the risk attitude and personal values. Correlations were calculated for each experimental group independently (certain option as gain vs. certain option as price to pay). In the group where the certain option was framed as price to pay a significant negative correlation was found between the personal value benevolence and change of the risk attitude in the third choice task ($r = -.42$). In the experimental group where the certain option was framed as a sure gain four significant correlations were found. A positive correlation was found between the change of the risk attitude in the interpersonal choice task leading to advantageous payoff inequality with benevolence ($r = .33$) and universalism ($r = .31$). Universalism was also

associated with the change of the risk attitude in interpersonal choice task leading to equal payoffs but yielding a high variance ($r = .31$). A negative correlation was found between the value stimulation and the change of the risk attitude in the interpersonal choice task leading to disadvantageous payoff inequality ($r = -.36$).

These correlations show that a change in the risk attitude towards more risk seeking is positively associated with benevolence and universalism when risky options lead to advantageous outcomes in the group where the certain option was framed as sure gain. Surprisingly, when the certain option was framed as price to pay, high value priority of benevolence was associated with lower changes of the risk attitude when the risky option leads to advantageous payoff distributions. Only in cases where the certain options framed as sure gain, high priority of the value universalism is associated with higher risk seeking when risky options yield equal outcomes with a high variance. Also, only in the group where the certain option was framed as sure gain high value priority for stimulation was related to a decrease of risk-taking in interpersonal choices leading to disadvantageous inequality was related to less risk-taking. The correlation matrix for both experimental groups is depicted in the Appendix Z for the uncorrected and Appendix AA for the corrected data set.

Discussion

Participants were less risk averse in choices involving others than in choices that only involved payoffs for them. The willingness to take higher risks was affected by the distribution of the payoff distribution of the risky choice, which suggests that prosocial behavior was driven by inequality aversion and/ or altruism. Furthermore, when people made decisions between lotteries and a sure gain they showed lower degrees of risk aversion than when they chose whether they wanted to buy a lottery or keep the money which had to be paid to play.

The change in risk-taking in interpersonal choices compared to individual choices could only be predicted with the giving in a dictator game in cases where the certain option was framed as gain and when the distribution of payoffs in the interpersonal lottery was equal between decision maker and recipient. People with higher levels of giving in a dictator game are more likely to show decreasing risk aversion in lotteries where the outcome distribution is equal. Personal values were not systematically associated with the change of the risk attitudes of the participants.

The observed risk-taking in individual and interpersonal contexts differs; this is in line with previous studies (Bolton & Ockenfels, 2010; Charness & Jackson, 2009; Loewenstein, Thompson, & Bazerman, 1989). The change of risk preferences seems to depend on the payoff structure and the decision maker's consideration of the benefit of the dependent other and does not generally reflect higher risk aversion in interpersonal contexts as found in previous studies (e.g., Charness & Jackson, 2009; Pahlke et al., 2011; Zaleska & Kogan, 1971). This shows that people dare because they care. However, this general finding has to be qualified.

Is altruism the driving motive underlying the observed effect? While the decision makers seem to be willing to take higher risks even when inequality in the certain option is advantageous for them, this is less so when the decision maker's expected payoff is lower than the expected payoff for the other. This suggests that inequality aversion influences the willingness to take risks benefitting another person, although this does not rule out that altruism as a motive for some. About 35% of the sample still take a higher risk if another person is affected by their choice even if the other gets more than they would if they would choose only for themselves. However, the distribution of payoffs significantly changes the amount of people willing to take a higher risk from 42% to 46% in the conditions where the expected payoffs are distributed equally or in favor for the decision maker. This suggests that a substantial amount of participants were influenced by inequality aversion over expected outcomes.

The notion that inequality concerns over outcomes lead to less risk-taking in cases where the expected payoffs are disadvantageous for the decision maker is supported by the finding that giving in the dictator game only predicts the change of risk-taking when the distribution of expected payoffs is equal. Giving in the dictator game might be more strongly driven by considerations of fairness norms than altruism (Andreoni & Bernheim, 2009), and as a result people who value fairness are not willing to take a higher risk for a distribution which they consider "unfair". Furthermore, this would explain why personal values associated with altruism showed limited association with change in risk-taking. On the other hand, the limited association of self-report measures and behavior is in line with the findings in literature, that personality measures are limited to predict behavior in laboratory experiments (e.g., Ma, Sherstyuk, Dowling, & Hill, 2002).

The general question of the experiment was: are people are willing to take risks in order to benefit another person? The results show that if another person benefits from a

risky choice people's risk aversion decreases, but not when the distribution of the benefits of risk-taking are disadvantageous for the decision maker. This suggests that envy crowds out prosocial behavior, when it is driven by inequality aversion, which seems to be the case in the current study.

One important factor of prosocial behavior is empathy (Batson, Chang, Orr, & Rowland, 2002; Batson et al., 1997; Batson & Shaw, 1991; Cialdini et al., 1987; Eisenberg & Miller, 1987; Midlarsky et al., 2005). Empathy is defined as "the ability to put oneself in another person's shoes" (Kirman & Teschl, 2010, p. 1) i.e., to be able to take the perspective of another person. Altruism is supposed to follow from empathetic concern (Batson & Shaw, 1991). Maybe empathetic people are more likely to reduce their risk aversion due to altruism since they gain utility from the payoff of the other than someone who is not empathetic and only gains utility from personal payoffs? This question was pursued in the second experiment.

Limitations

Some participants could be driven by the desire to satisfy the expectations of the recipients and appear fair rather than be fair. Their behavior is driven by image motivation. "Image motivation, or signaling motivation, refers to individuals' tendency to be motivated partly by how others perceive them. Image motivation therefore captures the rule of opinion in utility which is the desire to be liked and respected by others and by the self. If individuals are looking for social approval in their behavior, then they should try to signal traits which are defined as "good" based on social norms and values" (Ariely, Bracha, & Meier, 2009, p. 545). This questions the assumption that other-regarding preferences lead to more risk-taking when expected outcomes have positive consequences for another person. It is shown that if nature can be rendered responsible for the outcomes of one's actions, some people cease to behave in a fair manner (Andreoni & Bernheim, 2009; Dana et al., 2006). One way to rule out image motivation is to carry out the choices which affect others and offer a silent exit option (Dana et al., 2006). In the second experiment a silent exit option will be implemented in order to find out if image motivation influences risk-taking in interpersonal choice contexts.

Experiment 2

In the first experiment it was found that people are willing to sacrifice personal payoffs in order to increase the chance of benefitting the recipient. While some participants behaved as if motivated by altruism others seemed to be motivated by inequality aversion. The data from the interviews indicated that particularly participants who were motivated by the concern for the recipients seemed to be willing to accept higher risks and were less concerned about their personal safety despite their risk perception. One possible explanation could be that the participants behaving as if motivated by altruism experienced empathy towards the beneficiaries which, according to the empathy-altruism hypothesis (Batson et al., 1989; Batson et al., 1986), leads to a higher tendency to help. Possibly empathy was also activated in the participants in the first experiment who took a higher risk in order to benefit the other.

On the other hand, the increased risk-taking in the interpersonal choice context could be due to social image motivation. It has been shown in economic experiments, that the presence of another person, even under conditions of anonymity leads to higher rates of prosocial behavior than when choices are made in private or when the behavior of the decision maker and its impact on the outcomes of the other can be obscured (Dana et al., 2006; Dana et al., 2007). These findings are explained with social image motivation and the desire of people to behave according to the expectations of the other participant (Andreoni & Bernheim, 2009; Ariely et al., 2009). Social image therefore seems to present an important incentive to behave prosocially when making choices that affect another person. It was found that when given the opportunity to introduce ambiguity about the causal relationship between the other's payoff and the action of the decision maker, a substantial amount of participants chose it. This shows that offering a silent exit option may help to reduce the likelihood of social image motivation as a driving force of prosocial behavior (Dana et al., 2006).

In order to find out if this is the case, the second experiment has two objectives. First, to find out whether empathetic concern is related to risk-taking in interpersonal choice tasks. Second, to rule out image motivation as motive of increased risk-taking in the interpersonal choice context.

Research Questions

1. Does empathetic concern lead to increased risk-taking (i.e., more risk seeking) in interpersonal asymmetric risk situations?

The empathy-altruism hypothesis suggests that in a situation where a decision maker faces asymmetric risk, an empathetic decision maker should be willing to bear a higher risk than a non-empathetic one. Empathy should lead to an induction of altruism, and the outcomes for the other should influence the utility of the decision maker. If the decision maker is motivated by altruism the risky option becomes more attractive because the other benefits from risk-taking disproportionately higher than the decision maker profits from choosing the certain option.

2. Do people use the silent exit option to avoid responsibility for the outcomes of the recipient?

The introduction of an exit option rules out image motivation as another motive guiding prosocial behavior and introduces nature as possible explanation for outcomes of the recipient (Andreoni & Bernheim, 2009; Ariely et al., 2009). It is expected that participants choose not to use the exit option when making choices only affecting themselves, while when making choices affecting another person and given the option to exit they will use it. Furthermore, it is expected that the cost of the exit option influences whether people use it or not.

Moreover, it is assumed that people who feel empathetic concern for the other are driven by altruism and not image motivation when acting prosocially and as a result should not use the exit option independent of its cost. However, people whose prosocial behavior is guided by self-interest should choose the exit option more when it is free. Because the cost of exiting is lower than the cost of taking higher risks in order to behave according to the expectations of the recipient.

In the previous experiment reported above no systematic relationship between increasing risk-taking in interpersonal context and personal values associated with prosocial behavior were found. In order to influence behavior, personal values have to be activated (Verplanken & Holland, 2002). One possible explanation could be that the decision making task did not activate personal value. It is assumed that when empathy is activated personal values associated with prosocial behavior are more likely to influence behavior (Schwartz, Mikulincer, & Shaver, 2010).

3. Is the relationship between risk-taking and personal values moderated whether people feel empathetic towards the other or not?

In order to answer these questions a second experiment was conducted.

Method

Participants.

Participants were recruited using the online Recruitment System ORSEE (Greiner, 2004), although some participants showed up without receiving an invitation. Altogether $N = 128$ participants attended the laboratory session.

Table 21: Participants demographic information.

$N=128$	Gender		Age		Monthly disposable income	
	male	female	M	SD	M	SD
	24.2%	75.8%	22.57	3.23	464.38	249.16

Design.

The experiment had two factors that varied within-subjects: the choice context (interpersonal vs. individual choice context), and distribution of the payoffs between decision maker and recipient in the interpersonal lotteries. The interpersonal lotteries led to four different distributions in the risky option: equal, disadvantageous for the decision maker, advantageous for the decision maker and equality of payoffs but high variance. Between subject factors included empathy (high vs. low) and ease of exit (easy vs. difficult), which were varied.

Each individual choice task was transformed into an interpersonal choice task by adding consequences of the choice for another person and keeping everything else the same. The consequences for the second person did not differ between choice tasks. The order of individual choice task, and the interpersonal choice task and the order of the lotteries were counterbalanced for each treatment. The other participant was anonymous and randomly assigned to the decision maker.

The use of perspective taking as a means to induce empathy and the use of an exit option resembled research of Batson, which was characterized by the use of a two factorial between subjects design: empathy (high vs. low) induced via perspective taking and the exit from the situation (easy vs. difficult) (Batson, Duncan, Ackerman, Buckley, & Birch,

1981; Toi & Batson, 1982). In order to be able to charge participants for the exit option an endowment of 3000 Taler was given for each choice context and its four choice tasks.

Materials.

The materials used in the second experiment were identical to the first one, except the manipulation of the ease of exit and empathy. The study consisted of two main parts: an experiment and a questionnaire, both administered in the laboratory. The dependent variable was the individual degree of risk aversion. Risk aversion was measured in choices between lotteries and a certain option with consequences for the choosing person (individual choice) and in choices between lotteries and a certain option with consequences for the choosing person and another person (interpersonal choice). The choices in each task were presented in multiple price lists. The subject made choices whether they wanted to participate in a given lottery or not. The framing of the certain option was as price to pay to participate in the lottery, which was also used in the first experiment.

Empathy manipulation.

Empathy was manipulated via perspective taking (Batson, 1991; Batson et al., 1981; Batson et al., 1988; Batson & Moran, 1999). Subjects in the high empathy condition were instructed before and during the interpersonal choice task: “While you are working on the next task, imagine how the other person feels. Try to take the perspective of the other person and imagine the situation from her perspective and how she feels depending on the possible outcomes.” While participants in the low empathy condition received the following instruction: “While you are working on the next task concentrate on the provided information. Don’t let yourself be influenced by how the other feels or how she feels depending on the possible outcomes.” After the empathy manipulation the participants were informed that they now entered the phase of the task which is important to their and the others payoff.

Manipulation check for empathy.

In order to check if empathy was induced using the perspective taking instruction a list of 21 emotion adjectives were rated on a 7-point unidirectional scale (1 - not at all and 7 - extremely). The list of adjectives that had been used in previous research to measure empathy are (Batson, 1999): sympathetic, warm, compassionate, softhearted, tender, moved, friendliness, responsibility and feeling of togetherness. The consistency of the scale was satisfactory with a Cronbach’s Alpha of $\alpha = .72$.

Ease of exit.

Subjects were asked if they wanted to silently exit the game or if they wanted to carry on. Ease of exit was manipulated via the cost of the exit option. Subjects in the easy exit condition could choose to exit the task without acquiring any cost; in the difficult exit condition participants had to pay 500 tokens of their endowment of 3000 tokens in order to exit the game.

Personal values.

Personal values were assessed after the experiment using the German version of the Portrait Value Questionnaire (PVQ) (Schmidt et al., 2007). The PVQ was described in the method section of Experiment 1. In the second experiment only value types assumed to be associated with prosocial behavior in risky contexts were assessed. The reliability of each value scale and mean values and standard deviations observed in Experiment 2 are depicted in Table 22.

Table 22: Reliability of scales assessing personal values in Experiment 2.

Value type	Number of participants	Number of Items	Cronbach's Alpha	<i>M</i>	<i>SD</i>
Universalism	128	5	.78	4.6	.87
Benevolence	128	4	.67	4.7	.77
Security	128	5	.61	4.0	.83
Stimulation	128	3	.65	4.0	1.00
Self-determination	128	4	.67	4.8	.82

The scales of the PVQ assessing the value type's universalism, benevolence, security, stimulation and self-determination yield satisfactory reliabilities.

Procedure.

The study was conducted at the Hermann-Ebbinghaus Laboratory at the University of Erfurt. The treatment was programmed using z-Tree (Fischbacher, 2007). Participants were invited using the ORSEE database (Greiner, 2004). Altogether eleven sessions were carried out in which four treatment conditions were examined and participants were assigned randomly to the treatment conditions.

When entering the laboratory all participants were randomly assigned to isolated terminals where they received the same written instructions, stating the general rules and procedures of the experiment. These instructions were read out aloud to the participants and questions regarding the procedure were answered. They were informed that their payment at the end of the session would consist of a 2.50 € show-up fee plus the payoff from the experiment. The unit of experimental money was Taler, 1250 Taler equaled 1 €. The conversion rate was announced to the participants at the beginning of the experiment. Average earnings amounted to 8.07 € ($SD = 1.26$ €). Once the experiment started the participants were seated in separate cabins and were not able to communicate with one another. The experiment consisted of three parts: four interpersonal choice tasks, four individual choice tasks and a dictator game (see Figure 11).

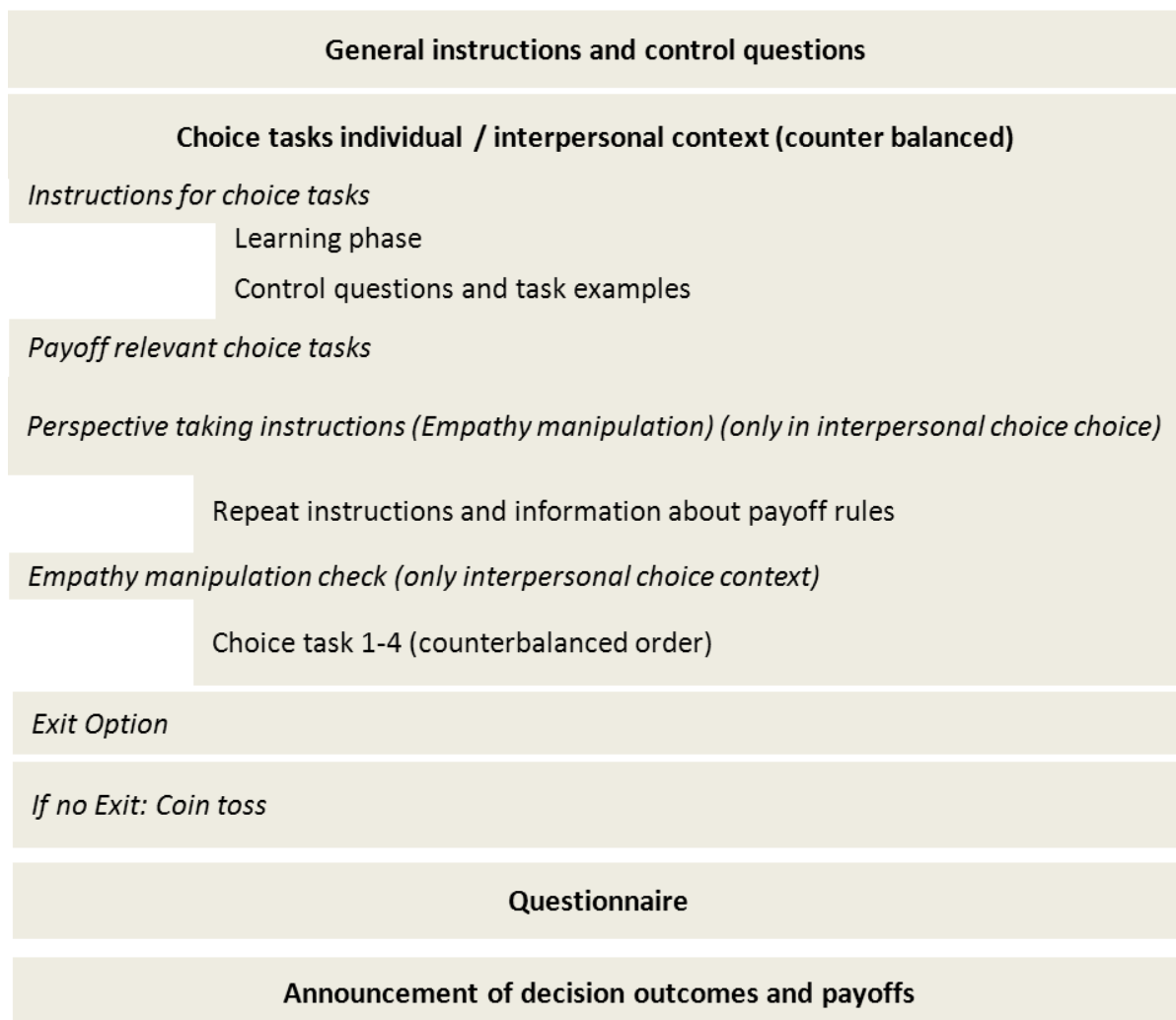


Figure 11: Sequence of events during the experimental session.

At the beginning of the experiment, all participants had to answer two questions to make sure that they understood the general instructions correctly. Each of the three parts of

the experiment commenced with instructions which were presented on the screen explaining the rules and procedures in the subsequent choice problems. The instructions were followed by control questions, assessing whether the participants understood the rules. After answering all control questions correctly, the participants were informed that they would now face choice problems which would determine their final payoffs.

The experiment consisted of interpersonal and individual choice tasks. The order of individual choice tasks and interpersonal choice tasks, and the presentation of options were counterbalanced in each treatment. Individual choice tasks and interpersonal choice tasks were alike and differed only in one respect: in the first the participants were only presented lotteries with a possible outcome for them personally, while in the second the participants were presented with possible outcomes for themselves and possible outcomes for another participant. The other participant was anonymous and randomly assigned to the decision maker.

All participants first played the role of the decision maker and then became a recipient. They were not aware of that role change when they had the role as decision maker. They were informed about both roles at the end of the experiment.

At the beginning of each payoff relevant stage they were informed about their endowment which they could use to buy lotteries and pay the exit fee. At the end of each stage an electronic coin toss was carried out.

In order to avoid portfolio effects within each part of the study the participants were told that for each task group one choice problem would be drawn randomly and played out and they received the information about their personal payoffs after all parts of the study were completed. Thus, after completing each part the participants saw on their screens that one of the choices was picked randomly and its outcome determined by a coin toss. However, the participants were not told which choice was picked until the end of the experiment.

The perspective taking instruction was provided only in the interpersonal task. Before each multiple price list with interpersonal choices the perspective taking instructions were presented. The first perspective taking instruction was given when entering the payoff relevant part. The manipulation check was carried out after the participants read the instructions of the choice interpersonal choice task in the payoff relevant stage. The manipulation check was only carried out once.

The exit option was provided after finishing all the choice tasks in one choice. When participants opted to exit the respective task, they moved on to the next without the electronic coin toss.

After all participants completed the choice tasks they filled out the Portray Value Questionnaire and provided their personal information. After completing the questionnaire the participants were informed about the outcomes of each choice problem that was picked randomly, and their final payoffs. Finally, they were paid privately in their terminal and took their leave.

Results

The number of times a person chose the certain option in each choice task indicates the switching point and thus, her certainty equivalent for a given lottery. At choice number six the payoff of the certain option is equivalent to the expected payoff of the gamble. As a result, a risk neutral person would always choose the gamble up to decision number six, be indifferent between the gamble and the certain option for choice numbers six, and switch to the certain option in choice number seven, resulting in five safe choices.

Each individual lottery and the interpersonal lottery yielding the same payoffs for the decision maker are considered lottery pairs. The proportion of safe choices across all participants for each decision in each choice task were aggregated and are depicted for each of the four lottery pairs, distinguishing the choice contexts (individual vs. interpersonal) in and the classification of participants can be found in the Appendix AA.

On the y-axis the proportion of safe choices for each decision is plotted, on the x-axis each decision, which is one row in each multiple price list, is plotted. When moving from left to the right on the x-axis, the certain option increases while the lottery payoffs as well as the probabilities were kept constant. Figure 12 shows the proportion of safe choices for each lottery pair and the choices predicted under the assumption of risk neutrality.

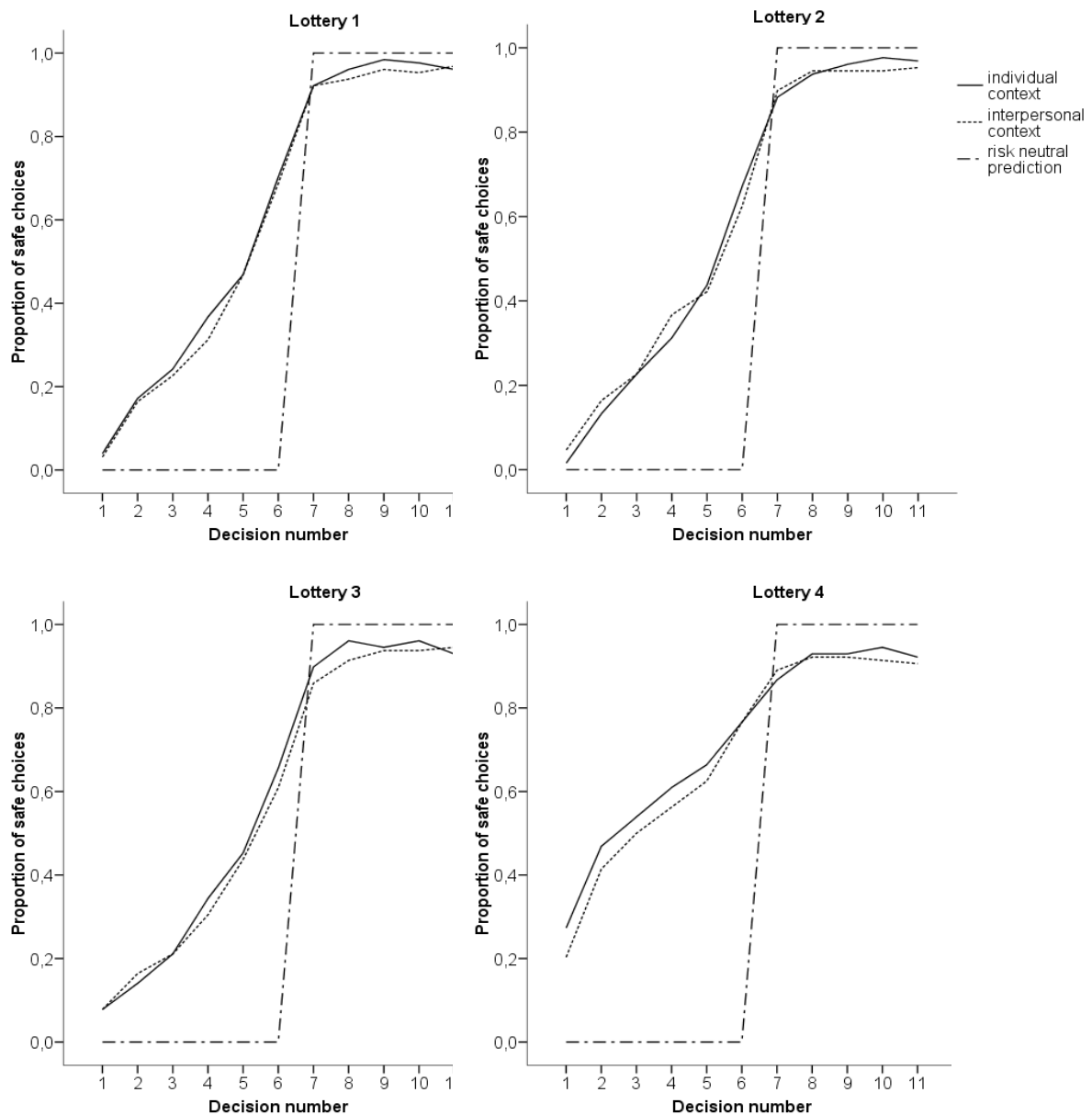


Figure 12: Proportion of safe choices, data averages for each paired individual and interpersonal choices and risk-neutral prediction.

In all four pairs the number of safe choices increases with increasing certainty equivalents and comparing plots of proportion of safe choice in the individual and interpersonal context yield no differences. The plots show that the majority of the participants made decisions that reflect risk aversion. The plots show that across all treatment conditions the proportion of safe choices in the individual choice context and the interpersonal choice context did not differ.

Consistency of choices.

The sample consisted of 128 participants. In the interpersonal choice task 88.3% of the participants made consistent decisions in the interpersonal choice task. Inconsistent

choices in one interpersonal choice task were observed in 3.9% of the cases, inconsistent choices in two interpersonal choice tasks were observed for 3.1%. Furthermore 1.6% made inconsistent choices in three interpersonal choice tasks and 3.1% chose inconsistently in all interpersonal choice tasks.

In the interpersonal choice task 89.1% of the participants made consistent decisions in the interpersonal choice task. Inconsistent choices in one interpersonal choice task were observed in 4.7% of the cases, inconsistent choices in two interpersonal choice tasks were observed for 2.3%. Furthermore 1.6% made inconsistent choices in three interpersonal choice tasks and 2.3% chose inconsistently in all interpersonal choice tasks. The choice context did not significantly differ regarding the frequency of inconsistent choices, a Wilcoxon signed rank test yielded, $Z = -.49, p = .630$. Moreover, cross tabs and a McNemar test show that most participants who made inconsistent choices in one decision context did not do so in the other, $\chi^2 = 3.67, df = 6, p = .720$. The tables are found in the Appendix CC and Appendix DD.

Because inconsistent choices are unsystematic they are viewed as mistakes, the handling of inconsistencies follows the same rationale as in the first experiment. Analysis of treatment effects were conducted twice, once for a complete sample and once for a sample in which inconsistent choices in one lottery were coded as missing values. In the first step the mean risk attitudes of the consistent and inconsistent sample are compared.

In order to find out if inconsistencies affect the risk attitude the mean risk attitudes of the corrected and the original sample were compared and analyzed with a MANOVA. The results and respective means are depicted in Table 23.

Table 23: Comparison of sample means of risk attitude with and without inconsistent cases.

Choice context	Lottery	Only consistent cases	<i>N</i>	Descriptive Statistics		MANOVA		
				<i>M</i>	<i>SD</i>	<i>F</i>	<i>p</i>	η_p^2
Individual	1	Yes	106	0.87	0.14	0.19	.665	< .01
		No	128	0.88	0.14			
	2	Yes	106	0.83	0.20	0.45	.504	< .01
		No	128	0.85	0.21			
	3	Yes	106	0.91	0.11	0.56	.456	< .01
		No	128	0.92	0.11			
	4	Yes	106	0.80	0.19	0.15	.703	< .01
		No	128	0.81	0.19			
Interpersonal	1	Yes	106	0.88	0.14	0.22	.643	< .01
		No	128	0.89	0.15			
	2	Yes	106	0.84	0.24	0.03	.859	< .01
		No	128	0.85	0.24			
	3	Yes	106	0.92	0.11	0.35	.553	< .01
		No	128	0.93	0.12			
	4	Yes	106	0.81	0.19	0.22	.639	< .01
		No	128	0.83	0.19			

The average risk attitudes in the sample consisting of only consistent cases were generally 0.1 – .02 lower than the average risk attitudes in the whole sample, the differences were not significant in any choice task as depicted in Table 23. For this reason and results of the based on the original sample without corrections will be presented in the text, the “corrected” analysis in foot notes.

Analyzing treatment effects of experiment 2.

The first research question was: *Does empathetic concern lead to increased risk-taking (i.e., be more risk seeking) in interpersonal asymmetric risk situations?* In order to

answer this question one group of participants was instructed to take the perspective of the recipient when making decisions (empathy high) and the other group was instructed to focus on the numerical information (low empathy). As a manipulation check the degree of empathy towards the recipient was calculated as a compound score of the ratings of eight adjectives associated with empathy (Batson & Moran, 1999). In the group receiving the instruction to take the perspective of the recipient the participants rated the adjectives associated with empathy higher ($M = 2.37, SD = .83$) than the participants instructed to focus on the objective information ($M = 2.16, SD = .96$). This difference was not significant ($t = 1.27, df = 117, p = .21$). Perhaps the perspective taking manipulation directly influenced the individual risk preferences? In order to examine the influence of perspective taking on risk-taking, individual risk attitude were calculated and compared with a Mixed Design ANOVA.¹⁷

In the analysis the factor choice context (interpersonal vs. individual choice context) and distribution of risky payoffs in the interpersonal lottery (equal vs. worse off vs. better off vs. equal/ variance high) were entered as within-subjects factors. The perspective taking instruction (focus on other vs. focus on objective information) was entered as between-subjects factor. The results are graphically depicted in 95% confidence intervals displayed in Figure 13. The descriptive statistics are depicted in the Appendix EE for the uncorrected data set and Appendix FF for the corrected data set.

¹⁷ The influence of the exit option was left out of the analysis since the exit option was provided after making the choices and it therefore should not influence the choice.

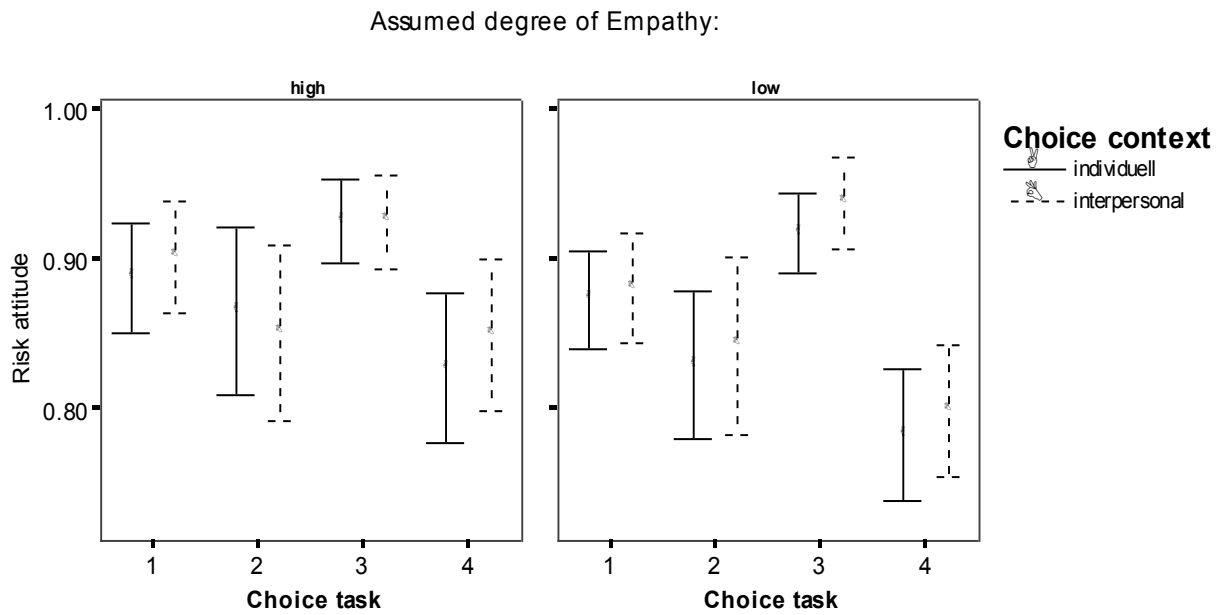


Figure 13: 95% Confidence intervals depicting risk attitudes depending on the choice context and the distribution of payoffs. Confidence intervals were calculated based on the between-subjects variance in the respective condition.

The individual risk attitude was significantly influenced by the payoff levels of the lotteries, $F(1, 117) = 35.65, p < .001, \eta_p^2 = .23$. However, no difference was found between the individual risk attitude in individual and interpersonal choice contexts, $F(1, 117) = .76, p = .39, \eta_p^2 = .01$. Also, the individual risk attitude was not different between the groups, $F(1, 1) = 1.41, p = .24, \eta_p^2 = .01$. The findings show that perspective taking did not lead to a change of the individual risk attitude.

The second research question was: Do people use nature in order to deny responsibility for the outcomes of the recipient? In order to control for social image motivation, an exit option was introduced allowing participants to choose not to take part in the gamble without the other participant knowing an exit option was used. When participants chose to exit, all choices in the respective task were regarded as safe choices. The exit option differed between-subjects in regard to the price, which functioned as a manipulation of ease of exit. The frequency of exiting is depicted in Table 24.

Table 24: Frequency of choosing the exit option depending on experimental conditions.

		Participants exit			
		Individual Context		Interpersonal Context	
		Yes	No	Yes	No
high	difficult	1	29	1	29
	easy	0	33	0	33
low	difficult	0	27	2	25
	easy	2	27	2	27

The exit option was hardly chosen in any condition irrespective of the empathy manipulation or ease of exit in the individual as well as in the interpersonal context.

Comparing experiment 1 and 2.

The second experiment resembled the first one in that risk aversion was measured in individual and interpersonal choice tasks using certainty equivalents. The introduction of an exit option did not influence choice behavior since it was provided after the choice task. The experiment aimed to replicate the findings of the first experiment and provide insight into underlying psychological mechanisms. However, the findings show that this endeavor failed. Why?

The findings of the second experiment were rather inconclusive and did not reveal a relationship of empathy and increased prosocial behavior. One important question of the experiments was: Are people willing to sacrifice personal payoffs for the sake of another person? While we assume that dictator games indicate that the answer would be yes, it is questionable whether participants really feel like they “lose” money when they propose an equal split. This assumption is supported by the finding that the framing of the certain option moderates the relationship between giving in a dictator game and changes of risk-taking in interpersonal lottery tasks in the first experiment. Maybe the salience of possible loss that participants can acquire differs depending on the framing of the certain option. For example, when people receive an endowment loss-aversion is induced, which is not the case when people only gamble for gains (Kahneman et al., 1991; Thaler et al., 1997). This suggests that the degree of salience of possible losses influences risky choices. In the first experiment the certain option was portrayed as sure gain in one and as price of the lottery in the other condition. In the second experiment the certain option was portrayed as price

of the lottery and the participants received an endowment before the task. Combining the two experiments leads to a three level manipulation of the factor salience of possible personal losses. In the condition when the salience of personal losses is lowest the certain option was portrayed as a sure gain. When the salience of personal loss was medium the certain option was portrayed as price of the lottery. When the salience of personal loss was high the certain option was portrayed as price of the lottery and the participants had an endowment which was used to pay.

To answer the question how the salience of personal losses influences risk-taking in an interpersonal context, it was analyzed how the within-subjects factor choice context (interpersonal vs. individual), the distributional equality of expected payoffs (equal vs. disadvantageous vs. advantageous vs. equal – high variance) and the between-subjects factor salience of losses (low vs. medium vs. high) influenced the risk preferences of the participants. This resulted in a 3x2x4 mixed-design ANOVA.^{18,19}

18 The number of participants in the conditions was not equal. In the second experiment, the condition where the certain option was framed as price and an endowment was given, the number of participants was $N = 119$. However, the difference of participants was not due to the treatment and the other two groups were sufficiently large.

19 Mauchly's Test indicates that the assumption of sphericity has to be refuted for the within-subjects factor distribution of payoffs, $\chi^2(2) = 145.63, p < .001$. As a result the degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity for the main effect of the distribution of payoffs.

The effects are displayed using 95% confidence intervals based on the between-subjects variance in Figure 14. Individuals' risk attitude was the dependent variable; it is plotted on the x-axis. The within-subjects factor, the distribution of possible payoffs, is plotted on the y-axis. The between-subjects factor, the three levels of salience of personal loss, are each depicted in an individual diagram.

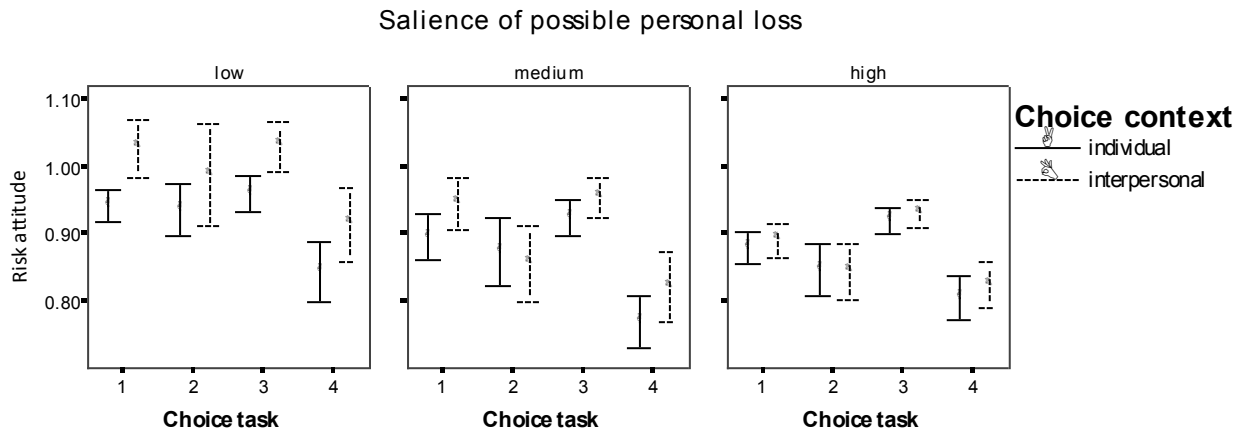


Figure 14: 95% Confidence intervals depicting mean risk attitude depending on the choice context and the distribution of payoffs for each level of salience of personal loss. Confidence intervals were calculated based on the between-subjects variance in the respective condition.

Figure 14 shows that when the salience of personal losses was low participants showed higher levels of risk seeking than in the medium and the high salient condition independent of the choice context. The salience of personal losses influenced the degree of risk aversion significantly, $F(2, 245) = 12.58, p < .001, \eta_p^2 = .09$.²⁰

The participants yielded the lowest degree of risk aversion when the distribution of expected payoffs were to their advantage, this was followed by the equal distribution, where risk aversion was higher than in the disadvantageous condition, the highest degree of risk aversion was observed in the condition with equal payoffs but high variance. The main effect for the distribution of payoffs was significant, $F(2.34, 573.41) = 67.10, p < .001, \eta_p^2 = .22$.²¹

²⁰ Significant main effect for salience of personal loss, $F(2, 195) = 8.45, p < .001, \eta_p^2 = .08$.

²¹ Significant main effect for the distribution of payoffs, $F(2.23, 434.96) = 61.01, p < .001, \eta_p^2 = .24$.

When making choices in the interpersonal choice context participants risk attitude displayed a lower degree of risk aversion than in the individual choice context. This main effect was significant, $F(1, 245.00) = 14.36, p < .001, \eta_p^2 = .055$.²² This main effect was qualified by a significant interaction of choice context and the salience of possible personal losses, $F(2, 245.0) = 4.05, p = .019, \eta_p^2 = .032$.²³ When the salience of personal losses increased participants were less likely to decrease their risk aversion when in the interpersonal context compared to their choice in the individual context.

When comparing the first and second experiment it was found that the risk attitude changed in the interpersonal choice context and was overall more risk seeking which indicates social preferences. However, the interaction effect of medium size suggest that a risk attitude that is more risk seeking depends on the salience of personal losses. Thus, the findings indicate that prosocial behavior in risky contexts is moderated by the salience of personal losses.

Relationship between individual risk attitudes and personal values.

To examine if personal values and the change of risk-taking in interpersonal choice contexts are related, a bivariate correlation analysis was carried out for each experimental group individually. A positive relationship indicates that a high score on the personal value is associated with a higher positive difference score. As a result as a positive correlation indicates that the more a person values a specific characteristic the more it increases risk seeking in the interpersonal context.

No significant correlations were found in the experimental group which was told to take over the perspective of the recipient. In the experimental group which was instructed to consider only the information given, a significant negative correlation was found for the value stimulation with the change of the individual risk attitude in choice task one ($r = -.26$) and choice task two ($r = -.30$). This indicates the value stimulation was associated with a lower increase of risk-taking interpersonal choices when they lead to equal or

22 Significant main effect for the choice context, $F(1, 195.00) = 11.62, p = .001, \eta_p^2 = .06$.

23 No significant interaction effect between choice context and salience of personal loss, $F(1, 195.00) = 2.20, p = .11, \eta_p^2 = .02$.

disadvantageous payoff distributions. All correlation coefficients are depicted in the Appendix GG for the uncorrected data set and Appendix HH for the corrected data set.

Discussion Experiment 2

The participants did not change their degree of risk aversion when making choices that influenced another participant and as a result the findings of the first experiment were not replicated. The personal values show no systematic relationship with the tendency to change the risk-taking when moving from individual decision to interpersonal decisions. Furthermore, the manipulation check indicated that the perspective taking manipulation did not lead to empathetic concern and the exit option was not used independent of its difficulty.

Inducing empathy via perspective taking.

Perspective taking in the current experiment did not induce empathetic feelings. This finding was surprising. Kirman and Teschl (2010) define empathy as “the capacity to put oneself in someone else’s shoes and thus to share the sentiments or thoughts of that person” (p. 313). As can be seen, this definition proposes that perspective taking is an integral part of empathy. The method of perspective taking used to induce empathy was successful in the past (e.g., Batson, 1997; Batson et al., 1991; Cialdini et al., 1987; Hoffman, 1991).

In previous studies empathy was related to feelings of sympathy for a person who was in pain or sad. These feelings present distinct emotional states known to the experimental participants. It was shown that the answers in a questionnaire assessing the empathetic capabilities correlated highly with the activation of areas of the brain associated with the affective component of pain when inducing empathy towards the person experiencing pain (Singer et al., 2004). The focus of the perspective taking manipulation in the experiment was on how the recipient will feel in the situation during the experiment and with the outcomes. Did this choice context and the incentive structure also evoke strong and clear emotions? The instructions for the perspective taking manipulation in the high empathy condition did not yield any words referring to emotions, while this was done to avoid reactance, it might have led the participants to not feel anything at all. Monetary outcomes are considered to have low affective valence (Loewenstein et al., 2001; Rottenstreich & Hsee, 2001). This issue was overlooked while designing the experiment since two studies using social dilemmas showed that perspective taking induced empathy

when payoffs were movie tickets or lottery tickets (Batson et al., 1995; Batson & Moran, 1999). However, in those two studies the perspective taking was explicitly not focusing on the outcomes of the exchanges, but on the emotional state of the exchange partner. In both cases the exchange partner (i.e., recipient) was described as “upset” due to an end of an intimate relationship. As a result it can be assumed that the incentive structure of the game in terms of payoffs alone did not motivate choices, but as a means as to cheer up the other.

In the current experiment the use of such a manipulation was not suitable for at least three reasons. First, the question guiding the research is about the influence of the incentive structure and how this influences choice and not on how outside conditions do, such as the mood of the recipient. Second, the description of the other leads to a decrease in anonymity and as a result reduces control over the experimental treatments. Third, in the studies of Batson, the recipient was not real and required the use of deception. In the experiment reported here an economic experimental paradigm was adopted. As a result deception was not allowed and exchanging information between the participants about how they feel in the face of the incentive structure would have breached anonymity.

While the above argumentation suggests that the perspective taking instructions did not induce empathetic feelings because the monetary consequences did not induce emotions, another explanation could be that because the situation entailed a conflict between maximizing personal profit and profit for the other, participants did not feel empathetic due to self-interest. In the experiment, the perspective taking instruction was received after learning the task and the payoff structure. Future research should examine if perspective taking instructions given before or after entering into a situation where a conflict between one’s own interest and the other exists influence empathy and choice behavior.

“Expensive” helping leads to lower levels of helping which is in line with other studies. Empathetic helping is only likely if the cost of helping is low (Neuberg et al., 1997). Does the cost of helping influence whether empathetic concern becomes induced through perspective taking? This question cannot be answered with the current data, because the cost of helping did not vary between groups. Future research should examine whether the use of the perspective taking manipulation induces empathy in situations where the salience of possible personal losses is low.

Exiting.

The participants in the experiment did not use the exit option. The exit option was provided after making the choices and since participants did not behave differently in the individual choices than in the interpersonal choices the exit option was not attractive nor necessary, because there was nothing to hide. The non-use of the exit option does not allow any conclusions about whether image motivation was driving prosocial behavior, because there was no prosocial behavior.

Furthermore, the participants' choices already reflected a high degree of risk aversion, and therefore to exit was not attractive, even for free, since this would decrease the expected payoff.

Discussion of Experiment 1 and Experiment 2

The question from the interviews stimulating the experimental study was: Do people dare because they care? Or in proper scientific language: Does the propensity for risk-taking increase if others benefit from the risky choice?

The experimental findings show that the answer to this question is conditional. Prosocial behavior (i.e., increased risk-taking for others) is observed in both experiments. However, the significant decrease in risk aversion depends on two conditions: the distribution of payoffs in the risky option and the salience of losses for the decision maker. Personal values do not seem to be systematically associated with the change of risk attitudes.

Inter-individual Differences of Personal Values and Prosocial Behavior

Schwartz (Schwartz, 2007; Schwartz et al., 2001) assumes that personal values can be represented as a coherent structure. The structure is presented as a circle, in which values that are opposed are depicted across from one another and values associated with one another are neighboring. It is assumed that correlation coefficients between neighboring values should be positive and with increasing distance between value the correlation coefficients decrease and even become negative when values oppose one another in the circle. The survey's used to validate the structure of the personal values had large samples ($N > 10,000$) and even low correlations ($r \geq .1$) were significantly different from 0. As a result the studies could establish the assumed structure and relationship with behavior such as voting or support of gay marriage. In the current two experimental studies the samples were much smaller (Experiment 1: $N = 90$ and Experiment 2: $N = 128$) and the correlations in the current study between prosocial behavior under certainty (dictator game), as well as under uncertainty (risky choice tasks in interpersonal context), were not generally significantly different from 0. The values universalism and benevolence, expected to be associated with prosocial behavior, were not significantly associated with prosocial behavior in the dictator game. In the risky choice task in the interpersonal context only for the group yielding a low salience of personal loss (certain option was framed as sure gain) and when the risky option lead to advantageous inequality for the decision maker both values were associated with more risk-taking. Because the majority of the correlations were not significant and the direction of the relationship changed depending on the choice tasks distributional equality, personal values cannot explain changes in individual risk-taking when comparing individual and interpersonal choice contexts. In

order to gain a better understanding of the influence of personal values on risk-taking, more different choice tasks should be used to reflect the three possible distributions (equal, disadvantageous and advantageous) in order to create a more reliable measure for them.

One reason why personal values did not influence choice could be that personal values were not activated by the situation. Values influence behavior only if they are consciously represented (Verplanken & Holland, 2002). According to Schwartz (2010) perspective taking should function as a way to activate personal values. The findings of the second experiment reported here do not support this claim, but can also not refute it. The manipulation check suggests that the perspective taking instructions as a means to induce empathy did not work. Whether perspective taking does not induce empathy in the economic context of the choice tasks or whether it is not related to personal values remains unsolved. Additionally, the finding that personal values were not associated with behavior in the dictator game is contrary to the finding of Schwartz (1996), where differences in value priority of benevolence and universalism were predictive for decisions about how to split a given amount of money. Thus, the current two experiments suggest that differences in priority of personal values do not significantly influence choices in economic decisions when another anonymous person is affected.

Distribution of Expected Payoffs and Prosocial Behavior

In the first experiment the findings suggest that if the risky option yields disadvantageous expected payoffs for the decision maker, risk aversion does not significantly decrease. It appears as if envy crowds out prosocial behavior. The results show that inequality concerns not only affect choices under certainty, but also choices involving risk. People prefer certain outcomes yielding inequality to their advantage more than disadvantageous outcomes even if these maximize joint payoffs.

Does inequality aversion or welfare maximization motivate choices in interpersonal decisions? In some studies it has been observed that people seem not to care for their relative payoffs, but rather choose as if interested in maximizing joint payoffs, even if this means to sacrifice personal gains (Charness & Rabin, 2002; Engelmann & Strobel, 2004). However, other studies show that people's choices are motivated by inequality aversion in favor of oneself (i.e., envy), rendering equal and advantageous distributions more attractive than disadvantageous payoffs even if these would maximize joint payoffs (Fehr & Schmidt, 1999; Loewenstein, Thompson, & Bazerman, 1989). In a recent paper it was suggested that agency can explain these conflicting findings (Choshen-Hillel & Yaniv,

2011). Agency refers to the ability to determine outcomes. When experiments involve the implementation of payoffs, they are considered “high agency” situations. On the other hand, experiments in which the distribution of outcomes is merely rated according to their satisfactory value are referred to as “low agency” conditions. It was found that when people implement the specific outcomes, when decision makers have high agency, they are more likely to choose the maximizing option. However, when decision makers have low agency and the decision was not implemented but merely rated for their satisfaction with outcomes, they prefer equality (Choshen-Hillel & Yaniv, 2011).

The choice tasks in the two experiments reported here are considered a high agency situation, because participants determine outcomes for themselves and others through their choices. According to the agency hypothesis, the decision maker also should choose the lottery with disadvantageous outcomes, since it maximizes joint payoffs. However, the decision maker did not sacrifice her own payoff for an option which maximizes joint payoffs but leads to disadvantageous inequality. How can the findings of the current experiments be accommodated in the agency framework?

One explanation could be cost of the option leading to maximization. It is assumed that prosocial behavior is depending on the balance between the cost of prosocial and cost of not acting prosocial (e.g., Dovidio et al., 1991). This notion is supported by the finding that the rate of people who chose the option which maximizes joint payoffs in the high agency condition decreased from 68.6% to 53.9% (comparing study one and study two of Choshen-Hillel & Yaniv, 2011) when it was costly to implement this choice. Possibly in the current study the cost to resolve inequality was perceived as too high? Supporting this assumption is the finding that even when expected payoffs led to equality or advantageous inequality people would only be willing to increase their certainty equivalent by 10%. This suggests that the personal cost to maximize joint payoffs influences the choice.

In the current study participants were faced with risky options that led to different distributions of outcomes between the decision maker and an anonymous recipient which may have shaped the evaluation of outcomes. According to prospect theory choice, risky options are not perceived objectively, but are edited by those calculating their value. One important step in the editing process is setting the reference point (Kahneman & Tversky, 1979). The perception of inequality in the disadvantageous lottery in the current experiment might involve two steps. First, the decision maker’s own expected payoffs in the risky option and the payoffs for the other are compared. If expected payoffs yield

equality or advantageous inequality own payoffs are compared to the payoffs of the other and the own minimal payoff is at least as good as the payoff of the other. As a result, if the reference point is set at the lowest minimal payoff, which is the payoff for the recipient, the decision makers expected outcomes are perceived as gains. This is not the case when the lottery leads to a disadvantageous payoff distribution. When the decision maker compares her own minimal payoff to the recipient's minimal payoff in the disadvantageous lottery, the decision maker's minimal payoff is below the minimal payoff of the recipient. As a result, the minimal payoff for the decision maker is perceived as a loss relative to the payoff of the recipient. This leads to the perception that one is faced with a mixed gamble (negative and positive outcomes or possible). Depending on what could be gained by choosing the certain option versus the possible gain of the lottery, the participant calculates the cost prosocial behavior. The final expected outcome seems even more disadvantageous, when the own relative payoff of the risky option is negative while the recipients payoff is positive. In this case the cost of prosocial behavior is perceived higher than not to behave prosocial.

Besides the assumption that inequality aversion leads to a change in behavior, two other explanations come to mind: loss-aversion, and whether the risky option is perceived as threat or opportunity. Both explanations will be further elaborated when the findings of the first and second experiment are compared.

Salience of Personal Loss and Prosocial Behavior

People are willing to take higher risks in an interpersonal choice context when their personal sacrifice is not salient, and with increasing salience of potential personal losses the likelihood to take a higher risk than when alone decreases. Possible reasons for this effect will be explored in this section.

One explanation could be that prosocial behavior decreased with increasing salience of loss because it rendered all interpersonal lotteries as yielding disadvantageous inequality for the decision maker. The cost of helping was objectively constant across all treatments. But by introducing the endowment in the second experiment, the lotteries subjectively yielded mixed payoffs (gains and losses). While the payoffs between the conditions in which the certain option was presented as sure gain and the condition where the certain option was presented as price of the lottery did not differ in terms of absolute wealth, they did in terms of relative wealth. Consider the following choice problem depicted in Table

25, once presented as a choice with the certain option as sure gain and once as price of the lottery.

Table 25: Difference between relative and absolute changes of wealth depending on presentation of the certain option.

	Certain option as sure gain (Condition 1 in Experiment 1)			Certain option as price to pay (Condition 2 in Experiment 1 and Experiment 2)		
	Certain Option	Risky Option		Certain Option	Risky Option	
	Sure gain	50%	50%	Price of lottery	50%	50%
Change of absolute final wealth	1500	1000	2000	1500	1000	2000
Change of relative wealth	1500	1000	2000	0	-500	500

Choosing the certain option in the sure gain condition leads to a gain for sure, while in the case when the certain option is portrayed as price, the change of wealth is zero, since one has already received the amount one would have paid. Therefore, while the final wealth is the same in both conditions, the relative change in wealth differs. As a result the decision maker perceives the lottery as extremely disadvantageous and therefore unattractive. This assumption is supported by the observed lack of prosocial behavior in the first experiment in the interpersonal choice leading to expected disadvantageous payoffs in the risky option. An alternative explanation which also captures the findings of the second experiment could be loss-aversion.

Loss aversion refers to the effect that “the disutility of giving up an object is greater than [sic] the utility associated with acquiring it” (Kahneman et al., 1991, p. 194). Possibly in the condition yielding disadvantageous equality the decision maker felt as though they were giving up an object without the certainty of acquiring another. In addition, the introduction of endowment led to mixed gambles and induced loss-aversion. Associated with loss-aversion are the status quo bias and the endowment effect.

Mixed gambles involve losses and gains, where the loss is not directly implemented in the lottery payoff matrix, but through introducing a payment, the lottery could lead to payoffs which were below the price paid, resulting in a decrease of the endowment. The

endowment effect refers to the phenomenon that people's valuation of goods depends on whether they are asked to value it by stating how much they would sell it for or by saying how much they would pay for it (Kahneman et al., 1991). The endowment effect is related to the status quo bias (Samuelson & Zeckhauser, 1988), which means that people prefer the status quo over a probabilistic gain if it requires risking part of their endowment. Based on the endowment effect, the risky options become less attractive, because in the high salience of personal loss, one has to give up parts of the endowment to participate in the lottery. However, it does not explain the collapse of prosocial behavior. If it is loss-aversion leading to an endowment effect, then the salience of loss should yield a main effect. However, the interaction effect suggests that the introduction of mixed gambles did influence the risk attitude in the individual context differently than in the interpersonal choice context.

Associated with loss-aversion is the reflection effect (Kahneman & Tversky, 1984). It is assumed in prospect theory that the reflection effect is due to loss-aversion. In conditions where the certain option yields sure losses, people would rather take a risk if this could lead to an outcome that is closer to the reference point. The finding that people try to reduce the sure loss by choosing the risky option, indicating risk seeking, while in the case of gain, they would rather take a small sure gain than choosing a risky option, seems to be robust across a number of studies (Levin, Schneider, & Gaeth, 1998). When comparing the experiments reported in this thesis it seems at first sight that the condition in which the certain option presents a price to pay a loss frame might be induced. However, this is not the case, since the certain option is not a loss. Therefore, the increase of risk aversion as a result of an increase of the salience of personal losses does not question prospect theory, but it points to an important distinction between the situational components of lotteries such as whether they are framed as gains or losses, as well as the informational component whether lotteries are perceived as a threat or opportunity.

The assumption that gain and loss frames lead to risk aversion and risk seeking respectively seems to be in conflict with studies focusing on risk behavior in the field of management (Sitkin & Pablo, 1992). In a review of literature concerning risk-taking among managers March and Shapira (1987) found that particularly in contexts that yield opportunities, managers were risk seeking and also encouraged others to do so. It was found in later studies, that assessing a risky option as opportunity or threat influences whether people favor the risky option or a certain option (Highhouse & Paese, 1996). In a

hypothetical management decision in an experiment it was observed that participants were risk seeking in situations framed as gain and risk averse in situations framed as loss. The opportunity and threat perception mediated the relationship between the situation frame and risk-taking (Xie & Wang, 2003).

The manipulation of the increasing salience of personal loss is not a framing of the choice, because in this case the certain option should also have varied regarding whether it is a sure loss or a sure gain. Thus, instead of framing the choices as losses or gains, the manipulation of the salience of losses could have changed the perception of opportunities and threats in the given choice problems, leading to different risk appraisals.

The change of the risk preferences seems not to be due to a change in the individual risk attitude but relationship between the perceived risk and the response to it. The gamble is perceived as a greater threat in the condition of high salience of personal losses and consequently less attractive. The focus is rather on the threat due to the losses than the opportunity to gain payoffs for the other. As a result, the risking of certain personal payoffs in order to increase expected joint payoffs is unattractive. The moderating role of salience of personal loss between risk perception and risk-taking suggests that the perception of opportunities and threats yielded by a risky option might be an important determinant of risky choice in interpersonal situations.

Alternative Explanation

An alternative explanation to loss-aversion as the driving mechanism in the second experiment leading to a lack of prosocial behavior could be a decrease in the perceived need of the recipient. Possibly by introducing the endowment, the decision maker assumed that the recipient also received an endowment and therefore, was not dependent on his or her choices to receive a payoff from the experiment. The perceived need of the recipient is an important prerequisite for prosocial behavior (e.g., Batson et al., 1988; Batson, Eklund, Chermok, Hoyt, & Ortiz, 2007; Toi & Batson, 1982). If the endowment would decrease the perceived need of the recipient by the decision maker, the endowment would present a confound in the experiment. However, at least two reasons speak against this assumption: First, participants were told that two types of players existed and they were told that they were a decision maker, meaning that they had no concrete information about the recipient. This was followed by the instruction when introducing the endowment: “You have an endowment of 3000 Taler for the next task.” This does not suggest that participants should assume that everybody independent of their role should have received this endowment, but

that the endowment was particularly for the choice task. If the decision makers would assume that everybody received this endowment, then this would question all findings in dictator or ultimatum games. Thus, the endowment instruction as a means to decrease perceived need seems unlikely. Second, in the second experiment, choices in the individual choice task reflected extreme risk aversion, which was significantly higher than in individual choices in the first experiment. To observe the effect of the endowment on the choices in the individual choice task implies that the effect of the endowment was independent of the recipient and the beliefs about his or her needs.

Limitations

The perspective taking manipulation and the endowment present two variations between the first and the second experiment, which independently could have led to the change of behavior. Despite this pitfall, the ceasing of prosocial behavior in the second experiment is assumed to be due to the endowment, and not the perspective taking manipulation for the following reasons. The perspective taking manipulation did not lead to any changes between the experimental groups depending on whether they were instructed to focus on numbers or on the recipient. Furthermore, it did not lead to differences in empathetic concern. While this suggests that the manipulation did not have any effect on the risk preference in the choices, a treatment condition with the endowment added without the perspective taking manipulation would have been more suited to satisfy experimental rigor. In addition, the current study cannot shed light on the question of whether empathy influenced the choices in the first experiment, since no endowment was given. As a result, an experiment with a perspective taking manipulation without an endowment would be necessary to clarify the role of empathy.

The finding that people did not use the exit option in the second experiment does not rule out that behavior in the first was not partially driven by image motivation. Since prosocial behavior was not found in the second experiment the question could not be addressed.

Lastly, the incentive structure of the choice tasks did not allow a clear distinction between altruism and inequality concern as a motive for higher risk-taking in the interpersonal choice task. Inequality concern would lead to higher risk-taking in interpersonal choice tasks because the certain option yielded extreme inequality of payoffs and this creates the desire to decrease inequality by choosing the risky option perceived as fair. Altruism would lead to more risk-taking not because of the inequality in the certain

option, but to give the recipient a chance to receive some earning. Altruism and inequality aversion cannot be disentangled in the present experiments. Therefore, it has to be assumed that inequality aversion as well as altruism motivated prosocial choices. However, it remains an open question why the disliking of advantageous payoff distributions should not be the same as altruism, since it considers the welfare of the other.

Conclusion

When people find themselves in a choice situation where taking a risk can benefit another person, people are likely to behave as if more risk seeking than they would when they would decide for themselves in a similar situation. However, the tendency to behave prosocially is influenced by two factors: inequality considerations and the salience of personal losses. When outcomes yield high inequality disadvantageous to the decision maker people are less likely to take higher risks for others than they would when alone. Furthermore, the likelihood of taking higher risks for others decreases when the salience of possible personal losses increases. The findings suggest that inequality concerns influence choices under risk where there are consequences for others as well as loss-aversion.

General Discussion

This thesis examined the relationship between risk perception and responses to risk, such as risk-taking and risk appraisal. Two variables that influence the relationship between risk perception and responses to risk were identified: adjustment processes and the social consequences of the risky choice. The review of the literature revealed that risk perception is based on the integration of probabilities, the subjective value of consequences (utility), and feelings associated with those consequences. Rational and emotional information jointly determine how a situation is appraised (Finucane & Holup, 2006; van Gelder et al., 2009). Dual process theories of information processing (Epstein, 2003; Séguin et al., 2007; Sloman, 1996) represent a way to integrate cognitive and emotional processes. However, the role of adjustment processes on the relationship between risk perception and responses to risk had not yet been examined.

Although control is considered an important factor of responses to risk (Slovic, 2000), the theories concerned with responses to risk do not consider the reflection of the individual's resources and capacities to limit the impact of negative events or their probability of occurrence as important factors. As a result, the experimental conditions under which most of the empirical studies testing assumptions about risk perception and responses to risk did not involve risks that can be influenced by the participants. The influence of an agent's action on the probability and the outcomes of the risk and how this changes possible responses to risk are not within the scope of those studies. However, if risk is understood as an expectation involving negative outcomes (Sjöberg, 2003), then the influence of one's own actions on the risky event should be considered as a factor influencing the response to risk.

Using the cognitive-transactional model of stress (Lazarus, 1966, 1999; Lazarus & Folkman, 1984) as a structural meta-theory allowed the integration of independent areas of research focusing on processes of risk perception and adjustment in a tentative model and led to specific research questions. The findings, implications and limitations of the interviews and experiments were discussed in the respective chapters and will not be repeated here. Instead, the findings of the interviews and experiments will be integrated and discussed.

Summary of findings

The findings in this thesis suggest: first, theory of risk perception and responses to risk should consider internal processes of adjustment when trying to explain and predict risk appraisals in situations of ongoing threat. Second, the relationship between risk perception and risk-taking is affected by the implications the option fraught with risk can have on another person.

This thesis employed a qualitative and a quantitative approach to examine the relationship between risk perception and risk-taking and the role of adjustment on this relationship. In the qualitative part of the thesis interviews with humanitarian aid workers were conducted. Due to the political situation in the Sudan it was possible to examine risk perception and the appraisal of extreme events, such as kidnapping and armed assaults, for personal well-being. The qualitative study gave insight into the use of adjustment strategies. The adjustment strategies together with risk-perceptions and risk appraisals were used to infer the underlying processes of adjustment. The question of whether or not the propensity for risk-taking increases when the expected outcomes of risk-taking affect another person emerged from the interview findings. This question was investigated in two experiments with student samples. The results suggest that when risky options lead to helping it increases the propensity for risk-taking when the salience of personal losses are low and when the distribution of outcomes is not disadvantageous for the deciding individual.

The interviews suggested the hypothesis that if people's choices under risk involve outcomes for others, they are willing to take higher risks than they would when alone. The experiment allowed the testing of this assumption and showed that it is conditional on the salience of personal losses. Do the people who were identified as considering the welfare of others compared to the ones who did not voice this in the interviews, indicate different degrees of salience of personal loss? No, rather the findings suggest that people who did not consider their risk-taking as a means for helping others indicated a lower salience of personal losses by often refuting the assumption put forth by the interviewer that their working context is risky.

Participants in the interviews who stated that risk-taking presents a means to help others were aware of possible personal losses, indicated by their ratings of the ambient risk of security incidents. For those participants the salience of personal losses did not lead to less risk-taking because they engaged in adjustment based on self-regulation and as a result

did not experience concern and distress. It was inferred from the participants' reasoning and the discrepancy between risk and concern ratings that accommodative processes played a central role to enable participants to experience safety, despite ongoing threat. However, participants acknowledging the possible personal losses but incapable of accommodating them further experienced heightened distress and left the area of ongoing threat.

The effect of salience of losses on risk-taking was also found in the experiments. With increasing salience of possible losses for the individual, the likelihood of taking higher risks decreased when risky options presented a means for helping. In the experiments processes of adjustment did not influence behavior because choices were not carried out with feedback and information was only available through description.

The findings from the experiments and interviews show that adjustment processes focusing on internal and situational aspects are important when making choices that require the resolution of conflict between opposing goals. In the current case these are helping others and personal safety. However, no direct test of the influence of adjustment processes is possible at this point in time due to the underlying methodological differences of interviews and experiments which will be further elaborated now.

Integrating qualitative and quantitative data: A problem of compatibility?

The integration of qualitative and quantitative data is referred to as a mixed methods approach. Mixed methods are regarded as a means to enrich psychological research (Gelo, Braakmann, & Benetka, 2008; Yoshikawa, Weisner, Kalil, & Way, 2008). A number of procedures of how to mix methods exist but their process and their description remains vague. For example, triangulation is one proposed way to combine qualitative and quantitative methods, and can be used to give insight into a phenomenon from different angles in order to validate one's findings and conclusions drawn from the data. While the purpose of triangulation is stated repeatedly, the methodological prescriptions of how to integrate information of different data formats (verbal vs. numerical data) remain vague (see for example Flick, 2000). Qualitative research is based on the assumption that reality is constructed by the respective individual and research attempts to capture the way situations are constituted in a participant's awareness through interpretation of verbal material. For this reason verbal accounts are central and transport the meaning of the object of interest. Qualitative findings are always bound to specific individuals or groups, quantitative findings can be generalized to the general population. Because quantitative

research is based on the assumption that reality is constituted by measurable objects and research aims to observe these and their relationship by measuring them.

Going beyond the question of data compatibility an even more critical question arises which is hardly touched on by the authors proposing mixed methods: how can two very different schools of thought be integrated (for a discussion see Gelo et al., 2008; Toomela, 2011; Wiggins, 2011)? When considering this question in light of this study, it is necessary to note that the experimental findings cannot be used to explain the behavior of humanitarian aid workers working in situations of ongoing threat. The experiments tested the relationship between a set of independent variables, such as choice context, equality considerations, and empathy, and their effect on the dependent variable risk-taking. In the field setting the situation was more complex and yielded numerous variables which could have influenced behavior. Second, the interview findings do not allow the conclusion about causal relationships between variables, but give insight into how people interpret the situation and how this interpretation is influenced by adjustment processes. The influence of adjustment processes on the subjective representation of a given situation cannot be explored using aggregated data of a group of individuals and therefore the use of interviews which focused on the subjective representation was fruitful.

However, to combine both approaches to complement each other enables a more complex picture of human behavior and the underlying processes guiding it. While the interviews allowed the identification of variables of interest in a complex environment, the experimental approach permitted the testing of specific hypothesis about their relationship. The experiments reflected the psychological situation of the consequences associated with the choice options described by some interview participants as a reason for why they engage in risk-taking. Therefore, the use of experiments presents an expansion of the insight gained through the interviews and tested whether the subjective situation perceived by some of the interview participants presents a situational factor that influences general behavior when it is an objective situational feature.

To integrate these findings in a coherent picture is difficult without assuming a hierarchical structure of methods, which would be the case when viewing the interviews as an exploratory study leading to the experiments or to view the experiments as a mere test of the conclusion drawn from the interviews. To avoid drawing such a conclusion, this thesis took a different approach by viewing the insights as complementary. This will be explained further in the following section.

Theoretical implications: Towards a transactional model of risk perception

This thesis found evidence suggesting that risk perception of events that are not one time decisions is the result of a transactional process. The results showed that adjustment processes and consequences of risk-taking beyond self-interest influence risk perceptions and risk-taking. The experiments and the interviews indicate that risk-taking is not determined by an attitude towards risk in general. Rather risk-taking depends on the situation specific perceived risk and the individual's risk attitude. This suggests that a transactional model of risk perception has to consider person specific variables as well as situation specific variables. The structural components of risk perception in a transactional model are the activation of adjustment processes (e.g., Greve, 2000), person specific risk attitudes which could be dependent on traits such as sensation seeking (e.g., Zuckerman, 1994) as well as threat orientation (e.g., Thompson, Schlehofer, & Bovin, 2006) and situational characteristics such as framing of the situation (e.g., Kahneman & Tversky, 1984), information format (e.g., Slovic et al., 2000) and emotional valence associated with the expected outcomes (e.g., Loewenstein et al., 2001). In order to formulate a transactional model of risk perception in the future research has to examine the specific relationships between those constructs. The role of adjustment processes, feelings in interpersonal choice and the role of uncertainty, three aspects which were of particular importance in the present work, will be discussed and directions for future research will be described in detail below.

Risk perception, responses to risk and adjustment processes.

It was found that risk perception is not only determined by consequences that affect the individual itself but also by consequences that affect others. The propensity for greater risk-taking when it presents a means to help another person is influenced by fairness considerations and also depends on the salience of personal losses for the individual. This finding is in contrast to classical economic theory where it is assumed that risk attitudes expressed as risk preferences in lottery choices are stable and that choices are guided by self-interest (Arrow, 1971). Furthermore, the findings question the underlying assumption that risk perceptions exclusively determine responses to risk and that risk responses, particularly risky choice, present a measure of risk perceptions.

In each of the two experiments, risk preferences were assessed repeatedly without a long time lag between measurements, using the same method, while the framing of the decision problem did not vary. The variation between the tasks was only whether they

were carried out in an individual or an interpersonal context. It is assumed that the risk-taking increased in interpersonal choices in the experiments because the utility of the lotteries increased when other people were affected and not because of a change in risk attitudes. This is in line with concepts of other regarding preferences (Fehr & Schmidt, 2005) assuming that people receive utility from either the relative payoff difference (i.e. inequality considerations) (Bolton, Katok, & Zwick, 1998; Fehr & Schmidt, 1999) or that their utility is directly increased through the gain of the other (i.e. joint welfare maximization or altruism) (Charness & Rabin, 2002; Engelmann & Strobel, 2004). For this reason, other regarding preferences have to be considered when interested in risky choices in an interpersonal choice context. Therefore, when trying to model choice behavior in risky contexts that involve outcomes affecting others, it is necessary to integrate an individual's risk attitude as well as other regarding preferences in one utility function. This is a problem that remains to be solved.

In the interpersonal choice context, people seemed to be willing to take higher risks than when outcomes only impacted them alone. The propensity towards risk-taking was influenced by whether the risky option could yield relative negative payoffs compared to the certain option for the decision maker. This suggests that perceived opportunity and perceived threat influenced risk-taking in interpersonal choices. The role of the perception of opportunity and threat has been examined in individual choice contexts (Highhouse & Yüce, 1996; Sitkin & Weingart, 1995; Xie & Wang, 2003), but no study has explored this issue in an interpersonal choice context.

The perception of opportunity or threat in an ambiguous situation is dependent on situational variables such as perceived control (Brandstädter et al., 2004) and goal focus (Rothermund et al., 2001). This suggests that internal processes shape the subjective representation of the situation and are also likely to influence the relationship between risk perception and responses to risk such as risky choice. Furthermore, the interview study suggests that adjustment processes influence the subjective representation of the context and the appraisal of ambient risk of security. Particularly the appraisal of threat is assumed to be influenced by adjustment processes (Folkman et al., 1986). For this reason future studies should investigate how the activation of adjustment processes influences the perception of ambiguous situations and resulting responses to risk.

Future research needs to focus on the influence of adjustment processes on information processing and information search behavior because they are assumed to

determine risk perception. It is assumed that people generally dislike uncertainty (Loewenstein, 1994). When people could have taken a chance to win but did not, they are still searching for information in order to resolve the uncertainty about whether they would have won or not. This shows that people dislike ignorance even in the face of missed chances (Shani, Igou, & Zeelenberg, 2009; Shani, Tykocinski, & Zeelenberg, 2008). However, is this also true for situations of pending catastrophe? For example, how do house owners respond to information about possible flood risks associated with their building grounds? Adjustment and the use of strategies to manage risks are only likely to be used when a risk is acknowledged. Particularly immunization processes are likely to interfere with accurate judgments because they lead to biased information. The use of interviews enabled the identification of characteristics which are likely to influence how the individual perceives an ambiguous situation.

Future research should find out if those variables are systematically related to risk perceptions and how situational characteristics affect risk perception. For example, whether risk is appraised before or after the decision could give insight into when immunization processes are likely to be activated. Furthermore, it remains an open question of how adjustment processes and strategies used to adapt to ongoing threat influence responses to risk (risk appraisal in this case) and functioning after the experience of traumatic events. In order to explore person specific adjustment trajectories and responses this would require a longitudinal approach.

Feelings and risk-taking involving consequences for others.

In the current experimental study feelings were not examined as possible predictors of risky choices. It cannot be ignored that feelings may influence choice in interpersonal choices under risk, because of the possibility that acting prosocially can induce positive feelings. To perceive the act as rewarding suggests that it is not only the increase of the welfare of the other that matters but that being the one who acts is satisfying as well. This was found to be the case both in the interviews and in the laboratory, where it was observed that people donate payoffs to a public good even when their contribution does not increase the public good. This led to the assumption that giving itself has value and induces a “warm glow” (Andreoni, 1990). The metaphor of warm glow giving was explored and it was found that people do indeed experience a positive feeling when giving (Anik, Aknin, Norton, & Dunn, 2009; Konow & Earley, 2008). This finding is significant because feelings are related to risk perception. Finucane et al. (2000) point out an inverse

relationship between the perception of risk and benefit of a hazard. It is assumed that hazards which yield high benefit are perceived as less risky than hazards which yield low benefit. The effect is mediated by affect; a high benefit associated with a hazard induced positive affect which in turn leads to a low risk perception, while a high risk judgment induces negative affect which in turn is associated with low perceived benefit.

Future research needs to explore how immediate feelings experienced during risk perception induced by the consequence of helping influence risk-taking. People who judged the risk of security incidents as high but experienced low concern might be influenced by the positive affect caused by the benefits of risk-taking for others. On the other hand, participants who do not focus on the possible benefit are more concerned, because they perceive the threat of the hazard to be greater since they experience no positive affect associated with the prosocial act. The hypothesis that feelings induced by prosocial acts influence risky choice remains to be tested experimentally.

Interpersonal risk-taking in the face of uncertainty.

In the applied setting, which was examined in the interviews, consequences and the likelihood of negative events were at all times uncertain. In contrast, in the experiments probability information as well as payoff information was provided to the participants. The findings of the experiments shed light on choices under risk when probabilities and consequences are known. The probabilities assigned to the outcomes of the risky options in the experiment were in the medium range ($p = .5$), while in the applied context of the interviews, the participants were faced with choices where possible negative outcomes were rare ($p \leq .1$) as the review of the past security incidents indicates (e.g., Stoddard et al., 2009). How would risk-taking in the interpersonal choice context differ when the choices would involve rare events?

Prospect theory would suggest that the rare event would be overweighted and people would be more likely to opt for the safe option (Kahneman & Tversky, 1979; Tversky & Kahneman, 1992). Future research needs to find out if this still holds when another person participates in the winnings but not in the losses which have a small probability. The behavior of people in interpersonal choice contexts where probabilities are more extreme is likely to be different. The probability information in the experiments was provided through description. The findings should only be generalized to situations where probability information is provided through description, because choices in individual contexts differ

when information about probabilities is acquired through experience (e.g., Barron & Erev, 2003; Hertwig et al., 2004; Hertwig et al., 2006).

One important characteristic of the situation of the humanitarian aid workers who participated in the interview study is that the possible negative events that they can experience yield very low probabilities. As a result they mostly experience positive, i.e. safe consequences, which benefit another person and not themselves. How are choices influenced by risky options, which have a high probability of positive payoffs for another person and very low probability of consequences leading to negative outcomes for the individual in repeated decisions where the distribution of events is acquired through experience?

Future directions.

It was shown that a transactional perspective on the relationship between risk perception and responses to risk leads to a number of new questions. The activation of adjustment processes might be an important factor influencing information processing and information search and therefore indirectly shape responses to risk. Another factor associated with information processing are feelings experienced during the decision making process. Those are likely to be affected by the specific nature of outcomes, as well as the individual's ability to regulate emotional responses. The activation of adjustment processes therefore also might influence risk perception and not just responses to risk. The picture becomes even more complex when considering how information was acquired, which might influence all of the processes and factors above. Some ways how these individual questions can be approached are proposed in the sections above, but to put together the puzzle pieces remains a task for the future.

Practical implications

At the beginning of this work the underlying assumptions of operational security management in organizations working in situations that yield ambiguous security was described. It was argued that the focus of security management is the event or object presenting the risk and that it is generally assumed that responses to risk represent a manifestation of risk perceptions. This thesis shows that the perception of safety not only depends on the information about the possible threat but responses to risk and risk perception are distinct. The response to a threat is influenced by situational aspects and information concerning how the threat can be controlled. Therefore, the way risk is

communicated must be transactional, which means it has to consider the impact of the affected person on the object emanating threat. Threat information leads to an increase of anxiety but not better coping (Ruiter, Verplanken, Kok, & Verrij, 2003), the focus when exploring responses to risk should not only focus on the risky event but also the individual affected by it. This can have two implications which need to be explored in future research: first, if a threat cannot be controlled people will be more careful and second, if the threat can be controlled people will experience less distress.

Furthermore, a focus on the individual affected by threat is necessary when considering the impact of emotional reactions on risk perception and decision making. It was shown in previous studies that particularly the ability of emotional regulation influences decisions in situations when emotions are activated (Magar, Phillips, & Hosie, 2008) and that strategies to regulate emotions differ in their effectiveness depending on whether emotions are accepted but reappraised or when they are controlled and suppressed (Gross & John, 2003; Richards & Gross, 2000). The two ways of emotion regulation were also identified in the interviews conducted with humanitarian aid workers in the Sudan. For these reasons it is an important question for future research.

In line with the above argument that the focus on risk perception and responses to risk needs to include the person affected by the threat, is the finding that people displayed less risk-taking when their personal possible losses were highly salient. It has been found in other studies that narrative descriptions of specific cases reduced the likelihood of defensive reactions and led to elevated risk perception (De Wit, Das, & Vet, 2008; Slovic et al., 2000). This suggests that when communicating the risk of an event or an object with the goal to increase precaution, the communication should not only focus on the event or object itself in terms of probabilities and outcomes but the negative impact it can have on the person affected by it.

Limitations

The limitations of the interview study and the experiments were presented individually above. However, it is important to keep in mind the possible limitations when integrating experimental data and interview findings to gain insight into risk perception and risk-taking. Here one is faced with a “challenging translation” for methodological and content specific reasons. It is difficult to combine qualitative and quantitative research, due to the fact that the nature of the answers differs. However, in the current work the insight gained through the interviews leads to a better understanding of the situational components

of the context and how it is experienced from the point of view of the interviewed person. The experiments, on the other hand, allowed the opportunity to test whether these situational variables have a general effect on risk perception. Thus, the findings which emerged from one method allow a better understanding of the findings emerging from the other.

A second important limitation is the question of whether the incentive structure of the experiment really captures the situation of humanitarian aid workers. While in the interview study the risky options that the participants reported were concerned with consequences such as providing medicine to sick people or distribute food among the hungry, participants in the experiments were making choices concerning money. While it has been shown that the quantity of monetary rewards do not significantly change choice behavior (Holt & Laury, 2005; Kachelmeier & Shehata, 1992), this remains a question for rewards which differ in their quality.

Third, it was argued that self-regulation as well as viewing risk-taking as a means of helping led to the asymmetry between risk perception and concern in the interviews. However, the reported difference between risk perceptions and personal concern could also be artifacts of the interview procedure for two reasons. First, during the interviews, experiences were reported retrospectively. Retrospective reports are prone to be influenced by hindsight bias, which refers to the phenomenon that “when people try to recall past beliefs, their view is unwittingly contaminated by subsequently acquired ones. As a result, they exaggerate the extent to which they knew all along what they actually learned only later” (Fischhoff, Gonzalez, Lerner, & Small, 2005, p. 125). Participants that stated in the interview that they perceived the security situation as risky might not have done so in the situation when they actually made risky choices and their report presents a skewed representation of their risk perception and safety concerns in the past. Second, it is shown in other studies that justification pressure leads to an increase of information search in order to use risk defusing operators which leads to choices of otherwise risky options (Bar & Huber, 2008; Huber et al., 2009). The interviews could have induced justification pressure and, as a result, participants searched for information about risk defusing operators. It could also be that the participants stated their concern as low because they used risk defusing operators when they presented and evaluated their personal risk during the interview.

Conclusion

The findings of this thesis suggest that in decision making under risk preferential choices do not directly reflect risk perceptions. The relationship between risk perceptions and risky choices can differ depending on situational variables such as choice context and distributional equality as well as inter-individual differences regarding the activation of adjustment processes. The findings support the transactional perspective on the relationship of risk perception and responses to risk put forward in this thesis. In the literature to date the perspective on risk perception has been focused on the event or object emanating the risk. While control and newness of risks are considered crucial components of risk perception besides probability information and outcomes, the ways that people use strategies and knowledge to limit the impact of risks and how these in turn affect risk perception has not been examined. This leads to the general assumption implicitly held that risk perception is directly reflected by responses to risk.

However, in this thesis it was found that responses to risk are influenced by adjustment strategies and the attractiveness of outcomes associated with the risky options beyond self-interest. A new model of risk perception and responses to risk is proposed that views risk perception as influenced by context factors which determine the attractiveness of risky outcomes. Accordingly, this thesis shows that responses to risk are determined by more than a calculation of given probabilities and outcomes associated with an event or object, but depend on the individual's representation of the risk.

In order to further understand the relationship between risk perception and responses to risk the focus needs to move beyond the object or event associated with the risk itself and needs to integrate the reactions and adjustment processes of the individuals affected by the risky event. This thesis is a first step towards this end. It appears that when the transactional conception of risk perception and responses to risk is pursued further, we can increase our understanding of how to enable people to live well in a fundamentally uncertain world.

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Appendix

Appendix A

Instructions of individual choice task varying regarding the formulation of the certain option

You have completed the introduction and practice rounds for the next part of the study. In this part of the study lotteries will be presented to you in tables. The structure of the tables is equivalent to the ones just practiced. In each row of the table you have to decide whether you buy a ticket for a lottery, which is offered to you, or not (In each row of the table you have to decide between two lotteries: Option B or Option A). The lottery choices are independent of one another. The consequences of the lottery affect only you personally. The payoff of the lottery depends on a coin toss. The probability of heads or tails is 50 % respectively.

At the end of the study one your lottery choices will be drawn randomly and played out. 1200 Taler are equivalent to 1 €. If you have any questions at this point please turn to the lab assistants. When you are ready to continue, please press OK.

To read the instructions and to complete the table you have 3 minutes. In each of the rows of the table depicted below you see a lottery and its respective price to participate (In each of the rows of the table depicted below you see two lottery options: Option A and Option B).

The payoff of the lottery depends on a coin toss. The probability of heads or tails is 50 % respectively. The lotteries are independent of one another.

Please decide in each row, if you buy a ticket for the respective lottery or not (between Option A and Option B). At the end of the study one your choices will be drawn randomly and played out. Your decisions are regarding real money!

Appendix B

Instructions for the interpersonal choice task varying regarding the formulation of the certain option

You have completed the introduction and practice rounds for the next part of the study. In this part of the study lotteries will be presented to you in tables. The structure of the tables is equivalent to the ones just practiced. In each row of the table you have to decide whether you buy a ticket for a lottery, which is offered to you, or not (In each row of the table you have to decide between two lotteries: Option B or Option A). In this part there are two types of participants: Decision makers and recipients. You are a decision maker. Your decisions do not only have consequences for you personally but also for another person, the recipient. The recipient is another participant who is randomly assigned to you. It holds that: You will not interact with the other, or receive information about his/her identity. The other will receive information at the end of the study that he received payoffs through choices of another person, but not through whom. The payoff of the lottery depends on a coin toss. The probability of heads or tails is 50 % respectively.

At the end of the study one your lottery choices will be drawn randomly and played out. 1200 Taler are equivalent to 1 €. If you have any questions at this point please turn to the lab assistants. When you are ready to continue, please press OK.

To read the instructions and to complete the table you have 3 minutes. In each of the rows of the table depicted below you see a lottery and its respective price to participate (In each of the rows of the table depicted below you see two lottery options: Option A and Option B).

There are two types of participants: Decision makers and recipients. You are a decision maker. Your decisions do not only have consequences for you personally but also for the recipient. The recipient is another participant who is randomly assigned to you.

It holds that: You will not interact with the recipient, or receive information about his/her identity. The recipient will receive information at the end of the study that he received payoffs through choices of another person, but not through whom.

The payoff of the lottery depends on a coin toss. The probability of heads or tails is 50 % respectively. The lotteries are independent of one another.

Please decide in each row, if you buy a ticket for the respective lottery or not (between Option A and Option B).

At the end of the study one your choices will be drawn randomly and played out. Your decisions are regarding real money!

Appendix C

Example of individual choice task with the certain option portrayed as price

	Lottery		Price	Do you buy a ticket?
	You get in case of			
	Heads	Tails		
1.	1500	2500	1500	Yes / No
2.	1500	2500	1600	Yes / No
3.	1500	2500	1700	Yes / No
4.	1500	2500	1800	Yes / No
5.	1500	2500	1900	Yes / No
6.	1500	2500	2000	Yes / No
7.	1500	2500	2100	Yes / No
8.	1500	2500	2200	Yes / No
9.	1500	2500	2300	Yes / No
10.	1500	2500	2400	Yes / No
11.	1500	2500	2500	Yes / No

Appendix D

Example of individual choice task with the certain option portrayed as sure gain

	Option A		Option B	Your Choice
	You get in case of		You get in case of	
	Heads	Tails	Heads or Tails	
1.	1500	2500	1500	A / B
2.	1500	2500	1600	A / B
3.	1500	2500	1700	A / B
4.	1500	2500	1800	A / B
5.	1500	2500	1900	A / B
6.	1500	2500	2000	A / B
7.	1500	2500	2100	A / B
8.	1500	2500	2200	A / B
9.	1500	2500	2300	A / B
10.	1500	2500	2400	A / B
11.	1500	2500	2500	A / B

Appendix E

Example of interpersonal choice task with certain option portrayed as price

	Lottery		Price		Without the lottery the other will get	Do you buy a ticket?	
	You get in case of		The other gets in case of				
	Heads	Tails	Heads	Tails			
1.	1500	2500	1500	2500	1500	0	Yes / No
2.	1500	2500	1500	2500	1600	0	Yes / No
3.	1500	2500	1500	2500	1700	0	Yes / No
4.	1500	2500	1500	2500	1800	0	Yes / No
5.	1500	2500	1500	2500	1900	0	Yes / No
6.	1500	2500	1500	2500	2000	0	Yes / No
7.	1500	2500	1500	2500	2100	0	Yes / No
8.	1500	2500	1500	2500	2200	0	Yes / No
9.	1500	2500	1500	2500	2300	0	Yes / No
10.	1500	2500	1500	2500	2400	0	Yes / No
11.	1500	2500	1500	2500	2500	0	Yes / No

Appendix F

Example of interpersonal choice task with certain option portrayed as sure gain

	Option A				Option B		Your Choice
	You get in case of		The recipient gets in case of		You get in case of	The other gets in case of	
	Heads	Tails	Heads	Tails	Heads or Tails	Heads or Tails	
1.	1500	2500	1500	2500	1500	0	A / B
2.	1500	2500	1500	2500	1600	0	A / B
3.	1500	2500	1500	2500	1700	0	A / B
4.	1500	2500	1500	2500	1800	0	A / B
5.	1500	2500	1500	2500	1900	0	A / B
6.	1500	2500	1500	2500	2000	0	A / B
7.	1500	2500	1500	2500	2100	0	A / B
8.	1500	2500	1500	2500	2200	0	A / B
9.	1500	2500	1500	2500	2300	0	A / B
10.	1500	2500	1500	2500	2400	0	A / B
11.	1500	2500	1500	2500	2500	0	A / B

Appendix G

Instructions of the dictator game

In the next part of the study different distributions of money will be presented to you. In the task you have to decide, how much of the money you want to give to a randomly assigned other participant.

It holds that: You will not interact with the other participant or receive information about his/her identity. The recipient will receive information at the end of the study that he received payoffs through choices of another person, but not through whom.

The decisions that you make in the next task influence your payoffs that you will receive at the end of the study.

At the end of the study one of your choices will be selected randomly and paid out. 1200 Taler equal 1 €.

If you have any questions at this point please turn to the lab assistants. When you are ready to continue, please press OK.

In the table below you see 21 rows with paired payoffs: Payoffs for you personally and payoffs for another participant. The other participant is now randomly assigned to you. Please indicate which distributions of the 2000 Taler you accept. At the end of the study one of your decisions is picked at random and paid out.

In this part 1200 Taler equal 1 €. You have 6 minutes to complete the table.

Appendix H

Dictator game choice matrix

	Distribution of Payoffs		Do you accept the distribution
	You get	The other gets	
1.	2000	0	Yes / No
2.	1900	100	Yes / No
3.	1800	200	Yes / No
4.	1700	300	Yes / No
5.	1600	400	Yes / No
6.	1500	500	Yes / No
7.	1400	600	Yes / No
8.	1300	700	Yes / No
9.	1200	800	Yes / No
10.	1100	900	Yes / No
11.	1000	1000	Yes / No
12.	900	1100	Yes / No
13.	800	1200	Yes / No
14.	700	1300	Yes / No
15.	600	1400	Yes / No
16.	500	1500	Yes / No
17.	400	1600	Yes / No
18.	300	1700	Yes / No
19.	200	1800	Yes / No
20.	100	1900	Yes / No
21.	0	2000	Yes / No

Appendix I

Items of Portraits Values Questionnaire (PVQ) (Schwartz et al., 2001) translated into German (Schmidt et al., 2007)

For each portrait, respondents answer: “How much like you is this person?” The response alternatives are; “very much like me”, “like me”, “somewhat like me”, “a little like me”, “not like me”, and “not like me at all”. For each portrait, respondents choose their response by checking one of six boxes labeled with the response alternatives.

Rating Items from 1 (not like me at all) to 6 (very much like me).

Benevolence

12. It's very important to him to help the people around him. He wants to care for other people.

18. It is important to him to be loyal to his friends. He wants to devote himself to people close to him.

27. It is important to him to respond to the needs of others. He tries to support those he knows.

33. Forgiving people who might have wronged him is important to him. He tries to see what is good in them and not to hold a grudge.

Universalism

3. He thinks it is important that every person in the world be treated equally. He wants justice for everybody, even for people he doesn't know.

8. It is important to him to listen to people who are different from him. Even when he disagrees with them, he still wants to understand them.

19. He strongly believes that people should care for nature. Looking after the environment is important to him.

23. He believes all the worlds' people should live in harmony. Promoting peace among all groups in the world is important to him.

29. He wants everyone to be treated justly, even people he doesn't know. It is important to him to protect the weak in society.

40. It is important to him to adapt to nature and to fit into it. He believes that people should not change nature.

Self-direction

1. Thinking up new ideas and being creative is important to him. He likes to do things in his own original way.

11. It is important to him to make his own decisions about what he does. He likes to be free to plan and to choose his activities for himself.

22. He thinks it's important to be interested in things. He likes to be curious and to try to understand all sorts of things.

34. It is important to him to be independent. He likes to rely on himself.

Stimulation

6. He thinks it is important to do lots of different things in life. He always looks for new things to try.

15. He likes to take risks. He is always looking for adventures.

30. He likes surprises. It is important to him to have an exciting life.

Hedonism

10. He seeks every chance he can to have fun. It is important to him to do things that give him pleasure.

26. Enjoying life's pleasures is important to him. He likes to 'spoil' himself.

37. He really wants to enjoy life. Having a good time is very important to him.

Achievement

4. It's very important to him to show his abilities. He wants people to admire what he does.

13. Being very successful is important to him. He likes to impress other people.

24. He thinks it is important to be ambitious. He wants to show how capable he is.

32. Getting ahead in life is important to him. He strives to do better than others.

Power

2. It is important to him to be rich. He wants to have a lot of money and expensive things.

17. It is important to him to be in charge and tell others what to do. He wants people to do what he says.

39. He always wants to be the one who makes the decisions. He likes to be the leader.

Security

5. It is important to him to live in secure surroundings. He avoids anything that might endanger his safety.

14. It is very important to him that his country be safe from threats from within and without. He is concerned

that social order be protected.

21. It is important to him that things be organized and clean. He doesn't want things to be a mess.

31. He tries hard to avoid getting sick. Staying healthy is very important to him.

35. Having a stable government is important to him. He is concerned that the social order be protected.

Conformity

7. He believes that people should do what they're told. He thinks people should follow rules at all times, even when no-one is watching.

16. It is important to him always to behave properly. He wants to avoid doing anything people would say is wrong.

28. It is important to him to be obedient. He believes he should always show respect to his parents and to older people.

36. It is important to him to be polite to other people all the time. He tries never to disturb or irritate others.

Tradition

9. He thinks it's important not to ask for more than what you have. He believes that people should be satisfied with what they have.

20. Religious belief is important to him. He tries hard to do what his religion requires.

25. He believes it is best to do things in traditional ways. It is important to him to follow the customs he has learned.

38. It is important to him to be humble and modest. He tries not to draw attention to himself.

Appendix J

Risk attitude classification for all participants based on lottery choices depending on choice context

Table J1: Risk attitude classification of participants in experiment 1.

Number of safe choices	Risk attitude	individual context lottery								interpersonal context lottery							
		1		2		3		4		1		2		3		4	
		%	Cum%	%	Cum%	%	Cum%	%	Cum%	%	Cum%	%	Cum%	%	Cum%	%	Cum%
0	risk-seeking	1.7	1.7	.8	.8	2.5	2.5	.8	.8	9.2	9.2	8.3	8.3	15.0	15.0	6.7	6.7
1		.8	2.5	1.7	2.5	1.7	4.2	1.7	2.5	4.2	13.3	1.7	10.0	1.7	16.7	.8	7.5
2		0	2.5	.8	3.3	.8	5.0	0	2.5	.8	14.2	.8	10.8	.8	17.5	1.7	9.2
3		0	2.5	2.5	5.8	1.7	6.7	.8	3.3	5.8	20.0	3.3	14.2	5.0	22.5	5.0	14.2
4		2.5	5.0	7.5	13.3	2.5	9.2	5.0	8.3	7.5	27.5	10.0	24.2	5.8	28.3	3.3	17.5
5	risk-neutral	27.5	32.5	25.0	38.3	25.0	34.2	5.0	13.3	21.7	49.2	20.0	44.2	22.5	50.8	10.0	27.5
6	risk-averse	35.0	67.5	32.5	70.8	35.0	69.2	21.7	35.0	25.0	74.2	27.5	71.7	20.0	70.8	23.3	50.8
7		12.5	80.0	14.2	85.0	12.5	81.7	12.5	47.5	12.5	86.7	7.5	79.2	15.0	85.8	9.2	60.0
8		13.3	93.3	5.8	90.8	5.8	87.5	11.7	59.2	7.5	94.2	5.8	85.0	6.7	92.5	5.8	65.8
9		2.5	95.8	6.7	97.5	5.0	92.5	9.2	68.3	3.3	97.5	2.5	87.5	3.3	95.8	5.0	70.8
10		3.3	99.2	2.5	100.0	3.3	95.8	8.3	76.7	1.7	99.2	6.7	94.2	1.7	97.5	9.2	80.0
11		.8	100.0	0	100.0	4.2	100.0	23.3	100.0	.8	100.0	5.8	100.0	2.5	100.0	20.0	100.0

Appendix K

Frequency of inconsistent choices in individual and interpersonal choice context in Experiment 1

Table K1: Inconsistent choices in experiment 1.

Choice Context	Frequency of inconsistent choices	Number of participants	Percent
Individual	0	102	85.0
	1	9	7.5
	2	4	3.3
	3	4	3.3
	4	1	.8
	Total	120	100 %
Interpersonal	0	101	84.2 %
	1	10	8.3 %
	2	4	3.3 %
	3	3	2.5 %
	4	2	1.7 %
	Total	120	100 %

Appendix L

Relationship between inconsistent choices in individual and interpersonal choice context in Experiment 1

Table L1: Cross tabs for inconsistent choices in interpersonal and individual choice tasks.

N = 120		Frequency of inconsistent choice in individual context					
		0	1	2	3	4	Total
Frequency	0	92	5	3	1	0	101
of	1	6	4	0	0	0	10
inconsistent	2	3	0	1	0	0	4
choices in	3	1	0	0	1	1	3
interpersonal	4	0	0	0	2	0	2
context	Total	102	9	4	4	1	120

Appendix M

Descriptive statistics for of risk attitudes in experiment 1 (uncorrected dataset)

Table M1: Mean risk attitudes and standard deviations for each choice task and choice context.

Choice context	Choice task	Frame of certain option	<i>Descriptive Statistics</i>		
			<i>Mean</i>	<i>SD</i>	<i>N</i>
individual	1	Sure gain	.94	.10	66
		Price to pay	.90	.12	54
		Total	.92	.11	120
	2	Sure gain	.94	.16	66
		Price to pay	.87	.19	54
		Total	.91	.17	120
	3	Sure gain	.96	.11	66
		Price to pay	.92	.10	54
		Total	.94	.10	120
	4	Sure gain	.84	.18	66
		Price to pay	.77	.14	54
		Total	.81	.17	120
Interpersonal	1	Sure gain	1.03	.17	66
		Price to pay	.94	.14	54
		Total	.99	.16	120
	2	Sure gain	.99	.31	66
		Price to pay	.86	.21	54
		Total	.93	.27	120
	3	Sure gain	1.03	.15	66
		Price to pay	.96	.11	54
		Total	1.00	.14	120
	4	Sure gain	.92	.22	66
		Price to pay	.82	.19	54
		Total	.87	.21	120

Appendix N

Descriptive statistics for of risk attitudes in experiment 1 (only consistent participants)

Table N1: Mean risk attitudes and standard deviations for each choice task and choice context.

Choice context	Choice task	Frame of certain option	<i>Descriptive Statistics</i>		
			<i>Mean</i>	<i>SD</i>	<i>N</i>
individual	1	Sure gain	.93	.10	46
		Price to pay	.89	.12	46
		Total	.91	.12	92
	2	Sure gain	.92	.12	46
		Price to pay	.86	.20	46
		Total	.89	.16	92
	3	Sure gain	.95	.09	46
		Price to pay	.92	.11	46
		Total	.93	.10	92
	4	Sure gain	.83	.18	46
		Price to pay	.76	.14	46
		Total	.79	.17	92
Interpersonal	1	Sure gain	1.01	.16	46
		Price to pay	.93	.15	46
		Total	.97	.16	92
	2	Sure gain	.96	.30	46
		Price to pay	.85	.21	46
		Total	.91	.27	92
	3	Sure gain	1.02	.15	46
		Price to pay	.95	.12	46
		Total	.98	.14	92
	4	Sure gain	.90	.22	46
		Price to pay	.81	.18	46
		Total	.86	.20	92

Appendix O

Giving in the dictator game

Table O1: Frequency of transferred amount in percent of the endowment.

Proportion of endowment transferred in %	Frequency	Percent of participants	Cumulative Percent
.00	27	24.8	24.8
5.00	5	4.6	29.4
10.00	7	6.4	35.8
15.00	4	3.7	39.4
20.00	2	1.8	41.3
25.00	4	3.7	45.0
30.00	3	2.8	47.7
35.00	4	3.7	51.4
40.00	3	2.8	54.1
45.00	5	4.6	58.7
50.00	27	24.8	83.5
55.00	3	2.8	86.2
60.00	6	5.5	91.7
65.00	4	3.7	95.4
70.00	1	.9	96.3
75.00	1	.9	97.2
80.00	3	2.8	100.0
Total	109	100.0	

Appendix P

Scatter plot and regression slope, predicting change of safe decisions in interpersonal lottery with equal payoffs with giving in dictator game, certain option = sure gain

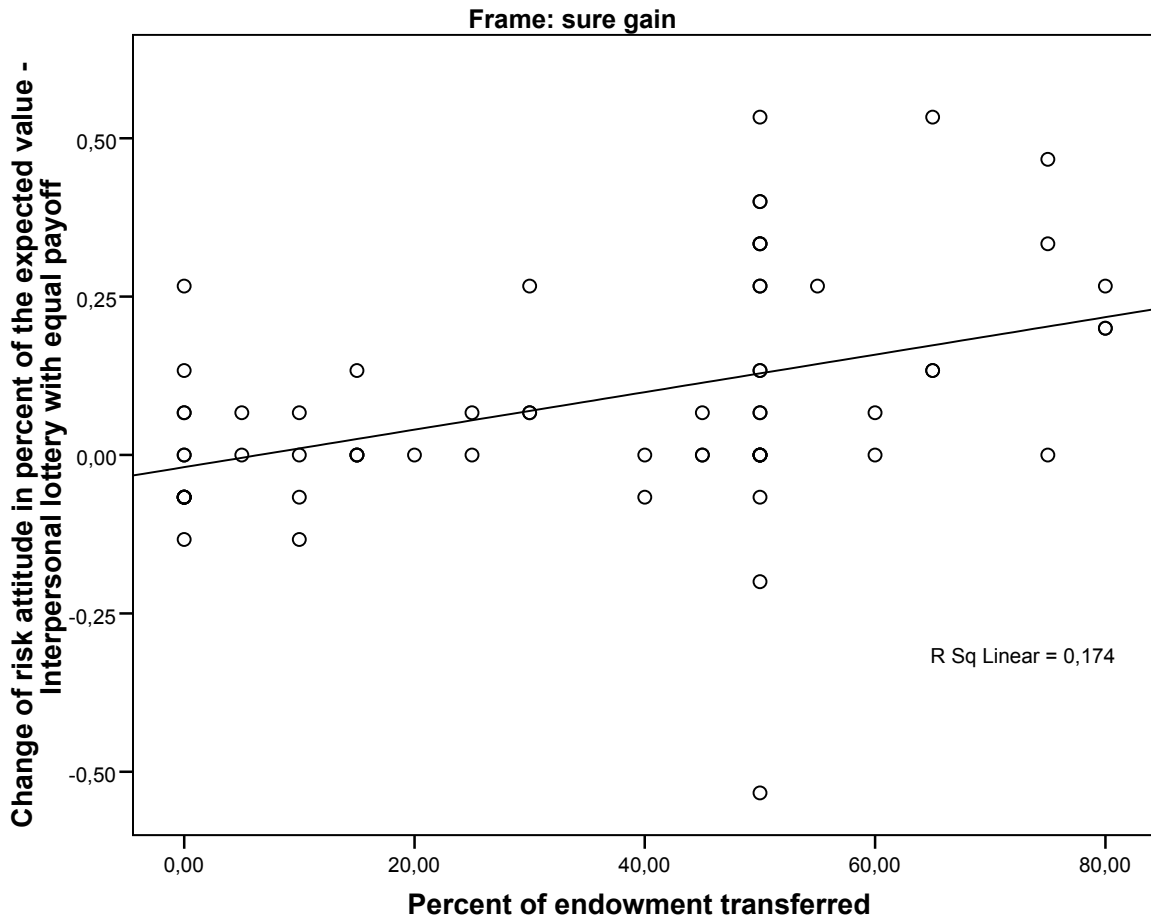


Figure P1: Scatterplot and regression slope for endowment transferred in the dictator game with change of risk attitude in risky choices depending on context.

Appendix Q

Scatter plot and regression slope, predicting change of safe decisions in interpersonal lottery with equal payoffs with giving in dictator game, certain option = price to pay

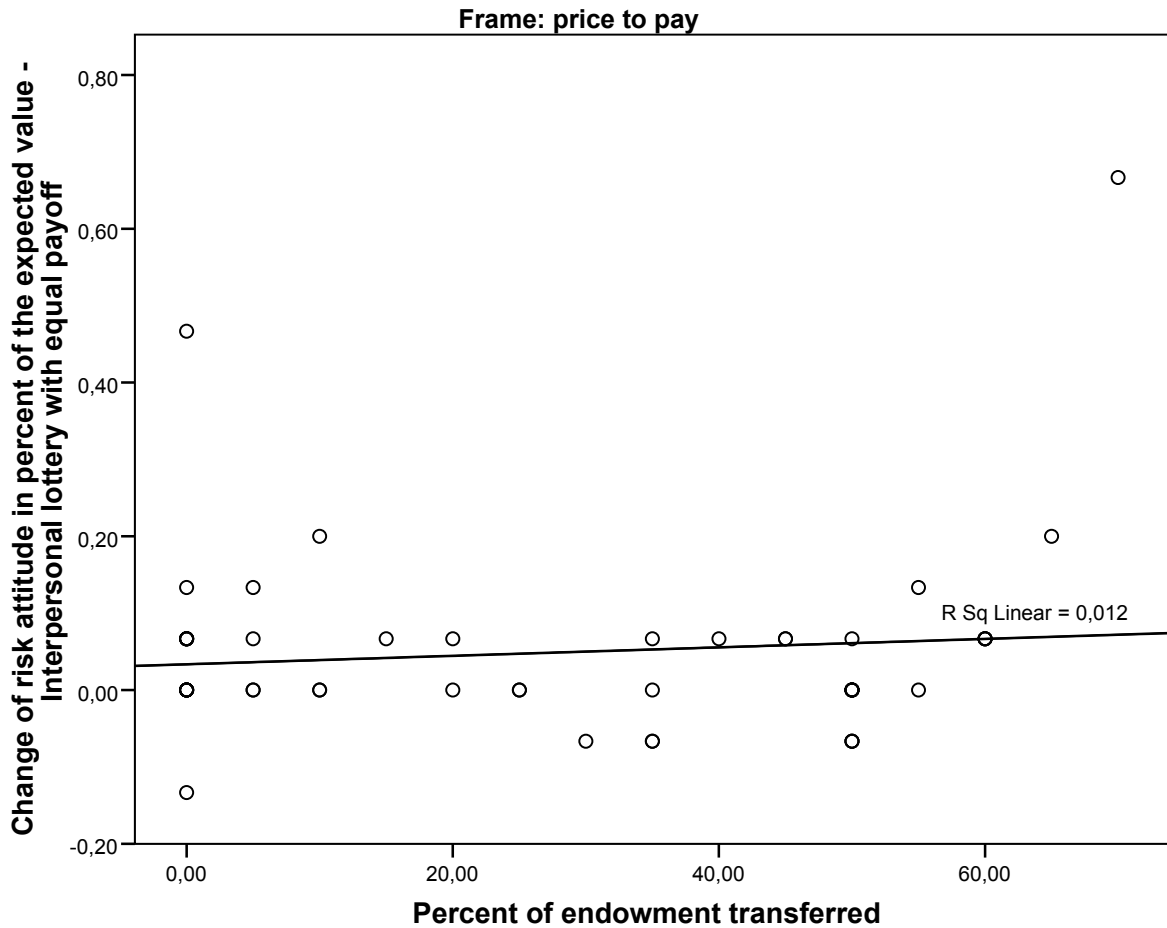


Figure Q1: Scatterplot and regression slope for endowment transferred in the dictator game with change of risk attitude in risky choices depending on context.

Appendix R

Scatter plot and regression slope, predicting change of safe decisions in interpersonal lottery with disadvantageous payoffs with giving in dictator game, certain option = sure gain

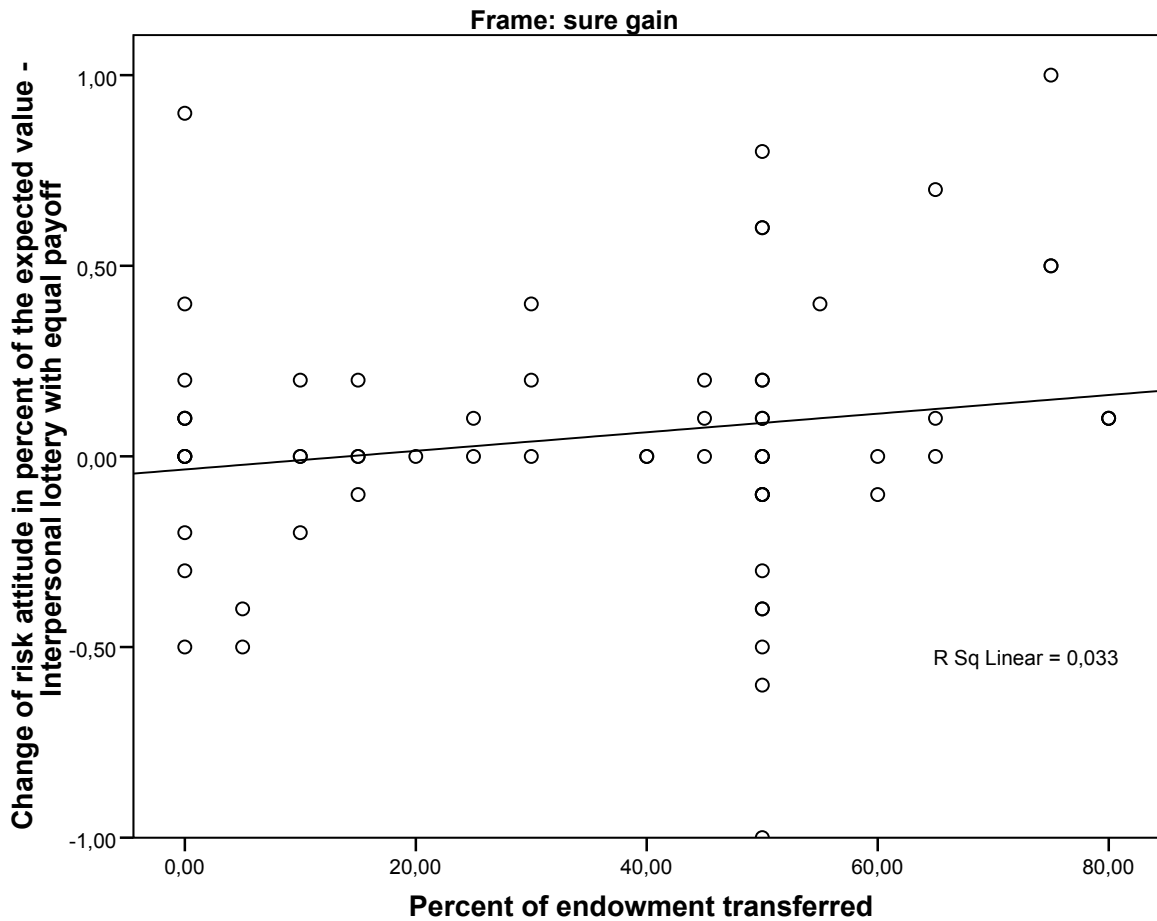


Figure R1: Scatterplot and regression slope for endowment transferred in the dictator game with change of risk attitude in risky choices depending on context.

Appendix S

Scatter plot and regression slope, predicting change of safe decisions in interpersonal lottery with disadvantageous payoffs with giving in dictator game, certain option = price to pay

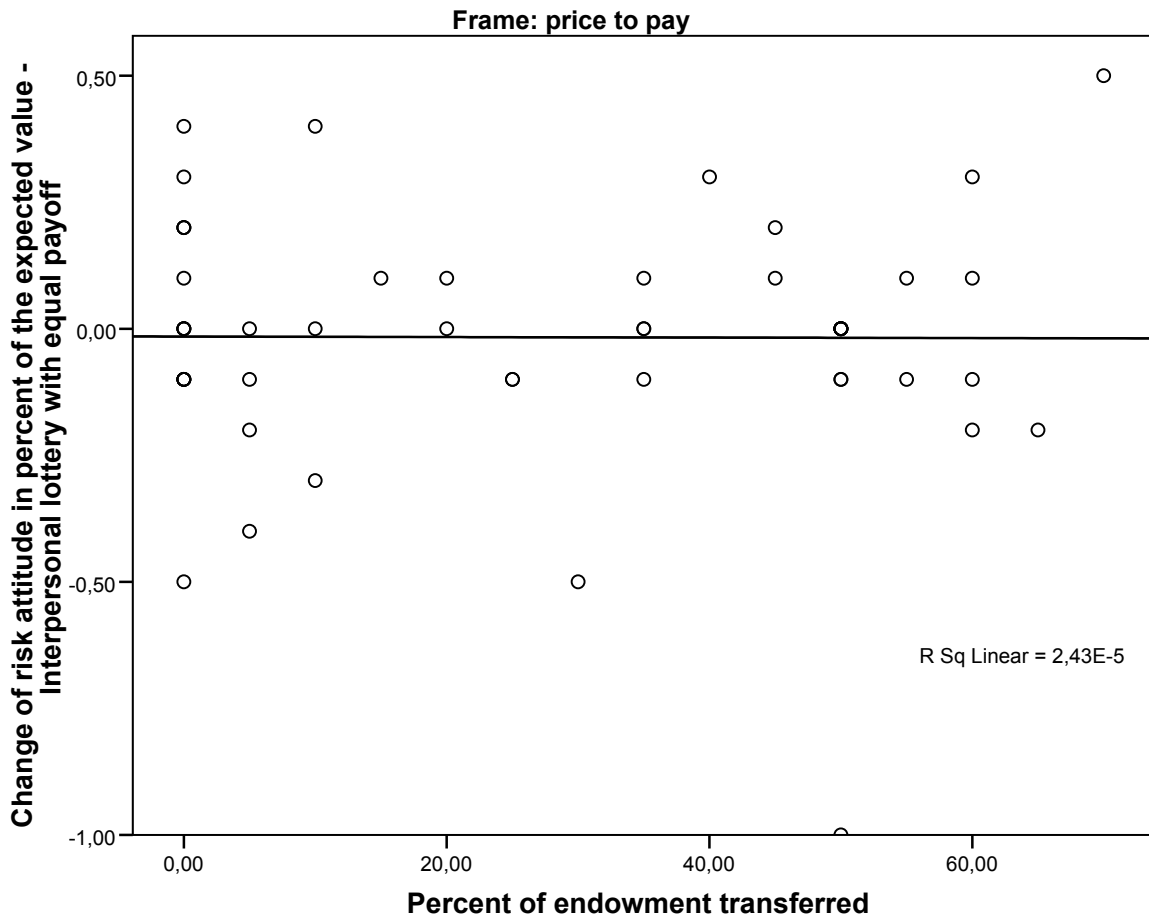


Figure S1: Scatterplot and regression slope for endowment transferred in the dictator game with change of risk attitude in risky choices depending on context.

Appendix T

Scatter plot and regression slope, predicting change of safe decisions in interpersonal lottery with advantageous payoffs with giving in dictator game, certain option = sure gain

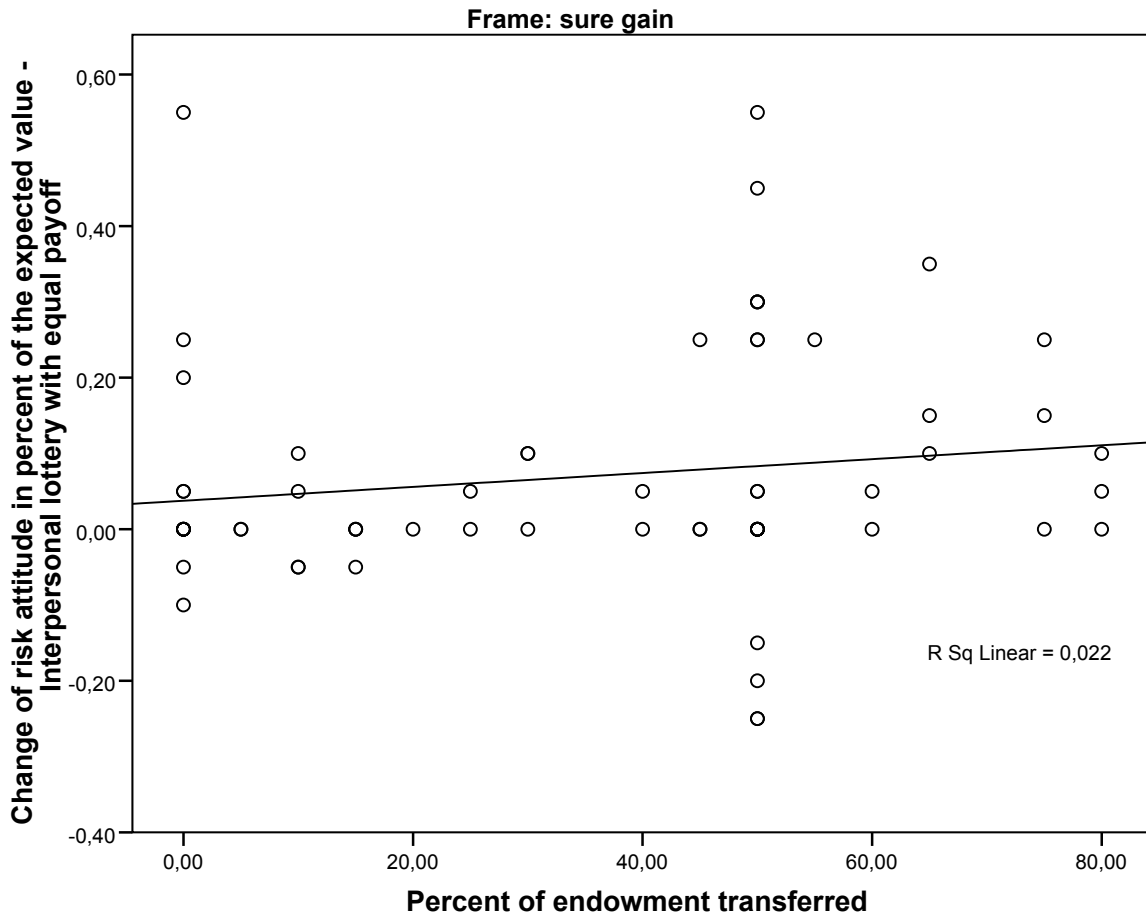


Figure T1: Scatterplot and regression slope for endowment transferred in the dictator game with change of risk attitude in risky choices depending on context.

Appendix U

Scatter plot and regression slope, predicting change of safe decisions in interpersonal lottery with advantageous payoffs with giving in dictator game, certain option = price to pay

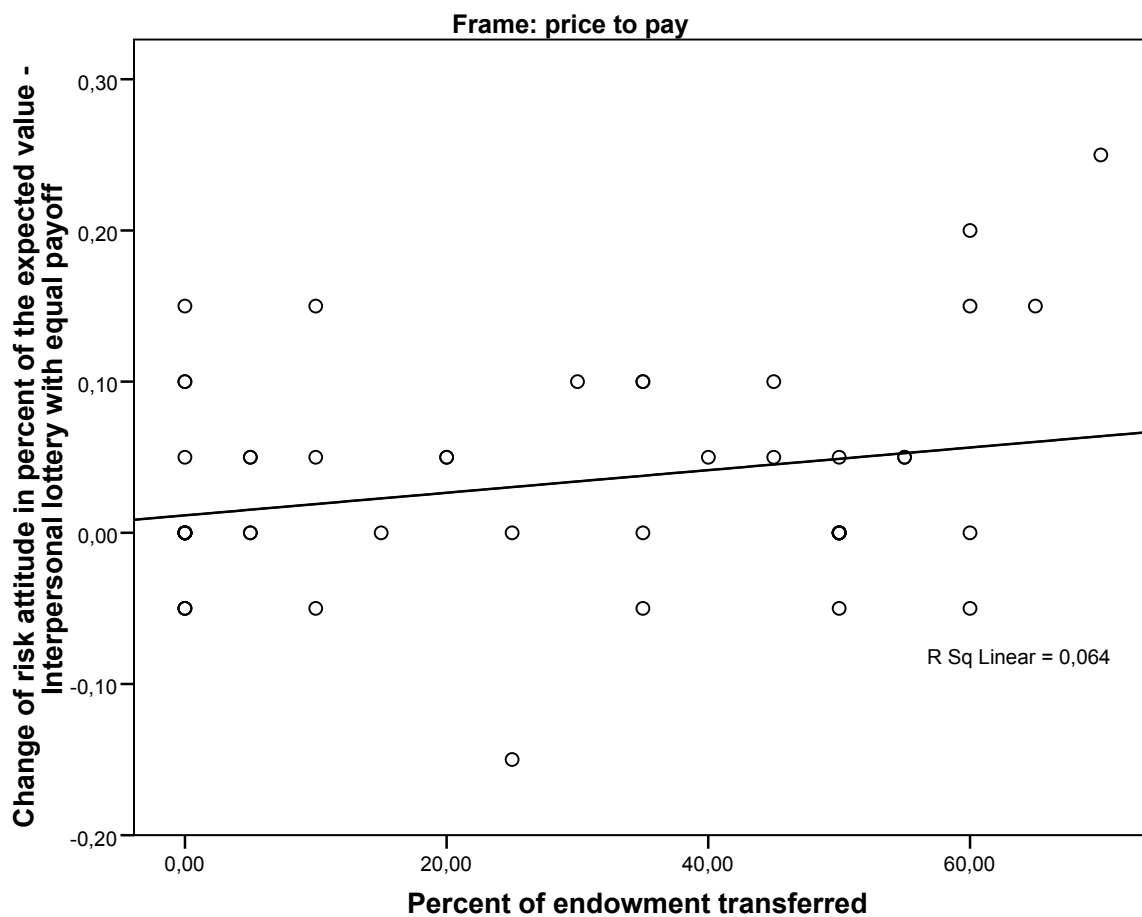


Figure U1: Scatterplot and regression slope for endowment transferred in the dictator game with change of risk attitude in risky choices depending on context.

Appendix V

Scatter plot and regression slope, predicting change of safe decisions in interpersonal lottery with equal payoffs and high variance with giving in dictator game, certain option = sure gain

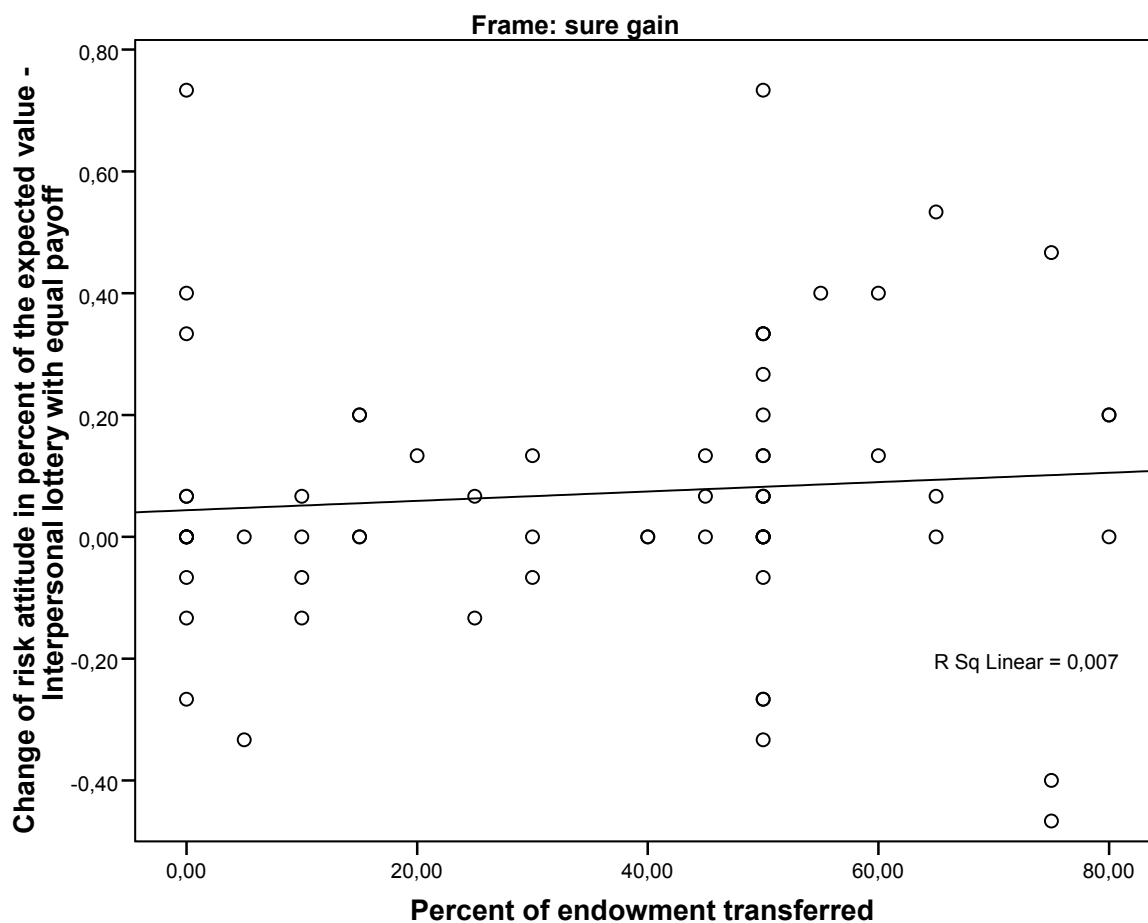


Figure V1: Scatterplot and regression slope for endowment transferred in the dictator game with change of risk attitude in risky choices depending on context.

Appendix W

Scatter plot and regression slope, predicting change of safe decisions in interpersonal lottery with equal payoffs and high variance with giving in dictator game, certain option = price to pay

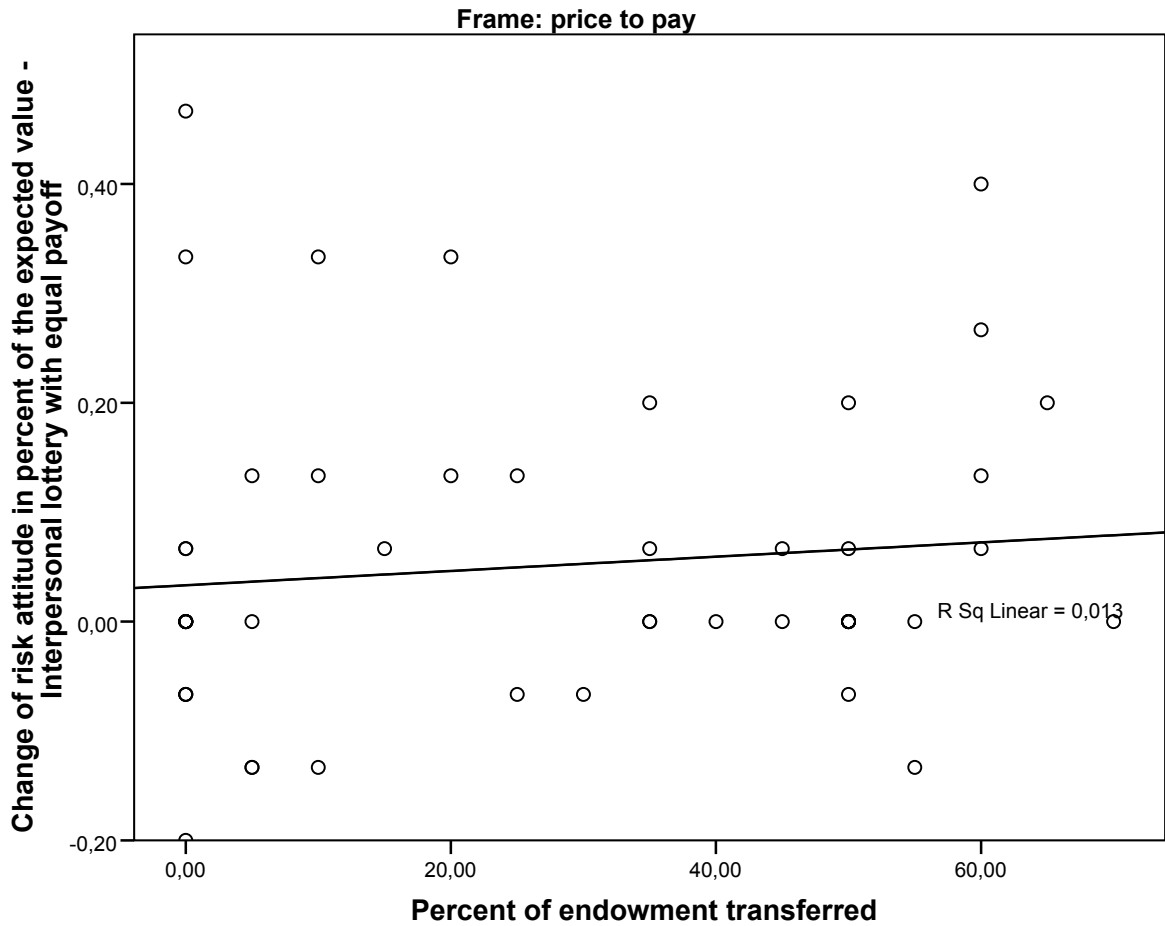


Figure W1: Scatterplot and regression slope for endowment transferred in the dictator game with change of risk attitude in risky choices depending on context.

Appendix X

Correlation between individual importance of situational aspects and the change of the risk attitude in the interpersonal lottery, certain option = sure gain

Table X1: Correlation coefficients of changes of risk attitude and importance of situational characteristics.

N = 26		1	2	3	4	5	6	7
Responsibility	Pearson's <i>r</i>	1						
	Sig. (2-tailed)							
Personal payoff	Pearson's <i>r</i>	-.051	1					
	Sig. (2-tailed)	.806						
Recipient's payoff	Pearson's <i>r</i>	.445*	-.246	1				
	Sig. (2-tailed)	.023	.226					
Change of risk attitude in choice task 1	Pearson's <i>r</i>	.118	-.144	.392*	1			
	Sig. (2-tailed)	.565	.482	.048				
Change of risk attitude in choice task 2	Pearson's <i>r</i>	.285	-.333	.472*	.434**	1		
	Sig. (2-tailed)	.158	.096	.015	.000			
Change of risk attitude in choice task 3	Pearson's <i>r</i>	.002	-.209	.170	.463**	.492**	1	
	Sig. (2-tailed)	.993	.307	.406	.000	.000		
Change of risk attitude in choice task 4	Pearson's <i>r</i>	.156	-.168	.200	.297*	.416**	.475**	1
	Sig. (2-tailed)	.446	.413	.327	.015	.001	.000	

** . Correlation is significant at the $p = 0.01$ level 2-tailed.

* . Correlation is significant at the $p = 0.05$ level 2-tailed.

Appendix Y

Correlation between individual importance of situational aspects and the change of risk attitude in the interpersonal lottery for certain option = price to pay

Table Y1: Correlation coefficients of changes of risk attitude and importance of situational characteristics.

N = 26		1	2	3	4	5	6	7
Responsibility	Pearson's <i>r</i>	1						
	Sig. (2-tailed)							
Personal payoff	Pearson's <i>r</i>	-.179	1					
	Sig. (2-tailed)	.383						
Recipient's payoff	Pearson's <i>r</i>	.510	-.123	1				
	Sig. (2-tailed)	.008	.549					
Change of risk attitude in choice task 1	Pearson's <i>r</i>	-.115	-.183	.144	1			
	Sig. (2-tailed)	.578	.372	.483				
Change of risk attitude in choice task 2	Pearson's <i>r</i>	-.124	.232	-.105	.354*	1		
	Sig. (2-tailed)	.547	.254	.611	.009			
Change of risk attitude in choice task 3	Pearson's <i>r</i>	.251	-.136	-.161	.399*	.298*	1	
	Sig. (2-tailed)	.217	.507	.432	.003	.028		
Change of risk attitude in choice task 4	Pearson's <i>r</i>	.072	-.085	-.250	-.027	.145	.145	1
	Sig. (2-tailed)	.727	.680	.217	.848	.294	.297	

** . Correlation is significant at the $p = 0.01$ level 2-tailed.

* . Correlation is significant at the $p = 0.05$ level 2-tailed.

Appendix Z

Correlation between personal values and change of risk attitude for certain option = sure gain

Table Z1: Correlation coefficients for personal values and change of risk attitude.

N = 49		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Universalism (1)	Pearson's r	1													
	Sig. 2-tailed														
Stimulation (2)	Pearson's r	-.009	1												
	Sig. 2-tailed	.953													
Benevolence (3)	Pearson's r	.488**	.136	1											
	Sig. 2-tailed	.000	.352												
Security (4)	Pearson's r	-.040	-.374**	-.193	1										
	Sig. 2-tailed	.783	.008	.184											
Performance (5)	Pearson's r	.119	.174	-.087	.447**	1									
	Sig. 2-tailed	.415	.231	.553	.001										
Conformism (6)	Pearson's r	-.051	-.148	.214	.398**	.209	1								
	Sig. 2-tailed	.728	.309	.139	.005	.149									
Tradition (7)	Pearson's r	-.037	.029	.405**	.026	-.156	.397**	1							
	Sig. 2-tailed	.799	.845	.004	.858	.285	.005								
Power (8)	Pearson's r	.002	-.102	-.235	.384**	.489**	-.103	-.197	1						
	Sig. 2-tailed	.992	.486	.105	.006	.000	.482	.175							
Self-determination (9)	Pearson's r	.351*	.511**	.095	-.024	.406**	-.078	-.113	.163	1					
	Sig. 2-tailed	.013	.000	.517	.871	.004	.594	.440	.263						
Hedonism (10)	Pearson's r	-.087	.533**	.039	-.110	.099	-.033	-.234	.061	.520**	1				
	Sig. 2-tailed	.553	.000	.792	.453	.501	.820	.105	.676	.000					
Change of risk attitude in choice task 1 (11)	Pearson's r	.139	-.196	.141	.132	-.119	.178	.057	-.175	-.159	-.006	1			
	Sig. 2-tailed	.341	.178	.334	.366	.414	.221	.699	.229	.276	.969				
Change of risk attitude in choice task 2 (12)	Pearson's r	.184	-.360*	.204	.176	-.100	.178	-.028	.042	-.192	-.106	.434**	1		
	Sig. 2-tailed	.205	.011	.159	.226	.494	.220	.850	.774	.186	.469	.000			
Change of risk attitude in choice task 3 (13)	Pearson's r	.332*	.076	.308*	.122	.057	.121	.081	-.138	.162	.116	.463**	.492**	1	
	Sig. 2-tailed	.020	.604	.031	.402	.696	.409	.581	.345	.266	.427	.000	.000		
Change of risk attitude in choice task 4 (14)	Pearson's r	.340*	-.131	.162	.066	.228	.080	-.034	.200	.034	-.157	.297*	.416**	.475**	1
	Sig. 2-tailed	.017	.369	.267	.652	.115	.587	.818	.168	.814	.283	.015	.001	.000	

** . Correlation is significant at the $p = 0.01$ level 2-tailed.

* . Correlation is significant at the $p = 0.05$ level 2-tailed.

Appendix AA

Correlation between personal values and change of risk attitude for certain option = price to pay

Table AA1: Correlation coefficients for personal values and change of risk attitude.

N = 41		1	2	3	4	5	6	7	8	9	10	11	12	13	14
Universalism (1)	Pearson's r	1													
	Sig. 2-tailed														
Stimulation (2)	Pearson's r	.204	1												
	Sig. 2-tailed	.201													
Benevolence (3)	Pearson's r	.569**	.288	1											
	Sig. 2-tailed	.000	.068												
Security (4)	Pearson's r	-.122	-.027	.156	1										
	Sig. 2-tailed	.447	.867	.331											
Performance (5)	Pearson's r	-.098	.405	.088	.414*	1									
	Sig. 2-tailed	.541	.009	.586	.007										
Conformism (6)	Pearson's r	.141	-.042	.453	.497*	.303	1								
	Sig. 2-tailed	.380	.792	.003	.001	.054									
Tradition (7)	Pearson's r	.146	.136	.502**	.336	.111	.506**	1							
	Sig. 2-tailed	.363	.396	.001	.032	.491	.001								
Power (8)	Pearson's r	-.219	.253	-.415	.163	.360*	-.263	-.139	1						
	Sig. 2-tailed	.170	.110	.007	.309	.021	.096	.386							
Self-determination (9)	Pearson's r	.196	.700**	.324	-.077	.391	-.077	.100	.107	1					
	Sig. 2-tailed	.220	.000	.039	.632	.011	.633	.532	.505						
Hedonism (10)	Pearson's r	.172	.638**	.234	.103	.260	-.059	-.125	.119	.375	1				
	Sig. 2-tailed	.282	.000	.140	.523	.101	.713	.437	.457	.016					
Change of risk attitude in choice task 1 (11)	Pearson's r	-.060	-.145	-.067	-.045	.175	.074	-.027	-.107	-.098	-.039	1			
	Sig. 2-tailed	.711	.366	.675	.779	.273	.647	.866	.505	.543	.810				
Change of risk attitude in choice task 2 (12)	Pearson's r	-.092	-.184	-.266	-.067	.131	-.235	-.176	.172	-.133	-.037	.354*	1		
	Sig. 2-tailed	.565	.250	.093	.676	.414	.138	.272	.283	.408	.816	.009			
Change of risk attitude in choice task 3 (13)	Pearson's r	-.264	-.225	-.422*	.015	.226	-.034	-.223	.118	-.278	-.165	.399*	.298*	1	
	Sig. 2-tailed	.095	.158	.006	.928	.156	.832	.161	.462	.079	.302	.003	.028		
Change of risk attitude in choice task 4 (14)	Pearson's r	-.091	.080	-.084	-.181	-.031	.013	.055	-.206	.011	.024	-.027	.145	.145	1
	Sig. 2-tailed	.573	.619	.601	.257	.849	.935	.731	.197	.947	.881	.848	.294	.297	

** . Correlation is significant at the $p = 0.01$ level 2-tailed.

* . Correlation is significant at the $p = 0.05$ level 2-tailed.

Appendix BB

Risk attitude classification for all participants based on lottery choices depending on choice context for experiment 2

Table BB1: Risk attitude classification of participants in experiment 2.

Number of safe choices	Risk attitude	individual context lottery								interpersonal context lottery							
		1		2		3		4		1		2		3		4	
		%	Cum%	%	Cum%	%	Cum%	%	Cum%	%	Cum%	%	Cum%	%	Cum%	%	Cum%
0	risk-seeking	.8	.8	1.6	1.6	2.3	2.3	3.1	3.1	2.3	2.3	3.1	3.1	4.7	4.7	4.7	4.7
1		0	.8	0	1.6	0	2.3	0	3.1	.8	3.1	0	3.1	0	4.7	0	4.7
2		0	.8	1.6	3.1	0	2.3	.8	3.9	.8	3.9	.8	3.9	0	4.7	.8	5.5
3		2.3	3.1	2.3	5.5	.8	3.1	1.6	5.5	0	3.9	2.3	6.3	2.3	7.0	1.6	7.0
4		5.5	8.6	4.7	10.2	7.0	10.2	3.1	8.6	1.6	5.5	3.1	9.4	4.7	11.7	3.1	10.2
5	risk-neutral	21.1	29.7	23.4	33.6	24.2	34.4	14.8	23.4	28.1	33.6	25.0	34.4	24.2	35.9	12.5	22.7
6	risk-averse	22.7	52.3	21.1	54.7	19.5	53.9	12.5	35.9	18.8	52.3	21.9	56.3	19.5	55.5	15.6	38.3
7		10.2	62.5	13.3	68.0	11.7	65.6	7.0	43.0	14.8	67.2	7.0	63.3	13.3	68.8	6.3	44.5
8		12.5	75.0	7.8	75.8	12.5	78.1	4.7	47.7	7.0	74.2	12.5	75.8	7.8	76.6	7.0	51.6
9		6.3	81.3	10.2	85.9	7.8	85.9	8.6	56.3	7.0	81.3	4.7	80.5	7.0	83.6	10.2	61.7
10		14.1	95.3	10.2	96.1	6.3	92.2	18.0	74.2	13.3	94.5	12.5	93.0	7.8	91.4	18.0	79.7
11		4.7	100.0	3.9	100.0	7.8	100.0	25.8	100.0	5.5	100.0	7.0	100.0	8.6	100.0	20.3	100.0

Appendix CC

Frequency of inconsistent choices in individual and interpersonal choice context in experiment 2

Table CC1: Inconsistent choices in experiment 2.

Choice Context	Frequency of inconsistent choices	Number of participants	Percent
Individual	0	113	88.3
	1	5	3.9
	2	4	3.1
	3	2	1.6
	4	4	3.1
	Total	128	100.0
Interpersonal	0	114	89.1
	1	6	4.7
	2	3	2.3
	3	2	1.6
	4	3	2.3
	Total	128	100.0

Appendix DD

Relationship between inconsistent choices in individual and interpersonal choice context in experiment 2

Table DD1: Cross tabs for inconsistent choices in interpersonal and individual choice tasks.

N = 128		Frequency of inconsistent choice in individual context					
		0	1	2	3	4	Total
Frequency	0	106	4	1	2	1	114
of	1	4	1	1	0	0	6
inconsistent	2	2	0	1	0	0	3
choices in	3	1	0	1	0	0	2
interpersonal	4	0	0	0	0	3	3
context	Total	113	5	4	2	4	128

Appendix EE

Descriptive statistics for of risk attitudes in experiment 2 (uncorrected dataset)

Table EE1: Mean risk attitudes and standard deviations for each choice task and choice context.

Choice context	Choice task	Perspective Taking	<i>Descriptive Statistics</i>		
			<i>Mean</i>	<i>SD</i>	<i>N</i>
individual	1	Yes	.89	.15	68
		No	.87	.13	60
		Total	.88	.14	128
	2	Yes	.86	.23	68
		No	.83	.19	60
		Total	.85	.21	128
	3	Yes	.93	.12	68
		No	.92	.10	60
		Total	.92	.11	128
	4	Yes	.83	.21	68
		No	.78	.17	60
		Total	.81	.19	128
Interpersonal	1	Yes	.90	.16	68
		No	.88	.14	60
		Total	.89	.15	128
	2	Yes	.85	.24	68
		No	.84	.23	60
		Total	.85	.24	128
	3	Yes	.92	.13	68
		No	.94	.12	60
		Total	.93	.12	128
	4	Yes	.85	.21	68
		No	.80	.17	60
		Total	.83	.19	128

Appendix FF

Descriptive statistics for of risk attitudes in experiment 2 (only consistent participants)

Table FF1: Mean risk attitudes and standard deviations for each choice task and choice context.

Choice context	Choice task	Perspective Taking	<i>Descriptive Statistics</i>		
			<i>Mean</i>	<i>SD</i>	<i>N</i>
individual	1	Yes	.88	.15	59
		No	.86	.12	47
		Total	.87	.14	106
	2	Yes	.85	.22	59
		No	.81	.18	47
		Total	.83	.20	106
	3	Yes	.91	.11	59
		No	.91	.11	47
		Total	.91	.11	106
	4	Yes	.82	.20	59
		No	.76	.16	47
		Total	.80	.19	106
Interpersonal	1	Yes	.88	.13	59
		No	.88	.14	47
		Total	.88	.14	106
	2	Yes	.85	.24	59
		No	.83	.24	47
		Total	.84	.24	106
	3	Yes	.92	.11	59
		No	.93	.12	47
		Total	.92	.11	106
	4	Yes	.84	.21	59
		No	.78	.15	47
		Total	.81	.19	106

Appendix GG

Correlations between personal values and change of risk attitude in interpersonal choices, empathy = high

Table GG126: Correlation coefficients of changes of risk attitude and personal values priorities.

N = 68		1	2	3	4	5	6	7	8	9
Universalism (1)	Pearson's <i>r</i> Sig. (2- tailed)	1								
Stimulation (2)	Pearson's <i>r</i> Sig. (2- tailed)	.104	1							
Self- determination (3)	Pearson's <i>r</i> Sig. (2- tailed)	.355**	.449**	1						
Benevolence (4)	Pearson's <i>r</i> Sig. (2- tailed)	.506**	.114	.345**	1					
Security (5)	Pearson's <i>r</i> Sig. (2- tailed)	.222	.015	.202	.274*	1				
Change of risk attitude in choice task 1 (6)	Pearson's <i>r</i> Sig. (2- tailed)	-.042	-.041	-.057	-.216	-.057	1			
Change of risk attitude in choice task 2 (7)	Pearson's <i>r</i> Sig. (2- tailed)	-.023	.014	-.049	.047	.003	.284*	1		
Change of risk attitude in choice task 3 (8)	Pearson's <i>r</i> Sig. (2- tailed)	-.167	-.005	-.128	-.081	.018	.424**	.426**	1	
Change of risk attitude in choice task 4 (9)	Pearson's <i>r</i> Sig. (2- tailed)	.033	-.148	-.102	-.111	.213	.401**	.322**	.668**	1

** . Correlation is significant on the $p = .01$ level.

* . Correlation is significant on the $p = .05$ level.

Appendix HH

Correlations between personal values and change of risk attitude in interpersonal choices, empathy = low.

Table HH1: Correlation coefficients of changes of risk attitude and personal values priorities.

N = 60		1	2	3	4	5	6	7	8	9
Universalism (1)	Pearson's <i>r</i> Sig. (2- tailed)	1								
Stimulation (2)	Pearson's <i>r</i> Sig. (2- tailed)	-.005	1							
Self- determination (3)	Pearson's <i>r</i> Sig. (2- tailed)	.036	.519**	1						
Benevolence (4)	Pearson's <i>r</i> Sig. (2- tailed)	.510**	-.104	-	1					
Security (5)	Pearson's <i>r</i> Sig. (2- tailed)	.120	-.267*	.101	.146	1				
Change of risk attitude in choice task 1 (6)	Pearson's <i>r</i> Sig. (2- tailed)	.173	-.266*	-	.161	.010	1			
Change of risk attitude in choice task 2 (7)	Pearson's <i>r</i> Sig. (2- tailed)	.208	-.300*	-	.151	.120	.662*	1		
Change of risk attitude in choice task 3 (8)	Pearson's <i>r</i> Sig. (2- tailed)	.144	-.072	-	-.104	.056	.542**	.513**	1	
Change of risk attitude in choice task 4 (9)	Pearson's <i>r</i> Sig. (2- tailed)	.052	-.045	-	.140	-	.082	.157	.327*	1

** . Correlation is significant on the $p = .01$ level.

* . Correlation is significant on the $p = .05$ level.

Curriculum Vitae

Johannes Leder, born 18th of October, 1980 in Sömmerda, Germany

Address: Maschmühlenweg 6 App. 333, 37073 Göttingen

married

Education

2008-2012	Doctoral Studies, University of Erfurt, Center of Empirical Research in Economics and Behavioral Sciences (CEREB)
2005-2007	M.A., University of Erfurt, Psychology
2002-2005	B.A., University of Erfurt, Major: Psychology, Minor: Economics
2000	Abitur (high school graduation)

Scholarships

2008-2011	Christoph-Martin-Wieland-Stipendium of the University of Erfurt
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Professional Experience

04/2012-05/2012	Research Associate, University of Hildesheim Project: Social Identity and Stress (PI: Prof. Andreas Mojzisch)
05/2011-12/2011	Research Associate, University of Erfurt Department of Differential Psychology and Psychological Assessment (PI: Prof. Ernst Hany)
Since 2011	Self-employed consultant for Human Resource Management and Training

Publications

Articles in Peer Reviewed Journals

Hariskos, W., Leder, J., Teodorescu, K. (2010). Commentary on the market entry prediction competition 2010. *Games*, 2(2), 200-208.

Conference Presentations

Social Preferences and Risk Taking in Interpersonal and Individual Choice Contexts, held at the 23rd *Subjective Probability, Utility, and Decision Making Conference*, Kingston upon Thames, England.

Social Preferences and Risk Taking in Interpersonal and Individual Choice Contexts, held at the 7. *Tagung der Fachgruppe Arbeits-, Organisations- und Wirtschaftspsychologie der Deutschen Gesellschaft für Psychologie*, Rostock, Germany.

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1. Prof. Dr. Ernst Hany (Erstbetreuer)
2. Prof. Dr. Tilmann Betsch (Zweitbetreuer)
3. Elisa Grosch (Transkriptionsarbeiten)

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