TRADEOFFS AND CONFLICT IN DECISION MAKING: DEVELOPMENT

AND APPLICATIONS OF THE DOUBLE-MEDIATION MODEL

Inês Ferreira de Oliveira Valente Rosa

Tese submetida como requisito parcial para obtenção do grau de

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Tese orientada por Prof. Doutor Marc Scholten

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Palavras-chave:

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Key words:

Conflict; tradeoffs; double-mediation model; risky choice

Categorias de Classificação da tese

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RESUMO

O conflito surge quando trocas entre objectivos incompatíveis têm de ser realizadas. Abordamos a questão de como a quantidade de conflito está relacionado com o tamanho dessas trocas. O modelo de dupla-mediação (Scholten & Sherman, 2006), um modelo de geração de conflito na formação de preferências, postula que a relação entre tamanho de troca e conflito é mediada por duas fontes de conflito em direcções opostas: O conflito originado pela preocupação com o sacrifício que decorre de escolhermos uma opção em detrimento de outra, que aumenta com o tamanho de troca, e o conflito originado pela preocupação com a argumentação que pode ser construída a favor de uma opção, que diminui com o tamanho de troca. O modelo também prevê como a relação entre tamanho de troca e conflito é afectada por terceiras variáveis do contexto de escolha. Embora Scholten e Sherman (2006) tivessem aplicado o modelo de dupla-mediação ao conflito na escolha sem risco, muitas das escolhas que fazemos pertencem ao domínio do risco (i.e., envolvem consequências incertas). A escolha arriscada tem sido intensamente estudada; porém, a maioria da investigação foca as escolhas que as pessoas fazem e não o conflito que sentem ao fazerem essas escolhas. Assim, o objectivo principal desta dissertação é estender a aplicação do modelo de dupla-mediação ao domínio da escolha arriscada. De modo a validar as assumpções fundamentais do modelo de dupla-mediação centramo-nos no conflito originado por decisões entre jogos, que implicam trocas elementares entre probabilidade e consequência monetária. Em cinco experimentos, estudamos os efeitos de variáveis situacionais e individuais no conflito decisional. As variáveis situacionais são o sinal das consequências (i.e., se as decisões envolvem ganhos ou perdas), o método de elicitação de preferências (i.e., se a tarefa consiste em escolher ou rejeitar uma opção), e o peso diferencial dos atributos (i.e., se o peso dos atributos é igual ou diferencial). No que respeita a esta última variável, manipulamos o peso dos atributos (aumentando a amplitude das diferenças monetárias entre os jogos e diminuindo a amplitude das diferenças de probabilidade entre os jogos) em cada condição de sinal das consequências. A variável individual é o estilo de pensamento do decisor (i.e., se o decisor tende a processar a informação de um modo mais racional ou experiencial). Como previsto, os resultados demonstram que estes factores contextuais afectam diferenciadamente o conflito originado pela preocupação com o sacrifício e o conflito originado pela preocupação com a argumentação, e consequentemente, a relação entre tamanho de troca e conflito. Validamos assim a aplicação do modelo de dupla-mediação à escolha arriscada e demonstramos que o modelo captura um processo de geração de conflito que é comum ao domínio de escolha com e sem risco. Discutimos as contribuições desta investigação para uma compreensão mais abrangente do conflito decisional e do processo de tomada de decisão.

ABSTRACT

Conflict arises when tradeoffs must be made between incompatible goals and we address the question of how the amount of conflict is related to the size of these tradeoffs. The double-mediation model (Scholten & Sherman, 2006), a model of conflict generation in preference formation, posits that the relation between tradeoff size and conflict is mediated by two conflict sources in opposite directions: The conflict from concern about the sacrifice that is to be incurred in choosing one option instead of the other, which increases with tradeoff size, and the conflict from concern about the argumentation that can be made in favor of an option, which decreases with tradeoff size. The model also predicts how the relation between tradeoff size and conflict is affected by third variables in the choice context. While Scholten and Sherman (2006) applied the double-mediation model to conflict in riskless choice, many choices we make are in the risky domain (i.e., they involve uncertain outcomes). Risky choice has been extensively investigated; nevertheless, most analyses focus on the choices that people make, not on the conflict they experience in making those choices. Therefore, the main aim of this dissertation is to extend the application of the double-mediation model to the risky choice domain. To validate the substantive claims of the double-mediation model we focus on the conflict aroused by decisions between gambles implying elementary tradeoffs between probability and monetary outcome. In five experiments, we address the effects of situational and individual variables on decisional conflict. The situational variables are outcome sign (i.e., whether decisions involve gains or losses), preference elicitation method (i.e., whether the task is to choose or to reject an option), and differential attribute weight (i.e., whether the attributes are of equal or differential weight). In what concerns the latter variable, we manipulate the attribute weight (by increasing the outcome differences between the gambles and by decreasing the probability differences between the gambles) in each outcome sign condition. The individual variable is the decision maker's thinking style (i.e., whether decision makers tend to process information in a more rational or experiential way). As predicted, the results demonstrate that these contextual factors differentially affect the conflict from concern about sacrifice and the conflict from concern about argumentation, and consequently, the relation between tradeoff size and conflict. We thus validate the application of the double mediation model to risky choice and show that the model captures a process of conflict generation that is common to the domain of risky and riskless choice. We discuss the contributions of this research for a more complete understanding of decisional conflict and of the decision making process.

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CHAPTER 1: CONFLICT IN DECISION MAKING

Making decisions is part of our daily lives, and with decisions comes conflict. As aptly stated by Tversky and Shafir (1992, p. 358), the "experience of conflict is the price one pays for the freedom to choose."

When making a decision, people have to trade off the advantages and disadvantages of one option against the advantages and disadvantages of another option. As Luce, Payne, and Bettman (2001, p.86) stated, "the decision makers must accept less of one choice attribute in order to get more of another." Suppose that you are applying for a job and that two job options are available. Job *A* offers a fixed (certain) salary of €1000, while job *B* offers a smaller base salary of €600 plus the possibility of receiving an extra €700 with a chance of 60% (likelihood of achieving the proposed objectives). Note that this is equivalent to saying that Job *A* offers €1000 for sure, while job *B* offers the possibility of receiving €1300 with a 60% chance or else €600. Which job would you prefer? In order to make this decision, probability must be traded off against salary; and, therefore, if job *B* is preferred over *A*, it means that you are willing to accept less security in order to have the chance of getting a greater salary. Because the decision maker does not always know how to make these tradeoffs, preference uncertainty or conflict arises.

Now imagine that the decision is between job *A*, that offers €1000 for sure, and job *C*, that offers €1300 for sure. This decision is unambiguous. The job that offers the larger salary (*C*) is clearly superior because it is better on one dimension and it is not worse on any other. In short, job *C* is a dominating option. When one option dominates the other(s), no attributes have to be traded off, and therefore, no conflict arises (Scholten, 2002; Tversky & Shafir, 1992). Because dominance implies that no conflict is aroused and because a decision must involve the consideration of at least two options that arouse some degree of conflict (Hansen, 1976), it can be argued that situations like this are not in fact decisions. Therefore, conflict is present in every decision, whether important or trivial (Chatterjee & Heath, 1996), big or small (Shafir, Simonson, & Tversky, 1993), and dominance can be seen as the zero degree of a decision.

Tradeoffs arouse conflict either in risky or riskless choices. In the riskless choice domain, where the outcomes of choice are certain, conflict arises from the tradeoff between the features of the options. For example, in a decision between a USB flash drive with a higher storage capacity but a higher price and another flash drive with a lower price but also a

lower storage capacity, price has to be traded off against storage capacity (i.e., price and storage capacity cannot be maximized at the same time), and conflict arises accordingly.

The domain of decision making studied in this dissertation is that of risky choice, the most intensively investigated domain in the field of behavioral decision making. In risky choice, where outcomes of choice are uncertain, conflict arises from the tradeoff between probability and outcome, as in the decision between job A and job B given above. In elementary tradeoffs, people must decide between a smaller but more probable outcome and a larger but less probable outcome. An example is a decision between job A, that offers €1000 for sure (i.e., with a 100% chance), and job D, that offers the possibility of obtaining €1550 with a 70% chance, or else €0 (imagine the case of free lancers).[2] Because probability and amount cannot be maximized at the same time conflict arises.

Naturally, there are decisions that are more difficult and others that are easier (Beattie & Barlas, 2001). Moreover, the difficulty of the decision, or the conflict that the decision maker experiences, has an impact on choice behavior, for instance, on the time that it takes to make a decision, on response error (e.g., Fischer, Luce, & Jia, 2000b), and on the tendency to defer choice (e.g., Shafir et al., 1993).

Furthermore, it is important to distinguish motivational difficulty, i.e., the difficulty aroused by incompatible goals, from cognitive difficulty, i.e., the difficulty generated, for instance, by the number of options, or by the number of attributes. In this research we focus on motivational difficulty rather than on cognitive difficulty.

So, what makes a decision easy or difficult? Making a decision implies making a tradeoff; and because tradeoffs must be made, conflict arises. People experience conflict because they must evaluate *how much* of one attribute has to be traded off against another (Shafir et al., 1993). To put it in another way, conflict is related to the magnitude of the differences between the attributes of the options available, or in short, to the size of the tradeoff.

Moreover, the size of the tradeoff increases as more of one attribute has to be traded off against more of another, or in other words, as the magnitude of the differences between the attributes increases. In order to illustrate how tradeoff size can vary, consider a decision between job A (receiving €100 with a 100% chance), job D (receiving €1550 with a 70%; chance), and job E (receiving €1950 with a 55% chance). To decide between any two jobs, the

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[2] Although in job A the outcome is attached to a probability of 1 (100% chance), certainty is not required.

decision maker must trade off the advantage in amount of one job (e.g., *A*) against the advantage in probability of obtaining that outcome (amount) of the other job (e.g., *D*). Job *D* offers a larger but less probable outcome than *A*, and job *E* offers an even larger and less probable outcome than *A*. Thus, because of the larger attribute differences between the options, comparing *A* to *E* implies a larger tradeoff than comparing *A* to *D* or *D* to *E*. Therefore, the question of how the *amount* of conflict is related to the *size* of the tradeoffs (i.e., the magnitude of the advantages that options have relatively to one another) arises.

Not only is conflict a fundamental aspect of choice, it also has, as mentioned earlier, implications for choice behavior. Moreover, the view taken in this dissertation is that an analysis of conflict can reveal processes that eventually result in choice behavior. Thus, for a more complete understanding of decision making it is important to examine the conflict that people experience when making a choice.

Most research on risky choice focuses on the choices that people make, not on the conflict they experience in making those choices. The security-potential/aspiration theory (Lopes, 1987, 1995; Schneider & Lopes, 1986; Schneider, 1992) and the decision field theory (Busemeyer & Diederich, 2002; Busemeyer & Townsend, 1993; Diederich, 1997) are the only theories that address conflict in risky choice. The security-potential/aspiration theory describes when conflict occurs, while the decision field theory also predicts that conflict might affect choice. In this dissertation we take the former approach, but from a different theoretical perspective because our focus is on how conflict depends on tradeoff size, i.e., on how much the options differ in probability and outcome. We examine the process of decision making through the analysis of conflict, rather than through an analysis of the choices that are made. The double-mediation model, a model developed by Scholten and Sherman (2006) to address conflict in preferential choice, describes those processes and discloses them through the analysis of the relation between tradeoff size and conflict, and how that relation is moderated by contextual factors.

The double-mediation model posits that the relation between tradeoff size and conflict is mediated by two sources of conflict, the concern about sacrifice (that is to be incurred in choosing one option instead of the other) and the concern about argumentation (that can be made for any decision), and moderated by third variables in the choice context (such as differential attribute importance). Up to now, the double-mediation model was only applied to riskless choice and it accurately predicted the process of conflict generation in this domain. Therefore, the main aim of this dissertation is to extend its application to the domain of risky

choice, by examining the arousal of conflict in the formation of preference between two single-outcome gambles, i.e., in elementary tradeoffs between outcome and probability.

We examine how situational and individual variables impact the decisional conflict, specifically, how they affect the two conflict sources and moderate the relation between tradeoff size and conflict. That is, according to the double-mediation model, the concern about sacrifice and the concern about argumentation mediate the relation between tradeoff size and conflict in opposite directions; we investigate how the contextual factors affect the relative weight of these opposing processes. The situational variables are: Outcome sign, i.e., whether the decision outcomes are positive or negative (gains or losses); preference elicitation method, i.e., whether the task is to choose or to reject an option; and differential attribute weight, i.e., whether the attributes are of equal or differential weight. In what concerns the latter variable, we manipulate the attribute weight (by increasing the range of the outcome differences between the gambles and by decreasing the range of the probability differences between the gambles) in each outcome sign condition, i.e., in gains and in losses. The individual variable is the decision maker's thinking style, i.e., whether decision makers tend to process information in a more rational or experiential (or both) way.

The thesis is divided into four chapters. Chapter 1 provides a concise presentation and discussion of relevant literature on risky choice, concluded by a detailed specification of the research objectives. Chapters 2 and 3 concern the empirical studies. We start with an overview of the studies that will be undertaken (Experiments 1 and 2 in chapter 2, and Experiments 3, 4, and 5 in chapter 3), then we turn to the studies themselves, and finally conclude with a summary of the main findings. It should be noted that each Experiment is preceded by an introduction section, in which we present and discuss specific evidence relating to the study and derivation of hypotheses. Chapter 4 is the general discussion.

Risky Choice

Many outcomes of choice are not certain, requiring analyses of choice under risk or uncertainty. Either in choice under risk or under uncertainty, people face outcomes that depend on uncertain events. They decide without knowing for sure what the outcomes of their decisions will be. This is in contrast with riskless choices, which involve certain outcomes.

In choice under uncertainty the outcomes of choice are uncertain and the probabilities attached to these outcomes are not known and virtually unknowable, in choice under risk however, the outcomes are uncertain but the degree of uncertainty is known, or at least easily

estimable (Abelson & Levi, 1985).[3] Examples of choice under uncertainty are stock investments and insurance investments. Examples of choice under risk are roulettes and lotteries. Many other decisions, such as whether or not to maintain one's current job or whether or not to buy a new car, entail some degree of risk because it is not possible to anticipate all the decision outcomes (Abelson & Levi, 1985) or to be certain of which outcomes will occur.

In this dissertation we investigate conflict arousal in risky choices. In risky choice, the uncertainty is given by the probabilities with which the outcomes will occur (Kahneman & Tversky, 1983), and in the simplest possible case, risky choice tasks involve a tradeoff between the magnitude of an outcome and the probability of obtaining that outcome.

Indeed, typical experiments on risky choices involve elementary tradeoffs between gambles, where the outcomes can be positive or negative. In other words, they involve making a decision between a gamble that offers a higher probability of winning a smaller monetary amount, which is called the safer option, and a gamble that offers a lower probability of winning a larger monetary amount, which is called the riskier option, or, making a decision between a gamble that entails a higher probability of losing a smaller monetary amount (safer option) and a gamble that entails a lower probability of losing a larger monetary amount (riskier option). As Payne, Bettman, and Johnson (1992, pp. 106-107) asserted, "not only do responses to gambles provide insight into basic psychological processes of judgment and choice but understanding decision making under uncertainty and risk has direct relevance for improving decisions in business and public policy."

An example of a typical risky choice involving positive outcomes would be a decision between gamble x (€600, 90%), i.e., which offers the possibility to gain €600 with a chance of 90%, and gamble y (€835, 65%), i.e., which offers the possibility to gain €835 with a chance of 65%. An example of typical risky choice involving negative outcomes would be a decision between gamble x' (-€600, 90%), i.e., which entails the possibility of losing €600 with a chance of 90%, and gamble y' (-€835, 65%), i.e., which entails the possibility of losing €835 with a chance of 65%. Whether a decision entails positive or negative outcomes, it implies that a tradeoff, between an additional monetary amount (gain or loss) of €235 and an additional risk of 25%, must be made. Moreover, conflict arises because decision makers do not always know how to make these tradeoffs. In other words, in the former case, conflict

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[3]The distinction between risk (knowable probabilities) and uncertainty (unknowable probabilities) was firstly introduced by Knight (1921).

arises because probability of winning and amount to win cannot be maximized at the same time. Similarly, in the latter case, conflict arises because probability of losing and amount to lose cannot be minimized at the same time.

In the present research we examine the arousal of conflict in risky choice by focusing on decisions between two single-outcome gambles, i.e., on elementary tradeoffs between monetary outcome and probability, both in decisions involving positive outcomes and in decisions involving negative outcomes.

Conflict: Definition, Types, and Manifestations

Definition of Conflict

Conflict has no formal definition (Tversky & Shafir, 1992). The most generally held view, which is also the view that we adopt, is that conflict involves preference uncertainty (Chernev, 2001; Dhar, 1997a; Fischer, Jia, & Luce, 2000a; Fischer et al., 2000b; Luce, Jia, & Fischer, 2003; Shafir et al., 1993; Simonson, 1989; Simonson, Carmon, & O'Curry, 1994; Simonson, Nowlis, & Simonson, 1993). When there is only one option, which has both positive and negative features, conflict refers to the uncertainty about how to evaluate (or rate) that option (Fischer et al., 2000a; Fischer et al., 2000b). When the decision involves multiple options, conflict refers to the uncertainty about which option is more valuable or about which is the best option (Fischer et al., 2000a; Fischer et al., 2000b).

Types of Conflict

Kurt Lewin (1935, 1951) distinguished three basic types of motivational conflicts: Approach-approach conflict (type I), approach-avoidance conflict (type II), and avoidance-avoidance conflict (type III). Hovland and Sears (1938) later added a type IV conflict: The double approach-avoidance conflict.

Type I, approach-approach conflict, arises from decisions between competing attractive options, i.e., positive, and thus, desirable options (Houston & Doan, 1996; Hovland & Sears 1938; Lewin, 1951). Type III, avoidance-avoidance conflict, arises from decisions between competing repulsive options, i.e., negative, and thus, undesirable options (Houston & Doan, 1996; Hovland & Sears 1938; Lewin, 1951). Type II, approach-avoidance conflict is a concurrent attraction and repulsion by an option that has both positive and negative valences, in which the gradient of avoidance is assumed to be steeper than the gradient of approach

(Lewin, 1951; see also Epstein, 1978).[4] The fourth conflict type, double approach-avoidance conflict, consists of two type II situations. In this case, there will be a conflict between two options that are both attractive and repulsive, i.e., each option has both positive and negative valences.

Furthermore, as Atthowe (1960) suggested, approach (or attraction) can be considered as the possibility of winning a monetary amount, and avoidance (or repulsion) as the possibility of losing a monetary amount. Therefore, in the domain of risky choice, a person experiences an approach-approach conflict when is faced with a decision between gambles involving positive outcomes (i.e., winning something), and an avoidance-avoidance conflict when the decision is between gambles involving negative outcomes (i.e., losing something). For instance, having to decide between receiving €85 for sure and receiving €100 when heads or €70 when tails involves an approach-approach conflict, whereas, having to decide between paying €85 for sure and paying €100 when heads or €70 when tails involves an avoidance-avoidance conflict. An approach-avoidance conflict is experienced when a person has to decide whether to accept a gamble in which the outcome may be positive or negative, as for example, a gamble that offers the possibility of receiving €100 when heads or paying €60 when tails. Finally, a double approach-avoidance conflict is experienced when a person must decide between gambles involving both positive and negative outcomes, as for instance, between receiving €100 when heads or paying €60 when tails and receiving €50 when heads or paying €10 when tails.

In the present research we investigate conflict arousal in elementary tradeoffs between probability and outcome; specifically, in decisions between gambles involving only positive outcomes or only negative outcomes. For this reason, from now on we will focus on Lewin's distinction between approach-approach and avoidance-avoidance conflicts (types I and III).

Lewin (1951) argued that as the psychological distance to an option decreases, the more a person is attracted or repelled by an option. In approach-approach conflicts, the closer a person is to one of the options, the stronger the attraction to that option and the weaker the attraction to the competing ones. Thus, approach-approach conflicts produce a stable equilibrium, in which a step closer to one of the options is a step toward conflict resolution by making one option seem more attractive than the competing one. In other words, as the

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[4]Epstein (1978) suggested a fifth type of conflict, the avoidance-approach conflict. As the approach-avoidance conflict, the avoidance-approach conflict arises from the simultaneous attraction and repulsion of an alternative, nevertheless, while in the former case the gradient of avoidance is assumed to be steeper than the gradient of approach, in the latter the reverse would occur.

decision maker approaches one of the options, the more that option becomes preferred. In avoidance-avoidance conflicts, the closer a person is to one of the options, the stronger the repellence by that option and the weaker the repellence by the competing ones. Therefore, avoidance-avoidance conflicts produce a stable equilibrium, in which a step closer to one of the options is a step away from the resolution of conflict by making that option seem more unattractive than the competing ones. In other words, as decision makers approach one of the options, the more they are repelled by that option, reversing the preference toward the competing option. This generates vacillation between the choice options, and thus, complicates the resolution of conflict.

Conflict is an unpleasant state from which people try to escape. However, a decision is often necessary and escaping is impossible, leading to hesitancy, tension, vacillation, and blocking between the choice options. Although it is believed (e.g., Lewin, 1951; Miller, 1944; Houston, Sherman, & Baker, 1991) that this will occur in avoidance-avoidance conflicts, or in other words, that decision difficulty is limited to options with negative characteristics, we argue that any type of conflict is psychologically unpleasant, generating difficulty and thus conflict. Even in approach–approach conflicts, decision makers can be paralyzed by not knowing which option they prefer. Consider, for instance, a choice between to equally attractive vacation destinations, or between two equally attractive gambles; it is likely that these decisions will be difficult rather than straightforward. Nevertheless, we also argue that avoidance-avoidance conflicts are indeed the most difficult (Epstein & Smith, 1967). They are psychologically more unpleasant and create a greater level of hesitancy, tension, and vacillation, or complete blocking between the choice options, generating more difficult decisions and longer decision times than approach-approach conflicts, as demonstrated by several authors (Arkoff, 1957; Minor, Miller, & Ditrichs, 1968; Murray, 1975; Schill, 1966).

Manifestations of Conflict

Just as there is no formal definition of conflict, there is no standard procedure for measuring it either (Tversky & Shafir, 1992). Rather, many different behaviors and judgments are seen as manifestations of conflict, and thus, are used as conflict measures (see Scholten & Sherman, 2006):

- Decision time – the time to reach a decision (Berlyne, 1957; Cartwright & Festinger, 1943; Diederich, 2003; Festinger, 1943a, 1943b; Fischer et al., 2000a;

Fischer et al., 2000b; Kiesler, 1966; Luce, 1998; Luce, Bettman, & Payne, 1997; Scholten & Sherman, 2006; Tyebjee, 1979);

- Decision difficulty – the difficulty in reaching a decision (Chatterjee & Heath, 1996; Scholten, 2002; Scholten & Sherman, 2006; Simonson, 1989);

- Confidence – the confidence in the decision reached (Dhar, 1996; Festinger, 1943a, 1943b; Russo, Meloy, & Medvec, 1998; Scholten & Sherman, 2006; Zakay, 1985; Zakay & Tsal, 1993);

- Equality of preferences – the degree to which options are equally preferred (Scholten & Sherman, 2006; Tyebjee, 1979);

- Equality of importance - the degree to which attributes are equally preferred (Scholten & Sherman, 2006; Simonson, 1989);

- Decision inconsistency – the inconsistency between the decisions made on different occasions (Fischer et al., 2000a; Fischer et al., 2000b; Luce et al., 2003);

- Choice deferral – the choice of the avoidant or no-choice option, i.e., of the option of not choosing any of the available options (Dhar, 1996, 1997a, 1997b; Dhar & Nowlis, 1999; Dhar & Simonson, 2003; Luce, 1998; Tversky & Shafir, 1992);

- Number of thoughts – the number of thoughts or justifications made for and against each option (Dhar, 1997a; Simonson, 1989).

The confidence measure is negatively related to conflict, and all other measures are positively related to conflict. The equality measures of conflict will reach their maximum when the attributes are equally important or when the options are equally preferred; that is, conflict will decrease as one attribute becomes more important than the other or as one option becomes more preferred than the other.

In our studies, we excluded the 'choice deferral' and 'number of thoughts' manifestations as conflict measures. The choice deferral measure was excluded given that the double-mediation model assumes conflict aversion. That is, because decision makers are conflict averse, they tend to follow the path of least resistance when it is impossible to escape from conflict by simply not choosing. This implies that the double-mediation model applies, and as a consequence, the decision making processes that it describes can be detected, only when choice deferral is not an option. The number of thoughts, or justifications made for and against each option, was also not considered as a conflict measure for the reason that we suspect that it would affect conflict arousal. This assumption derives from Scholten and

Sherman's (2006) investigation of conflict in riskless choice, which revealed that asking the participants to justify their choices affected the relation between tradeoff size and conflict.

We have seen that the experience of conflict, or preference uncertainty, can manifest itself in many different ways. Nevertheless, most formal models of decision making do not account for decisional conflict. Models of *rational* choice explicitly exclude conflict by assuming that the decision maker has certain preferences.

Rational Choice Under Risk

Rational theory of choice assumes that people choose by maximizing expected utility. They are never uncertain about which option to choose because they order the options from least preferred to most preferred and choose the option that is most preferred (e.g., Dhar, 1997a). The preference order is given by the expected utility of each option. Utility is independent from the set of options under consideration, and conflict has no influence on choice (Tversky & Shafir, 1992). For instance, how long it takes to make a choice (a manifestation of conflict) does not have an influence on what choice is made.[5] Moreover, choice is taken to disclose the choice process (utility maximization), whereas choice conflict is not.

Expected utility is a generalization of expected value. The expected value of an option (*EV*) is obtained by multiplying the probability of each outcome (*p*) by its monetary value (*x*), and then by summing across all the possible outcomes (*i*):

$$EV = \sum_i x_i * p_i.$$

For instance, consider the decision between gaining €600 for sure (option *y*) and gaining €1000 with a chance of 65% (option *z*). The expected value for option *y* is €600 * 1 = €600 and the expected value for option *z* is €1000 * .65 + €0 * .45 = €650. Thus, because *z* has a higher expected value, it should be preferred to *y*. However, researchers noticed that *y* is usually preferred to *z*, in other words, people generally prefer a sure outcome over a gamble (a risky option) of equal (or higher) expected value (e.g., Kahneman & Tversky, 1979).[6] This phenomenon is called risk aversion.

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[5] In contrast, research demonstrates that decision time is inversely correlated with choice probability (Diederich & Busemeyer, 1999; Jamieson & Petrusic, 1977; Mosteller & Nogee, 1951; Petrusic & Jamieson, 1978).

[6] Of course that beyond a certain point, i.e., when the expected value of the gamble exceeds a certain value, people will definitely prefer the gamble over the sure outcome

Many analyses of risky choice draw on the psychophysical approach of Bernoulli (1954), who proposed that people maximize expected utility instead of expected value. People evaluate the options not in terms of their outcomes but rather in terms of final states of wealth, obtained by integrating the outcomes (*x*) with current wealth (*w*). Thus, instead of evaluating *x,* one evaluates *w* + *x*. Moreover, one assigns utilities to final states of wealth. As can be seen in Figure 1, the utility function is concave. This is the law of diminishing marginal utility: Utility increases with wealth, but at a decreasing rate, i.e., with each additional unit of wealth, utility increases less.
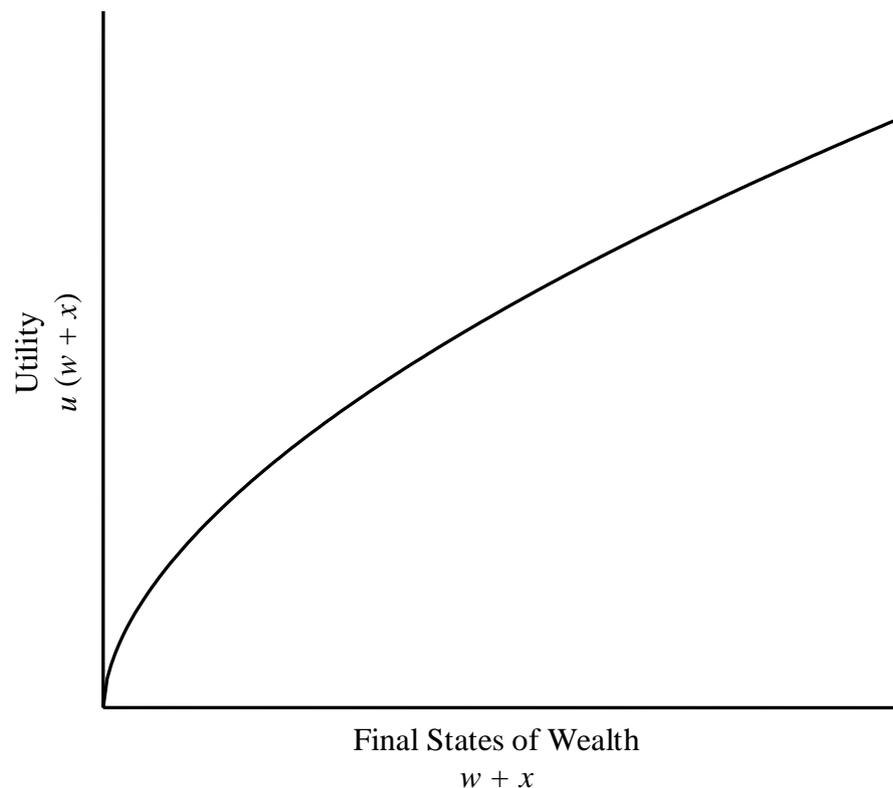
Figure 1. Example of a utility function.

The concavity of the utility function entails risk aversion, according to which people can prefer option *y* (€600), with an expected value of €600, to option *z* (€1000, 65%), with an expected value of €650.

Bernoulli's (1954) idea that people maximize expected utility is the basis of expected utility theory, in which the expectation of a gamble (an option) is given by a weighted mean, where the probability of occurrence of each possible outcome is multiplied by its utility, $u(x_i)$, and the gamble with higher expected utility (*EU*) is chosen. Formally:

$$EU = \sum_i p_i * u(x_i).$$

For instance, suppose that when facing a choice between option *y* (€600) and option *z* (€1000, 65%), a decision maker assigns a utility of 75 to the gain of €600 and a utility of 100 to the gain of €1000. The expected utility of option *y* will be 1 * 75 = 75 utiles, and the expected utility of option *z* will be .65 * 100 + 0 * .45 = 65 utiles; therefore, option *y* will be preferred.

Von Neumann and Morgenstern (1944) developed the theory of games and economic behavior, an axiomatic treatment of expected utility maximization. They formalized expected utility theory as a rational decision criterion (Schoemaker, 1982) by developing a set of axioms that, if satisfied, define a rational choice under risk. If these axioms (rules) are followed, utilities can be derived and a preference order among options can be obtained by ordering the expected utilities of each option (Hastie & Dawes, 2001). Given this preference order, people are certain about what they want, meaning that conflict is removed from the analysis of risky choice.

Axiomatizing Conflict Away

Many different axiomatizations of expected utility theory have been advanced since von Neumann and Morgenstern's (1944) original attempt (Hastie & Dawes, 2001). We will focus on completeness and transitivity (e.g., Schoemaker, 1982), the two axioms that yield a preference order between the options.

Completeness (or comparability) distinguishes three preference states: Either *A* is preferred to *B* (i.e., *A* ≻ *B*), or *B* is preferred to *A* (i.e., *B* ≻ *A*), or *A* and *B* are equally preferred (i.e., *A* ~ *B*). The former two cases are referred to as strict preference, whereas the latter case is referred to as indifference. Completeness means that choice reveals a preference among *A* and *B*. That is, *A* is chosen, when *A* is preferred to *B* (i.e., *A* ≻ *B*), and *B* is chosen when *B* is preferred to *A* (i.e., *B* ≻ *A*). Even in a state of indifference, choice will be consummated ('choose any'), meaning that there is no room for conflict in the choice between two options.

The case for completeness as an axiom of rational choice is often made with the argument of "Buridan's ass", a hungry ass who died of starvation when faced with a choice between two equidistant and equivalent (or equally attractive) haystacks because it was unable to establish a preference between equally preferred options.

Transitivity states that, if option *A* is preferred to *B*, and *B* is preferred to *C*, then *A* must be preferred to *C* (i.e., $A \succ B, B \succ C, A \succ C$). Transitivity means that choice reveals a consistent ordering of the options in the choice set. Indeed, if preferences were intransitive, that is, if the options were *not* consistently ordered (i.e., $A \succ B \succ C \succ A$) it would be impossible for choice to be consummated, because none of the options could come out as the best.

While the case for transitivity as an axiom of rational choice could be made by confronting Burridan's ass with a choice between three options, it is usually made with the argument of "money pumps". For instance, suppose that you are given *A* and that you are willing to pay some amount to exchange *A* for *C* (because $C \succ A$). Then, you are again willing to pay to exchange *C* for *B* (because $B \succ C$). Then, you are again willing to pay to exchange *B* for *A* (because $A \succ B$). Thus, the decision maker ends up with the same option *A*, but with less money in his pocket (e.g., Tversky, 1969).

Completeness and transitivity ensure that people are not paralyzed by indecision, and that decisions are consistent. Over the last decades, many violations of the axioms have been documented. For instance, Tversky and Kahneman (1981), with the famous Asian disease problem, demonstrated that people often violate completeness by violating descriptive invariance (or extensionality), a more fundamental condition of rationality, according to which a decision does not depend on the description of the choice problem (Kahneman & Tversky, 1983; Tversky & Kahneman, 1988).

Consider the Asian disease choice problems (Tversky & Kahneman, 1981, p. 453):

"Imagine that the U.S. is preparing for the outbreak of an unusual Asian disease which is expected to kill 600 people. Two alternative programs to combat the disease have been proposed.

-Problem 1: If program A is adopted, 200 people will be saved; if program B is adopted, there is a 1/3 probability that 600 people will be saved and 2/3 probability that no one will be saved. Which program would you favor?

-Problem 2: If program C is adopted 400 people will die; if program D is adopted there is a 1/3 probability that nobody will die, and 2/3 probability that 600 people will die. Which program would you favor?"

An example of a rational choice would be preferring program *A* to *B* in problem 1, and program *C* to *D* in problem 2. This is because, although option *A* is positively framed (the outcomes are formulated in terms of number of persons saved) and option *C* is negatively

framed (the outcomes are formulated in terms of number of persons lost), both options present the exact same outcomes. Note that option *A* is equivalent to *C*, and that option *B* is equivalent to *D*. Thus, descriptive invariance and completeness are satisfied and preferences are consistent. However, the authors found that a great majority of people have inconsistent preferences, choosing program *A* in problem 1, but program *D* in problem 2. That is to say that, in the positive frame people prefer *A* over *B*, and that in the negative frame they prefer *B* over *A*. Therefore, different formulations of the same choice problem can lead to different preferences, violating descriptive invariance and completeness. This phenomenon is called a framing effect.

People often disobey completeness by the violation of another form of invariance, procedural invariance. Here, preferences do not depend on the procedure that is used to elicit the preferences, i.e., different (but formally equivalent) preference elicitation methods should lead to the same preference order (e.g., Tversky, Sattath, & Slovic, 1988). Nevertheless, several authors have demonstrated that procedural invariance fails to hold, as we have seen discrepancies between choice and matching (e.g., Tversky et al., 1988), choice and pricing (e.g., Lichtenstein & Slovic, 1971), and choice and rejection (e.g., Shafir, 1993). For instance, Shafir (1993) investigated procedural invariance across the choice and rejection preference elicitation methods (that is, when the task is to choose or to reject an option). To illustrate, consider the next example (Shafir, 1993, p. 549):

"Imagine that you serve on the jury of an only-child sole-custody case following a relatively messy divorce. The facts of the case are complicated by ambiguous economic, social, and emotional considerations, and you decide to base your decision entirely on the following few observations. To which parent would you award sole custody of the child? / Which parent would you deny sole custody of the child?

-Parent A: Average income, average health, average working hours, reasonable rapport with the child and relatively stable social life.

-Parent B: Above-average income, very close relationship with the child, extremely active social life, lots of work-related travel and minor health problems."

Asking the participants to 'award', i.e., to choose an option, is equivalent to asking to 'deny', i.e., to reject an option, so that if one option is chosen than the other should be rejected. Therefore, rationality requires that if option *B* is preferred over *A* in the choice condition, option *A* should be preferred over *B* in the reject condition. In this case, procedural invariance and completeness are satisfied and preferences are consistent. Nevertheless, Shafir

(1993) found that option *B,* which is called the enriched option (because it has more positive and negative attributes), tended to be more chosen *and* also more rejected than option *A,* the impoverished one (which has fewer positive and negative attributes). That is, the same option (*B*) was preferred in both conditions, revealing that different preference elicitation methods led to inconsistent preferences, violating procedural invariance and completeness.

Tversky (1969), followed by other authors such as Budescu and Weiss (1987), Leland (1994), and Lindman and Lyons (1978), demonstrated that the transitivity axiom can also be violated and that these violations are systematic and predictable. The author demonstrated that decision makers frequently choose by using a lexicographic semiorder which can give rise to intransitivities. As Tversky (1969, p. 32) stated, a lexicographic semiorder is when "a semiorder or a just noticeable difference structure is imposed on a lexicographic ordering." In turn, in a lexicographic order (Abelson & Levi, 1985), the attributes are ordered according to their importance, the options are compared on the most important attribute, and the option with the higher or better value on that attribute is chosen. If two or more options remain (because they are equivalent on the most important attribute), the process is repeated with the second most important attribute. The process will continue until there is only one option left. Thus, the distinction between the two choice strategies is that, in the lexicographic semiorder, small differences between the options (or differences that are equal or lower to a certain value/minimum) are neglected, and thus, options are treated as equivalent, giving rise to intransitivities.

To illustrate, consider Tversky's (1969, p. 33) risky choices between pairs of gambles, which are presented in Table 1. The author demonstrated that, when choosing between pairs of contiguous gambles (e.g., between *a* and *b*, or *b* and *c*), participants ignored the probability differences (because they were small) and preferred the gamble with the higher payoff, but, when choosing between more extreme pairs of gambles, in which the differences were larger (e.g., between *a* and *e* or *b* and *e*), they chose according to the probability attribute, meaning that they preferred the gamble with the higher probability of winning. For instance, participants preferred gamble *a* to *b*, *b* to *c*, *c* to *d* and *d* to *e* in the former case*,* but, for instance, gamble *e* to *a* or *e* to *b* in the latter.

Table 1

Tversky's Gambles

Gamble	Probability of winning	Payoff (in $)	Expected value (in $)
a	7/24	5.00	1.46
b	8/24	4.75	1.58
c	9/24	4.50	1.69
d	10/24	4.25	1.77
e	11/24	4.00	1.83

In sum, people often make inconsistent decisions, violating completeness and transitivity. If people obeyed completeness and transitivity, we could say they acted as if they were certain of their preferences. So do the above violations of completeness and transitivity imply that subjects were not certain of their preferences? Not necessarily, because decisions were made separately from one another: A positive frame separate from a negative frame, choice separate from rejection, separate dyadic choices instead of a single pentadic choice, and so on. It may be that subjects were certain of their preferences at each separate occasion, although their preferences were inconsistent across occasions. But then the question of how certain the subjects would be of their preferences if they were confronted with their own inconsistencies arises.

Preference uncertainty has been exposed by research in which people are given the opportunity not to choose (e.g., Dhar, 1996, 1997a; Dhar & Nowlis, 1999; Dhar & Simonson, 2003; Luce, 1998; Tversky & Shafir, 1992). When the possibility of not choosing one of the available options is offered (i.e., the no-choice option), the decision maker tends to select that option under conditions of preference uncertainty or conflict. For instance, Tversky and Shafir (1992) demonstrated that the no-choice option becomes the most popular option when conflict increases. To illustrate, consider a choice between *A* and *C*, and a choice between *A*, *B* and *C*, in which *A* and *B* are two equally attractive options and *C* is the no-choice option. If preferences are consistent as rationality implies, a decision maker who prefers *A* in the first case, could not prefer *C* in the latter case. Nevertheless, Tversky and Shafir (1992) demonstrated that participants indeed preferred *A* to *C* but *C* to *A* and *B*. Thus, when *B* came to establish a tradeoff with *A*, giving rise to conflict, the no-choice option went from less preferred than *A* to more preferred than *A,* in violation of completeness.

Violations of completeness and transitivity, along with other axioms of expected utility theory, have spurred the development of alternative theories of risky choice. The most prominent of these is prospect theory (Kahneman & Tversky, 1979). As we discuss next, prospect theory, like most other theories, accommodates inconsistent preferences on separate occasions, but not indecision at any given occasion.

Prospect Theory

According to prospect theory (Kahneman & Tversky, 1979; Tversky & Kahneman, 1992), the decision process is composed of two phases, editing and evaluation. In the editing phase, the choice set prospects (options) are analyzed and a cognitive representation of the prospects is built. Several operations, which transform the prospects' probabilities and outcomes, are performed in order to simplify the subsequent phase.

The most important editing operation is coding (Kahneman & Tversky, 1979), according to which the outcomes are evaluated as changes of wealth instead of final states. These changes are relative to a neutral reference point, usually one's current wealth (status quo). Outcomes above the reference point are coded as gains and outcomes below the reference point are coded as losses.

Another operation is simplification. One way to simplify an option is by rounding probabilities or outcomes (or both). Consider prospects y (€200, 51%) and z (€200, 49%). It seems that option y dominates (is superior to) option z. However, the difference between them is eliminated when they are both simplified to (€200, 50%). Many violations of expected utility theory can be explained by these operations. For instance, simplification can result in intransitive preferences because the small differences between the options are eliminated, as demonstrated by the counterexample discussed earlier. This elimination process is captured by Tversky's (1969) additive-difference model, in which people make direct comparisons between options, and small (subthreshold) differences are discarded. In the counterexample, these were the small probability differences in choices between contiguous gambles.

The second phase, evaluation, consists of an evaluation of the edited prospects, where the prospect with the highest value is chosen. The value of a prospect, V, that yields an outcome x with probability p, and an outcome y with probability q, is given by:

$$V(y, p; z, q) = \pi(p)v(y) + \pi(q)v(z).$$

That is, the value of the prospect *V*, can be obtained by multiplying the decision weight of each outcome, $\pi(p)$, by its outcome value, $v(x)$, and then by summing across the two possible outcomes.

Value Function

In expected utility theory, the utility function, *u*, is defined over final states of wealth. However, in prospect theory, the value function, *v,* is defined over changes of wealth relative to a neutral reference point, i.e., it is reference dependent. As mentioned earlier, the reference point is usually the decision maker's current wealth, and it can be influenced by expectations and formulations of the decision problem (Kahneman & Tversky, 1979).

The norm of risk aversion is a major implication of expected utility theory. Nevertheless, Kahneman and Tversky (1979) verified that this holds only for choices among positive prospects. For choices among negative prospects, people tend to have a risk seeking tendency, i.e., they tend to prefer a gamble (the risky option) over a sure outcome with equal (or higher) expected value.[7] For example, Kahneman and Tversky (1979) demonstrated that in choices between positive prospects a majority of participants prefer option *y* (€3000, 100%) to *z* (€4000, 80%), while in choices between negative prospects a majority of participants prefer option *z'* (-€4000, 80%) to *y'* (-€3000, 100%). This reverse preference pattern was called the reflection effect.

Therefore, while the utility function follows the law of diminishing marginal utility, which entails risk aversion for both gains and losses, prospect theory's value function follows the law of diminishing sensitivity, which entails risk aversion for gains and risk seeking for losses. The law of diminishing sensitivity states that "people are more sensitive to changes near their status quo than to changes remote from the status quo" (Wakker, Kobberling, & Schwieren, 2007, p. 206). That is, people are more sensitive to a change from a gain of €40 to €50 than from €140 to €150, and conversely, to a change from a loss of -€40 to -€50 than from -€140 to -€150. For this reason, the value function is concave for gains producing risk averse preferences (as in expected utility theory), but convex for losses producing risk seeking preferences.

The coding operation and the diminishing sensitivity principle explain the violation of completeness in the Asian disease problem. In the gain scenario, i.e., when the decision

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[7]Again, of course that beyond a certain point, i.e., when the expected value of the sure outcome exceeds a certain value, people will definitely prefer the sure outcome over the gamble.

problem is positively framed, option *A* is preferred to *B* because the outcomes are evaluated as gains, which produces risk averse preferences, as implied by the diminishing sensitivity principle. Conversely, in the loss scenario, i.e., when the decision problem is negatively framed, option *D* is preferred to *C* because the outcomes are evaluated as losses, which generates risk seeking preferences, as implied by the diminishing sensitivity principle. Thus, we have a violation of completeness. However, although preferences are inconsistent across frames, there is, according to prospect theory, no preference uncertainty within frames.

Apart from reference dependence and diminishing sensitivity, the value function is characterized by loss aversion, which is that losses are more painful than equivalent gains are pleasant. Accordingly, Kahneman and Tversky (1979) propose an S-shaped value function, inflected at the neutral reference point, and steeper over losses than over gains. The value function is illustrated in Figure 2.

Losses — Gains

Changes of Wealth
(*x*)
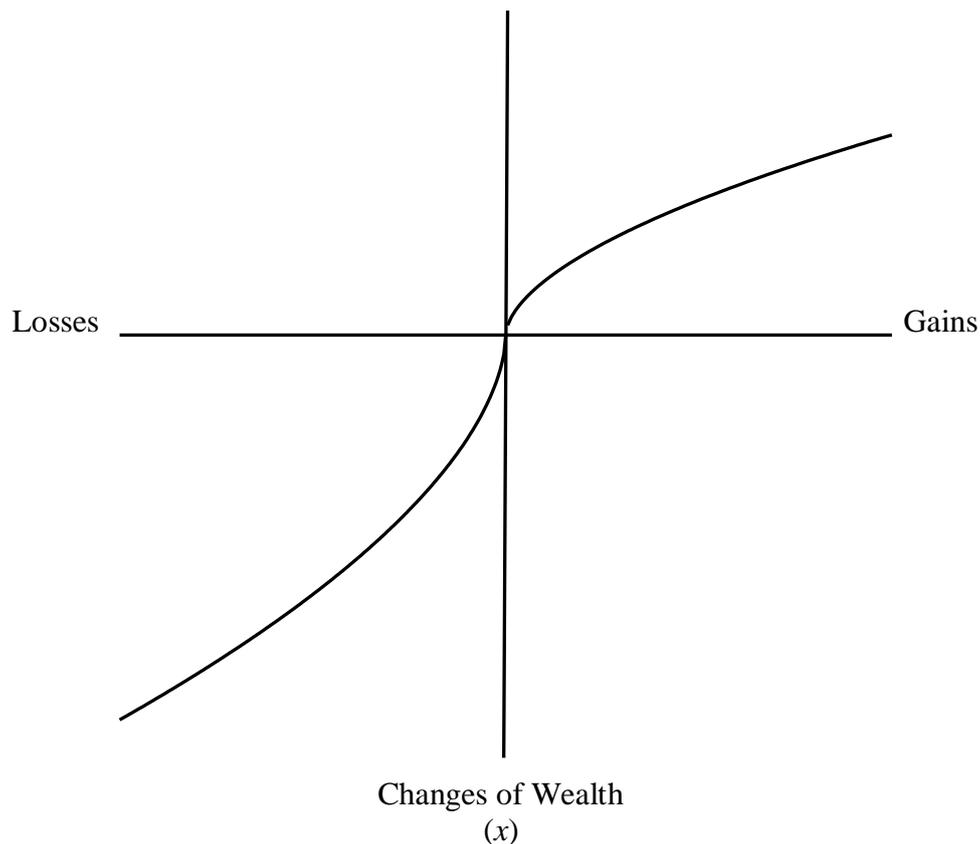
Figure 2. Example of a value function.

To exemplify the effect of loss aversion, consider a gamble that offers a 50% chance to win €60 and a 50% chance to lose -€60. Because a loss of €60 is more unpleasant than a

gain of €60 is pleasant, people usually prefer to maintain the status quo and not to play the gamble. As Kahneman and Tversky (1983, p. 342) stated, "the attractiveness of the possible gain is not nearly sufficient to compensate the aversiveness of the possible loss."

Probability Weighting Function

According to the expectation rule, the value of an outcome is weighted by its occurrence probability (by an objective probability). However, in prospect theory, the stated probability is replaced by a decision weight, $w(p)$, and as a result, the outcome value is multiplied by a decision weight instead of by an objective probability.

As the value function, the weighting function is reference dependent and follows the law of diminishing sensitivity. Certainty and impossibility are the reference points; thus, probabilities are evaluated as deviations from 1 (certainty) or 0 (impossibility) at a decreasing rate of sensitivity (changes near the reference point have a greater impact). To illustrate, consider the Russian Roulette example, adapted from Kahneman and Tversky (1979): "Suppose you are compelled to play Russian Roulette, but are given the opportunity to purchase the removal of one bullet from the loaded gun" (p. 283). In which situation would you be willing to pay more?

A: To reduce the number of bullets from 1 to 0.

B: To reduce the number of bullets from 4 to 3.

The majority of participants preferred option *A* over *B,* which shows that introducing possibility has a greater impact than increasing the degree of possibility (i.e., the possibility effect). Impossibility works as a reference point, from which the sensitivity to probabilities decreases. Therefore, a person is more sensitive to an increase from 0 to 1/6 than from 3/6 to 4/6, and thus, a person is willing to pay more to reduce the probability of death from 1/6 to 0 than from 4/6 to 3/6.

Now consider a choice between two other options. In which situation would you be willing to pay more?

B: To reduce the number of bullets from 4 to 3.

C: To reduce the number of bullets from 6 to 5.

In this case, the majority of participants preferred option *C* over *B*. This choice reveals that removing certainty has a greater impact than reducing the degree of certainty, or, in other

words, that certain outcomes are overweighted relatively to probable ones. This is called the certainty effect. Certainty functions as a reference point from which the sensitivity to probabilities decreases. Therefore, a person is more sensitive, and thus, is willing to pay more, to reduce the probability from 1 to 5/6 than from 4/6 to 3/6.

Finally, consider the following choice. In which situation would you be willing to pay more?

A: To reduce the number of bullets from 1 to 0.

C: To reduce the number of bullets from 6 to 5.

The majority of participants preferred option *C* over *A*, showing that removing certainty has a greater impact than introducing possibility, that is, probabilities are underweighted in relation to certain outcomes. This property of the weighting function was labeled as subcertainty: The decision maker assigns an additional weight to certainty and therefore, the sum of the decision weights of complementary probabilities is less than 1, i.e., $w(p) + w(1-p) < 1$. More formally, if $w(1) - w(5/6) > w(1/6) - w(0)$, thus $1 - w(5/6) > w(1/6)$, and as a result $w(1/6) + w(5/6) < 1$.

Subcertainty entails that probabilities are underweighted, implying risk aversion for gains and risk seeking for losses. Nevertheless, Kahneman and Tversky (1979) also argued that this holds for moderate and large probabilities but not for small ones. They propose that small probabilities are overweighted, implying risk seeking for small gains and risk aversion for small losses. This explains why people gamble, even though there is a low probability of winning, and why they pay for insurance, even though there is a low probability of loosing (i.e., of needing the insurance).

Overall, the weighting function is an S-shaped function, according to which small probabilities are overweighted and moderate to large probabilities are underweighted, as represented in Figure 3.
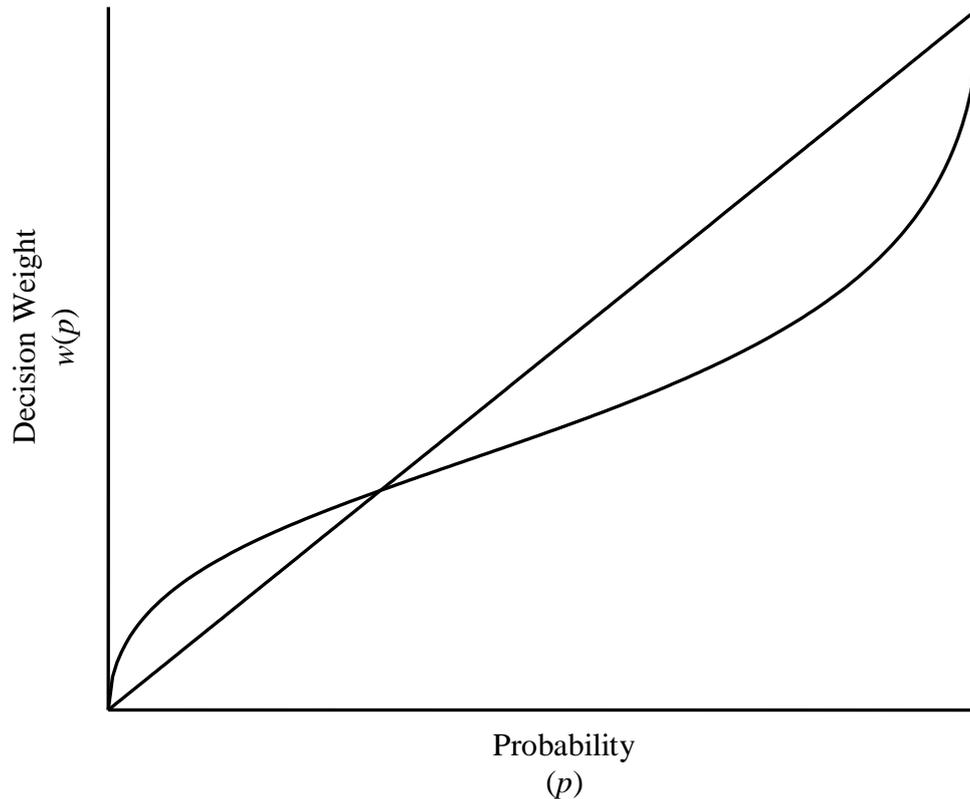
Figure 3. Example of a weighting function.

As we previously referred, in the present research we examine gambles involving elementary tradeoffs between probability and outcome. To avoid pronounced nonlinearities near impossibility (very small probabilities) and certainty (very large probabilities), our gambles entail only moderate probabilities (the largest probability interval ranges from a probability of .212 to a probability of .846). Thus, our weighting function is relatively flat and linear and implies the common preference for the riskier gamble in gains and for the safer gamble in losses.

Prospect theory (Kahneman & Tversky, 1979) allows for violations of the axioms of expected utility theory, among which completeness and transitivity, in the form inconsistent preferences across occasions. However, like expected utility theory, it does not accommodate preference uncertainty at any given occasion. Next we discuss a theory that addresses conflict in risky choice and predicts in what choice situations it will occur.

Security-Potential/Aspiration Theory

Security-potential/aspiration theory (Lopes, 1987, 1995; Schneider & Lopes, 1986; Schneider, 1992) describes people's preferences between multi-outcome gambles (e.g.,

lotteries) by combining psychophysical and motivational approaches of risky choice. It assumes that choice is determined by two factors, a dispositional and a situational factor, and that conflict can occur when these factors are in disagreement.

The first factor, the security-potential factor is motivational, a dispositional variable that reflects a person's evaluation of risk (Lopes, 1987; Schneider & Lopes, 1986). A person is motivated to achieve security or to achieve potential. The security-potential criterion is the overall utility of an option and is given by a decumulative weighting value rule (Lopes & Oden, 1999). That is, as in other decumulative weighting models (e.g., cumulative prospect theory, Tversky & Kahneman, 1992), in the security-potential criterion, the distribution of probabilities associated with the utility of the outcomes is transformed by a rank dependent method (first developed by Quiggin, 1982) in which, the weight associated with the probabilities will depend on the ordinal position of the outcomes (Zank, 2004). The outcomes are ordered from the worst (lowest outcome) to the best (highest outcome) and probabilities are decumulatively weighted. In other words, the decision weights are determined by a (decumulative) probability function, which gives the probability of winning an outcome at least as high as outcome x (Lopes & Oden, 1999). Similarly to other decumulative weighting models, this weighting function can be different for gains and losses; however, the utility function is linear (Lopes & Oden, 1999).

Since prospect theory, it is recognized that in risky choices decision makers are risk seeking for gains and risk seeking for losses. Nevertheless, either for gains or for losses, the distinction between security and potential means that we can classify individuals' attitude toward risk in two poles. At one end are the security seekers, who tend to avoid bad outcomes and who choose the safer option showing a risk averse behavior. At the other end are the potential seekers, who are motivated to get good outcomes, in spite of the risk. They usually behave like risk seeking persons, choosing the riskier option.

However, this does not mean that security seekers are never risk seeking and that potential seekers are never risk averse. The indecision between choosing security or potential can be a source of conflict (Lopes, 1987). For instance, security seekers may take a chance depending on the choice set (i.e., on the available options). When the options available have only a small difference on the worst outcomes and a large advantage in potential, they will probably choose the riskier option (Schneider, 1992).

Lopes and Oden (1999) argue that people are security motivated (security seekers) or potential motivated (potential seekers) depending on the relative weight that they assign to

security and potential. Accordingly, the authors categorize people's preference toward risk into three groups: Security-minded (security motivated), potential-minded (potential motivated), and cautiously-hopeful (with some degrees of caution and hope). In the security-minded group, a greater weight is assigned to security, and thus, the safer option is generally preferred. Conversely, in the potential-minded group, a greater weight is given to potential, and thus, the riskier option is usually preferred. In the limiting cases, where only security or potential is weighted, people are strictly security-minded (always preferring the safer option) or strictly potential-minded (always preferring the riskier option), respectively. Between these extremes, with some combination of caution and hope, is the cautiously hopeful group (both options can be preferred depending on the choice set characteristics).

The second factor, level of aspiration, is a situational variable that describes the individual differences in responding to different needs and situational constraints, demands, and opportunities (Lopes, 1987). It includes: Decision maker's aspirations (what they hope to win), contextual influence (e.g., high probability gains tend to be preferred), and outside influence (e.g., people tend to make more risky choices when they are losing at the end of a round).

The aspiration level is a reference point. An option is evaluated by assessing the probability that an option will yield an outcome at or above the aspiration level. As a result, the aspiration level is expressed by the lowest outcome value that a decision maker considers acceptable to win (or lose). This value depends on the frame of the option. Usually people set up lower aspiration levels for gains than for losses. As Schneider (1992) stated, people are more demanding, or more ambitious, for losses, because they "have a stronger desire to minimize losses than to maximize gains" (p. 1054), as implied by the loss aversion principle. Also, security-motivated (risk averse) people set lower aspiration levels than potential motivated (risk seeking) people. However, the inverse can occur under high situational constraints (Schneider & Lopes, 1986).

From the interaction between the security-potential factor and the aspiration level conflict may arise. If these two factors are in accordance, there will be no conflict because both factors favor the same option. In contrast, when motivation is in disagreement with aspiration level, there will be conflict because each factor favors a different option. That is, conflict arises when the motives that lead a person to prefer the safer or the riskier option are incompatible with the needs aspired or with the situational constraints. When conflict occurs,

both options can be chosen, depending on other factors such as the weight that each criterion has to the decision maker or the choice set characteristics.

This hypothesis was tested with multi-outcome lotteries (Lopes, 1987; Schneider & Lopes, 1986) where the task was to order the lotteries according to the preferences of the participants. The authors demonstrate that, in general, when people are security seekers, there is no conflict for gains but there is conflict for losses, and the inverse situation for potential seekers. For a better understanding of how conflict can arise, let us consider the case of a security seeker, which is by far more common. First of all, it is relevant to remember that: (1) security seeking implies weighting more the worst outcomes (i.e., small gains or large losses), which leads to a preference for the gambles that offer certain, or at least, high probable gains (or losses); (2) a low or moderate aspiration level will be set for gains, which leads to a preference for gambles that provide low or moderate gains; and (3) a more ambitious aspiration level will be set for losses than for gains, which leads to a preference for the gambles that provide only low losses.

When a security seeker is faced with a choice between gains, e.g., between gamble y (€68) and gamble z (€170, 40% or €0, 60%), no conflict arises. The safer option, i.e., gamble y, is uniformly preferred because it favors both desire for security (a certain gain) and aspiration level (a moderate gain, €68). In contrast, when a security seeker is faced with a choice between losses, e.g., between y' (-€68) and z' (-€170, 40% or €0, 60%), conflict does arises because each factor favors a different option. In particular, while gamble y satisfies desire for security (a certain loss), gamble z provides a high probability of satisfying the aspiration level (a low loss, €0). In other words, while desire for security requires a risk averse choice, the satisfaction of aspiration level requires a risk seeking choice. As a consequence, this conflict between security and aspiration will probably cause "vacillation back and forth in a frustrating attempt to isolate 'the lesser of two evils'" (Schneider, 1992, p. 1055). When conflict is present both options can be preferred depending on other aspects of the decision.

Although security-potential/aspiration theory predicts conflict, it is, like expected utility theory and prospect theory, a deterministic-static theory. A stochastic-dynamic theory of choice and conflict is discussed next.[8]

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[8]A stochastic (or probabilistic) model predicts choice probabilities and consequently a direction of preference, whereas, a deterministic model predicts with certainty which option will be preferred (Busemeyer & Townsend, 1993). A dynamic model considers the existing relation between preference strength, i.e., the magnitude of choice, and deliberation time, i.e., choice response times, whereas a static model does not (Busemeyer & Townsend, 1993).

Decision Field Theory

Decision field theory (Busemeyer & Diederich, 2002; Busemeyer & Townsend, 1993; Diederich, 1997) is a stochastic-dynamic theory of decision behavior under uncertainty, which predicts not only the choice probabilities (like other models of decision making), but also choice response times, taken as a manifestation of conflict. In other words, decision field theory predicts what decisions will be more or less conflicting.

Decision field theory describes a two step process of preference formation and evolution. Preferences are initially formed in the first phase, the initial impression, and subsequently evolved in the second phase, the deliberation. In the end a decision is made.

In the initial impression, a preference state is primarily formed from prior knowledge and past experience with the choice task. Thus, the deliberation process starts from this preliminary preference state, rather than from a neutral point.

In the deliberation process, people evaluate the options by anticipating the possible outcomes of each option and comparing them against each other. Thus, a momentary preference state is originated by the value difference between the options. The initial preference state (produced earlier in the initial impression phase) is then updated by the subsequent momentary preference state (formed in the deliberation phase).

However, because the evaluation of the outcomes cannot be made all at the same time, deliberation continues. Thus, many momentary preference states can be formed within a decision. These momentary preference states will be continually updated until the preference is strong enough. This means that the deliberation process stops and an option is chosen when the preference state goes beyond a threshold set by the decision maker. Therefore, the greater the number of preference states necessary to cross the threshold, the longer the decision time will be.

An important point of decision field theory is that it can be regarded as a model of choice *and* conflict: It is a choice model because it predicts choice probabilities, and it is a conflict model because it accounts for deliberation time, which is a manifestation of conflict.

Moreover, decision field theory accommodates the effect of type of conflict on decision time. The theory predicts that the preference state is affected by the value difference between the options, but also by the valence of the options, i.e., type of conflict: In contrast to approach-approach conflicts, avoidance-avoidance conflicts generate vacillation in the

preference state, which leads to longer decisions processes in avoidance-avoidance than in approach-approach conflicts. In consequence, the decision field theory includes a (goal gradient) parameter, which increases when avoidance-avoidance conflicts are involved, causing the decision time to be longer. The sign of the (goal gradient) parameter thus depends on whether the decision involves an approach-approach conflict or an avoidance-avoidance conflict, or in other words, on whether the decision involves gains or losses.

While conflict arises where tradeoffs between probability and outcome must be made, decision field theory has so far not been applied to the issue of how conflict is related to the size of the tradeoffs, i.e., the magnitude of probability and outcome differences. This issue is addressed by the double-mediation model of conflict generation (Scholten & Sherman, 2006), a deterministic-static model of a probabilistic-dynamic phenomenon.

Tradeoffs and Conflict: The Double-Mediation Model

Tradeoffs and Conflict

It is generally agreed upon that conflict is related to the size of the tradeoffs between the attributes (e.g., Chatterjee & Heath, 1996; Festinger, 1957; Scholten, 2002; Shafir et al., 1993; Simonson & Tversky, 1992; Tversky & Simonson, 1993). However, until the formulation of Scholten and Sherman's (2006) double-mediation model, there was no consensus as to the precise relation between tradeoff size and conflict. Before moving to the double-mediation model, we present a brief summary of the existing perspectives.

The dominant perspective on the relation between tradeoff size and conflict is that conflict increases with tradeoff size (Chatterjee & Heath, 1996; Festinger, 1957; Scholten, 2002; Simonson & Tversky, 1992; Tversky & Simonson, 1993) because more sacrifices are to be incurred in choosing one option instead of the other. That is, losses are more painful than equivalent gains are pleasant (Kahneman & Tversky, 1979), or, as Simonson and Tversky (1992; Tversky & Simonson, 1993) argued, disadvantages are more painful than equivalent advantages are pleasant. Thus, larger tradeoffs lead to a greater unattractiveness of both options under consideration by amplifying the lose-lose nature of the decision and intensifying the vacillation between the options (Chatterjee & Heath, 1996). This means that when more or larger advantages have to be traded off, greater are the sacrifices that one must forego with the decision, and therefore, greater is the conflict aroused. In order to illustrate, consider again the following three gambles: Gamble x (€600, 90%), gamble y (€835, 65%),

and gamble z (€1350, 40%). Deciding between x and z implies sacrificing an amount of €750 (when x is preferred) or a 50% chance of winning (when z is preferred), whereas deciding between x and y implies sacrificing only €235 (when x is preferred) or a 25% chance of winning (when y is preferred). Because greater sacrifices are involved in deciding between x and z than between x and y (or between y and z), a greater conflict is aroused in the former case.

The other perspective on the relation between tradeoff size and conflict is that conflict decreases with tradeoff size because arguing in favor of one option becomes easier. As Scholten and Sherman (2006) noted, when asked about this, people often disagree with the assumption that conflict is greater when tradeoffs are large. Rather, they claim that conflict is greater when tradeoffs are small because it is more difficult to find good reasons in favor of one of the options. This view is supported by reason-based choice theory (Shafir et al., 1993; Simonson 1989), which posits that decisions are based on the reasons for selecting one option instead of the other. That is, decision makers are concerned with the argumentation that can be made in order to justify the decision. Thus, smaller tradeoffs imply that fewer or weaker arguments can be made for any decision, and therefore, that a greater conflict is aroused. Conversely, larger tradeoffs imply that more or stronger arguments can be made for any decision, and therefore, that less conflict is aroused. For instance, a decision between gamble x and z offers a stronger reason for choosing either option (a high probability of winning in the case of gamble x or a large amount to be won in the case of gamble z) than a decision between gamble x and y (or between y and z), therefore, less conflict is aroused in the former than in the latter case.

In order to unify these two contradictory perspectives, Scholten and Sherman (2006) developed the double-mediation model. The model posits that the relation between the size of the tradeoffs and conflict is mediated both by sacrifice and argumentation in opposite directions.

The Double-Mediation Model

The double-mediation model (Scholten & Sherman, 2006) is a model of conflict generation on preference formation that describes how conflict is related to the tradeoff size and how this relation is moderated by third variables in the choice context. The model assumes that conflict is generated by two sources: The concern about sacrifice, that is to be incurred in choosing one option instead of the other, and the concern about argumentation,

that can be made for any decision. While sacrifice focuses on what one foregoes with the decision (the dark side of the decision), argumentation focuses on how a decision can be justified to oneself (the bright side of the decision).

Both the concern about argumentation and about sacrifice arouse conflict but it is through argumentation that conflict is resolved (see Scholten, Rosa, & Ferreira, 2010). Argumentation consists in arguing unilaterally in favor of an option, i.e., in overweighting its pros and underweighting its cons. In a decision between gamble x and z, argumentation in favor of x means overweighting the advantage in probability of winning and underweighting the disadvantage in amount to win. Thus, argumentation is, in the double-mediation model, pro-argumentation. The contra-argumentation, for instance, the argument that gamble x offers a smaller gain, or conversely, that gamble z offers a larger gain, belongs to the role of sacrifice. Therefore, the consideration of sacrifice is, in the double-mediation model, contra-argumentation, which consists in underweighting the pros and overweighting the cons of one option. Accordingly, as Scholten et al. (2010, p. 6) asserted, "the double-mediation model is basically an *argumentation* model, although it was originally not conceived that way."

Although the decision maker will be engaged in pro- and contra-argumentation (i.e., will weight the pros and cons of each option), which causes indecision, conflict is resolved when, at some point, the decision maker follows a single line of argumentation in favor of one of the options.

The double-mediation model has his roots in decision field theory (Busemeyer & Diederich, 2002; Busemeyer & Townsend, 1993; Diederich, 1997), but it was developed as an autonomous model for two main reasons. First, decision field theory does not address the relation between tradeoff size and conflict or the way in which this relation is moderated by other aspects of the decision situation. Second, the double-mediation model distinguishes two sources of conflict and it is not obvious how these can be incorporated in the formal machinery of decision field theory (Scholten & Sherman, 2006).

Drawing on decision field theory, the double-mediation model posits that the process of preference evolution consists of two phases: Preliminary impression and subsequent deliberation. In the preliminary impression phase, the decision maker forms a preliminary impression of the choice problem from prior knowledge and past experience. During the subsequent deliberation process, the decision maker compares the options along their attributes, contemplating the consequences of choosing one option instead of the other.

The concern about sacrifice and the concern about argumentation arouse conflict in both phases. Nevertheless, it is only in the deliberation phase that conflict is affected by the tradeoff size given that it is in this stage that attributes are traded off against one another. The relation between tradeoff size and conflict is mediated by the two conflict sources in opposite directions: Concern about sacrifice generates a positive relation, whereas concern about argumentation generates a negative relation. Large tradeoffs entail large attribute differences, which imply that a decision is easier to justify to oneself because a stronger argument can be made in favor of one option, and thus, that little conflict is aroused by the concern about argumentation. Of course that in this case a strong argument can be made in favor of the other option as well, but this is the consideration of sacrifice. So, large tradeoffs also imply that large sacrifices are to be incurred when choosing on option, and thus, that a lot of conflict is aroused by the concern about sacrifice. Conversely, in small tradeoffs the attribute differences are small, which implies that the decision is more difficult to justify to oneself because only weak arguments can be made in favor of an option, and thus, a lot of conflict is aroused by the concern about argumentation. Of course, that the argument in favor of the other option is also weak, which means that small sacrifices are to be incurred, and thus, that little conflict is aroused by concern about sacrifice.

The conflict aroused by each concern is updated along the choice process and in both cases the preliminary conflict is updated by the conflict from subsequent deliberation. Therefore, the degree to which conflict is affected by tradeoff size ultimately depends on the level of preliminary conflict. Preliminary conflict has a mobilizing effect "producing a drive to gather information about the alternative courses of action and to get ready for action" (Scholten & Sherman, p. 239). Therefore, conflict from preliminary impression is a drive for focused deliberation and the greater the preliminary conflict aroused by a concern, the stronger the drive to devote attention to that concern during subsequent deliberation and the more the preliminary conflict is updated by the conflict from subsequent deliberation. Because only the conflict from the deliberation stage is affected by tradeoff size, the degree of updating directly determines the degree to which the conflict aroused by a concern is affected by tradeoff size.

Moreover, people are averse to conflict, thus, when choice deferral (or avoidance) is not an option, they will follow the path of least resistance. Conflict aversion manifests itself as defensive inattention to the concern that arouses the most conflict, and as a consequence, the source that contributes more to the final conflict is the one that arouses less conflict. When, in

small tradeoffs, concern about sacrifice arouses a low conflict level and concern about argumentation a high level, more attention is devoted to the small sacrifice than to the weak arguments. The decision tends to be viewed as "trivial" (small sacrifices) rather than "very hard to justify" (weak arguments). Conversely, when, in large tradeoffs, concern about sacrifice arouses a high conflict level and concern about argumentation a low level, more attention is devoted to the strong arguments than to the large sacrifices: The decision tends to be viewed as "very easy to justify" (strong arguments) rather than "highly consequential" (large sacrifices). As depicted in Figure 4, in this case, an inverse U-shaped relation between tradeoff size and conflict is originated.
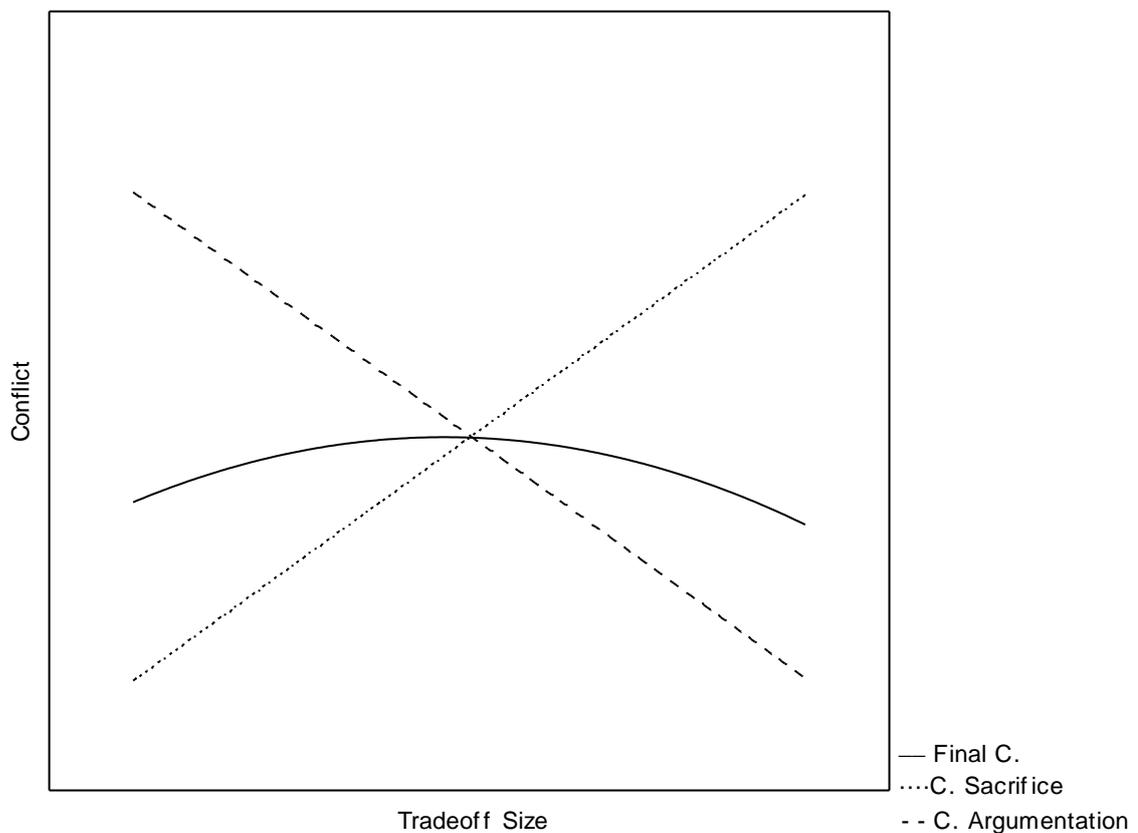
Figure 4. General relation between tradeoff size and conflict.

The double-mediation model generally predicts an inverse U-shaped relation between tradeoff size and conflict. Nevertheless, it also predicts that this relation between tradeoff size and conflict can become (more) positive or (more) negative, depending on several aspects of the decision situation, which modify the way in which the concern about sacrifice and about argumentation mediate it. For instance, if, in a given context the concern about argumentation

arouses more preliminary conflict than the concern about sacrifice, the conflict originated by this concern will decrease more with tradeoff size than the conflict from concern about sacrifice increases. Thus, according to the double-mediation model, the negative mediating effect produced by the concern about argumentation is accentuated relatively to the positive effect of concern about sacrifice, which generates a (more) negative relation between tradeoff size and conflict, as illustrated in Figure 5.
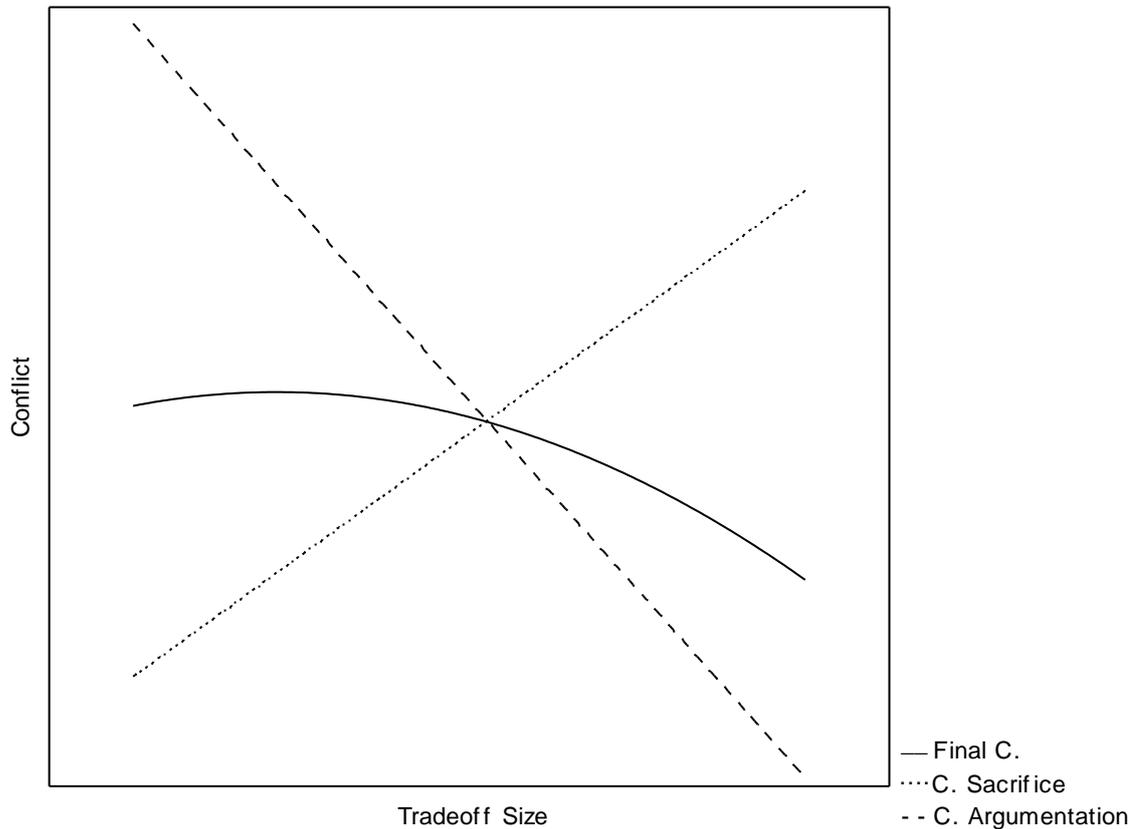
Figure 5. Relation between tradeoff size and conflict when preliminary conflict from argumentation increases.

In contrast, if, in a given context the concern about sacrifice arouses more preliminary conflict than the concern about argumentation, the conflict originated by this concern will decrease more with tradeoff size than the conflict from concern about sacrifice increases. Thus, according to the double-mediation model, the positive mediating effect produced by the concern about sacrifice is accentuated relatively to the positive effect of concern about argumentation, which generates a (more) positive relation between tradeoff size and conflict, as illustrated in Figure 6.
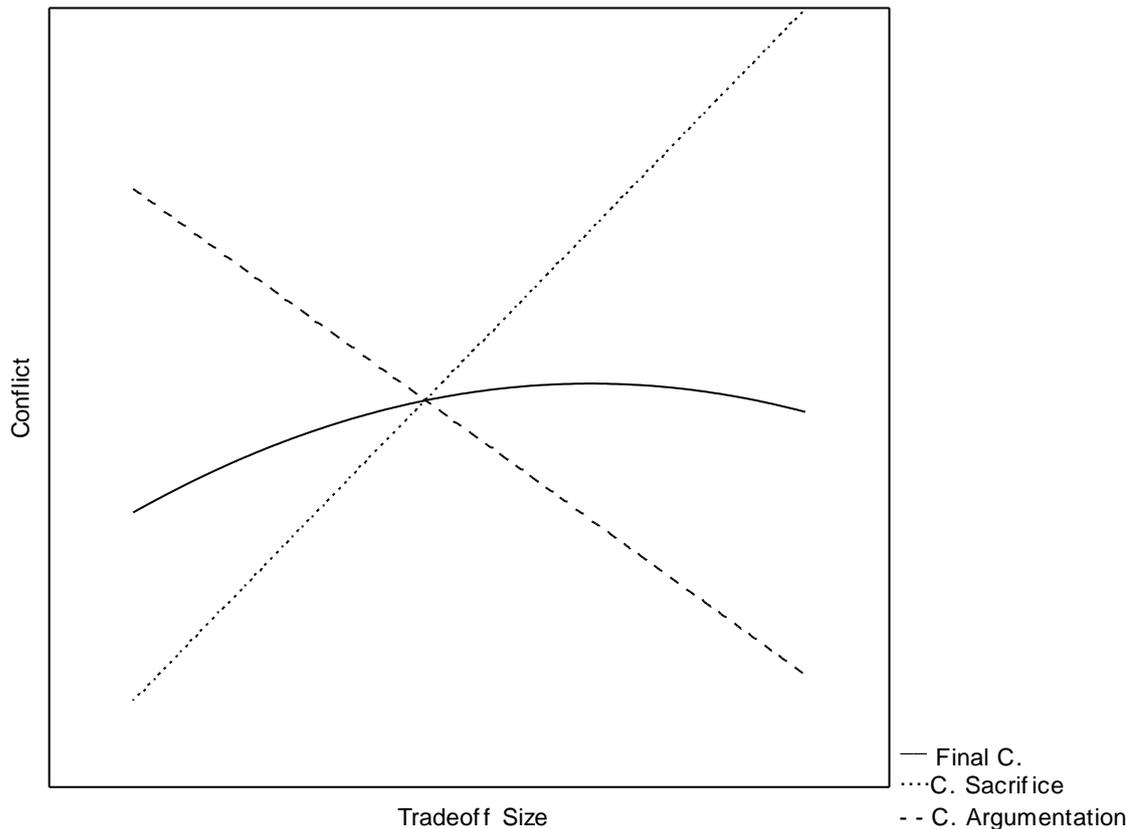
Figure 6. Relation between tradeoff size and conflict when preliminary conflict from sacrifice increases.

Scholten and Sherman (2006) studied the impact of differential attribute importance on the moderation of the relation between tradeoff size and conflict. Differential attribute importance is an aspect of the decision situation that favors a particular decision (the option that is superior on the more important attribute). This moderating factor turns the relation between tradeoff size and conflict less dependent from tradeoff size and changes it into a more positive relation. Specifically, differential attribute importance produces a decrease in the preliminary conflict generated by the concern about sacrifice "because incurring a sacrifice along the less important attribute seems less painful than incurring a sacrifice along the more important attribute" (Scholten & Sherman, 2006, p. 243). Nevertheless, it produces an even greater decrease in the preliminary conflict generated by the concern about argumentation because people will have a strong argument to decide in favor of the option that is superior along the most important attribute, without alleviating the sacrifices that are to be incurred with that decision. Because the preliminary conflict aroused by both concerns decreases, the relation between tradeoff size and conflict is attenuated. Moreover, because the negative effect of concern about argumentation is more attenuated than the positive effect of

concern about sacrifice, the relation between tradeoff size and conflict will become mediated less by argumentation and more by sacrifice, and a more positive relation arises. The results obtained by Scholten and Sherman (2006) confirmed their predictions. In the next section we present the formal specification of the model.

The double-mediation model: Formal specification. Conflict is a function of concern about sacrifice and concern about argumentation: The final conflict level, C, results from the conflict aroused by concern about sacrifice, S, and from the conflict aroused by concern about argumentation, A. To accommodate conflict aversion, C is the geometric mean of S and A:

$$C = \sqrt{SA} , \qquad (A1)$$

where $S, A \geq 0$.

Each source of conflict arouses conflict in the preliminary impression and subsequent deliberation. Therefore, for each source, the conflict from the preliminary impression, S_0 and A_0, is updated by the conflict from deliberation, $w_S S_1$ and $w_A A_1$. The updating consists in adding the conflict from deliberation to the residual conflict from the preliminary impression, $(1 - w_S)S_0$ and $(1 - w_A)A_0$:

$$S = (1 - w_S)S_0 + w_S S_1 \qquad (A2)$$

$$A = (1 - w_A)A_0 + w_A A_1 , \qquad (A3)$$

where $S_0, A_0, S_1, A_1 \geq 0$, and $0 \leq w_S, w_A < 1$.

The updating is a function of preliminary conflict: The greater the preliminary conflict, the stronger the drive for focused deliberation, and the more the preliminary conflict is updated by the conflict from deliberation. Thus, the updating parameters, w_S and w_A, increase with preliminary conflict, S_0 and A_0:

$$w_S = \frac{(\gamma S_0)^\alpha}{1 + (\gamma S_0)^\alpha} \qquad (A4)$$

$$w_A = \frac{(\gamma A_0)^\alpha}{1 + (\gamma A_0)^\alpha} , \qquad (A5)$$

where γ is an arbitrary scaling constant, and $\alpha \geq 0$ is a drive-capacity parameter.

Finally, the conflict from deliberation is affected by the size of the tradeoffs: The conflict aroused by concern about sacrifice in the positive direction and the conflict aroused by concern about argumentation in the negative direction. Therefore, while S_1 increases with tradeoff size, A_1 decreases with tradeoff size. Assuming that S_1 and A_1 are linearly related to tradeoff size, T, we have:

$$S_1 = \delta T, \tag{A6}$$

$$A_1 = \delta(1 - T), \tag{A7}$$

where $\delta \geq 0$ is an arbitrary scaling constant. As in Scholten and Sherman (2006), tradeoff size is expressed on the same scale as conflict, so that $\delta = 1$.

In summary, according to the double-mediation model, there are two conflict sources, the concern about sacrifice and the concern about argumentation, which mediate the relation between tradeoff size and conflict in opposite directions, producing, in general, an inverse U-shaped relation. The model also predicts that third variables in the choice context can moderate this relation by affecting the mediating effects of concern about sacrifice and about argumentation, and thus, changing the relation into a (more) positive or (more) negative one.

Research Goal

While the double-mediation model has so far been applied by Scholten and Sherman (2006) to conflict formation in riskless choice, many choices that we make are in the risky domain.

Risky choice is an intensively investigated domain, but *conflict* in risky choice has received only scarce attention. Except for security-potential/aspiration theory (Lopes, 1987, 1995; Schneider & Lopes, 1986; Schneider, 1992) and the decision field theory (Busemeyer & Diederich, 2002; Busemeyer & Townsend, 1993; Diederich, 1997), which address conflict in risky choice, most research focuses on the choices that people make.

The security-potential/aspiration theory describes when conflict occurs, while the decision field theory also predicts that conflict might affect choice. Nevertheless, our focus is on how conflict depends on tradeoff size, therefore, the main goal of the present research is to extend the application of the double-mediation model from riskless choice to risky choice. If successful, the model captures a process of conflict generation that is common to both domains. Moreover, because this process of conflict generation is intimately related to the

process of preference formation, successful application of the model also exposes how choices are made.

To validate the substantive claims of the double-mediation model we focus on the conflict aroused by decisions between gambles implying elementary tradeoffs between probability and monetary outcome and examine the effects of situational and individual variables in the choice context on decisional conflict.[9] The situational variables are outcome sign, preference elicitation method, and differential attribute weight. The individual variable is the decision maker's thinking style. We intend to demonstrate that these factors influence the conflict experienced in a risky choice and the way in which conflict and tradeoffs are related, by affecting the conflict generated by the two sources (the concern about sacrifice and the concern about argumentation). In the terms of the double-mediation model, outcome sign, preference elicitation method, thinking style, and differential attribute weight, as other factors in the choice context, have an impact on the preliminary conflict generated by concern about sacrifice and about argumentation, and moderate the relation between tradeoff size and conflict. This analysis will unveil some of the processes that govern conflict generation in risky choice.

The study of outcome sign, i.e., the study of decisions involving positive versus negative options (gains versus losses), is a central aspect of the analyses of risky choice, nevertheless, nearly all these analyses concern the choices that people make and not the conflict that they experience (when making a choice). In Experiments 1 and 2 we address the effects of outcome sign on conflict arousal. On the topic of conflict among gains and losses, an additional objective is to go back to Lewin's (1951) analysis of conflict, particularly, to the distinction between approach-approach and avoidance-avoidance conflicts, and extend it to risky choice.

Furthermore, in Experiment 1, the effects of outcome sign are examined in combination with the effects of preference elicitation method (choosing versus rejecting). Nagpal and Krishnamurthy (2008) claimed that the level of conflict experienced by the decision makers in gains and in losses depends on whether the task is to choose or to reject an option. Our aim is to investigate how conflict arousal is affected by the sign of the outcomes, by the preference elicitation method, and by their interaction. In Experiment 2, we examine the effects of outcome sign and of decision maker's thinking style. Our purpose is to provide further support for the role of outcome sign on conflict, and more importantly, to extend the

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[9]Part of this research has been reported in Scholten et al.'s (2010) paper.

application of Epstein's (1994) cognitive-experiential self-theory to the study of individual differences in decisional conflict, which has been applied in several areas, including in the study of individual differences in judgment and decision making. We investigate how a rational and/or experiential thinking style affect the conflict aroused by the two sources (the concern about sacrifice and about argumentation) and the way in which conflict is related with tradeoff size.

In sum, in chapter 2 we investigate the role of outcome sign, of preference elicitation method, of the interaction between outcome sign and preference elicitation method, and of thinking style, on conflict arousal.

In chapter 3 (Experiments 3, 4 and 5) we address the effects of a third situational factor, the differential attribute weight. The relevance of this factor stems from Scholten and Sherman's (1996) research on conflict in riskless choice. Scholten and Sherman (2006) highlighted differential attribute importance as a relevant moderating factor of the relation between tradeoff size and conflict in riskless choice. Yet, research (e.g., Myers & Alpert, 1977) has suggested that a decision is determined not by the most important attribute, but rather by the attribute to which the decision makers assign a greater weight on a particular decision (the determinant attribute). Therefore, our analysis is focused on the prior importance of the attributes (probability versus outcome), the weight that these attributes receive in a given decision situation, and the implications for the arousal of conflict. We examine the impact of manipulating the attribute weight on the relation between tradeoff size and conflict, by increasing the outcome differences between the gambles (Experiments 3, 4 and 5) and by decreasing the probability differences between the gambles (Experiments 4 and 5). In Experiments 3 and 4 we focus on the effect of these manipulations in choices involving gains, whereas in Experiment 5 we focus on the effect of these manipulations in choices involving losses.

CHAPTER 2: EXPERIMENTS 1 AND 2

Theoretical Overview

"Conflict arises because a person does not always know how to trade off costs against benefits, risk against value" (Tversky & Shafir, 1992, p. 358). In risky choice this means that conflict can arise from the tradeoff between probability and monetary outcome, either when decisions involve positive outcomes, i.e., when money can be won, because probability of winning and amount to win cannot be maximized at the same time, or when decisions involve negative outcomes, i.e., when money can be lost, because probability of losing and amount to lose cannot be minimized at the same time. In other words, conflict arises both in gains and losses.

According to the double-mediation model conflict is aroused by the concern about sacrifice and by the concern about argumentation both in riskless and in risky choice. The two sources originate conflict both in the preliminary impression and in the subsequent deliberation phase, and it is in deliberation that conflict is affected by tradeoff size. In general, the model predicts an inverse U-shaped relation between tradeoff size and conflict. Nevertheless, it also predicts that this relation is moderated by third variables in the choice context. That is, different aspects of the decision situation (i.e., choice context) can influence the preliminary conflict aroused by concern about sacrifice and about argumentation, and consequently change the relation between tradeoff size and conflict. We now present which factors will be examined in this chapter.

In risky choice, whether the outcomes are gains or losses is one of the factors that has an impact on decisional conflict. By merging the double-mediation model (Scholten & Sherman, 2006) with Lewin's (1951) analysis of conflict, we investigate conflict arousal in decisions between positive gambles, or approach-approach conflicts in Lewin's terminology, and decisions between negative gambles, or avoidance-avoidance conflicts. The aim is to validate the application of the double-mediation model to risky choice, and also to validate Lewin's approach to risky choice (Experiment 1 and 2).

Furthermore, as recently suggested by Nagpal and Krishnamurthy (2008), the decisional conflict will also be affected by whether the task is to choose or to reject an option. Experiment 1 addresses the effect of outcome sign (gains versus losses), of preference

elicitation method (choice versus rejection), and of the interaction between outcome sign and preference elicitation method.

In Experiment 2 we examine the effects of outcome sign and thinking style. We combine the double-mediation model with Epstein's (1994) cognitive-experiential self-theory to derive predictions about the way in which a rational and/or an experiential thinking style affect the preliminary conflict from concern about sacrifice and argumentation, and thus, the relation between tradeoff size and conflict. Our aim is to extend the application of the double-mediation model to the study of the individual differences in decisional conflict, and also to extend Epstein's (1994) theory to the study of individual differences in decisional conflict.

Given that both Experiments address the study of conflict arousal in gains and losses, it is to the effect of outcome sign that we turn now, leaving the discussion of the effect of preference elicitation method and of thinking style for the introductions of Experiment 1 and 2, respectively. We derive the predictions about the role of outcome sign by first applying Lewin's analysis of conflict to risky choice and then by integrating it with the double-mediation model.

Conflict in Gains and Losses: Lewin's Analysis

As we previously stated, Lewin (1951) asserted that a person will experience an approach-approach conflict when choosing between competing attractive (or positive) options, and that, the closer the person is to one of the options, the stronger the attraction to that option and the weaker the attraction to the competing options. Approach-approach conflicts produce an unstable equilibrium because a step closer to one of the options is a step toward conflict resolution by making that option seem more attractive than the competing one. Therefore, they are easier to resolve and generate shorter decision times. This in comparison with avoidance-avoidance conflicts, in which there is a choice between competing repulsive (or negative) options, and that, the closer the person is to one of the options, the stronger the repellence by that option, and the weaker the repellence by the competing ones. They produce a stable equilibrium because a step closer to one of the options is a step away from the resolution of conflict by making that option seem more unattractive than the competing ones, which generates more hesitancy, tension, and vacillation, or complete blocking between the choice options.

Avoidance-avoidance conflicts are therefore more difficult to resolve, which will lead to longer decision times. Accordingly, Lewin (1951) argued that avoidance-avoidance

conflicts are more intense than approach-approach conflicts and many studies have confirmed it: Avoidance-avoidance conflicts result in longer decision times (Arkoff, 1957; Minor et al., 1968; Murray, 1975; Schill, 1966) and in more "undecided" choices (Barker, 1946; Murray, 1975), and they are judged to be more difficult (Arkoff, 1957; Murray, 1975), than approach-approach conflicts. An approach-approach conflict will be experienced in a decision involving gains, given that it entails a possible positive outcome (a chance to obtain gain), and an avoidance-avoidance conflict will be experienced in a decision involving losses, given that it entails a possible negative outcome (a chance of incurring a loss). We thus expect to validate Lewin's (1951) analysis of conflict in risky choice, i.e., that changing the sign of the outcomes of the options from gains to losses will increase the level of experienced conflict, by employing a variety of conflict measures. We thus arrive at the following hypothesis:

H1.1. Conflict will be greater for losses than for gains.

According to Lewin (1951), the force with which a person is attracted or repelled by an option increases as the psychological distance to that option decreases. In our studies, the options are gambles which imply a tradeoff between probability and outcome, and the distance between the gambles is the size of these tradeoffs. Therefore, we combine Lewin's (1951) analysis with Scholten and Sherman's (2006) double-mediation model, to derive a second prediction about the way in which the tradeoff size affects conflict in gains and in losses.

Gains and Losses: The Double-Mediation Model and Lewin´s Analysis

The double-mediation model predicts that the two conflict sources, the concern about sacrifice and the concern about argumentation, generally produce an inverse U-shaped relation between tradeoff size and conflict. Nevertheless, as we referred previously, the model also predicts that this relation can be moderated by third variables in the choice context, which change the mediating effect of concern about sacrifice and about argumentation, and consequently, the shape of the relation between tradeoff size and conflict. As we discuss next, outcome sign is one of these moderating factors.

Concern about argumentation drives decision makers to look for positive arguments in favor of one of the gambles to justify their choice. As we previously referred, in decisions involving gains, conflict is due to the concurrent attraction of the gambles (which involve a chance of obtaining a gain). This, produces an unstable equilibrium, in which getting closer to one of two positive gambles is a step toward conflict resolution. In the double-mediation

model, 'getting closer to' a gamble means arguing in favor of that gamble, and this indeed strengthens the argument in favor of it (the higher probability of winning or the larger amount to win). As decision makers approach one of the gambles by arguing in favor of it, the more that gamble becomes preferred.

On the other hand, in decisions involving losses, conflict is due to the concurrent repellence of the gambles (which involve a chance of incurring a loss), implying that whatever the choice is made, it always entails an undesirable and repulsive outcome. This produces a stable equilibrium, in which getting closer to one of the gambles is a step away from the resolution of conflict. In the double-mediation model, this is true as far as it is contradictory to argue in favor of a negative gamble. There is a great difficulty in finding a positive argument in favor of a negative gamble. As decision makers approach to one of the gambles, the more they become repelled by it; this reverses the preference toward the competing gamble, causing vacillation back and forth, which complicates the resolution of the conflict. For instance, if the decision makers' preference is directed to the riskier option (i.e., to the option that provides a lower probability of losing), they will be repelled by the associated potential large loss. In turn, if their preference goes in the direction of the safer option (i.e., of the option that provides a lower loss), they will be repelled by the associated high probability of losing. This ambivalence will, up to a certain point, sustain vacillation, i.e., the decision makers' preference will oscillate between the safer and the riskier gamble. Nevertheless, beyond that point, conflict *must* be resolved and the person *will* eventually strengthen the argument in favor of one of the gambles (the lower probability of losing or the smaller amount to lose).

In sum, we argue that the point of contact between Lewin's (1951) analysis and the double-mediation model is argumentation, not sacrifice: If it were for sacrifice, the person would never 'get closer to' either gamble, because the advantage foregone would prevent that from happening. In particular, changing the outcome sign from gains to losses will increase the concern about argumentation because it is contradictory to argue in favor of a negative gamble but there is no contradiction in arguing in favor of a positive one. In other words, the preliminary conflict aroused by concern about argumentation will be greater for losses than for gains. We thus arrive at the following hypothesis:

H1.2.1. When the sign of the outcomes changes from gains to losses, the preliminary conflict from concern about argumentation will increase.

In addition, because the preliminary conflict has a mobilizing effect, i.e., the preliminary conflict from concern about argumentation is the drive to devote attention to that concern during subsequent deliberation, and because only the conflict from deliberation is affected by tradeoff size, the conflict from concern about argumentation will be affected more by tradeoff size for losses than for gains. Therefore, the negative mediating effect of concern about argumentation will be accentuated relatively to the positive mediating effect of concern about sacrifice, and the relation between tradeoff size and conflict will become more negative, or less positive, for losses than for gains. This leads to the following hypothesis:

*H1.2.2.*When the sign of the outcomes changes from gains to losses, the relation between tradeoff size and conflict will change in a downward direction.

The assertion that the relation between tradeoff size and conflict changes in a downward direction (*H1.2.2*) is about the linear trend of the relation, but not about the specific shape of the relation. For instance, when a positive relation changes into an inverse U-shaped relation, the linear trend changes from greater than zero to (nearly) zero. Alternatively, when an inverse U-shaped relation changes into a negative relation, the linear trend changes from (nearly) zero to smaller than zero. Finally, when a positive relation changes into a negative relation, the linear trend changes from greater than zero to smaller than zero. The assertion that the relation changes in a downward direction covers all these situations. The same rational applies to all hypotheses regarding the changing shape of the relation between tradeoff size and conflict in every Experiment.

Experiment 1:

Outcome Sign and Preference Elicitation Method

In Experiment 1 we investigate the effects of outcome sign, i.e., whether the decision involves gains or losses, in combination with the effects of preference elicitation method, i.e., whether the task is to choose or to reject an option (choice versus rejection). According to Nagpal and Krishnamurthy (2008), decisional conflict depends on the interaction between outcome sign and preference elicitation method, rather than on the sign of the outcomes by itself, due to (in)compatibility effects. Accordingly, in decisions involving gains conflict should be greater in rejecting than in choosing tasks, whereas, in decisions involving losses conflict should be greater in choosing than in rejecting tasks. We will argue, however, that the level of conflict will be affected not only by the interaction between outcome sign and preference elicitation method but also by the outcome sign and by the preference elicitation

method alone. We also derive predictions on how the preference elicitation method will affect the preliminary conflict and consequently the relation between tradeoff size and conflict.

We have previously discussed the impact of outcome sign on conflict arousal in risky choices and predictions were derived by combining Lewin's analysis of conflict with the double-mediation model. In brief, decisions involving avoidance-avoidance conflicts (i.e., losses) generate more hesitancy and vacillation between the alternatives than decisions involving approach-avoidance conflicts (i.e., gains). Thus, conflict will be more complicated to resolve in the former than in the latter case. Moreover, conflict will be greater in losses than in gains essentially because, while there is no contradiction in arguing in favor of a positive gamble, it is contradictory to argue in favor of a negative gamble, which will increase the preliminary conflict from concern about argumentation. As a consequence, in the subsequent deliberation phase, the negative mediating effect produced by this concern on the relation between tradeoff size and conflict will be accentuated and the relation will become more negative (or less positive). Therefore, in what concerns the effect of outcome sign on conflict, the following hypotheses will be tested:

H1.1. Conflict will be greater for losses than for gains.

H1.2.1. When the sign of the outcomes changes from gains to losses, the preliminary conflict from concern about argumentation will increase.

H1.2.2. When the sign of the outcomes changes from gains to losses, the relation between tradeoff size and conflict will change in a downward direction.

We now discuss the effects of preference elicitation method and its interaction with outcome sign.

Preference Elicitation Method: Choosing Versus Rejecting

From a rational perspective, choosing or rejecting should reveal the same preference. Nevertheless, research has demonstrated the opposite. As it was already mentioned, Shafir (1993) investigated the decision maker's preferences across the choice and rejection methods and showed that the two preference elicitation methods led to inconsistent preferences. The enriched option, the one with more positive and more negative attributes (i.e., more extreme attribute values), tended to be chosen more often *and* rejected more often than the impoverished option, the one with fewer positive and negative attributes (i.e., more moderate attribute values). Drawing on the compatibility principle, according to which the compatibility

between an input and an output increases the weight of the input (Tversky et al., 1988), Shafir (1993) argued that the positive and negative features of the options are differentially weighted depending on the nature of the task, such as choice or rejection. When making a decision, people look for reasons in favor and against the options (pros and cons), thus, in choice, people will focus on reasons for choosing, whereas, in rejection, they will focus on reasons to reject. A greater weight will be assigned to the features that are compatible with the nature of the task: Positive attributes will be more heavily weighted in choosing tasks but negative attributes will be more heavily weighted in rejecting tasks (Shafir, 1993).

In Shafir's (1993) research, each option comprised both positive and negative attributes, and the difference between them was the extremeness of the attribute values. This manipulation implied that one option, the one with more extreme values, generated a greater compatibility between task and valence than the other option, the one with moderate attribute values, both in choice and in rejection. In Hovland and Sears's (1938) typology of choice conflicts, this manipulation motivated double approach-avoidance conflicts. Meloy and Russo (2004, study 2) developed "exclusively compatible and incompatible decision contexts" (p. 119), by creating decisions between options comprising only positive or negative attributes. In other words, the authors motivated approach-approach conflicts and avoidance-avoidance conflicts, as we did in the present research. Their results not only supported the compatibility principle, but also revealed that incompatibility led to a greater decision uncertainty and less extreme attribute evaluations, or in other words, to a greater conflict.

Recently, Nagpal and Krishnamurthy (2008) addressed the effects of compatibility on conflict. They investigated decisions between attractive and unattractive options (i.e., approach-approach conflicts and avoidance-avoidance conflicts) and their aim was to demonstrate that the compatibility between the valence of the options and the preference elicitation method had an impact on decision time, decision difficulty, attribute recall, and decision effort. They argued that choosing requires an attractiveness judgment, which is more compatible with attractive than with unattractive options, whereas rejecting requires an unattractiveness judgment which is more compatible with unattractive than with attractive options. They also argued that incompatibility generates a greater conflict than compatibility. Indeed, their results showed that incompatible situations (choosing between unattractive options or rejecting between attractive ones) generated a greater conflict level than compatible ones (choosing between attractive options or rejecting between unattractive ones).

In sum, decisional conflict is affected by the compatibility between the preference elicitation method and the valence of the options. In our study, the positive or attractive options are positive gambles and the negative or unattractive options are negative gambles. Thus, gains should be more compatible with choosing but more incompatible with rejecting, whereas losses should be more compatible with rejecting but more incompatible with choosing. Furthermore, because a greater conflict is expected when the valence of the options (outcome sign) is incompatible with the preference elicitation method, we predict that, in gains conflict will be greater in rejecting than in choosing tasks and in losses the reverse will occur:

H2.1.1. In choices involving gains, conflict will be greater in a reject than in a choice task.

H2.1.2. In choices involving losses, conflict will be greater in a choice than in a reject task.

Nagpal and Krishnamurthy (2008) claimed that decisional conflict is aroused not by the valence of the options itself, but rather, by the interaction between the valence and the preference elicitation method. We argue that this is not entirely true for several reasons. First, as it was earlier discussed, outcome sign should have a main effect on conflict. Regardless of the nature of the task, i.e., whether it is to choose or to reject a gamble, it is always contradictory to argue in favor of a negative gamble. Second, as we discuss below, the preference elicitation method should have a weaker effect on losses than in gains and the preference elicitation method should have a main effect on conflict. We first address the effect of preference elicitation method on losses and then turn to the main effect of preference elicitation method on conflict.

The scenario to which people are most accustomed is choosing among gains because it is by far the most common one. Not only a great deal of research is focused on how people choose among positive options, but also, most decisions in our everyday life, involve positive options. All the other scenarios, choosing among losses, rejecting among gains, and rejecting among losses, are less common (and thus people are less accustomed) than choosing among gains. Therefore, choosing among losses, rejecting among gains and rejecting among losses, should result in more similar levels of conflict than the choosing among gains scenario. The implication is that the difference in the level of experienced conflict should be larger when changing from choice among gains (more common task) to rejection among gains (less common task) than when changing from choice among losses (less common task) to rejection among losses (less common task).

This does not mean that in decisions involving losses the compatibility between task (elicitation preference method) and valence (outcome sign), cannot, to some extent, facilitate the decision by decreasing the experienced conflict, and thus, originating a greater conflict in choosing (i.e., incompatible situations) than in rejection (i.e., compatible situations). However, a smaller difference in conflict will be aroused when changing the preference elicitation method from choice to rejection in losses than in gains. We thus arrive at the following hypothesis:

H2.2. The effect of preference elicitation method on conflict will be weaker for losses than for gains.

Furthermore, not only outcome sign but also preference elicitation method should have an independent effect on conflict. Meloy and Russo (2004, study 2) found that people prefer to choose than to reject an option, perhaps because they are more used to decisions involving choices than to decisions involving rejections.[10] They showed that despite of the compatibility effects, a greater decision uncertainty (i.e., conflict) is experienced when people are asked to reject rather than to choose an option. We therefore expect that rejection tasks will be more difficult to perform than choice tasks. In other words, a greater conflict should be aroused in rejecting than in choosing tasks (either if the options are positive or negative). This leads to the following hypothesis:

H3.1. Overall conflict will be greater in rejecting than in choosing tasks.

In addition, we predict that the effect of preference elicitation method on the two conflict sources will also be similar to that of outcome sign. When changing from choice to rejection, or from gains to losses, conflict will increase essentially due to an increase of the preliminary conflict from argumentation. As Nagpal and Krishnamurthy (2008) noted, a rejection task involves an unattractiveness judgment because people will look for reasons to reject an option. Therefore, just as it is contradictory to argue in favor on a negative gamble, it is contradictory to argue in favor of any gamble when an unattractiveness judgment is required. In other words, arguing in favor of a gamble is incompatible with a rejection task because people are focused on the reasons against a gamble. As a result, it is expected that the concern about argumentation will arouse a greater preliminary conflict in rejecting than in choosing tasks. We thus arrive at the following hypothesis:

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[10]This does note rules out the fact that choosing in gains is by far the most common task, as previously argued.

H3.2.1. When the preference elicitation method changes from choice to rejection, the preliminary conflict from concern about argumentation will increase.

Moreover, in the double-mediation model, the preliminary conflict from a concern is the drive to devote attention to that concern during subsequent deliberation, and only the conflict from deliberation is affected by tradeoff size. Therefore, in the subsequent deliberation phase, the negative mediating effect of concern about argumentation will be accentuated (relatively to the positive mediating effect of concern about sacrifice), and thus, the relation between tradeoff size and conflict will become more negative (or less positive):

H3.2.2. When the preference elicitation method changes from choice to rejection, the relation between tradeoff size and conflict will change in a downward direction.

In sum, in Experiment 1 we predict that conflict is affected by the outcome sign (*H1.1*, *H1.2.1* and *H.1.2.2*), by the interaction between outcome sign and preference elicitation method (*H2.1.1*, *H2.1.2* and *H2.2*), and by the preference elicitation method, (*H3.1*, *H3.2.1* and *H3.2.2*).

Method of Experiment 1

Participants. A total of 286 psychology students from ISPA University Institute (ISPA-IU) participated in the study and each participant received a voucher of €7.50 for the library or the cafeteria.

Materials and stimuli. The data were collected through a computerized questionnaire developed in *Turbo Pascal*. The questionnaire was composed by two parts. In the first part the participants completed 12 decision tasks and after completing each task they completed three rating scales corresponding to three measures of conflict. In the second part, the participants repeated the 12 decision tasks but without having to complete the rating scales. The consistency, or rather, the inconsistency between the decisions made in two parts corresponds to another conflict measure (decision inconsistency). The decision tasks were dyadic choices between gambles that implied a tradeoff between probability of winning and amount to win or a tradeoff between probability of losing and amount to lose.

Each stimulus, i.e. each gamble, yield an outcome x with probability p or a zero outcome with probability 1-p. Two sets of stimuli comprised two outcome sign conditions: The gains condition, in which the decision outcomes are positive, and the losses condition, in which the decision outcomes are negative. As described in Appendix A, the stimuli of the

gains condition were constructed on the basis of estimates of prospect theory (Tversky & Kahneman, 1992) such that, according to those estimates, the participants should be pairwise indifferent between the gambles. The stimuli of the losses condition were obtained by reversing the sign of the outcomes.[11]

The chance device of the gambles was a card gamble and consisted in drawing one card, at random, from a deck of 52 cards. The probability of winning/losing (e.g., .346) corresponded to the number of winning/losing cards (e.g., 18) relatively to the total number of cards in the deck (52). Therefore, in each decision task, the participants were presented with a specification of the winning/losing cards (e.g., a black number), the respective winning/losing percentage (e.g., 34.6%), and the outcome (e.g., €17.00 or €-17.00), as follows: "Win €17.00 upon drawing a black number (a chance of 34.6%)" - gains condition, or "Lose €17.00 upon drawing a black number (a chance of 34.6%)" - losses condition. Note that the information about the nonzero outcome was explicit but the information about the zero outcome remained implicit.

In both outcome sign conditions, probability (of winning or losing) ranged from .308 to .693, which corresponds to a range of winning/losing cards from 16 to 36. The specifications of the winning/losing cards are given in Appendix B. Moreover, in order to avoid that the participants were presented with repeated descriptions of the cards, two different specifications for every probability level were constructed (see Appendix B). The outcome differences (amount to be won or lost) ranged from €5.00 to €20.00 in the gains condition and from €-5.00 to €-20.00 in the losses condition. The gambles and their probabilities (p), outcomes (x), and expected values (px) are showed in Table 2. Lower probabilities (i.e., the riskier gambles) had higher (more positive) expected values in gains and lower (more negative) expected values in losses, compensating for the common preference for the safer gamble in gains (due to risk aversion) and for the riskier gamble in losses (due to risk seeking) when the probability of the nonzero outcome is not very low (Kahneman & Tversky, 1979).

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[11]This could be done because the curvature was the same in gains and in losses, and because constant loss aversion does not affect preferences between negative gambles.

Table 2

Probabilities, Outcomes, and Expected Values (Experiment 1)

| | | Outcome Sign condition | | | |
| | | Gains | | Losses | |
f^a	p	x^b	px	x^b	px
16	.308	20.00	6.16	-20.00	-6.16
17	.327	18.50	6.05	-18.50	-6.05
18	.346	17.00	5.88	-17.00	-5.88
19	.365	15.50	5.66	-15.50	-5.66
20	.385	14.50	5.58	-14.50	-5.58
21	.404	13.50	5.45	-13.50	-5.45
23	.442	11.50	5.08	-11.50	-5.08
24	.462	11.00	5.08	-11.00	-5.08
25	.481	10.00	4.81	-10.00	-4.81
26	.500	9.50	4.75	-9.50	-4.75
27	.519	9.00	4.67	-9.00	-4.67
28	.538	8.50	4.57	-8.50	-4.57
30	.577	7.50	4.33	-7.50	-4.33
31	.596	7.00	4.17	-7.00	-4.17
32	.615	6.50	4.00	-6.50	-4.00
34	.654	6.00	3.92	-6.00	-3.92
35	.673	5.50	3.70	-5.50	-3.70
36	.692	5.00	3.46	-5.00	-3.46

[a]The number of winning or losing cards in a deck of 52 cards.

[b]Euros (€).

Design. Conflict was the dependent variable and was assessed with five component measures. Four of these measures were the ones used by Scholten and Sherman (2006) in previous tests of the double-mediation model: Decision time (i.e., the time to reach a decision), decision difficulty (i.e., the difficulty in reaching a decision), lack of confidence (i.e., the lack of confidence in the decision reached) or decision uncertainty, and preference equality (i.e., the degree to which options are equally preferred). The fifth measure was decision inconsistency (i.e., the inconsistency between the decision made in the first part and in the second).

The decision time and decision inconsistency measures are behavioral manifestations of conflict. The decision difficulty, decision uncertainty, and preference equality measures are

mental manifestations. In particular, decision difficulty and decision uncertainty are 'direct-rating' measures, and preference equality is an 'indirect-rating' measure.

The design included three within-participants independent variables. The first variable is outcome sign, which has 2 levels: Gains (positive outcomes) and losses (negative outcomes). The second variable is tradeoff size, which has 3 levels: Small, intermediate, and large tradeoffs. That is, the differences between the options (gambles) along the attributes (outcome and probability) are small, intermediate, or large. Finally, the third variable is reference gamble, which had not been mentioned so far given that it is a counterbalancing variable. This variable refers to the (reference) option from which the tradeoff size will vary. Reference gamble has 2 levels: Large-amount and high-probability. In the large-amount condition, the small, intermediate, or large tradeoffs are specified (or vary) with respect to a gamble involving a large amount to be won/lost but a low probability of winning/losing. Conversely, in the high-probability condition, the small, intermediate, or large tradeoffs are specified (or vary) with respect to a gamble involving a high probability of winning/losing but a small amount to be won/lost.

This means that the large-amount condition implies the manipulation of larger outcome values, whereas the high-probability condition implies the manipulation of higher probability values. For instance, given that the largest possible outcome to be won is €20.00, in the large-amount condition a small tradeoff is implied by the choice between the gambles (€20, 30.8%) and (€18.50, 32.7%), an intermediate tradeoff between the gambles (€20.00, 30.8%) and (€11.50, 44.2%), and a large tradeoff between the gambles (€20.00, 30.8%) and (€7.50, 57.70%). Conversely, because the highest probability of winning is .692, in the high-probability condition a small tradeoff is implied by the choice between the gambles (€5.00, 69.2%) and (€5.50, 67.30%), an intermediate tradeoff between (€5.00, 69.2%) and (€8.50, 53.8%), and a large tradeoff between (€5.00, 69.2%) and (€14.50, 38.50%).

The three independent variables were manipulated according to a 2 (range condition) x 3 (tradeoff size) x 2 (reference gamble) within-participants design, resulting in 12 pairs of gambles (12 decision tasks) for each participant.

The design also included three between-participants factors. Two of these were counterbalancing factors introduced in order to avoid that the participants were repeatedly exposed to the same stimuli (gambles). The first factor was reference-gamble extremeness, which was developed to preclude that within each reference-gamble condition, tradeoff size would vary with respect to one and the same reference gamble. Accordingly, tradeoff size and

reference gamble were varied in different levels of the probability attribute, counterbalancing the extremeness of the reference gamble across tradeoff sizes, as showed in Table 3. The second factor counterbalances the assignment of the extremeness conditions to the two outcome sign conditions. The outcome sign conditions varied across the six different extremeness conditions (see Table 3) in accordance with Table 4.

Table 3

Assignment of Reference-Gamble Extremeness to Tradeoff Sizes (Experiment 1)[a]

Extremeness Condition	Large-amount condition			High-probability condition		
	Small Tradeoff	Intermediate Tradeoff	Large Tradeoff	Small Tradeoff	Intermediate Tradeoff	Large Tradeoff
1.1	16-17	18-25	20-36	35-36	26-34	16-31
1.2	20-21	16-23	19-35	30-31	28-36	17-32
1.3	18-19	21-28	16-31	32-34	23-30	20-36
2.1	16-17	20-27	19-35	35-36	24-31	17-32
2.2	18-19	17-24	20-36	32-34	27-35	16-31
2.3	20-21	18-25	17-32	30-31	26-34	19-35

[a]The tradeoff sizes are indicated by the number of winning (losing) cards in each option pair. See Table 2.

Table 4

Assignment of Extremeness Conditions to Outcome Sign Conditions (Experiment 1)[a]

Outcome Sign	Counterbalancing Condition											
	1	2	3	4	5	6	7	8	9	10	11	12
Gains	1.1	1.1	1.2	2.1	2.1	2.2	1.2	1.3	1.3	2.2	2.3	2.3
Losses	1.2	1.3	1.3	2.2	2.3	2.3	1.1	1.1	1.2	2.1	2.1	2.2

[a]For the extremeness conditions, see Table 3.

The third between-participants factor was the preference elicitation method: Choice versus rejection. In the choice condition, the participants were asked to choose one of the two gambles, whereas in the rejection condition, they were asked to reject one of the two gambles.

Across the within and between participants design five factors were randomized: (1) the distribution of the participants by the experimental conditions; (2) the order of the 12

decision tasks for each participant (in both parts of the experiment); (3) the order by which the options are presented, specifically, the left-right position of options y and z (y-z or z-y), which was randomized across participants and choice tasks; (4) the order by which the conflict scales are presented, which was randomized across participants and choice tasks; and (5) the specification of the winning/losing cards, which was randomized across the different levels of the probability attribute.

Procedure. Experiment 1 was conducted in the laboratory of ISPA-IU. Each experimental session was run by computer with at most 20 participants at a time and lasted about 30 minutes. With previous authorization of the professors, the participants were recruited in their classrooms.

When all the participants where in the lab, the participants were told that they could start the experiment and that the instructions were given by the computer. The instructions informed them that they would have to decide between gambles that involved choosing (in the case of the participants in the choice condition) or rejecting (in the case of the participants in the rejection condition) among different monetary outcomes associated to different probabilities. In half of the tasks one gamble presents a higher probability of winning a monetary amount and the other gamble presents a larger monetary amount to be won; in the other half, one gamble presents a higher probability of losing a monetary amount and the other gamble presents a larger monetary amount to be lost. They were also informed that the experiment was composed by two parts, which always involved having two choose/reject one of two gambles, and that in the first part they would have to complete three rating scales after each decision task. Moreover, they rehearsed the instructions for keyboard handling. They were reminded that there was no right or wrong answer; that we just wanted to understand their true preference in risky choices.

The gambles that involved winning a monetary amount (gains condition) were displayed in a blue background, whereas the gambles that involved losing a monetary amount (losses condition) were displayed in a green background in order to avoid 'distractions'. In each decision task, the gambles were displayed in an attribute (row) by option (column) format and the options were labelled from left to right as P and Q. An arrow sign was located below each option (a leftward below P and a rightward below Q). Figure 7 illustrates a decision task, specifically, a choosing task in the gains condition.

	P	**Q**
Win:	€9.50	€6.00
Upon drawing:	A black card (a chance of 50.0%)	A red card or a black figure (a chance of 65.4%)
Choose:	◄	►

Figure 7. Decision task. In this example, the outcome sign condition is gains and the preference elicitation method condition is choice.

The participants selected a gamble by pressing the correspondent arrow on the keyboard. At this moment, this arrow started to blink and the other (corresponding to the non selected gamble) disappeared. Also, a message appeared on the bottom of the screen reminding the participants that they could correct the answer by pressing "Backspace" or that they could confirm it by pressing "Enter". In the former situation, the program returned to the decision task, and in the latter, the experiment proceeded to the first rating scale. Three rating scales, corresponding to three measures of conflict (difficulty to reach a decision, uncertainty in the decision reached, and equality of preferences), were completed sequentially. The fourth measure of conflict, decision time, was automatically recorded (in milliseconds). The time started to be counted when the decision task was displayed and ended when the participant confirmed the decision.

In each rating scale the gambles and the attributes were displayed in a matrix format on the top of the screen, the chosen gamble was marked with an arrow (below it), and a 9-point rating scale appeared on the bottom of the screen. All numbers were presented on the scale but only the odd numbers (1, 3, 5, 7, and 9) were labelled. An example of a rating scale is given in Figure 8.

To what extent do you prefer one gamble to the other?

___1___.___2___.___3___.___4___.___5___.___6___.___7___.___8___.___9___

| Much more preferred | More preferred | Equally preferred | More preferred | Much more preferred |

Figure 8. Rating scale. This example illustrates a preference rating scale in the choice condition.

In the preference rating scale the left-right location of the each option (gamble) corresponded to the same location in the matrix in both outcome sign conditions (see Figure 8). In the choice condition, the positions 1, 3, 5, 7, and 9 were labelled as "much more preferred", "more preferred", "equally preferred", "more preferred", and "much more preferred", respectively; in the rejection condition, the same positions were labelled as "much less preferred", "less preferred", "equally preferred", "less preferred", and "much less preferred", respectively. In the difficulty rating scale the positions 1, 3, 5, 7 and 9, were labelled as "very easy", "easy", "neither easy nor difficult", "difficult", and "very difficult", respectively. Finally, in the confidence rating scale, the positions 1 and 9 were labelled as "no confidence" and "full confidence", respectively. For each rating scale, the participant pressed the correspondent digit on the keyboard. At this moment, this number started to blink and the others (corresponding to the non selected positions) disappeared. Also, a message appeared on the bottom of the screen, reminding the participants that they could correct the answer by pressing "Backspace" or that they could confirm it by pressing "Enter". In the former situation, the program returned to the rating task and in the latter the computer program proceeded to the next rating scale. Moreover, when the three rating scales were completed, the program continued to the next decision task (pair of gambles).

When the first part of the experiment ended (i.e., when all the 12 decision tasks and respective rating scales were completed), the program proceeded two the second part. At this moment, the participants were informed that the same 12 decision tasks were presented and that they would again have to chose/reject one of the gambles, but without having to complete the rating scales.

Measures. The difficulty and confidence ratings were simply coded from 1 to 9. Higher values indicated greater difficulty and less confidence or more uncertainty. These are the conflict measures d and u, i.e., the difficulty of reaching a decision and the uncertainty about the correctness of the decision reached (respectively).

The preference ratings, v, were converted to a 0 to 1 scale by coding them from 1/10 to 9/10. These values were transformed into a conflict measure by using Shannon's (1948) entropy formula:

$$e(v) = -\left[v\log_2(v) + (1-v)\log_2(1-v)\right],$$

where $0 < v, w < 1$. Thus, v was transformed into $e(v)$, which corresponds to the degree to which the options were equally preferred. To illustrate, when $v = .5$, the options are equally preferred, and thus, conflict reaches its highest level, $e(v) = 1$. As $v \to 0$ or $v \to 1$, the preference for one of the options increases, and consequently, $e(v) \to 0$ because conflict is decreasing.

The response (or decision) times were transformed from milliseconds to seconds. In addition, because the decision times had positively skewed distributions (i.e., their means were disproportionately affected by the relativelyly few very slow responses), a logarithmic transformation was performed and the positive skew was largely removed from all distributions. Thus, the conflict measure t (time to reach a decision), was transformed into $\log_2(t)$ (the logarithm of decision time).

Decision inconsistency, i, was evaluated by the value of the difference between the decisions made in the first part and the decisions made in the second part of the questionnaire. Accordingly, 0 was assigned when the decisions were consistent and 1 when they were inconsistent.

In sum, the conflict measures are d for decision difficulty, u for decision uncertainty, $e(v)$ for preference equality, $\log_2(t)$ for decision time, and i for decision inconsistency. All measures are positively related to conflict.

Results of Experiment 1

In all the analyses (in this and subsequent Experiments), the tests of explicitly stated hypotheses are one-tailed tests, whereas all others are two-tailed tests. More information on the results of Experience 1 is presented in Appendix C.

Conflict: Variable construction. The dependent variable, conflict, is a composite factor obtained from five conflict measures. For this reason, a principal component analysis was conducted on the five conflict measures. To decide about the number of components to extract (in this and subsequent principal component analyses) we used Cattell's scree test, unless the scree plot was not clear, in which case we used Kaiser's rule. In the present analysis, one component was extracted, which had an eigenvalue of 1.72 and explained 34.34% of the total variance. The five measures loaded positively on this common factor: Decision time (.36), decision difficulty (.78), decision uncertainty (.73), preference equality (.62), and decision inconsistency (.23). This is the conflict factor that we intended to extract. We ran an internal consistency reliability analysis on the conflict measure, which revealed a standardized Cronbach alpha of .48 and an average inter-item correlation of .16.[12] The analysis of 'alpha if item deleted' provides information about the content validity of the conflict variable. There was no increase in the value of alpha when an item was deleted, attesting to the content validity of the all items. The decision inconsistency measure had a low loading on the conflict factor; nevertheless, the experimental results were not affected by the inclusion or exclusion of the decision inconsistency measure. So we constructed the conflict variable as a composite of all five measures. Accordingly, we derived the (standardized) scores on the principal component and then linearly transformed them to scales from 0 to 1.

Conflict: Test of hypotheses. Six linear regressions were performed. Regression 1 was performed in order to test *H1.1* (the difference in conflict between gains and losses), *H1.2.2* (the moderating effect of outcome sign on the relation between tradeoff size and conflict), *H3.1* (the difference in conflict between choice and rejecting tasks), and *H3.2.2* (the moderating effect of preference elicitation method on the relation between tradeoff size and conflict). Conflict was the dependent variable and outcome sign, preference elicitation method, tradeoff size, and reference gamble were the independent variables. The analysis included: A contrast between gains and losses; a contrast between choice and rejection; two polynomial contrasts (linear and quadratic) between small, intermediate, and large tradeoffs; a contrast between the large-amount condition and the high-probability condition; and 18 contrasts capturing the interactions between the independent variables. With respect to the tradeoff size variable, the linear contrast compares small to large tradeoffs capturing the linear relation between them, and the quadratic contrast compares intermediate to small and large

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[12]It can be argued that the internal consistency of the conflict scale was 'low'. Nevertheless, this was likely due to the fact that the scale is composed of a reduced number of items given that reliability is highly sensitive to the length of the scale (e.g., Ferguson & Takane, 1989).

tradeoffs capturing the quadratic relation between them (this applies to all the analyses of every Experiment).

Regressions 2 and 3 were conducted to evaluate the specific shape of the relation between tradeoff size and conflict in each outcome sign condition, and to test *H2.1.1* (the difference in conflict between choice and rejecting tasks in gains) and *H2.1.2* (the difference in conflict between choice and rejecting tasks in losses), respectively. These analyses included all the contrasts of regression 1, except the ones associated with the outcome sign conditions. Regressions 4 and 5 were performed in order to evaluate the specific shape of the relation between tradeoff size and conflict in each preference elicitation method condition. We included all the contrasts of regression 1, except those associated with the preference elicitation method conditions. Finally, regression 6 was conducted to test *H2.2* (the difference in conflict between choice and rejecting tasks when gains change into losses). The contrasts were the ones included in regression 1, except that the contrast between choice and rejection was replaced by a contrast between choice-gains-and-rejection-losses and choice-losses-and-rejection-gains.

The results of regression 1 showed a significant effect of outcome sign, $t(3432) = 4.26$ $p < .001$: Conflict was greater for losses than for gains, consistent with *H.1.1*. There was also a significant effect of the interaction between outcome sign and tradeoff size (linear contrast), $t(3432) = -2.42$, $p = .01$: Consistent with *H1.2.2*, when gains changed into losses, the relation between tradeoff size and conflict changed in a downward direction as depicted in Figure 9. In addition, regressions 2 and 3 demonstrated that for gains there was a positive relation between tradeoff size and conflict, $t(1716) = 3.02$, $p < .01$, whereas for losses there was an inverse U-shaped relation, $t(1716) = 1.82$, $p = .07$ (effect marginally significant).
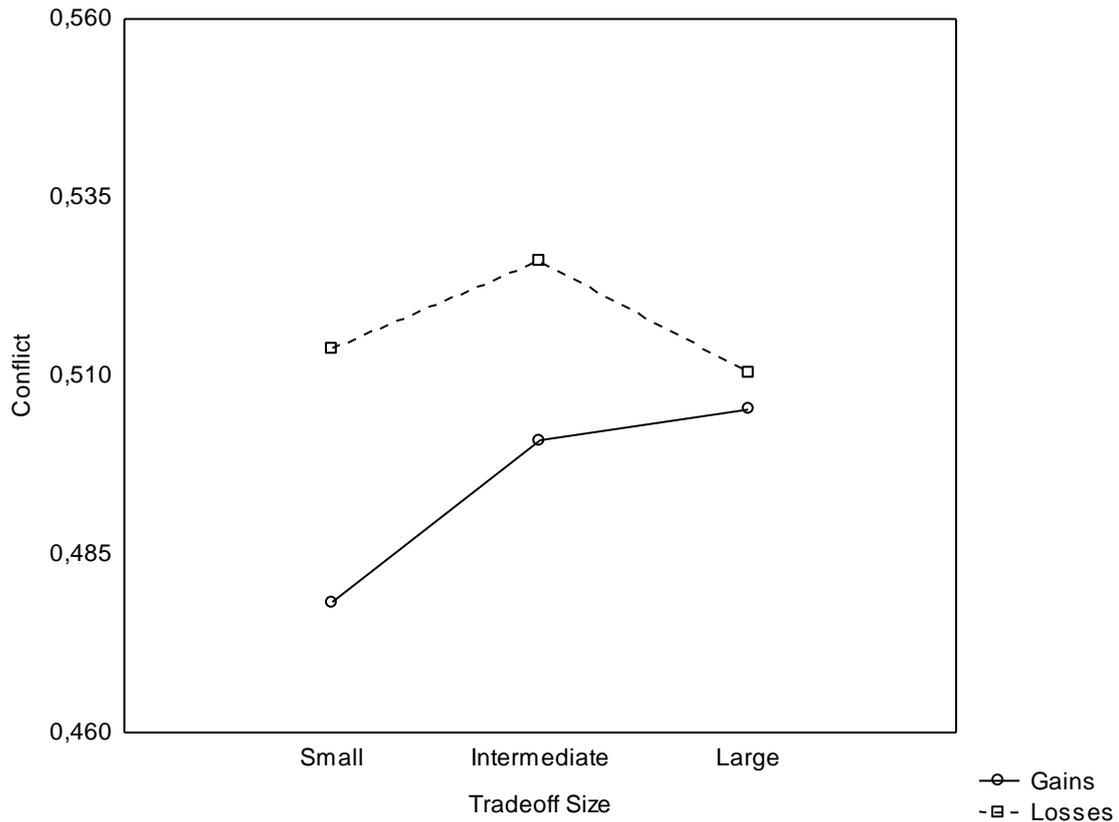
Figure 9. Relation between tradeoff size and conflict by outcome sign conditions (Experiment 1).

The results of regression 1 also showed a significant interaction effect between preference elicitation method and outcome sign, $t(3432) = -3.12$, $p < .01$, which demonstrates that preference elicitation method has a differential effect on gains and losses. As depicted in Figure 10, when changing the preference elicitation method from choice to rejection, conflict did increase in gains, $t(1716) = 4.33$, $p < .001$ (regression 2), but almost did not decrease in losses, $t(1716) = -0.07$, $p = .47$ (regression 3). Thus, *H2.1.1* was supported but *H2.1.2* was not. Figure 10 also shows that the effect of preference elicitation method was weaker for losses as predicted by *H2.2*. Indeed, regression 6 revealed a significant effect of the contrast between choice-gains-and-rejection-losses and choice-losses-and-rejection-gains, $t(3432) = -3.02$, $p < .01$, which demonstrates that the effect of preference elicitation method was less pronounced in losses than in gains, consistent with *H2.2*.
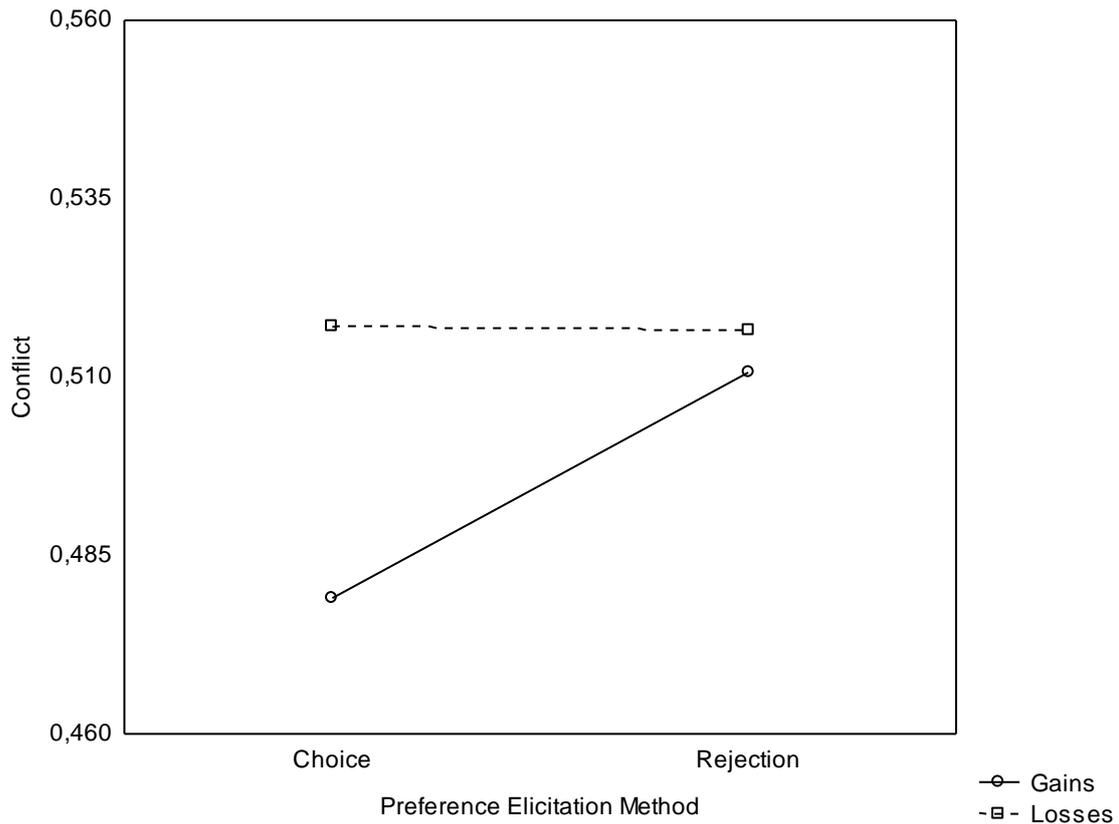
Figure 10. Level of conflict by outcome sign and preference elicitation method conditions.

Furthermore, regression 1 also demonstrated a significant main effect of preference elicitation method, $t(3432) = 3.02$, $p < .01$: Overall conflict was greater in the rejection condition than in the choice condition, consistent with *H3.1*. The interaction effect between preference elicitation method and tradeoff size (linear contrast) was also (marginally) significant, $t(3432) = -1.43$, $p = .08$: Consistent with *H3.2.2*, changing the preference elicitation method from choice to rejection changed the relation between tradeoff size and conflict in a downward direction, as depicted in Figure 11. In addition, regressions 4 and 5 demonstrated that there was a positive relation between tradeoff size and conflict when the task was to choose, $t(1716) = 2.29$, $p = .02$, whereas there was an inverse U-shaped relation when the task was to reject, $t(1716) = 2.05$, $p = .04$.
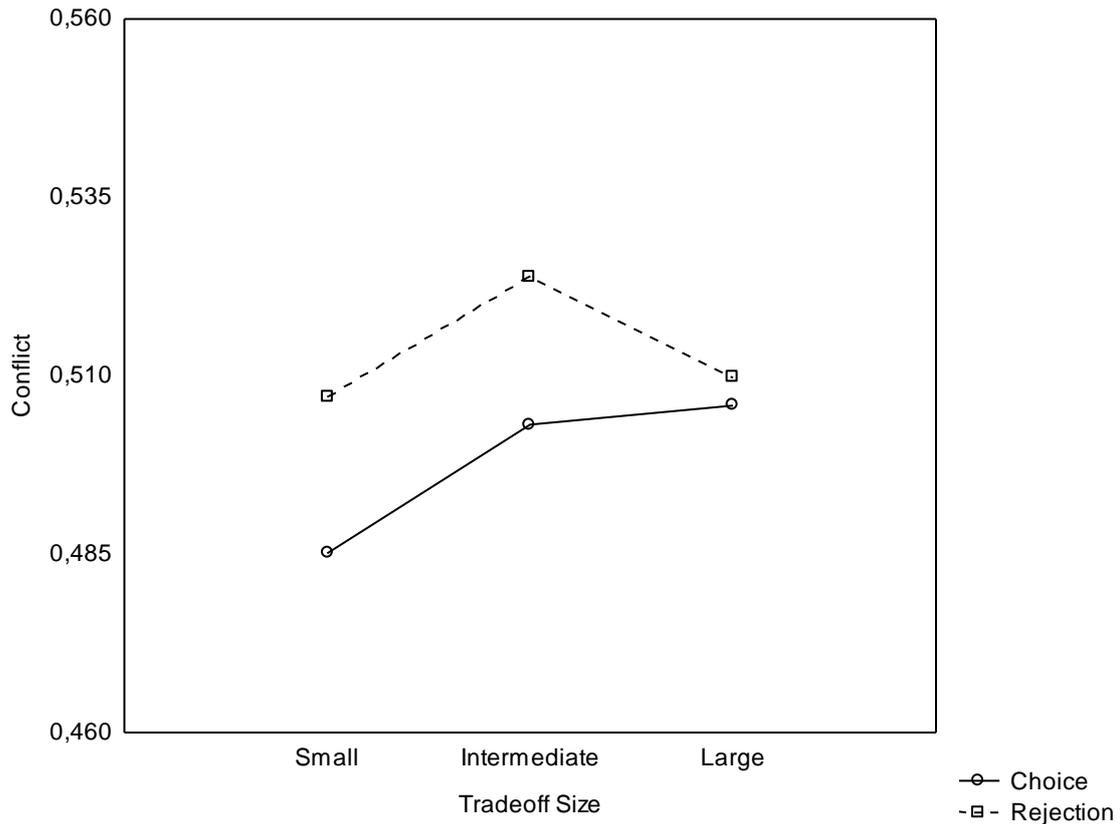
Figure 11. Relation between tradeoff size and conflict by preference elicitation method conditions.

Model estimation and parametric hypotheses test. Different levels of final conflict aroused by different choice problems were observed. From these observed levels of final conflict, the double-mediation model can then be estimated. When the formal specification of the model was presented, we specified how the degree of updating is related to preliminary conflict and how the conflict from deliberation is related to tradeoff size. The only substantive elements of the double-mediation model to be estimated are the levels of preliminary conflict, S_0 and A_0. The predicted levels of final conflict follow automatically from the equations given in that section. Therefore, in order to estimate the parameters of the double-mediation model, Equations A4 and A6 were substituted into Equation A2, Equations A5 and A7 were substituted into Equation A3, and Equations A2 and A3 were substituted into Equation A1. Furthermore, the parameters were estimated with the Hooke-Jeeves and Quasi-Newton routine in the Statistica software (StatSoft, 2003), minimizing the sum of squared deviations between observed and predicted levels of conflict. The dependent variable, conflict, was expressed on a scale from 0 to 1, and so were the independent variables. We assumed an equal spacing between the three tradeoff sizes. Thus, for each independent variable, we let the

preliminary conflict from sacrifice $S_0 = 0$, ½, and 1, and, conversely, the preliminary conflict from concern about argumentation $A_0 = 1$, ½, and 0, for small, intermediate, and large tradeoffs, respectively. The procedure for estimating the parameters is the same in all Experiments.

In Experiment 1 we estimated ten parameters from the 2 (outcome sign) × 2 (preference elicitation method) × 2 (reference gamble) × 3 (tradeoff size) = 24 levels of conflict observed across all 12 tasks. Two of these were the auxiliary parameters.[13] The other eight were the estimated levels of preliminary conflict. The estimates are given in Appendix C. The goodness-of-fit of the estimated model was $R^2 = .89$ (i.e., the estimated model accounted for 89% of the variance in the observed levels of conflict). Given that the estimated model provided an accurate description of the data, we could proceed by testing our hypotheses on the estimated levels of preliminary conflict.[14]

When gains changed into losses, preliminary conflict from concern about argumentation increased, $t(15) = 3.27$, $p = .01$, consistent with *H1.2*. At the same time, preliminary conflict from concern about sacrifice decreased, $t(15) = -3.90$, $p < .01$. Nonetheless, the difference in preliminary conflict from concern about sacrifice was not as great as the difference in preliminary conflict from concern about argumentation, $t(15) = -4.02$, $p < .01$.

When the preference elicitation method changed from choice to rejection, preliminary conflict from concern about argumentation increased, $t(15) = 2.28$, $p = .02$, consistent with *H3.2.1*. The preliminary conflict from concern about sacrifice decreased as well, $t(15) = -2.47$, $p = .03$. Nevertheless, the difference in preliminary conflict from concern about sacrifice was not as great as the difference in preliminary conflict from concern about argumentation, $t(15) = -2.57$, $p = .02$.

Discussion of Experiment 1

One objective of Experiment 1 was to examine the impact of a situational factor, outcome sign (gains versus losses), on conflict arousal in risky choices by combining the double-mediation model with Lewin's (1951) analysis of conflict. The three hypotheses that

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[13]The auxiliary parameters, the arbitrary scaling constant and the drive-capacity parameter were obtained from Equations A4-A5.

[14]When fitting the double-mediation model to the data our concern was estimating the levels of preliminary conflict, which requires the model to provide an accurate description of the data (as it was the case). Therefore, we were interested in the *descriptive*, and not in the *predictive*, accuracy of the model.

addressed the effects of outcome sign were confirmed: Conflict was greater for losses than for gains; when gains changed into losses the preliminary conflict from concern about argumentation increased; and when gains changed into losses the relation between tradeoff size and conflict became more negative (or less positive).

Nevertheless, another significant result has emerged. Although it was not expected, changing the outcome sign from gains to losses also affected the concern about sacrifice, even though not as much as the conflict from concern about argumentation. In losses, the preliminary conflict from concern about sacrifice decreased. Thus, the positive effect produced by this mediator on the relation between tradeoff size and conflict was attenuated, which also contributed to the negative change in this relation.

In Experiment 1 we also aimed to investigate the effects of outcome sign in combination with another situational factor, the preference elicitation method, i.e., whether the task is to choose or to reject a gamble. Two of the three hypotheses that addressed these effects were confirmed: Conflict was greater in rejection than in choice tasks for gains, but the reverse did not occur in losses; and the effect of preference elicitation method was weaker for losses than for gains. Indeed, the effect of preference elicitation method in losses was almost nil meaning that the participants in the choice condition experienced about the same amount of conflict as the participants in the rejection condition.

The effect of preference elicitation method in gains is in agreement with the compatibility principle: Conflict was greater when people were asked to reject (incompatible situation) than when they were asked to choose between one of two options (compatible situation). Nevertheless, it may well be that this was not really (or at least not only) a consequence of a compatibility effect. It could be because choosing among gains is a much more common scenario than rejecting among gains. Thus, as we previously argued, conflict would be greater when the task is to reject because people are much less accustomed to reject than to choose among gains.

The three hypotheses that concerned the effects of preference elicitation method on conflict arousal were also confirmed. Conflict was greater in rejecting than in choosing tasks. When the preference elicitation method changed from choice to rejection, the preliminary conflict from concern about argumentation increased, and the relation between tradeoff size and conflict became more negative (or less positive). Although not predicted, the concern about sacrifice was also affected by the preference elicitation method, but not as much as the concern about argumentation. When the preference elicitation method changed from choice to

rejection the preliminary conflict from concern about sacrifice decreased, which also contributed to the negative change in the relation between tradeoff size and conflict.

The main effect of preference elicitation method must be qualified, in that preference elicitation method had a simple main effect in gains and practically no simple main effect in losses. Choosing between two options is indeed more difficult than rejecting between two options, but apparently only in gains.

Overall, our results demonstrated that outcome sign does had an independent effect on conflict, moderating the relation between tradeoff size and conflict. Preference elicitation method also affected conflict arousal and the relation between tradeoff size and conflict, but only in gains. Unexpectedly, the effect of preference elicitation method did not hold across gains and losses. Furthermore, although we did expect a weaker compatibility effect in losses than gains (because both choosing among losses and rejecting among losses are uncommon scenarios), we did not expect that the effect would be almost nil. Moreover, these results are inconsistent with previous findings. First, Nagpal and Krishnamurthy (2008), for instance, did found a compatibility effect between the valence of the options and the nature of the task (preference elicitation method) in gains and in losses: A greater conflict was aroused in incompatible situations. Second, apart from the compatibility effects, Meloy and Russo (2004, study 2), also demonstrated an effect of the preference elicitation method. Third, none of their studies found a main effect of outcome sign, whereas we did. Naturally, this raises the question of what could possibly explain these divergences. We argue that the answer lies in the manipulation of the valence conditions.

Our manipulation involved decisions between gambles in which money could be won (positive condition) or in which money could be loss (negative condition). This implies that the two valence conditions are outcome sign conditions, meaning that the outcomes are different in sign, and that they entail an absolute and 'pure' gain or loss to the decision maker. In the literature, however, the decisions in the negative condition imply only 'relative' losses for the decision maker. Consider the stimuli used by Nagpal and Krishnamurthy (2008, study 2). In the positive condition, one of the attributes of one of the options, an automobile, was having a 90% chance of not needing major repairs during the first 100,000 miles, whereas in the negative condition it was having a 10% chance of needing major repairs during the first 100,000 miles. Although the outcomes in the negative condition are unattractive, they do not really imply a loss for the decision maker. Indeed, in Nagpal and Krishnamurthy' (2008, study 2) research, the two valence conditions are framing conditions, i.e., the outcomes are equal in

sign although they appear to be different, and thus, the outcome of choice is not 'really' negative.[15] There are other studies in which the valence conditions are not manipulated by framing (see Meloy & Russo, 2004, study 1, and Nagpal & Krishnamurthy, 2008, study 1). Nevertheless, the outcomes of choice still do not imply a 'direct' or 'pure' loss for the decision maker as in our research, i.e., the decision maker does not, in fact, incur in a loss.

It is reasonable to assume that the feeling that a person experiences when a decision entails a possible loss is more intense than when a decision entails a merely negative or unattractive outcome. If losses are much more unpleasant than merely negative or unattractive options, then the level of conflict should be much greater in the former than in the latter case. Moreover, because losses are so aversive (causing so much vacillation between the options), people become focused on how to deal with it, and thus, whether the task is to choose or to reject one option becomes irrelevant (none of the tasks alleviates the loss). This explains why the main effect of preference elicitation method did not hold across gains and losses and why there was no compatibility effect for losses in our study but there was in previous research. Moreover, this also implies that the contrast between gains and losses produces a greater difference in conflict than the contrast between merely positive (or attractive) and negative (or unattractive) options, explaining why we did find a main effect of outcome sign (valence condition), whereas previous research did not.

Finally, conflict was assessed with five component measures: Decision time, decision difficulty, decision uncertainty, preference equality, and decision inconsistency. Decision inconsistency was the weakest conflict measure. Nevertheless, because the inclusion or exclusion of this measure did not affect the experimental results, conflict was constructed as a composite of all five measures. Scholten and Sherman (2006) used another conflict measure, the attribute-weight equality.[16] Like decision difficulty, decision uncertainty and preference equality, attribute-weight equality is a mental manifestation of conflict. In particular, it is an 'indirect-rating' measure (as the preference equality measure). This measure will also be included in the subsequent Experiments.

In this Experiment we investigated how conflict was affected by the outcome sign in choosing and in rejecting tasks. In Experiment 2, as in all subsequent Experiments, we focus

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[15]For a more detailed distinction between framing and reflection studies see Fagley (1993) and Kühberger, Schulte-Mecklenbeck, and Perner (1999).

[16]In Scholten and Sherman's (2006) investigation, this measure appears under the name of equality of attribute importance (i.e., the degree to which attributes are equally important for the decision reached). We renamed it as attribute-weight equality, given that, the 'importance for the decision reached' is the weight that an attribute has in a particular decision.

on choice tasks. We aim to provide further evidence in support of the role of outcome sign on conflict arousal, and to broaden the scope of our investigation, by also examining the effect of an individual factor, which is the decision maker's thinking style.

Experiment 2:

Outcome Sign and Thinking Style

In Experiment 1 we examined the effects of two situational factors in the arousal of conflict in risky choices: Outcome sign and preference elicitation method. We demonstrated that, regardless of preference elicitation method, outcome sign has an impact on conflict. Consistent with Lewin's (1951) analysis of conflict, we confirmed that people experience more conflict when choosing among losses than when choosing among gains. More importantly, we successfully applied the double-mediation model (Scholten & Sherman, 2006) to risky choice by showing that outcome sign moderated the relation between tradeoff size and conflict: When gains changed into losses, the preliminary conflict from concern about argumentation increased and the relation between tradeoff size and conflict became more negative (or less positive). In Experiment 2, we aim to provide further evidence in support of the role of outcome sign on the arousal of conflict, and to broaden the scope of our investigation, by examining the effects of a situational factor (outcome sign) and of an individual factor. The individual factor is the thinking style of the decision maker. Drawing on Epstein's (1994) cognitive-experiential self-theory, we propose that individual differences in the thinking style, i.e., in level of rationality and experientiality, will correspond to individual differences in the preliminary conflict from the two sources. For instance, we predict that the level of preliminary conflict from concern about argumentation will be greater when the level of rationality and/or experientiality is high, than when both are low. These and other predictions will be tested in this Experiment.

The predictions about the effect of outcome sign on conflict were already derived (see theoretical overview) and tested in Experiment 1. The same hypotheses will be tested in this Experiment:

H1.1. Conflict will be greater for losses than for gains.

H1.2.1. When the sign of the outcomes changes from gains to losses, the preliminary conflict from concern about argumentation will increase.

*H1.2.2.*When the sign of the outcomes changes from gains to losses, the relation between tradeoff size and conflict will change in a downward direction.

In brief, decisions involving losses generate more hesitancy and vacillation between the alternatives than decisions involving gains. Thus, conflict is more complicated to resolve in the former than in the latter case. Moreover, conflict is greater in losses than in gains essentially because while there is no contradiction in arguing in favor of a positive gamble it is contradictory to argue in favor of a negative gamble, which increases the preliminary conflict from concern about argumentation. As a consequence, the negative mediating effect produced by this concern on the relation between tradeoff size and conflict is accentuated and the relation becomes more negative (or less positive).

We now focus on the individual differences in the thinking style. We combine the double-mediation model (Scholten & Sherman, 2006) with Epstein's (1994) theory to derive predictions about how the two thinking styles, rational and experiential, affect conflict and its relation with tradeoff size.

Thinking Style

The dual-system approach is common to many different areas such as persuasion and attitude change (Chaiken, 1980; Petty & Cacioppo, 1981, 1986), judgment and decision making (Stanovich & West, 2000; Kahneman, 2003), reasoning (Evans, 1984; Sloman, 1996), and personality (Epstein, 1994).[17] They converge to the notion that the mind has dual aspects, that behavior results from the relationship between two systems (Barrett, Tugade, & Engle, 2004), which Stanovich and West (2000) generically labeled as System 1 and System 2. As Kahneman (2003) noted, system 1 is ruled by habits and operates in a fast, automatic, effortless, associative, and implicit manner, whereas system 2 is guided by rules and is more serial, slow, effortful, conscious, and deliberatively controlled. System 1 can be influenced by emotions, whereas system 2 cannot.

The view that risky choice is governed by the operation of two systems (one more rational or cognitive, the other more experiential or affective) has recently gained growing acceptance (e.g., Loewenstein, Weber, Hsee, & Welch, 2001; Mukherjee, 2010; Slovic, Finucane, Peters, & MacGregor, 2004). Our research is grounded on Epstein's (1994)

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[17]See Evans (2008) for a recent review.

cognitive-experiential self-theory, a broader theory, which incorporates the dualism of information processing in a global personality theory.

Cognitive-experiential self-theory has been shown to be applicable to a wide range of psychological domains, including judgment and decision making (see Epstein & Pacini, 1999), and has been used for the study of *individual differences* in judgment and decision making (e.g., Bartels, 2006; Björklund & Bäckström, 2008; Danziger, Moran, & Rafaely, 2006; Levin, Gaeth, Schreiber, & Lauriola, 2002; McIntosh, 2005; Pacini & Epstein, 1999; Shiloh, Salton, & Sharabi, 2002). Moreover, the importance of the cognitive-experiential self-theory in risky choice has already been discussed by Slovic et al. (2004; see also Loewenstein et al., 2001). Our aim is to extend its application to the study of individual differences in decisional conflict.

Cognitive-Experiential Self-Theory

The cognitive-experiential self-theory (CEST), introduced by Epstein (1973), posits that people automatically create a theory of reality "in order to make life as livable, meaning as emotionally satisfying, as possible." (Epstein, 1994, p. 715). This theory of reality is an implicit model of the world composed by a world theory, a self-theory, and by propositions connecting the both. According to CEST, there are two ways (systems) by which people can adapt to the world: A rational system and an experiential system.[18] The essential proposition of CEST is that the experiential system is guided by emotions. In comparison to other dual-process models, CEST emphasizes the role of the experiential system, by assuming that it is by this system that the personal theories of reality are created. This that does not imply that the experiential system is more important than the rational system, only that CEST "has nothing new to say about it, other than to note that CEST assumes it is far less important in the conduct of everyday affairs than most people realize" (Epstein, Lipson, Holstein, & Huh, 1992, p. 328). Therefore, the rational system is assumed to be primarily conscious, reason oriented and affect free, deliberative and analytical, operating according to conventionally established rules of logic and evidence. The experiential system is assumed to be primarily preconscious, holistic, fast, and automatic, driven by emotion, operating according to the pleasure/pain principle, i.e., is motivated to approach pleasure and to avoid pain.

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[18]The rational and the experiential systems correspond to systems 2 and 1 (respectively) in Stanovich and West's (2000) terminology.

The experiential system implies a relatively automatic, intuitive, and effortless processing, and therefore, is considered to be the mode that operates by default (Epstein, Pacini, Denes-Raj, & Heier, 1996). The responses produced by this system are, in general, adaptive and efficient; however, they can also be a source of error, generating several maladaptive biases (Denes-Raj & Epstein, 1994). Nevertheless, this does not mean that the rational system, which implies a relatively controlled, analytical, and effortful processing, would be the most appropriate mode for processing information. Each system has his advantages and disadvantages, and is suitable for resolving different types of situations (Epstein, 1990). The rational system usually encodes reality in terms of abstract symbols, and thus, is more appropriate to resolve situations which imply logic, analytic and/or abstract thinking, for instance, mathematical problems. The experiential system, usually encodes reality in terms of concrete images, metaphors and narratives, and thus, is more appropriate to resolve situations implying the use of knowledge derived from past experience, as the case of interpersonal problems (Denes-Raj & Epstein, 1994; Epstein, 1994; Epstein et al., 1996).

The two systems function in a parallel, independent but interactive way. That is, the activation of one system does not depend on the activation of the other, but they can communicate with each other and mutually influence one another (they sometimes reinforce each other's response, and other times produce different responses that compete for dominance). This interaction is usually seamless and integrated, but conflict between feelings and thoughts (heart and mind) may arise (e.g., Epstein et al., 1996). The activation or dominance of each system depends on individual and situational factors. The situational factors include the nature of the situation, the emotion involvement with the situation, and the repeated amount of relevant experience. The individual factors are the individual differences in information processing styles (Pacini & Epstein, 1999), or thinking styles (Epstein et al., 1996).

Our analysis focuses on how the individual differences in the style of thinking affect the decisional conflict. In the double-mediation model, thinking style, as other factors in the choice context, should have an impact on preliminary conflict. We thus propose that the individual differences in the 'normal level of activation' of each system correspond to individual differences in the conflict aroused by the concern about sacrifice and about argumentation when a preliminary impression is formed. To assess individual differences in rationality and experientiality, we apply Pacini and Epstein's (1999) rationality-experientiality inventory, which is described in the next section.

Measuring Individual Differences in Thinking Style

To assess the individual differences in the style of thinking, i.e., in the degree to which people tend to use the analytical-rational and the intuitive-experiential processing modes, Epstein and his colleagues (see Epstein et al., 1996) developed the rational-experiential inventory (REI). REI is a self-report questionnaire which measures rationality and experientiality through two unipolar scales: Need for Cognition (NFC) and Faith in Intuition (FI). The NFC scale measures the degree to which people use an analytical-rational thinking and was adapted from the original scale developed by Cacioppo and Petty (1982). The FI scale measures the degree to which people engage in intuitive-experiential thinking (see Epstein et al., 1996).

Two versions of REI were developed. In the first version of REI (Epstein et al., 1996), 1996), the NFC scale (the rationality scale) was composed by 19 items and the FI scale (the experientiality scale) by 12 items, performing a total of 31 items. Epstein et al. (1996) demonstrated that REI was valid and reliable, although the NFC scale presented a greater reliability than the FI scale ($\alpha = .87$ and $\alpha = .77$, respectively). Moreover, the correlation between the two scales was small and not significant, $r = .07$, which supports the assumption that rationality and experientiality are two independent modes of processing information. The factor structure also supported this assumption.

Nevertheless, this version of REI presented some limitations, for instance, the content of the scales was not equivalent, the length of the scales was unbalanced, and the number of positively versus negatively worded items in each scale was uneven (see Pacini & Epstein, 1999, for more information). In order to account for these limitations, Epstein, Pacini, and Norris (1998, cited in Pacini & Epstein, 1999) developed, and Pacini and Epstein (1999) validated a new version of REI.

This REI version (see Pacini & Epstein, 1999) consists of two scales, the rationality scale and the experientiality scale. Both the rationality scale and the experientiality scale were composed of 20 items, performing a total of 40 items. Furthermore, each scale was divided into two subscales (10 items per subscale), engagement and ability. Thus, rationality and experientiality result from the addition of the respective subscales. Rational engagement evaluates the degree to which people enjoy or rely in an analytic and logic thinking; rational ability evaluates the degree to which people are able to think in an analytical and logic manner; experiential engagement evaluates the degree to which people make decisions (and

enjoy making those decisions) by relying on feelings and intuitions; and experiential ability evaluates the degree to which people follow their feelings and intuitions (Pacini & Epstein, 1999). In addition, approximately half of the items are positively worded and the other half negatively worded. The answering scale was a 5 point rating scale, which ranged from 1 (definitely not true of myself) to 5 (definitely true of myself).

Pacini and Epstein (1999) demonstrated that this improved version of REI was valid and reliable (rationality scale, $\alpha = .90$, and experientiality scale, $\alpha = .87$). The scales presented a more similar and greater reliability than previously, especially the experientiality scale, in which reliability rose from $\alpha = .77$ to $\alpha = .87$. Moreover, the correlation between the scales (which was again not significant) and the factor structure supported the independence assumption. With respect to the ability and engagement subscales, the factor analysis only supported the rational scale. Nevertheless, the authors maintained this subdivision for the experientiality scale, arguing that its correlations with other variables showed discriminant validity.

In the present research we apply the REI version of Pacini and Epstein (1999) to assess individual differences in rationality and experientiality. As it was previously said, the main idea is that individual differences in the 'normal activation level' of the rational system and the experiential system will correspond to individual differences in the conflict aroused by the concern about sacrifice and about argumentation when a preliminary impression of a choice problem is formed. Thus, given the scores on this inventory, we assign each participant to one of four groups, depending on whether the participant's level of rationality or experientiality is relatively high or low. We will have a group that scores high on both, a second group that scores high on rationality but low on experientiality, a third group that scores low on rationality but high on experientiality, and a fourth group that scores low on both. We are then able to test our hypotheses through specific comparisons between these four groups. In the next section we combine CEST (Epstein, 1944) with the double-mediation model (Scholten & Sherman, 2006) and derive predictions about how the relatively high or low level of rationality and experientiality of the participants will affect conflict arousal in risky choice.

Conflict and Thinking Style

We investigate the impact of thinking style on the arousal of conflict in choices involving a tradeoff between probability and outcome (amount to win or to lose). This is an

environment of abstract symbols (words and numbers), which, according to CEST, should foster a more rational thinking. In other words, it can be expected that the rational system will dominate the experiential one. Thus, because in the double-mediation model thinking style will have an impact on preliminary conflict, it can be expected that if the rational system will dominate the experiential one, then preliminary conflict will not depend on experientiality when rationality is high:

H3. When rationality is high, preliminary conflict will not depend on experientiality.

CEST assumes that there are two ways by which people can adapt to the world and therefore to the choice problems that they have to face: A rational and an experiential one. In other words, it is through rationality and experientiality that people can deal or cope with the challenges posed by the environment. "Rational persons" (those who score high on rationality but low on experientiality) will adapt to the choice problem in a more analytical way. "Experiential persons" (those who score high on experientiality but low on rationality) will adapt the choice problem in a more intuitive way. "Rational *and* experiential persons" (those who score high on both rationality and experientiality) may adapt to the choice problem either way. Nevertheless, in situations where the rational system dominates the experiential one, adaptation will probably be made in a more analytical way. Finally, in persons who are neither rational nor experiential (those who score low on both rationality and experientiality), adaptation will be more complicated because no adaptation mode is *immediately* available to the person. It must be highlighted that we are referring to *relative* levels of rationality and experientiality, not *absolute* levels. Thus, low scores on REI do not imply that the person is completely devoid of rationality and experientiality (and that no adaptation will occur), only that it is less likely that an adaptation mode is immediately available to the person. And whether an adaptation mode is immediately available or not will be reflected in the preliminary conflict aroused by the decision problems, which will affect the relation between tradeoff size and conflict as we discuss next.

According to the double-mediation model, people will form a preliminary impression when facing a choice problem, realizing that a tradeoff must be made and that it must somehow be resolved. Adaptation means that people can deal or cope with the challenges posed by the environment; in our research, adaptation means that people can cope with the choice problems, and thus, resolve the decisional conflict. Therefore, in the double-mediation model, adaptation means that people can make an argument to resolve the decisional conflict (recall that the model assumes that conflict is resolved to argumentation).

This implies that, in cases where at least one adaption mode is immediately available ("rational persons," experiential persons," or "rational and experiential persons"), the person will be more confident that an argument can be made in favor of one of the options, either analytically or intuitively, and the preliminary conflict aroused by the concern about argumentation should decrease. In contrast, in cases where no adaptation mode is immediately available (persons who are neither rational nor experiential), a person will have no immediate mode to deal with the choice problem and to resolve conflict and, as a consequence, the preliminary conflict aroused by the concern about argumentation will be greater. We thus arrive at the following hypothesis:

H4.1. The preliminary conflict from concern about argumentation will be greater when both rationality and experientiality are low (persons who are neither rational nor experiential) than when either or both are high ("rational persons," experiential persons," or "rational and experiential persons").

In the double-mediation model, the preliminary conflict from a concern is the drive to devote attention to that concern during subsequent deliberation and only the conflict from deliberation is affected by tradeoff size. Therefore, given that when rationality and experientiality are low the preliminary conflict from concern about argumentation will be greater (than when either or both are high), in the subsequent deliberation phase, the negative mediating effect of concern about argumentation will be accentuated (relatively to the positive mediating effect of concern about sacrifice), and thus, the relation between tradeoff size and conflict will become more negative (or less positive):

H4.2. The relation between tradeoff size and conflict will be more negative, or less positive, when both rationality and experientiality are low (persons who are neither rational nor experiential) than when either or both are high ("rational persons," "experiential persons," or "rational and experiential persons").

We have asserted that adaptation favors argumentation, i.e., the immediate availability of an adaptation mode leads to a decrease in preliminary conflict from concern about argumentation. Nevertheless, we also predict that the decrease will be less pronounced when people adapt to the choice problem by the rational system than when they adapt by the experiential system. Stated differently, the preliminary conflict from concern about argumentation will be greater when adapting to the choice problem by the rational system than when adapting to the choice problem by the experiential system as we discuss next.

Argumentation in the double-mediation model is pro-argumentation, that is, arguing unilaterally in favor of one option overweighting its pros and underweighting its cons. Thus, contrary to what the terminology might imply, the rational system in CEST is not best equipped for argumentation. The rational system should foster a careful evaluation/weighting of the pros and cons of each option, which in terms of the double-mediation model means that it should be more oriented to pro- *and* contra-argumentation. As Epstein (1994, p. 711) stated, the rational system is oriented toward "justification via logic and evidence", whereas the experiential system is oriented toward what is "self-evidently valid". The "logic and evidence" support both options and arguing in favor of one of the options is more arbitrary. Thus, the rational system can be expected to reject pro-argumentation as arbitrary. In contrast, the experiential system can be expected to accept pro-argumentation as "self-evidently valid". In sum, adapting to the choice problem by the rational system should arouse a greater preliminary conflict from concern about argumentation, than adapting to the choice problem by the experiential system.

As discussed previously, the rational system should dominate the experiential system, therefore, adaptation by the rational system should occur when rationality is high and experientiality is either high or low, whereas adaptation by the experiential system should occur when rationality is low but experientiality is high. We thus arrive at the following hypothesis:

H5.1. Preliminary conflict from concern about argumentation will be greater when rationality is high ("rational persons" or "rational and experiential persons") than when rationality is low but experientiality is high ("experiential persons").

The rational system is more likely to reject pro-argumentation as arbitrary because it is more oriented toward contra-argumentation, or consideration of sacrifice, than the experiential system. This implies that, not only the preliminary conflict from concern about argumentation (pro-argumentation) will be greater when the adaptation is made through the rational system, but also, that the preliminary conflict from concern about sacrifice (contra-argumentation) will be greater when the adaptation is made through the rational system. This leads to the following hypothesis:

H5.2. Preliminary conflict from concern about sacrifice will be greater when rationality is high ("rational persons" or "rational and experiential persons") than when rationality is low but experientiality is high ("experiential persons").

Because when people adapt to the choice problem by the rational system they are more oriented toward pro- and contra-argumentation, *H5.1* and *H5.2* predict that both the preliminary conflict from concern about argumentation and from concern about sacrifice will be greater when rationality is high than when rationality is low but experientiality is high. Thus, the hypotheses do not imply *differential* effects on the two mediators, and therefore, do not imply a moderating effect of thinking style on the relation between tradeoff size and conflict.

Method of Experiment 2

Participants. A total of 228 psychology students from ISPA-IU participated in the study. They received a voucher of €7.50 for their participation.

Materials and stimuli. Conflict was measured through a computerized questionnaire developed by computer in *Turbo Pascal*. The questionnaire was similar the one used in Experiment 1, except that it consisted of only one part and that the participants completed four (instead of three) rating scales. There were again 12 decision tasks, which involved dyadic choices between card gambles implying a tradeoff between probability of winning and amount to win, or a tradeoff between probability of losing and amount to lose. The stimuli were gambles yielding an outcome x with probability p or a zero outcome with probability 1-p and were the same as in the previous Experiment.

To measure thinking style we used a reduced Portuguese version of the rational-experiential inventory (REI), which we adapted from the REI version of Pacini and Epstein (1999). We started by translating the REI to Portuguese and pretesting it on 66 psychology students. More details about the questionnaire, pre-test, and respective results are given in Appendix D. The results were similar to those obtained by Pacini and Epstein (1999) in that relatively strong and weak items in their study (with high and low saturation on the target scales) tended to be relatively strong and weak items in our study as well. Because the participants complained that the questionnaire was very repetitive, and because we wanted to avoid that this would jeopardize their cooperativeness in the experiment, we developed a reduced Portuguese version of REI. By doing so, the reliability of the rationality scale rose from $\alpha = .84$ to $\alpha = .88$ and the reliability of the experientiality scale from $\alpha = .89$ to $\alpha = .90$. This was the REI questionnaire used in the present Experiment, which is presented in Appendix E.

The reduced version of REI consisted of a total of 26 items. Items 1 to 13 evaluate

rationality and items 14 to 26 evaluate experientiality. In addition, items 3, 6, 10, 13, 14, 16, 17, 18, 19, 20, 21, 24, 25, and 26 are positively worded, and items 1, 2, 4, 5, 7, 8, 9, 11, 12, 22, 29, and 30 are negatively worded. The answering scale is a 5 point rating scale: (1) strongly disagree; (2) disagree; (3) nor agree or disagree; (4) agree; and (5) strongly agree. The participants marked the option with which they most identify. In addition, to avoid possible order effects, we developed five other versions of this questionnaire, in which the order of presentation of the scales and the order of presentation of the items were counterbalanced.

Design. Conflict was the dependent variable and it was assessed with five measures: Decision time, decision difficulty, decision uncertainty, preference equality and attribute-weight equality. The decision inconsistency measure was excluded as a conflict measure to keep the duration of the entire session within limits (on average, 35 minutes).

Similarly to Experiment 1, Experiment 2 yielded a 2 (outcome sign) $\times$ 3 (tradeoff size) $\times$ 2 (reference gamble) within-participants design, resulting in 12 pairs of gambles (12 decision tasks) for each participant. Moreover, four between-participants factors were included. Two of these were counterbalancing factors, as in Experiment 1: Reference-gamble extremeness and assignment of the extremeness conditions to the outcome sign conditions. The other two between-participants factors were rationality and experientiality. Both rationality and experientiality have two levels: High and low rationality, and high and low experientiality. Five factors were randomized across the within and between participants design: (1) the distribution of the participants by the experimental conditions and by the REI versions; (3) the order of the 12 decision tasks for each participant; (3) the order by which the options are presented; (4) the order by which the conflict scales are presented; and (5) the specification of the winning/loosing cards.

Procedure. Each experimental session was run with at most 20 participants at a time and lasted about 35 minutes. The session was divided into two stages.

In the first stage the participants completed the REI questionnaire, which was administered by paper and pencil in the classroom where the participants were recruited (with previous authorization of the professors). After completing REI, the participants were guided to the laboratory, were the second stage of the session took place. On this stage, the procedure was similar to that of Experiment 1, but, as we said previously, each choice task was accompanied by four rating tasks because of the inclusion of the attribute-weight equality measure.

In the attribute-weight rating scale (as in the others), the gambles and the attributes were displayed in a matrix format on the top of the screen, the chosen gamble was marked with an arrow (below it), and a 9-point rating scale appeared on the bottom of the screen. All numbers were presented on the scale but only the odd numbers were labelled. Specifically, the positions 1, 3, 5, 7, and 9 were labelled as "much more important", "more important", "equally important", "more important", and "much more important", respectively. In the gains condition, above the attribute-weight rating scale, the first attribute in the matrix appeared on the left side of the scale and the second on the right side. In the losses condition, the first attribute in the matrix appeared on the right side of the scale and the second on the left side.

Measures. The attribute-weight ratings, w, were computed as the preference ratings in Experiment 1. The other measures were also computed as in Experiment 1.

Thus, the conflict measures are d for decision difficulty, u for decision uncertainty, $e(w)$ for attribute-weight equality, $e(v)$ for equality of preferences, and $\log_2(t)$ for decision time.

Each REI item was answered according to a 5 point rating scale. Therefore, the rationality and experientiality ratings were coded from 1 to 5 for the positive items and from 5 to 1 for the negative items, so that the degree of rationality and experientiality increased as the score increased. The rationality and experientiality final scores were obtained by conducting principal component analysis and deriving their (standardized) scores. Then, we performed a median split on the two factors in order to transform rationality and experientiality into two dichotomous variables: Scores above the median value were coded as 1 (high rationality or high experientiality) and scores below the median value were coded as -1 (low rationality or low experientiality). Therefore, the participants were assigned to one of the four groups, depending on whether their level of rationality and experientiality was relatively high or low. This procedure allowed us to test our hypotheses which require specific contrasts between participants who are high or low in rationality and high or low in experientiality.

Results of Experiment 2

More information on the results of Experience 2 is presented in Appendix F.

Conflict: Variable construction. A principal component analysis was conducted on the five conflict measures to obtain the conflict variable. The first component, the conflict factor, was extracted. This component presented an eigenvalue of 1.98 and explained 39.61%

of the total variance. Moreover, this component loaded positively on all five measures: Decision time (.38), decision difficulty (.70), decision uncertainty (.72), preference equality (.68), and attribute-weight equality (.61). The internal consistency reliability analysis revealed a standardized Cronbach alpha of .61 and an average inter-item correlation of .24. There was no increase in the value of alpha when an item was deleted, attesting to the content validity of all items. Therefore, we constructed a composite measure of conflict, by deriving the (standardized) scores on the principal component and then linearly transforming them to scales from 0 to 1.

Rationality and experientiality measures. We started the analysis of REI by performing an internal consistency analysis to each scale. The reliability analysis performed on the rationality scale (13 items) revealed a standardized Cronbach alpha of .77 and an average inter-item correlation of .21. The exclusion of item 12 led to an increase of alpha; therefore, we excluded this item from the rationality scale. By doing so, the reliability of the rationality scale rose to $\alpha = .79$ and the average inter-item correlation to .25. The reliability analysis performed on the experientiality scale revealed a standardized Cronbach alpha of .79 and an average inter-item correlation of .23. The exclusion of item 20 led to an increase of alpha. Although, the increase was small, we excluded this item from the experientiality scale to maintain the same number of items in each scale. By doing so, the reliability of the experientiality scale rose to $\alpha = .80$ and the average inter-item correlation to .26.

We then conducted a principal component analysis with varimax rotation on the remaining 24 items. The first component, the rationality factor, presented an eigenvalue of 5.05 and explained 21.05% of the total variance. The second component, the experientiality factor, presented an eigenvalue of 3.52 and explained 14.67% of the total variance. The items and factor loadings are reported in Table 5. The factor structure was fairly good, but not as good as in the pretest. Three rationality items had very low loadings on either factor (items 2, 4, and 11); two of these had marginally higher loadings on the experientiality factor (items 2 and 4). Three experientiality items had higher loadings on the rationality factor (items 15, 21, and 23); one of these, substantially higher (item 15). However, because the inclusion or exclusion of these items, barely affected the reliability and unaffected the experimental results, the results reported below are those obtained with all 24 items.

Table 5

Factor Structure of the Reduced Rationality-Experientiality Inventory

Scale	Nº	Item	R	E
Rationality Scale	3	I enjoy intellectual challenges.	.83	-.10
	5	I don't like to have to do a lot of thinking.	.82	-.11
	1	I try to avoid situations that require thinking in depth about something.	.77	.00
	10	I prefer complex problems to simple problems.	.73	-.03
	6	I enjoy solving problems that require hard thinking.	.61	-.13
	9	Reasoning things out carefully is not one of my strong points.	.55	.00
	13	I have no problem thinking things through carefully.	.49	.19
	8	I am not a very analytical thinker.	.49	.12
	7	Thinking is not my idea of an enjoyable activity.	.40	.13
	11	Thinking hard and for a long time about something gives me little satisfaction.	.09	.02
	4	I am not very good at solving problems that require careful logical analysis.	.08	.09
	2	I'm not that good at figuring out complicated problems.	.05	.19
Experientiality Scale	16	Using my gut feelings usually works well for me in figuring out problems in my life.	-.23	.70
	18	Intuition can be a very useful way to solve problems.	.07	.68
	22	If I were to rely on my gut feelings, I would often make mistakes.	.15	.66
	17	I believe in trusting my hunches.	.10	.66
	19	I often go by my instincts when deciding on a course of action.	-.04	.64
	14	I like to rely on my intuitive impressions.	.34	.62
	25	I hardly ever go wrong when I listen to my deepest gut feelings to find an answer.	-.06	.57
	26	I can usually feel when a person is right or wrong, even if I can't explain how I know.	-.05	.54
	24	I think there are times when one should rely on one's intuition.	.30	.49
	23	I don't like situations in which I have to rely on intuition.	.37	.36
	15	I don't have a very good sense of intuition.	.61	.21
	21	When it comes to trusting people, I can usually rely on my gut feelings.	.32	.20

Conflict: Test of hypotheses. Five linear regressions were performed. Regression 1 was conducted in order to test *H1.1* (the difference in conflict between gains and losses), *H1.2.2* (the moderating effect of outcome sign on the relation between tradeoff size), and *H4.2* (the moderating effect of thinking style on the relation between tradeoff size). Conflict was the dependent variable and REI, outcome sign, tradeoff size, and reference gamble were the independent variables. The analysis included a contrast between gains and losses, two polynomial contrasts (linear and quadratic) between small, intermediate, and large tradeoffs, a contrast between the large-amount condition and the high-probability condition, three orthogonal contrasts between the four REI conditions, and 40 contrasts capturing the interactions between the independent variables.

The three orthogonal contrasts between the four REI conditions were:

(1) A contrast between low-rationality-and-low-experientiality (1 condition) and high-rationality-and-or-high-experientiality (3 conditions). This contrast, in combination with the linear contrast between tradeoff sizes, is needed to test *H4.2*, according to which the relation between tradeoff size and conflict will be more negative, or less positive, when both rationality and experientiality are low than when either or both are high.

(2) A contrast between low-rationality-and-high-experientiality (1 condition) and high-rationality (2 conditions). This contrast, in combination with the linear contrast between tradeoff sizes, is needed to test a null hypothesis, according to which the linear trend in the relation between tradeoff size and conflict is the same when rationality is high as when rationality is low but experientiality is high. (This null hypothesis holds when the effects predicted by *H5.1* and *H5.2* are equally strong.)

(3) The remaining contrast between high-rationality-and-low-experientiality (1 condition) and high-rationality-and-high-experientiality (1 condition).

Regressions 2 and 3 were conducted in order to evaluate the specific shape of the relation between tradeoff size and conflict in each outcome sign condition. These analyses included all the contrasts included in regression 1, except those associated with the outcome sign conditions. Regressions 4 and 5 evaluated the specific shape of the relation between tradeoff size and conflict in the low-rationality-and-low-experientiality condition and in the high-rationality-and-or-high-experientiality conditions. These analyses included all the contrasts included in regression 1, except those associated with thinking style.

The results of regression 1 showed a significant effect of outcome sign, $t(2688) = 7.22$, $p < .001$: Conflict was greater for losses than for gains, consistent with *H1.1*. The interaction effect between outcome sign and tradeoff size (linear contrast) was also significant, $t(2688) = -1.83$, $p = .03$: Consistent with *H1.2.2,* when gains changed into losses, the relation between tradeoff size and conflict changed in a downward direction as depicted in Figure 12. Furthermore, the effect of the linear contrast between tradeoff sizes was also significant, $t(2688) = 2.10$, $p = .04$: Conflict increased with tradeoff size. Regressions 2 and 3 demonstrated that for gains there was a positive relation between tradeoff size and conflict, $t(1344) = 2.75$, $p = .01$, whereas for losses there was an inverse U-shaped relation, $t(1344) = 1.92$, $p = .05$, respectively.
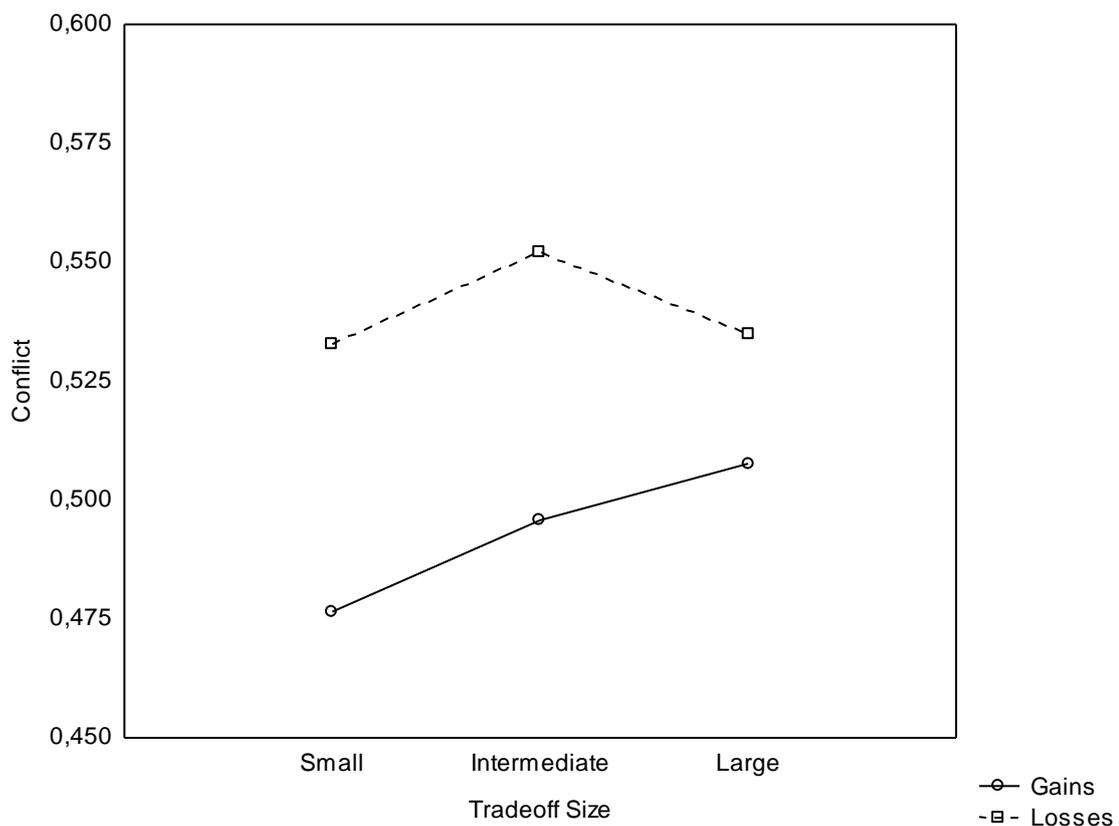
Figure 12. Relation between tradeoff size and conflict by outcome sign conditions (Experiment 2).

We now turn to the analysis of the effects of thinking style. Figure 13 demonstrates the observed relation between tradeoff size and conflict as a function of thinking style. The results of regression 1 revealed a (marginally) significant interaction effect between tradeoff

size (linear contrast) and thinking style (contrast between low-rationality-and-low-experientiality and high-rationality-and-or-high-experientiality), $t(2688) = -1.31$, $p = .10$: The relation between tradeoff size and conflict was less positive when both rationality and experientiality were low than when either or both were high, consistent with *H4.2*. Moreover, when both rationality and experientiality were low, there was an inverse U-shaped relation between tradeoff size and conflict, although not reliable, $t(672) = 1.08$, $p = .28$ (regression 4). When either or both were high, there was a positive relation between tradeoff size and conflict, $t(2040) = 2.42$, $p = .02$ (regression 5).
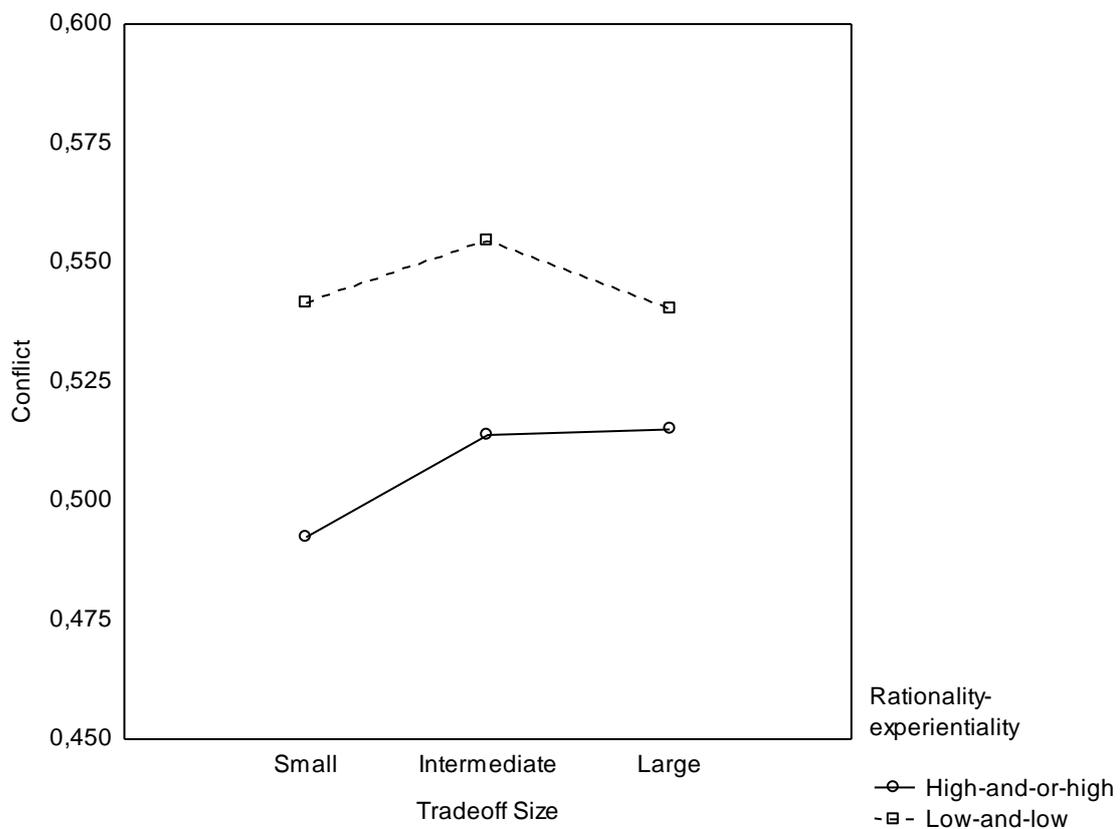
Figure 13. Relation between tradeoff size and conflict by thinking style: Contrast of low-rationality-and-low-experientiality with high-rationality-and-or-high-experientiality.

Furthermore, regression 1 also showed significant effects of two of the three contrasts between the rationality-experientiality conditions: Conflict was greatest when both rationality and experientiality were low, $t(2688) = 5.14$, $p < .001$, and greater when rationality was high than when rationality was low but experientiality was high, $t(2688) = 2.43$, $p = .01$. Finally,

when rationality was high, conflict did not depend on experientiality, $t(2688) = 0.93$, $p = .35$. These results are displayed in Figure 14.
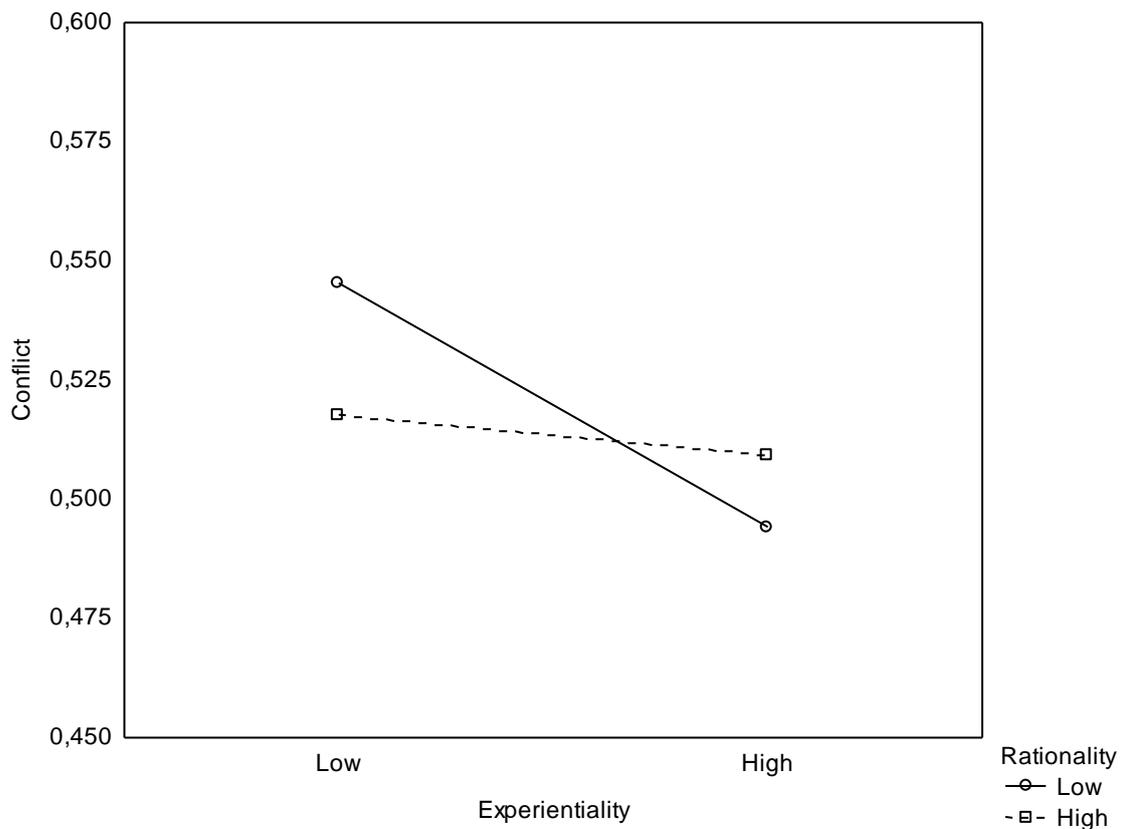
Figure 14: Level of conflict as a function of thinking style.

Model estimation and parametric hypotheses test. In Experiment 2, eighteen parameters were estimated from the 2 (rationality) $\times$ 2 (experientiality) $\times$ 2 (outcome sign) $\times$ 3 (tradeoff size) $\times$ 2 (reference gamble) = 48 observed levels of conflict. Two parameters were the auxiliary ones and the other 16 were the estimated levels of preliminary conflict. The estimates are given in Appendix F. The goodness-of-fit of the estimated model was $R^2 = .88$.

When gains changed into losses, the preliminary conflict from concern about argumentation increased, $t(30) = 7.13$, $p < .001$, consistent *H1.2.1*. The preliminary conflict from concern about sacrifice also increased, $t(30) = 1.84$, $p = .08$. Nevertheless, the difference in preliminary conflict from concern about sacrifice was not as great as the difference in preliminary conflict from concern about argumentation, $t(30) = -2.50$, $p = .02$.

We now turn to the analyses of the levels of preliminary conflict from concern about sacrifice and argumentation as a function thinking style, which are depicted in Figure 15. The

preliminary conflict from concern about sacrifice was greater than preliminary conflict from concern about argumentation, $t(30) = 2.56$, $p = .02$. We next examine the results that address our hypotheses.
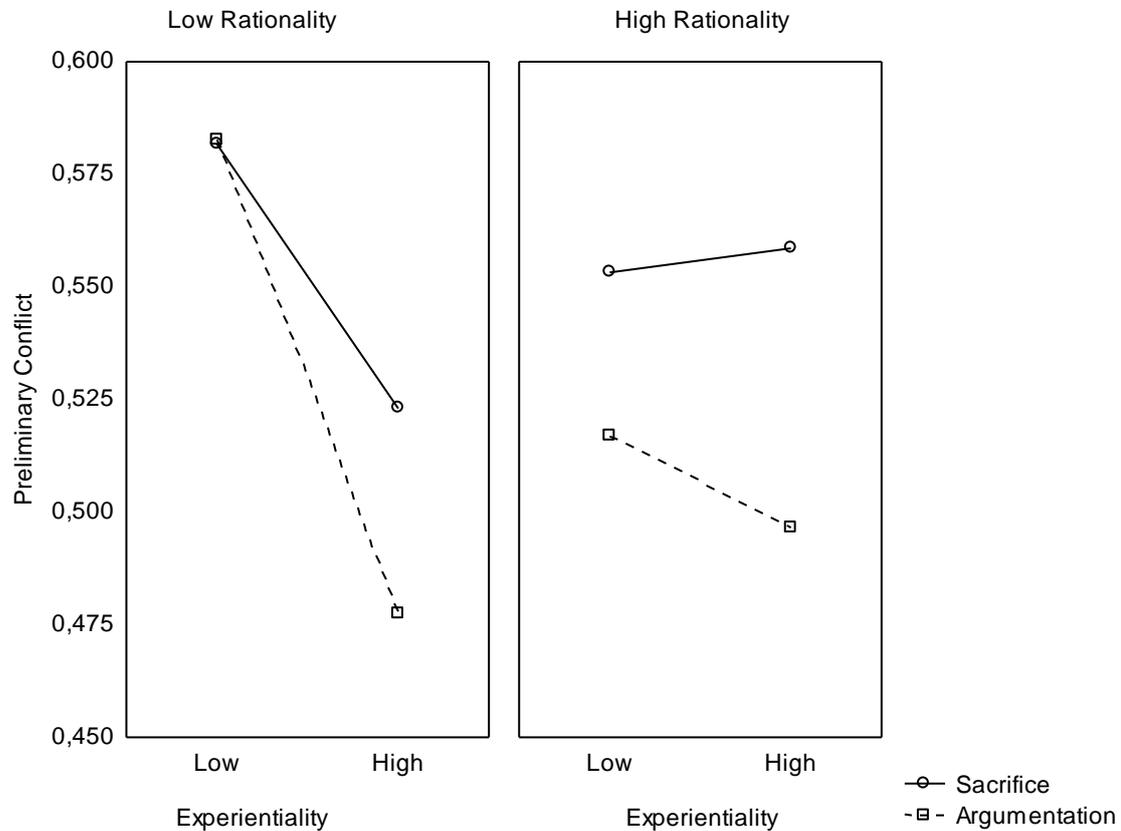
Figure 15. Level of preliminary conflict from concern about sacrifice and about argumentation as a function of thinking style.

When rationality was high, preliminary conflict from concern about argumentation did not depend on experientiality, $t(30) = 0.71$, $p = .48$ (main effect of experientiality) and, $t(30) = 0.88$, $p = .38$, in support of *H3*.

Furthermore, the preliminary conflict from concern about argumentation was greater when both rationality and experientiality were low than when either or both were high, $t(30) = 5.21$, $p < .001$, consistent with *H4.1*. The preliminary conflict from concern about sacrifice was also greater when both rationality and experientiality were low than when either or both were high, $t(30) = 1.56$, $p = .13$. However, the difference in preliminary conflict from concern about sacrifice was not as great as the difference in preliminary conflict from concern about argumentation, $t(30) = -1.94$, $p = .06$.

Finally, the preliminary conflict from concern about argumentation and the preliminary conflict from sacrifice were greater when rationality was high than when rationality was low but experientiality was high, $t(30) = 1.99$, $p = .03$, and, $t(30) = 1.96$, $p = .06$, consistent with *H5.1* and *H5.2,* respectively. In addition, the difference in the preliminary conflict from argumentation was about as great as the difference in preliminary conflict from sacrifice, $t(30) = 0.51$, $p = .62$.

Discussion of Experiment 2

In Experiment 2 we aimed to provide support for the role of outcome sign and to examine the effects of the rational and experiential thinking styles on conflict arousal in risky choice. The three hypotheses that addressed the effects of outcome sign were confirmed and the findings of Experiment 1 were corroborated: The participants experienced more conflict when choosing among losses than when choosing among gains; when gains changed into losses, the preliminary conflict from concern about argumentation increased; and when gains changed into losses, the relation between tradeoff size and conflict became more negative (or less positive). Although not expected, the results also revealed that when gains changed into losses the preliminary conflict from concern about sacrifice increased. This accentuated the positive effect of concern about sacrifice on the relation between tradeoff size and conflict, which contributed to a positive change in the relation. Nevertheless, the argumentation mediator was more strongly affected by the outcome sign than the sacrifice mediator, so that the relation between tradeoff size and final conflict indeed became more negative (or less positive) in losses than in gains.

The five hypotheses that addressed the effects of thinking style on conflict were also confirmed. One hypothesis related to the dominance of the rational system over the experiential system: We have confirmed that when rationality was high, preliminary conflict did not depend on experientiality.

Two other hypotheses concerned the effect of the immediate availability of an adaptation mode on conflict arousal. We have confirmed that preliminary conflict from concern about argumentation was greater when both rationality and experientiality were low (persons who are neither rational nor experiential) than when either or both were high ("rational persons," experiential persons," or "rational and experiential persons"). We have also confirmed that the relation between tradeoff size and final conflict was less positive when both rationality and experientiality were low than when either or both were high. In addition,

and although not predicted, the preliminary conflict from concern about sacrifice was also greater when both rationality and experientiality were low than when either or both were high. This accentuated the positive effect of concern about sacrifice on the relation between tradeoff size and conflict, which contributed to a positive change in the relation. Yet, the effect on the argumentation mediator was greater than on the sacrifice mediator, so that the relation between tradeoff size and final conflict was indeed less positive, or more negative, when both rationality and experientiality were low than when either or both were high.

In short, preliminary conflict indeed depended on the immediate availability of an adaption mode. Both the preliminary conflict from concern about argumentation and the preliminary conflict from concern about sacrifice were greater when no adaptation mode was immediately available to the person (than when at least one system was immediately available). Our interpretation is that when an adaptation mode is immediately available, the person becomes more confident that an argument can be made in favor of one of the options, either analytically or intuitively, which decreases the concern about argumentation. In addition, this greater confidence in pro-argumentation alleviates the concern about contra-argumentation as well, which decreases the concern about sacrifice. Nevertheless, contra-argumentation is still the obstacle to conflict resolution. Therefore, the effect of thinking style on the sacrifice mediator is not as strong as on the argumentation mediator.

The last two hypotheses addressed how the system by which adaptation takes place affects the preliminary conflict. We have confirmed that the preliminary conflict from concern about argumentation was greater when rationality was high ("rational persons" or "rational and experiential persons") than when rationality was low but experientiality is high ("experiential persons"), and so was the preliminary conflict from concern about sacrifice.

In short, preliminary conflict depended on the system by which adaptation took place. The preliminary conflict from both sources was greater when adaptation was made through the rational system than when it was made by the experiential system. It seems that, in agreement with our prior interpretation, the experiential processing is more prone to argue unilaterally in favor of one of the options (i.e., is more prone to dealing with pro-argumentation), which facilitates conflict resolution, whereas the rational processing is more oriented to pro- and contra-argumentation, which complicates conflict resolution.

We have seen that, although the immediate availability of an adaptation mode decreased the level of preliminary conflict from both sources, the decrease was smaller when adaptation is made by the rational system than when adaptation is made by the experiential

system. In accordance, higher levels of conflict were observed when people adapt by the rational system than when they adapt by the experiential one, but the highest levels of conflict were observed when none of the adaptation modes was immediately available to the person. This is in agreement with CEST, in that it is through the rational and experiential systems that people adapt to the world, and that adaptation becomes more complicated when people cannot immediately resort to either system (which is when none of the systems is immediately available).

CEST assumes that conflict between the rational and the experiential systems (between feelings and thoughts) may arise (e.g., Denes-Raj & Epstein, 1994). Nevertheless, it is important to highlight that our investigation did not address any conflict between the two processing modes. We examined how a rational and an experiential processing influenced the conflict aroused by tradeoffs between probability and outcome, and not the conflict aroused by the two processing modes when dealing with a particular situation. In other words, we measured the participants thinking style, i.e., we focused on the conflict experienced by individuals with different levels of activation of the systems, whereas Denes-Raj and Epstein (1994) for instance, manipulated the participants thinking style, i.e., they focused on a situation that activated the two systems.

To conclude, we must address a methodological issue. As we previously mentioned, the four REI conditions, 'low' and 'high' rationality and 'low' and 'high' experientiality, were constructed by the use of median splits. This procedure has some undesirable consequences, as for instance, the loss of information about individual differences, the loss of effect size, and the loss of power (MacCallum, Zhang, Preacher, & Rucker, 2002). Nevertheless, there was no better way to test the orthogonal contrasts between the four conditions, which made the use of median splits unavoidable.

In Experiment 2 we investigated how the arousal of conflict was affect by a situational factor, the outcome sign, and by an individual factor, the decision maker thinking style. In the next section we provide a summary and a discussion of the evidence found in Experiments 1 and 2.

Summary of Experiments 1 and 2

Experiments 1 and 2 provided evidence in support for the double-mediation model in the domain of risky choice. Outcome sign (gains and losses), preference elicitation method (choice and rejection), and thinking style (rational and/or experiential) affect the decisional

conflict by having an impact on the preliminary conflict from argumentation and sacrifice, and thus, moderating the relation between tradeoff size and conflict.

In what concerns the effect of outcome sign, and before moving to the discussion of its effects on the two mediators of the double-mediation model, it should be mentioned that our results validate Lewin's (1951) analysis of conflict in risky choice: The Experiments consistently demonstrate that choices involving losses, or avoidance-avoidance conflicts, arouse more conflict than choices among gains, or approach-approach-conflicts.

Notably, Experiments 1 and 2 also demonstrate that outcome sign moderates the relation between tradeoff size and conflict by affecting mostly the argumentation mediator: In losses, people become more concerned about argumentation which leads to a more negative (or less positive) relation for losses than for gains. Although the effect of outcome sign on the argumentation mediator was stronger, the sacrifice mediator was also affected by outcome sign. The effect of outcome sign on the sacrifice mediator was however less clear across Experiments: Preliminary conflict from concern about sacrifice was greater for gains than for losses in Experiment 1, but greater for losses than for gains in Experiment 2. The effect was highly significant in Experiment 1 but only marginally significant in Experiment 2. This suggests that preliminary conflict from concern about sacrifice tends to decrease, rather than increase, when changing from gains to losses (i.e., tends to be greater in gains than in losses rather than the reverse). Theoretically, this makes sense: In losses, conflict is so high due to the difficulty in argumentation, that people become focused on looking for a positive argument in favor of one of the negative gambles, and thus, their attention shifts toward argumentation (increasing the preliminary conflict aroused by this concern) and away from sacrifice (decreasing the preliminary conflict from concern about sacrifice).

The effect of preference elicitation method and the effect of outcome sign are therefore similar in that they have an equivalent moderating effect on relation between tradeoff size and conflict. Changing from gains to losses, or from choice to rejection, involves a process of shift of attention toward argumentation and away from sacrifice, which leads to a more negative (or less positive) relation between tradeoff size and conflict: Just as it is contradictory to argue in favor of a negative gamble, it is contradictory to argue in favor of any gamble when people are looking for reasons against a gamble, which makes them more focused on argumentation and less on sacrifice. Nevertheless, the main effect of preference elicitation method on conflict only holds for gains; for losses the effect disappears. Our interpretation is that in losses the level conflict was so high that the nature task became

'irrelevant'. This led us to conclude that the effect of outcome sign (gains versus losses) on conflict is itself very strong, prevailing over the effect of preference elicitation method.

The effects of outcome sign and preference elicitation method are similar to the effect of need for justification investigated by Scholten and Sherman (2006): The need for justifying one's choice to others increased the preliminary conflict from concern about argumentation but decreased the preliminary conflict from concern about sacrifice, probably because the person's attention shifts away from sacrifice to argumentation.

Furthermore, the findings that outcome sign has an independent effect on conflict and that the preference elicitation method affected the decisional conflict only in gains are, apparently, inconsistent with previous findings. We have explained the differences by looking at the manipulation of the valence conditions. In contrast with decisions in which the negatively valenced condition involves merely negative or unattractive options, decisions which involve 'pure' losses for the decision maker, as it was the case of our decision problems, generate a higher level of conflict. This caused preference elicitation method to become 'irrelevant' in losses, and thus, both its main effect and its interaction effect with outcome sign were almost nill (in losses). At the same time, this manipulation also created a greater difference between the conflict experienced in losses and in gains, leading to a main effect of outcome sign on conflict. If our hypothesis is accurate, Nagpal and Krishnamurthy's (2008) assertion that the decisional conflict results *only* from the interaction between the valence of the options and the nature of the tasks, may not be valid for all types of decisions.

We have also extended the application of the double-mediation model to the study of the individual differences in decisional conflict by combining the double-mediation model with Epstein's (1994) cognitive-experiential self-theory (CEST). The effects of the style of thinking on the mediators of the double-mediation model support the conclusion that the immediate availability of an adaptation mode moderates the relation between tradeoff size and conflict. A rational and/or an experiential processing boosts confidence that an argument can be made in favor of one of the options (either analytically or intuitively). This greater confidence in argumentation, i.e., pro-argumentation, reduces the concern about sacrifice, i.e., contra-argumentation, but not as much, because contra-argumentation is still the obstacle to conflict resolution.

Scholten and Sherman (2006) found a similar effect produced by differential attribute importance. Increasing the importance of one attribute decreases the preliminary conflict from both sources, but more from concern about argumentation than from concern about sacrifice.

Even though Scholten and Sherman (2006) do not contemplate the role of confidence, it may be that a greater differential importance also increases confidence: A greater difference in importance between the attributes (i.e., when one attribute is more important than the other), may increase a person's confidence that an argument can be made in favor of one of the options, i.e., in favor of the option that is superior/better along the more important attribute.

Moreover, the effects of the thinking style on the mediators of the double-mediation model also support the conclusion that the system by which people adapt also affects the arousal of conflict. More conflict is experienced when people adapt by the rational system than by the experiential one: A rational processing breeds more contra-argumentation, and therefore, more skepticism about pro-argumentation, than an experiential processing.

According to Epstein et al. (1996, p. 391), "experiential processing is often adaptive, but it is ill-suited for solving problems that require logical analysis and an understanding of abstract relations." From a *normative* perspective, experiential processing may be ill-suited for solving certain kinds of problems, insofar as it results in more decision errors and biases (but see the literature on individual differences and framing effects cited above). From a *hedonic* perspective, however, experiential processing may be very adaptive.

The risky choice problems facing our participants were stated in terms of abstract symbols (words and numbers), by which, according to Epstein (1994), the rational system usually encodes reality. Our results suggest that the rational system indeed dominated the experiential one: "Rational and experiential persons" (i.e., participants who scored high on both rationality and experientiality) adapted to the choice problems in a more analytical way; only "experiential persons" (i.e., participants who scored high on experientiality but low on rationality) adapted to the choice problems in a more intuitive way. *Even* in this adverse situation, however, experiential processing led to lower levels of conflict than rational processing. We conclude, therefore, that experiential processing is well-suited for pro-argumentation, while rational processing is more prone to contra-argumentation.

Pacini and Epstein (1999, study 2) investigated the role of the individual differences in the thinking style on the 'ratio bias' susceptibility and they also demonstrate a dominance of the rational system over the experiential one. The ratio bias effect refers to the preference for the lower probability gamble over the higher probability gamble, because the former presents a ratio of larger numbers, i.e., a larger number of winning events (e.g., 7 in 100), whereas the latter presents a ratio of smaller numbers, i.e., a larger proportion of winning events (e.g., 1 in 10). The authors found that the rational processing decreased the number of non-optimal

responses, and that when experientiality was low there was no other effect. When experientiality was high, rationality interacted with another variable, the monetary incentive ('high' versus 'low'). In particular, a greater monetary incentive increased the number of non-optimal responses but only when rationality was low; when rationality was high there was no interaction effect. The finding that monetary incentive only affected the ratio bias susceptibility when experientiality was high but rationality was low, reveals that it is only in this situation that the experiential processing actually occurs. Thus, Pacini and Epstein (1999, study 2) findings also support the conclusion that the rational system dominates the experiential one when the decision problems are presented by words and numbers, or in other words, in situations where abstraction and logic reasoning are implied. This seems a significant finding for the decision making research given that it is typically based on verbal and numerical formats.

In the next chapter we aim to provide further evidence in support of the double-mediation model in the domain of risky choice by broadening the scope of our investigation to the study of the impact of differential attribute weight on the arousal of decisional conflict.

CHAPTER 3: EXPERIMENTS 3, 4 AND 5

Theoretical Overview

The previous Experiments have provided evidence supporting the extension of the application of the double-mediation model from riskless choice (Scholten & Sherman, 2006) to risky choice. Scholten and Sherman's (2006) investigation of conflict arousal in riskless choice demonstrated that differential attribute importance moderates the relation between tradeoff size and conflict. In risky choice, the probability attribute tends to be more important than the outcome attribute. This is implied by the common preference for the safer gamble in gains (i.e., for the higher probability of winning) and by the common preference for the riskier gamble (i.e., for the lower probability of loosing) in losses.

An important attribute is a significant attribute, i.e., an attribute that weights on the decision maker's preferences and choices (Alpert, 1980; Myers & Alpert, 1977). This does not imply that every decision will be made, or determined, by the most important attribute. Indeed, the attribute that has the greater influence or that actually determines the decision maker's preferences and choices is called the determinant attribute (Alpert, 1971; Myers & Alpert, 1968). In other words, the determinant attribute is the one to which the decision makers assign a greater weight on a particular decision. Thus, depending on the choice set under consideration, the determinant attribute may or may not be the most important attribute. For instance, consider a decision where the tradeoff rate between the attributes is not constant, that is, the options under consideration have a small difference along the more important attribute compared with a large difference along the less important attribute. In this decision, it may be that the determinant attribute will be the less important instead of the more important attribute.

Goldstein (1990) conceptualized attribute importance in a different but equivalent way. The author distinguished between global and local interpretations of relative attribute importance. A global interpretation considers relative importance a stable feature that is context independent, i.e., that is not influenced by the particular set of available options. Conversely, a local interpretation considers relative importance to be an assessment that is context dependent. A major implication is that, when a decision maker considers an attribute locally, preferences can be different from choice set to choice set because different subjective weights (i.e., subjective perceptions of relative importance) can be assigned (Goldstein, 1990).

Taking into account both approaches and applying them to risky choice, it can be asserted that, even though probability may be globally more important, receiving a greater weight and thus being determinant for choice, locally, in a particular decision, the amount to win/lose can receive the greatest weight, meaning that the outcome attribute is most determinant of choice.

The weight of an attribute is assessed from the particular choice set under consideration (Simonson, 1990) and for this reason different weights can be assigned to the same attribute. In normative analyses of multi-attribute choice the impact of tradeoff rate on the determinance, or weight, of the attributes is captured by the range-sensitivity principle (Fischer, 1995), according to which the attribute weight will be greater when widening the range of that attribute (Fischer, 1995; Goldstein, 1990; Simonson, 1990; von Nitzsch & Weber, 1993) or narrowing the range of the other attribute (Simonson, 1990).

In risky choice, the weight of the outcome attribute can be increased by increasing the outcome range or by decreasing the probability range. Outcome range is increased by increasing the magnitude of larger outcomes while decreasing the magnitude of smaller ones. Probability range is decreased by decreasing the magnitude of higher probabilities while increasing the magnitude of lower ones. Therefore, in the present investigation, the weight of amount to win/lose (outcome attribute) should be increased either by increasing the magnitude of the monetary differences between the gambles (increased outcome range) or by decreasing the magnitude of the probability differences between the gambles (decreased probability range). Both manipulations influence the tradeoff rate by enhancing the magnitude of outcome differences relatively to the magnitude of probability differences, and thus, increasing the weight of the outcome attribute.

According to the double-mediation model, differential attribute weight, as any other factor in the choice context, will have an impact on preliminary conflict, and consequently, on the relation between tradeoff size and conflict. In Chapter 3 (Experiments 3, 4 and 5) we aim to provide further evidence in support of the extension of the double-mediation model from riskless to risky choice, by investigating the effect of differential attribute weight on conflict arousal in gains (Experiments 3 and 4) and in losses (Experiment 5). Our analysis will focus on the prior importance of the attributes (probability versus outcome), the weight that these attributes receive in a given decision situation, and the implications for the relation between tradeoff size and conflict. In Experiment 3 we examine the effects of an increased outcome range. In Experiments 4 and 5 we examine the effects of an increased outcome range and of a

decreased probability range. The manipulations should have the same effect on attribute weighting (and thus, on preferences), but a differential effect on preliminary conflict, and therefore, on the relation between tradeoff size and conflict. We will address these effects in the introduction of each Experiment.

Experiment 3:

Gains and Outcome Weight - Increasing Outcome Range

When choosing among gains there is a common preference for the safer gamble, which means that probability of winning is *a priori* more important than amount to win, and thus, that security is preferred over potential. Nevertheless, research (e.g., Myers & Alpert, 1977) suggests that depending on the decision context, the outcome attribute can be more heavily weighted, and thus, more determinant of choice. In Experiment 3, we develop an outcome range manipulation that consists of increasing the magnitude of the monetary differences between the gambles, which according to the range sensitivity principle (Fischer, 1995), should increase the weight of the outcome attribute so that potential becomes preferred over security, leading to a greater choice of the riskier gamble. We predict that increasing the outcome range will increase the preliminary conflict from concern about argumentation, which will lead to a more negative (or less positive) relation between tradeoff size and conflict.

Preferences and Outcome Weight in Gains

Risk aversion for gains is the major well-known phenomenon in risky choice and, as Kahneman and Tversky (1979; Tversky & Kahneman, 1992) stated, it is most prevalent when choosing between moderately and highly probable gains. As we previously referred, to be risk averse means that, when choosing between a sure thing and a risky prospect with equal expected value, people prefer the sure thing (the option that offers a smaller but certain gain). People prefer to gain something, even if the amount is small, rather than to take a risk and gain nothing. In choices between two gambles involving a tradeoff between probability of winning and amount to win, risk aversion implies that people will prefer the safer option (i.e., the gamble that provides a higher probability of winning) over the riskier one (i.e., the gamble that provides chance of winning a larger gain). In terms of security-potential/aspiration theory (Lopes, 1987, 1995; Schneider & Lopes, 1986; Schneider, 1992), people will prefer security (i.e., a greater probability of winning) over potential (i.e. the possibility of winning a larger

amount).

As discussed in the previous section, a decision is not necessarily determined by the most important attribute but rather by the one that receives the greatest weight in a particular decision, which may or may not be the most important attribute. We develop an outcome range manipulation that consists in increasing the outcome range (the amplitude of the outcome differences between the gambles), which according to the range sensitivity principle, should increase the weight of the outcome attribute and thus the choice of the riskier gamble. That is, if the prior importance of probability of winning provides a strong argument in favor of security, leading to a greater choice of the safer gamble, then, increasing the weight of amount to win, provides a strong argument in favor potential (i.e., in favor of the opposite choice), increasing the preference for potential over security and leading to a greater choice of the riskier gamble.

Furthermore, according to the double-mediation model, differential attribute weight, as any other factor in the choice context has an impact on preliminary conflict, moderating the relation between tradeoff size and conflict. Therefore, increasing the outcome weight by increasing the outcome range should increase its determinance on choice, which will affect not only the decision maker's preferences but also conflict arousal, as we discuss next.

Conflict and Outcome Weight in Gains

According to the double-mediation model, making a choice implies that people will look for reasons to choose one of option instead of the other in order to justify the decision to oneself. That is, people will be concerned about argumentation, i.e., the arguments that can be made in favor of any decision, for example, the argument for potential and the argument for security. If decision makers were not risk averse, it would be difficult to argue in favor of one of the gambles. That is, they would have two (equally) strong arguments to choose: The argument for security (higher probability of winning), which favors the safer gamble, and the argument for potential (larger gain), which favors the riskier one. Consequently, there would be no reason to prefer one gamble over the other, and thus, arguing unilaterally in favor of one the gambles would become more complicated, or in other words, people would be concerned about argumentation.

However, people are indeed risk averse, i.e., they tend to give more importance to probability of winning than to amount to win, and as a consequence, to prefer security over potential. It may be argued, therefore, that the decision maker views the argument for security

as a particularly cogent one. Thus, arguing unilaterally in favor of the safer option becomes easier and the preliminary conflict generated by the concern about argumentation decreases. Therefore, because conflict from the preliminary impression as mobilizing effect, the greater preliminary conflict aroused by concern about argumentation creates a stronger drive to devote attention to this concern during subsequent deliberation, which is when conflict is affected by tradeoff size. Accordingly, the negative mediating effect of concern about argumentation is accentuated, and the generally predicted inverse U-shaped relation between tradeoff size and conflict becomes more positive.

In addition, the shape of this relation is expected to change under differential attribute weight. We now discuss how increasing the outcome weight by increasing the outcome range should affect preliminary conflict and the relation between tradeoff size and conflict.

Increasing the outcome range, i.e., the magnitude of the outcome differences between the gambles, means that larger outcomes become larger and smaller ones become smaller. That is, the rate of the tradeoffs between probability and outcome is manipulated so that the differences in the amount to win become larger relatively to the probability differences (which are maintained because the probability range is preserved). This should strengthen the argument for potential (larger gain), while the argument for security (more probable gain) maintains its strength. On the one hand, potential becomes more appealing (the difference in weight offers an argument for choosing) and, on the other hand, people remain concerned about safety (the prior importance of the probability attribute still offers an argument for choosing). Thus, there will be no reason to prefer one gamble over the other and arguing unilaterally in favor of one of the gambles becomes more difficult. In other words, the preliminary conflict from concern about argumentation will increase. This leads to the following hypothesis:

H6.1. When the outcome range increases, the preliminary conflict from concern about argumentation will increase.

The preliminary conflict from concern about argumentation is the drive to devote attention to this concern during subsequent deliberation and only the conflict from deliberation is affected by tradeoff size. Thus, in the deliberation phase, the negative mediating effect of concern about argumentation will be accentuated, and the relation between tradeoff size and conflict will become more negative (or less positive). We thus arrive at the following hypothesis:

H6.2. When the outcome range increases, the relation between tradeoff size and conflict will change in a downward direction.

The double-mediation model draws on decision field theory (Busemeyer & Diederich, 2002; Busemeyer & Townsend, 1993; Diederich, 1997) in that it assumes that it is from prior knowledge and past experience with the choice problems that a preliminary impression is formed. This implies that, when participants are familiarized (i.e., have experience) with the choice problems, a preliminary impression can immediately be formed. For instance, in Experiments 1 and 2, where gains were contrasted with losses, no learning was necessary because the difference between gains (positive outcomes) and losses (negative outcomes) is evident. In other words, sensitivity to sign manipulations was acquired prior to Experiment, and thus, a preliminary impression could be immediately formed.

Nevertheless, when there is no prior experience, i.e., when participants are unfamiliar with the choice tasks, they have to learn how to choose as they proceed through the choice tasks. So, the effects of the manipulations may not appear (or may be less pronounced) until later in the experimental session, once knowledge about, and experience with the gambles has accumulated, and preliminary impressions can actually be formed on the basis of that knowledge and experience. In the present and subsequent Experiments, we contrast tradeoff rates (i.e., the magnitude of outcome differences are increased relatively to the magnitude of probability differences), which imply more subtle differences between the tasks, and thus, that experience is indeed necessary so that the participants can learn how to choose and become more familiar with the tasks. In other words, sensitivity to range manipulations will be acquired during the Experiment, and for this reason, it is expected that a preliminary impression cannot be formed immediately, but rather, progressively, as the participants proceed in the experimental situation. Therefore, it is expected that the moderating effect of outcome range will become more pronounced in the later tasks than in the earlier ones.[19] This leads to the following hypothesis:

H6.3. The moderating effect of outcome range on the relation between tradeoff size and conflict will become stronger with progress through the choice tasks.

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[19]We tested the effect of progress through the choice tasks in Experiments 1 and 2, but as expected, it did not affect the experimental results.

Method of Experiment 3

Participants. A total of 216 psychology students from ISPA-IU participated in the study. Each participant received a voucher of €7.50 for their participation. They also gained access to a lottery, in which three participants from each device condition were randomly selected to play out one of the gambles (one of the 12 decision tasks) of their experiment. The gamble to play was also randomly selected.

Materials and stimuli. The data were again collected through a computerized questionnaire developed in *Turbo Pascal*. As in Experiment 2, the participants completed 12 decision tasks and after completing each task they completed four rating scales corresponding to four measures of conflict. The decision tasks were dyadic choices between gambles implying a tradeoff between probability of winning and amount to win.

Each gamble yield an outcome x with probability p or a zero outcome with probability $1\text{-}p$. Two sets of stimuli comprised two range conditions: S-range (standard range) and O-range (outcome range increased). The stimuli of the S-range condition were those of the gains condition in Experiments 1 and 2. Thus, in the S-range condition, participants should, according to prospect theory, be pairwise indifferent between the gambles. The O-range condition (as the S-range condition) was developed on the basis of estimates of prospect theory (Tversky and Kahneman, 1992) as described in Appendix G. In the O-range condition, the range of the outcomes was increased, such that larger outcomes increased and smaller outcomes decreased. Therefore, in this condition, participants should prefer the riskier gamble over the safer one. The two range conditions and respective gambles are presented in Figure 16 in terms of outcome values (log scales), $v(x)$, and probability weights, $w(p)$.
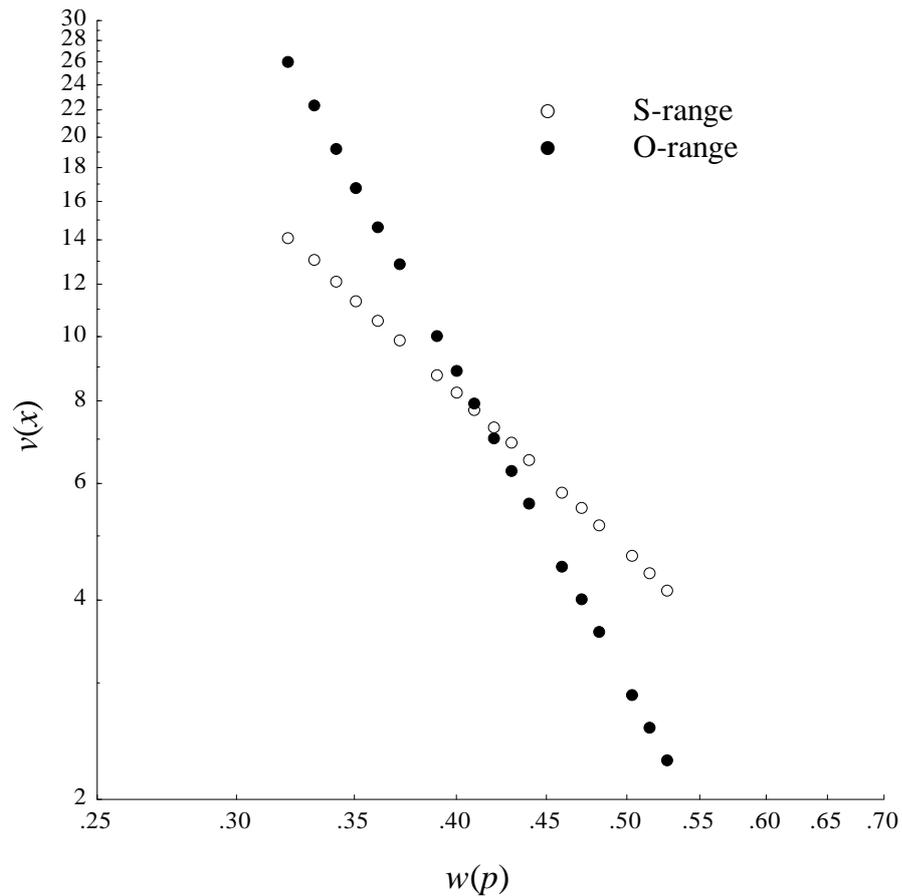
Figure 16. Probability weights and outcome values (Experiment 3).

The main chance device of the gambles was a card gamble as in the previous Experiments. In both range conditions, probability (of winning) ranged from .308 to .693, which corresponds to a range of winning cards from 16 to 36. The outcomes (amount to win) ranged from €5.00 to €20.00 in the S-range condition and from €2.50 to €40.00 in the O-range condition. The gambles and their probabilities (p), outcomes (x), and expected values (px) are showed in Table 6. Lower probabilities (i.e., the riskier gambles) had higher (more positive) expected values in both conditions. In the S-range condition, this compensates for the common preference for the safer gamble in gains; in the O-range condition, this is the result of the increased outcome range.

Table 6

Probabilities, Outcomes, and Expected Values (Experiment 3)

| | | Range Condition | | | |
| | | S-range | | O-range | |
f^a	p	x^b	px	x^b	px
16	.308	20.00	6.16	40.00	12.32
17	.327	18.50	6.05	33.50	10.95
18	.346	17.00	5.88	29.00	10.03
19	.365	15.50	5.66	24.50	8.94
20	.385	14.50	5.58	21.00	8.09
21	.404	13.50	5.45	18.00	7.27
23	.442	11.50	5.08	13.50	5.97
24	.462	11.00	5.08	12.00	5.54
25	.481	10.00	4.81	10.50	5.05
26	.500	9.50	4.75	9.00	4.50
27	.519	9.00	4.67	8.00	4.15
28	.538	8.50	4.57	7.00	3.77
30	.577	7.50	4.33	5.50	3.17
31	.596	7.00	4.17	5.00	2.98
32	.615	6.50	4.00	4.00	2.46
34	.654	6.00	3.92	3.50	2.29
35	.673	5.50	3.70	3.00	2.02
36	.692	5.00	3.46	2.50	1.73

[a]The number of winning cards in a complete deck of 52 cards.
[b]Euros.

Although the card gamble was the main chance device, another five chance devices were developed: Bingo, dice, keys, marbles, and raffles. These gambles were constructed in the same way as the card gambles and their characteristics (probabilities, outcomes, and expected values) are therefore similar. The six chance devices used in this Experiment are described in Table 7.

Table 7

Chance Devices and Descriptions

Device	Description
Bingo	Each game consists in drawing a ball from a bin that contains 90 balls numbered from 1 to 90. Both the chance of drawing a winning ball and the prize differ between the games.
Cards	Each game consists in drawing a card from a complete deck of 52 cards (13 cards of 4 suits). Both the chance of drawing a winning card and the prize differ between the games.
Dice	Each game consists in throwing 3 dice with their sides numbered from 1 to 6, the sum of which varies from 3 to 18. Both the chance of throwing a winning sum and the prize differ between the games.
Keys	Each game consists in drawing a key from a box that contains 52 keys, some of which open a safe and others do not. Both the proportion of keys that open the safe and the prize differ between the games.
Marbles	Each game consists in drawing a marble from an urn that contains 50 marbles of 2 colors (blue and red). Both the proportion of drawing a winning color and the prize differ between the games.
Raffles	Each game consists in drawing a raffle from a bag that contains 150 raffles, some of which are winning and others are not. Both the proportion of winning raffles and the prize differ between the games.

Design. The dependent variable, conflict, was assessed with the same five components used in the previous Experiment: Decision time, decision difficulty, decision uncertainty, preference equality, and attribute-weight equality.

Three independent within-participants variables were manipulated: (1) range condition, (2) tradeoff size, and (3) reference gamble. Range condition has 2 levels: S-range (standard range) and O-range (increased outcome range). Tradeoff size has 3 levels: Small, intermediate and large. Reference gamble has 2 levels: Large-amount and high-probability. The 2 (outcome sign) × 3 (tradeoff size) × 2 (reference gamble) within-participants design results in 12 pairs of gambles (12 decision tasks) for each participant.

Four between-participants factors were included. Two of these were counterbalancing factors as previously: The reference-gamble extremeness, which counterbalances the assignment of the extremeness of the reference gamble across tradeoff sizes, as shown in Table 8; and the assignment of the extremeness conditions to the two range conditions, which varies the extremeness conditions across the range conditions in accordance with Table 9.

Table 8

Assignment of Reference-Gamble Extremeness to Tradeoff Sizes (Experiment 3)[a]

Extremeness Condition	Large-amount condition			High-probability condition		
	Small Tradeoff	Intermediate Tradeoff	Large Tradeoff	Small Tradeoff	Intermediate Tradeoff	Large Tradeoff
1.1	16-17	18-25	20-36	35-36	26-34	16-31
1.2	20-21	16-23	19-35	30-31	28-36	17-32
1.3	18-19	21-28	16-31	32-34	23-30	20-36
2.1	16-17	20-27	19-35	35-36	24-31	17-32
2.2	18-19	17-24	20-36	32-34	27-35	16-31
2.3	20-21	18-25	17-32	30-31	26-34	19-35

[a]The tradeoff sizes are indicated by the number of winning cards in each pair. See Table 6.

Table 9

Assignment of Extremeness Conditions to Range Conditions (Experiment 3)[a]

Range Condition	Counterbalancing Condition											
	1	2	3	4	5	6	7	8	9	10	11	12
S-range	1.1	1.1	1.2	2.1	2.1	2.2	1.2	1.3	1.3	2.2	2.3	2.3
O-range	1.2	1.3	1.3	2.2	2.3	2.3	1.1	1.1	1.2	2.1	2.1	2.2

[a]For the extremeness conditions, see Table 8.

The third between-participants factor was progress through the choice tasks, which has two levels: First 6 tasks and last 6 tasks. The fourth between-participants factor was chance device. Chance device has two levels: Single-device and multiple-device. In the single-device condition the chance device was the same for all the decision tasks, always a card gamble. In the multiple-device condition there were six chance devices: Bingo, cards, dice, keys, marbles and raffles. The purpose of creating the multiple device condition was to investigate whether

our findings hold when using gambles that not of cards, and to enhance the similarity between the choice tasks of the present Experiment to the ones in Scholten and Sherman (2006). The authors developed different choice tasks involving different consumer products, we developed different gambles involving different chance devices.

Across the within and between participants design six factors were randomized: (1) the distribution of the participants by the experimental conditions; (2) the order of the 12 decision tasks for each participant; (3) the order by which the options are presented; (4) the order by which the conflict scales are presented; (5) the specification of the winning cards; and (6) the order of the six devices, which was randomized across the first half of the tasks and repeated across the second half.

Procedure and measures. Each experimental session was run by computer in the laboratory of ISPA-IU, with at most 20 participants at a time. Each session lasted about 25 minutes. The procedure was similar to Experiment 2, but a few changes were made. Firstly, the experimental session consisted of only one stage. Secondly, because Experiment 3 addressed conflict arousal only in gains, all gambles were displayed in a blue background, and above the attribute-weight rating scale, the first attribute in the matrix always appeared on the left side of the scale and the second on the right side.

The conflict measures were the same as in the previous Experiment.

Results of Experiment 3

More information on the results of Experience 3 is presented in Appendix F.

Conflict: Variable construction. A principal component analysis was conducted on the five conflict measures. The first component was extracted. This component, the conflict factor, presented an eigenvalue of 1.89, explained 37.80% of the total variance, and loaded positively on all five measures: Decision time (.45), decision difficulty (.71), decision uncertainty (.69), preference equality (.66), and attribute-weight equality (.52). The internal consistency reliability analysis revealed a standardized Cronbach alpha of .58 and an average inter-item correlation of .22. There was no increase in the value of alpha when an item was deleted, attesting to the content validity of the all items. Thus, we constructed the conflict variable, by deriving the (standardized) scores on the principal component and then by linearly transforming these scores to scales from 0 to 1.

Conflict: Test of hypotheses. One linear regression analysis (regression 1) was performed across the 12 tasks in order to test *H6.2* (the moderating effect of outcome range on the relation between tradeoff size and conflict) and *H6.3* (the effect of progress through the choice tasks on the moderating effect of outcome range). Conflict was the dependent variable. The independent variables were range condition, tradeoff size, reference gamble, chance device, and progress through the choice tasks. The analysis included: A contrast between the S-range condition and the O-range condition; two polynomial contrasts (linear and quadratic) between the small, intermediate, and large tradeoffs; a contrast between the large-amount condition and the high-probability condition; a contrast between the single-device condition and the multiple-device condition; a contrast between the first six tasks and the last six tasks; and 41 contrasts capturing the interactions between the independent variables.

Three other linear regression analyses were conducted across the last six tasks. One analysis tested *H6.2* (regression 2). This analysis included all contrasts mentioned previously, except those associated with progress through the choice tasks. The other two analyses (regressions 3 and 4) evaluated the specific shape of the relation between tradeoff size and conflict in each range condition. These analyses included all contrasts included in regression 1, except those associated with progress through the choice tasks and outcome range.

The results of regression 1 revealed a significant effect of the interaction between range condition and tradeoff size (linear contrast), $t(2544) = -4.09$, $p = .01$: Consistent with *H6*.2, when the outcome range increased, the relation between tradeoff size and conflict changed in a downward direction as depicted in Figure 17. The effect of the interaction between range condition, tradeoff size (linear contrast) and progress through the choice tasks was also significant, $t(2544) = -3.69$, $p < .001$: The moderating effect of outcome range became more pronounced with the progress through the choice tasks, consistent with *H6.3*.
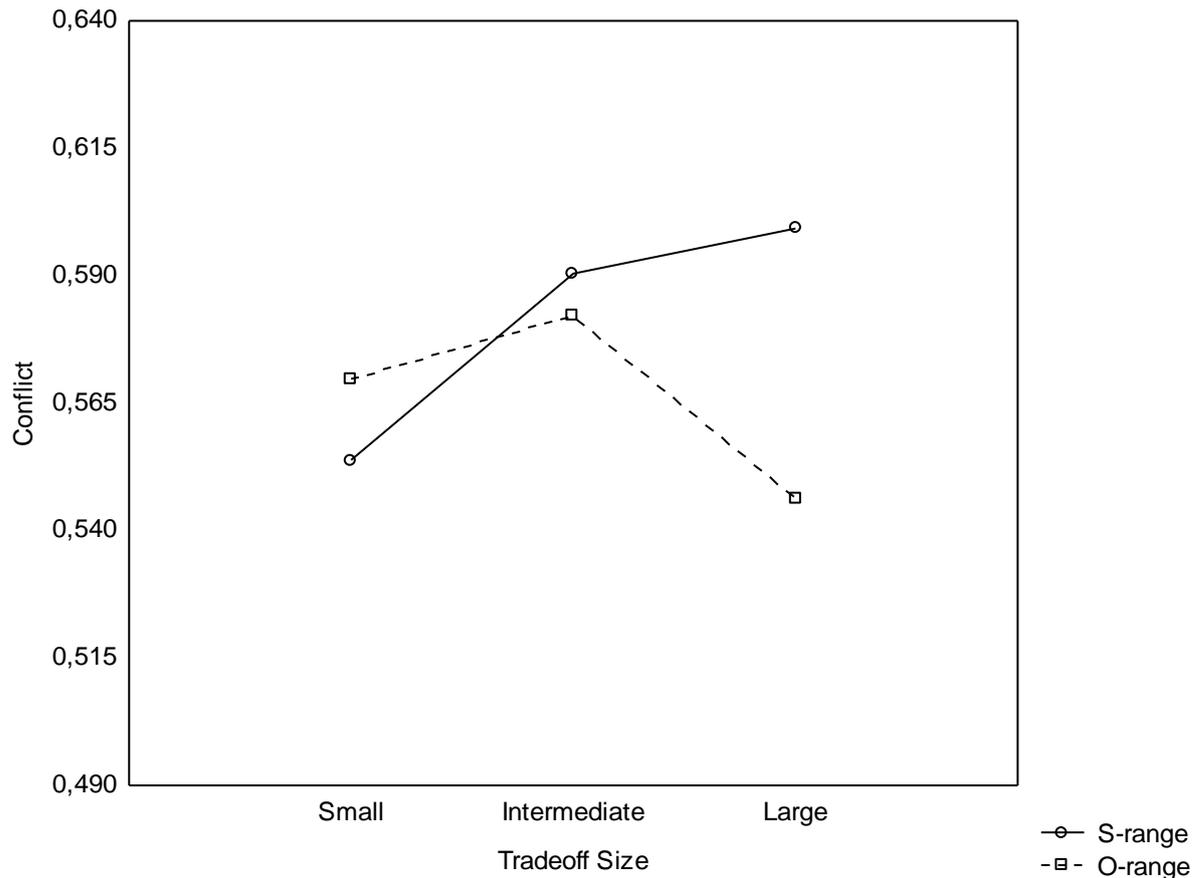
Figure 17. Relation between tradeoff size and conflict by range conditions across all decision tasks (Experiment 3).

We also found reliable main effects of: (1) range condition, $t(2544) = -2.44$, $p = .01$, which demonstrates that conflict was greater in the S-range condition than in the O-range condition; (2) chance device condition, $t(2544) = 4.35$, $p < .001$, which demonstrates that conflict was greater in the multiple-device condition than in the single-device condition; (3) tradeoff size (quadratic contrast), $t(2544) = 2.76$, $p = .01$, which demonstrates that conflict was greater for intermediate tradeoffs than for small and large tradeoffs (i.e., there was an inverse U-shaped relation between tradeoff size and conflict); and (4) progress through the choice tasks, $t(2544) = -6.84$, $p < .001$, which demonstrates that conflict was greater in the first than in the last six tasks.

Figure 18 shows the relation between tradeoff size and conflict in each range condition across the last 6 tasks. The results of regression 2 revealed that the interaction effect between range condition and tradeoff size (linear contrast) was again reliable, $t(1272) = -5.31$, $p < .001$, consistent with *H6.2*. Indeed, in support of *H6.3*, the effect became stronger and more reliable. Moreover, the main effects of range condition, $t(1272) = -2.49$, $p = .01$, chance

device, $t(1272) = 2.21$, $p = .03$, and tradeoff size (quadratic contrast), $t(1272) = 2.45$, $p = .01$, were again reliable. Finally, in the S-range condition there was a positive relation between tradeoff size and conflict, $t(648) = 3.88$, $p < .001$ (regression 3), and in the O-range condition there was an inverse U-shaped relation, $t(624) = 2.51$, $p = .01$, with a negative trend, $t(624) = -3.64$, $p < .001$ (regression 4).
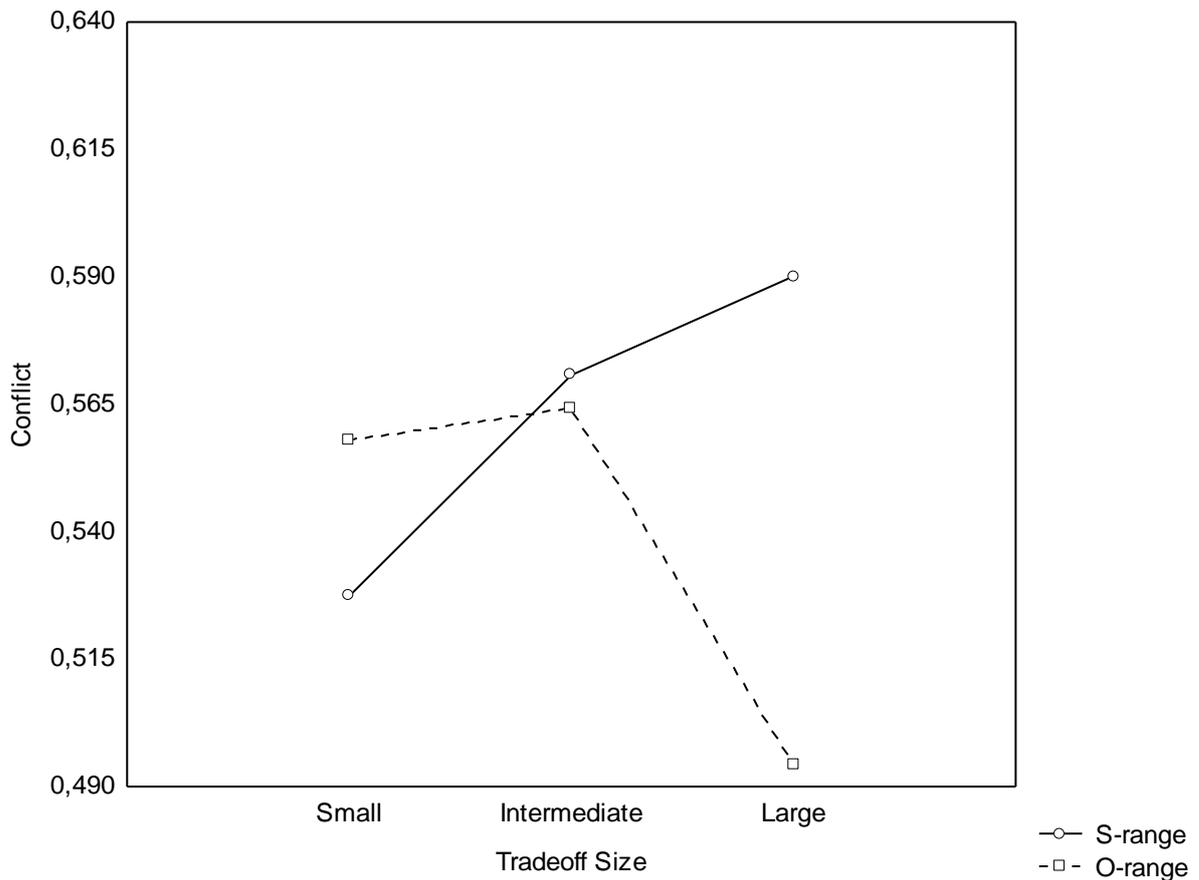
Figure 18. Relation between tradeoff size and conflict by range conditions across the last six tasks (Experiment 3).

Model estimation and parametric hypothesis test. In Experiment 3 we estimated five parameters from the 2 (chance device) × 2 (outcome range) × 2 (reference gamble) × 3 (tradeoff size) = 24 levels of conflict observed across the last six tasks. Two of these were the auxiliary parameters. The other three were the estimated levels of preliminary conflict.[20] The estimates are given in Appendix F. The goodness-of-fit of the estimated model was $R^2 = .72$.

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[20]The preliminary conflict from concern about sacrifice in the S-range condition had to be set to 1 in order to estimate the remaining parameters.

When the outcome range increased, the preliminary conflict from concern about argumentation increased, $t(19) = 2.53$, $p = .01$, consistent with *H6.1*. At the same time, the preliminary conflict from concern about sacrifice decreased, $t(19) = -11.93$, $p < .001$. Nonetheless, the difference in the preliminary conflict from concern about sacrifice was not as great as the difference in the preliminary conflict from concern about argumentation, $t(19) = -4.46$, $p < .001$.

Complementary analysis: Manipulation check. To validate the manipulation of the weight of the outcome attribute versus the weight of the probability attribute we analyzed the choice probabilities of the riskier option (which is superior along the outcome attribute). A choice probability near .5 means that both options were equally chosen, and thus, that the attributes were equally weighted. A probability significantly superior or inferior to .5 means that one of the gambles (the riskier or the safer one, respectively) was chosen more often than the other, and thus, that one attribute was more heavily weighted (outcome or probability, respectively). In the S-range condition, the gambles were constructed so that participants would be pairwise indifferent between them, i.e., so that the outcome and the probability attribute would be equally weighted. In the O-range condition, the gambles were constructed so that participants would prefer the riskier gamble over the safer one, i.e., so that the outcome attribute would receive a greater weight than the probability attribute.

To check how the manipulations affected the participant's choice patterns we conducted a nonlinear regression (LOGIT), in which we regressed choice of the riskier gamble on a contrast between the S-range condition and the O-range condition. The results showed a significant effect of range condition $\chi^2(1) = 169.00$, $p < .001$, which demonstrates that the choice of the riskier gamble was more common in O-range than in S-range, as depicted in Figure 19. In the S-range condition, the proportion of participants that chose the riskier gamble was .44, which was significantly different from the chance level, $p < .001$ (binomial test). In the O-range condition, the proportion of participants that chose the riskier gamble was .69, which was also significantly different from the chance level, $p < .001$ (binomial test).
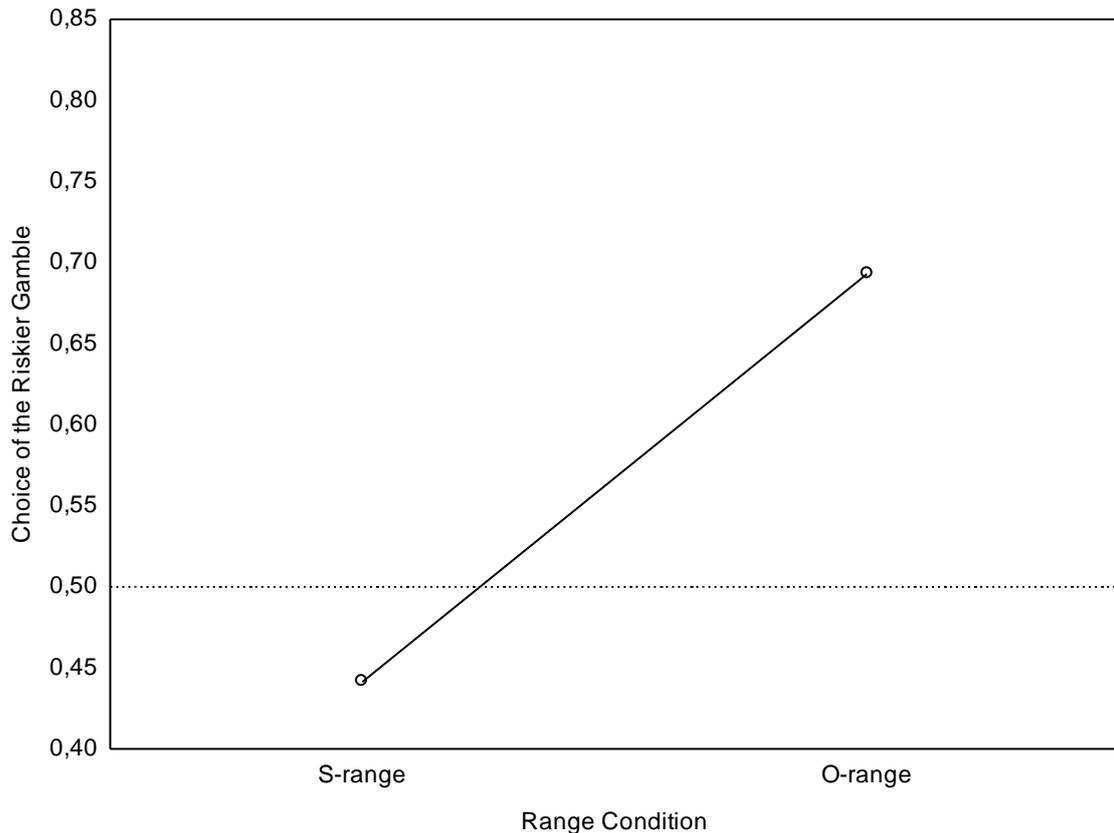
Figure 19. Choice of the riskier gamble by range conditions (Experiment 3).

These results demonstrate that as expected by the range sensitivity principle (Fischer, 1995), increasing the outcome range increased choice of the riskier gamble, i.e., the weight of the outcome attribute. Indeed, when the outcome range increased the choice of the riskier gamble was greater than the chance level, meaning that potential became preferred to security, and thus, that the outcome attribute became more heavily weighted (and more determinant of choice) than the probability attribute (see Figure 19). Moreover, in the standard range condition, we attempted to balance the weight of the attributes so that both attributes would be equally determinant of choice. Although the weight of the attributes was approximately the same, the difference was significant: The probability attribute was still more determinant than the outcome attribute, and thus, security was preferred to potential, as revealed by the greater choice of the safer gamble (see Figure 19).

Discussion of Experiment 3

The two hypotheses that addressed the effect of range condition on conflict were confirmed as well as the hypothesis concerning the effect of progress through the choice tasks

on the moderating effect. When the outcome range increased the preliminary conflict from concern about argumentation increased and the relation between tradeoff size and conflict became more negative (or less positive). The moderating effect of outcome range on the relation between tradeoff size and conflict became stronger with progress through the choice tasks.

The (parameter) estimation of the model revealed that when the outcome range was increased, conflict was greater mostly due to an increase of the preliminary conflict from concern about argumentation, as expected. Nonetheless, this analysis demonstrated that the sacrifice mediator was also affected by the outcome range, even though not as much as the argumentation mediator. Increasing the outcome range decreased the preliminary conflict from concern about sacrifice, which also contributed to a more negative (or less positive) relation between tradeoff size and conflict.

These results suggest that increasing the outcome range involves a shift of attention, in which attention shifts toward argumentation and away from sacrifice. Because arguing in favor of one of the gambles is not evident when the outcome range is increased, people become focused on argumentation, that is, they become more concerned with looking for a strong argument to choose (increasing the concern about argumentation) and less concerned with the sacrifices that are to be incurred with the decision (decreasing the concern about sacrifice).

Furthermore, in the present Experiment, two chance device conditions were developed. In the multiple device condition participants were presented with different choices tasks involving different chance devices, whereas in the single device condition, the participants were presented with different choice tasks involving only one chance device. Although chance device condition did not affect the experimental results, it did have an effect on the dependent variable: The participants experienced a lower conflict level in the single device condition than in the multiple-device condition. A possible explanation is that the participants in the single-device condition became more familiar with the experimental situation than the participants in the multiple-device condition. By becoming more familiar with the experimental situation, they became more confident in their decisions, as reflected by a lower level of conflict.

The results of Experiment 3 also showed a main effect of progress through the choice tasks on conflict: Conflict was greater in the first than in the last six tasks. In accordance with the previous interpretation, as participants proceeded through the choice tasks, they became

more familiar with the experimental situation, and thus, they became more confident in their decisions, which decreased the level of conflict.

Finally, our results revealed that conflict was also greater in the standard range condition than in the outcome range condition. Conflict should be greater when the options are more equally likely to be chosen, thus, conflict was greater in the standard range condition probably because the choice probabilities were closer to chance level in this condition (than in outcome range condition).

In agreement with previous research (see Fischer, 1995; Goldstein, 1990; Simonson, 1990; von Nitzsch & Weber, 1993) we have demonstrated that the choice set under consideration influences the weight that decision makers assign to each attribute. We have investigated the effects of an outcome range manipulation which increased the weight of the outcome attribute. Another form of manipulating the outcome range, and which is expected to have the opposite effect on attribute weighting (i.e., increasing the weight of the probability attribute), is the one associated with the peanuts effect on choice. The peanuts effect (Prelec & Loewenstein, 1991) was first discussed by Markowitz (1952), who suggested that people are risk averse merely for large gains and risk seeking for small gains.[21] For instance, when choosing between large gains, people will prefer gamble *y* ($1,000, 100%), the safer option, to gamble *z* ($10,000, 10%), the riskier option. However, when choosing between small gains they will prefer gamble *z*' ($10, 10%), the riskier option, to gamble *y*' ($1, 100%), the safer option. Prelec and Loewenstein (1991) defined the peanuts effects in a way that does not require a shift from risk seeking to risk aversion as outcome magnitude increases, only that people are more risk averse in large outcomes than in small ones. Or, conversely, as Weber and Chapman (2005, p. 31) put it: "Decision makers are more willing to take risks when playing for peanuts."

Several investigations have demonstrated the existence of the peanuts effect. For instance, Hogarth and Einhorn (1990) developed choices between gambles (with a *p* probability of winning the outcome $*x* and 1-*p* probability of obtaining $0) and a certain outcome (with the same expected value of the gamble). Probabilities were .10, .50, and .80, and three sets (levels) of outcomes, corresponding to expected values of $2, $200 and $20,000 (i.e., small, medium, and large gains), were used. Their results demonstrated that risk aversion decreases as monetary amounts decrease (for all the probability levels). A series of studies

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[21]The reverse pattern is expected for losses, in which preferences change from risk seeking in large losses to risk aversion in small ones.

(Du, Green, & Myerson, 2002; Green, Myerson, & Ostaszewski, 1999; Holt, Green, & Myerson, 2003; Myerson, Green, Hanson, Holt, & Estle, 2003; Rachlin, Brown, & Cross, 2000) confirmed these results by demonstrating that probabilistic (risky) rewards are discounted at a higher rate for large amounts than for small amounts. Thus, people are more risk averse for larger monetary outcomes. Weber and Chapman (2005) also found support for the peanuts effect in choices between two gambles: The choice of the safer gamble increased as the outcome magnitude increased. Thus, as they noted, certainty is not required for the effect to occur. In addition, the size of the effect increased with an increasing magnitude of the probabilities, and with an increasing probability ratio (the ratio between the probabilities of the non-zero outcomes in the gambles) but just above a certain size.

This way, the study of the peanuts effect requires a manipulation of outcome range which is different from the one used in our investigations. The outcome range manipulation of Experiment 3 (O-range) consisted of widening the outcome differences between the gambles by increasing the magnitude of larger outcomes and decreasing the magnitude of smaller ones, so that larger outcomes became larger and smaller ones became smaller. This manipulation differs from, what we called, a peanuts effect manipulation (PE-range), which consists of increasing the magnitude of *all* outcomes through a common multiplicative constant (i.e., all outcomes become larger).

We ran a study to check the effects of such a manipulation. This study was in all similar to Experiment 3 except that the O-range condition was replaced by the PE-range condition, in which the outcomes were multiplicatively increased.[22] In line with the peanuts effect, it was expected that in the PE-range condition (which involves larger outcomes) the weight of the probability attribute would be increased. That is, the preference for security over potential would be reinforced because 'weight' would become more aligned with 'prior importance' of the probability attribute, which would increase the choice of the safer gamble. Thus, to check the effects of the manipulation on choice and on conflict, a LOGIT analysis and a multiple linear regression analysis (similar to those of Experiment 3) were performed, respectively (see Appendix I).

The results demonstrated that the PE-range condition increased the choice of the riskier gamble, $\chi^2(1) = 9.54$, $p < .01$, instead of the safer one as it was expected. Thus, both the PE-range and the O-range manipulations increased the weight of the outcome attribute.

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[22] In the PE-range condition the geometric mean of the outcomes and expected values were increased, whereas in the O-range condition they were maintained constant.

Yet, the effect of PE-range on attribute weighting was smaller than the effect of O-range, $\chi^2(1) = 10.78$, $p < .001$: The PE-range increased the choice probability from .43 to .50, meaning that both the outcome and the probability attributes were equally weighted, whereas, the O-range manipulation increased the choice probability of the riskier gamble from .44 to .69, meaning that the outcome attribute became the most important attribute. In accordance with these results, the effect of the PE-range on conflict also tended to be similar to that of the O-range, but weaker and not reliable: The regression analysis performed on the last six tasks revealed that the relation between tradeoff size and conflict tended to become more negative in the PE-range condition, but the effect was not at all significant $t(852) = -0.59$, $p = .55$.

The relevant point is that the PE-range manipulation did not increase the preference for the safer gamble as it was supposed to. Rather, it increased the preference for the riskier gamble, as the O-range manipulation. There is evidence demonstrating that increasing the magnitude of all outcomes would generate a peanuts effect, which leads to the question of what could possibly explain these unforeseen results?

One possible explanation concerns the range manipulations. The outcomes ranged from €3.50 to €29.50 in the S-range condition and from €32.00 to €270.00 in the PE-range condition. Therefore, it could be argued that a peanuts effect should occur within each range condition, i.e., that the choice of the safer gamble would be greater for larger outcomes than for smaller ones in each range condition. If this was the case, then the reference gamble condition should have an effect on choice: The preference for the safer gamble should be greater in the large-amount condition (which involves larger outcomes) than in the high-probability condition (which involves smaller outcomes). Therefore, we conducted a LOGIT analysis on choice of the riskier gamble for each outcome range condition, with reference gamble condition as the independent variable. These analyses revealed that the choice did not differ by reference gamble condition, neither in the S-range condition, $\chi^2(1) = 1.37$, $p = .24$, nor in the PE-range condition, $\chi^2(1) = 0.78$, $p = .38$.

Weber and Chapman (2005) demonstrated that the peanuts effect was larger for larger probability magnitudes. They defined three levels of probability magnitudes: Low, medium, and high. Nevertheless, this manipulation implied that as the probability magnitudes increased, the probabilities also increased, i.e., the probabilities became closer to certainty. For instance, low, medium, and high magnitude probability levels correspond to tradeoffs between a 5% versus 10% winning chance, a 25% versus 50% winning chance, and a 50% versus 100% winning chance, respectively. In other words, the participants' preference for the

safer gamble increased as probabilities became closer to, or actually involved certainty. Therefore, and although the authors demonstrated that certainty was not necessary for the peanuts effect to occur, it is likely that it does play an important role on the strength of the effect. This may have affected our results given that in our investigation we only considered choices between gambles, i.e., we did not include a safe option, and the probabilities we used were not close to certainty.

Another factor that has probably contributed to the absence of the peanuts effect in our investigation was the multiplicative constant by which the outcomes were increased. Weber and Chapman (2005) showed that the choice of the riskier gamble decreased as the payout magnitude increased by using multiplicatively constants of 10, 100, and 1000. We multiplied our outcomes by 9 and perhaps this was not sufficiently large to raise the choice of the safer gamble.

On the whole, evidence seems to suggest that simply increasing the magnitude of all outcomes is not a sufficient condition to produce a peanuts effect; in fact, it leads to an increase of the weight of the outcome attribute rather than to an increase of the weight of the probability attribute. Other factors such as the presence/absence of certainty and the magnitude of the multiplicative constant should be taking into account.

In Experiment 3, we examined the effect of attribute weight on conflict arousal by manipulating (increasing) the range of the outcome differences between the gambles. In the next Experiment we extend our analysis by examining the effects of an increased outcome range and of a decreased probability range on conflict arousal.

Experiment 4:

Gains and Outcome Weight -

Increasing Outcome Range and Decreasing Probability Range

In Experiment 3 we addressed the impact of increasing the outcome weight by increasing the outcome range. Increasing the outcome range indeed increased the weight of the outcome attribute, as revealed by the increase of the choice of the riskier gamble. The results supported the predictions. An increased outcome range led to a greater preliminary conflict from concern about argumentation and to a more negative (or less positive) relation between tradeoff size and conflict. Also, this effect became stronger as participants proceeded in the experimental situation. According to the range sensitivity principle (Fischer, 1995), the

weight of an attribute can be enhanced not only by widening the range of that attribute, but also by narrowing the range of the other attribute. In Experiment 4, we manipulate the outcome weight by increasing the outcome range (as in Experiment 3) and by decreasing the probability range. Our aim is to corroborate the findings of Experiment 3 and to examine the effects of a decreased probability range on conflict arousal. The two manipulations should have the same effect on attribute weighting (and thus on preferences), but opposite implications for the relation between tradeoff size and conflict.

Preferences and Manipulations of Outcome Weight in Gains

In choices involving gains people prefer to play safe. They tend to assign a greater importance to probability of winning than to amount to win, and therefore, security is preferred over potential and the safer gamble tends to be chosen more often than the riskier one. Nevertheless, a decision is not necessarily determined by the most important attribute, but rather, by the attribute that is more heavily weighted in a particular decision, as it was demonstrated in Experiment 3. Depending on the decision context, the outcome attribute can receive a greater weight than the outcome attribute and be the determinant attribute for choice. In consequence, people will prefer potential over security, and consequently, the choice of the riskier option will increase.

In accordance with the range sensitivity principle (Fischer, 1995), in the present Experiment we manipulate the weight of the outcome attribute not only by increasing the outcome range (as in Experiment 3), but also by decreasing the probability range, i.e., by decreasing the magnitude of the probability differences between the gambles. Although these manipulations of outcome weight are distinct, they both result in an increase of the magnitude of the outcome differences relatively to the magnitude of the probability differences (manipulation of tradeoff rate). Therefore, because this should provide to the decision maker a strong argument in favor of amount to win, potential should become preferred over security and the choice of the riskier gamble should increase, either when the outcome range is increased or when the probability range is decreased.

Although it is expected that both manipulations will have a similar effect on preferences, it is also expected that they will have a differential effect on the arousal of conflict as discussed next.

Conflict and Manipulations of Outcome Weight in Gains

In Experiment 3 we have already derived predictions about the effects of the outcome range manipulation on conflict arousal. In brief, increasing the outcome range strengthens the argument for potential (larger gain) while maintaining the strength of the argument for security (more probable gain). Thus, because there is no longer a reason for the decision maker to prefer one gamble over the other, arguing unilaterally in favor of one gamble becomes more difficult. Accordingly, the preliminary conflict from concern about argumentation increases, and thus, in the subsequent deliberation phase, the negative mediating effect produced by this concern will be accentuated and the relation between tradeoff size and conflict will become more negative (or less positive). Furthermore, because sensitivity to range manipulations will be acquired during the Experiment, preliminary impression will be formed progressively as participants proceed through the choice tasks, and thus, the moderating effect of outcome range will be more pronounced in the later tasks than in the earlier ones. The same hypothesis will be tested here:

H6.1. When the outcome range increases, the preliminary conflict from concern about argumentation will increase.

H6.2. When the outcome range increases, the relation between tradeoff size and conflict will change in a downward direction.

H6.3. The moderating effect of outcome range on the relation between tradeoff size and conflict will become stronger with progress through the choice tasks.

Increasing the probability range, i.e., the magnitude of the probability differences between the gambles, means that higher probabilities become lower and lower probabilities become higher. That is, we manipulate the rate of the tradeoffs between probability and outcome so that the probability differences become smaller relatively to the outcome differences (which are maintained because the outcome range is preserved). This should weaken the argument for security (more probable gain) while the argument for potential (larger gain) maintains is strength. The prior importance of the probability attribute no longer offers a strong argument for choosing the safer gamble, and thus, the argument for potential will prevail over the argument for security. As a result, the decision maker is left with an argument to choose (a reason to prefer the riskier gamble) and it becomes easier to argue unilaterally in favor of the riskier gamble. In other words, the preliminary conflict aroused by the concern about argumentation will decrease, and consequently, in the subsequent

deliberation phase, the negative mediating effect of argumentation will be attenuated, and the relation between tradeoff size and conflict will become more positive (or less negative). We thus arrive at the following hypotheses:

H7.1. When the probability range decreases, the preliminary conflict from concern about argumentation will decrease.

H7.2. When the probability range decreases, the relation between tradeoff size and conflict will change in an upward direction.

Moreover, again because sensitivity to range manipulations will be acquired during the Experiment, experience with the tasks is necessary so that a preliminary impression can be formed on the basis of knowledge and past experience. Thus, we expect that the preliminary impression will be formed progressively as the participants proceed in the experimental situation, and, as a consequence, that the moderating effect of probability range predicted by *H7.2*, will become more pronounced in the later tasks than in the earlier ones. We thus arrive at the following hypothesis:

H7.3. The moderating effect of probability range on the relation between tradeoff size and conflict will become stronger with progress through the choice tasks.

Method of Experiment 4

Participants. A total of 108 psychology students from ISPA-IU participated in the study. Although participants were not paid, they gained access to a lottery, similar to the one of Experiment 3.

Materials and stimuli. As in the previous Experiments, the data were collected through a computerized questionnaire developed in *Turbo Pascal*. The participants completed 18 decision tasks and after completing each task they completed four scales corresponding to four conflict measures. As in Experiment 3, the decision tasks were dyadic choices between gambles implying a tradeoff between probability of winning and amount to win.

The gambles yield an outcome x with probability p or a zero outcome with probability $1-p$. Three sets of stimuli comprised three range conditions: S-range (standard range), O-range (outcome range increased), and P-range (probability range decreased). The ranges were again constructed on the basis of estimates of prospect theory (Tversky and Kahneman, 1992), as described in Appendix J. In the S-range condition, participants should, according to prospect theory, be pairwise indifferent between the gambles. In the O-range condition, the range of

the outcomes was increased, such that larger outcomes increased and smaller outcomes decreased. In the P-range condition, the probability range was decreased, such that larger probabilities decreased and smaller probabilities increased. Therefore, both in the O-range and P-range conditions, participants should prefer the riskier gamble over the safer one. The three range conditions and respective gambles are represented in Figure 20 in terms of outcome values (log scales), $v(x)$, and probability weights, $w(p)$.
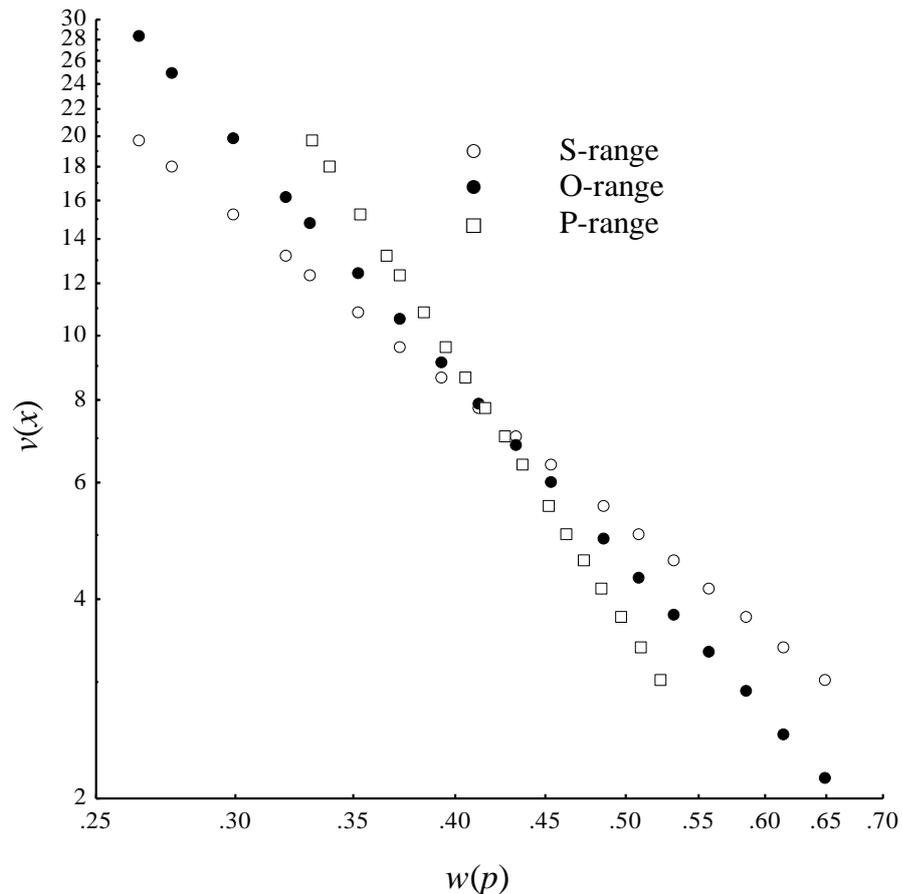
Figure 20. Probability weights and outcome values (Experiment 4).

In Experiment 3, the experimental results did not differ by chance device condition. For this reason, in Experiment 4, the chance device is always a card gamble. Furthermore, in the S-range and in the O-range conditions the probability (of winning) ranged from .212 to .846, which corresponds to a range of winning cards from 11 to 44. In the P-range condition the probability (of winning) ranged from .327 to .637, which corresponds to a range of winning cards from 17 to 35. The specifications of the winning cards are given in Appendix K. The outcome differences ranged from €3.50 to €29.50 in the S-range and P-range conditions, but from €2.50 to €44.50 in the O-range condition. The gambles, their

probabilities (p), outcomes (x), and expected values (px) are showed in Table 10. As in the previous Experiments, lower probabilities (i.e., the riskier gambles) had higher (more positive) expected values in all the three conditions. In the S-range condition, this compensates for the common preference for the safer gamble in gains; in the O-range condition, this is the result of the increased outcome range; and in the P-range condition, this is the result of the decreased probability range.

Table 10

Probabilities, Outcomes, and Expected Values (Experiment 4)[a]

	S-range				O-range				P-range		
f^a	p	x^b	px	f^a	p	x^b	px	f^a	p	x^b	px
11	.212	29.50	6.24	11	.212	44.50	9.41	17	.327	29.50	9.64
12	.231	26.50	6.12	12	.231	38.50	8.88	18	.346	26.50	9.17
14	.269	22.00	5.92	14	.269	30.00	8.08	19	.365	22.00	8.04
16	.308	18.50	5.69	16	.308	23.50	7.23	20	.385	18.50	7.12
17	.327	17.00	5.56	17	.327	21.50	7.03	21	.404	17.00	6.87
19	.365	15.00	5.48	19	.365	17.50	6.39	22	.423	15.00	6.35
21	.404	13.00	5.25	21	.404	14.50	5.86	23	.442	13.00	5.75
23	.442	11.50	5.09	23	.442	12.00	5.31	24	.462	11.50	5.31
25	.481	10.00	4.81	25	.481	10.50	5.05	25	.481	10.00	4.81
27	.519	9.00	4.67	27	.519	9.00	4.67	26	.500	9.00	4.50
29	.558	8.00	4.46	29	.558	7.50	4.18	27	.519	8.00	4.15
32	.615	7.00	4.31	32	.615	6.00	3.69	29	.558	7.00	3.90
34	.654	6.00	3.92	34	.654	5.50	3.60	30	.577	6.00	3.46
36	.692	5.50	3.81	36	.692	4.50	3.12	31	.596	5.50	3.28
38	.731	5.00	3.65	38	.731	4.00	2.92	32	.615	5.00	3.08
40	.769	4.50	3.46	40	.769	3.50	2.69	33	.635	4.50	2.86
42	.808	4.00	3.23	42	.808	3.00	2.42	34	.654	4.00	2.62
44	.846	3.50	2.96	44	.846	2.50	2.12	35	.673	3.50	2.36

[a]The number of winning cards in a complete deck of 52 cards. [b]Euros (€).

Design. The design was similar to the one of Experiment 3, with a few changes. Firstly, range condition has three (instead of two) levels: S-range (standard range), O-range (outcome range increased) and P-range (probability range decreased). The 3 (range

conditions) $\times$ 3 (tradeoff size) $\times$ 2 (reference gamble) within-participants design results in 18 decision tasks for each participant. Secondly, we included three (instead of four) between-participants factors. Two factors were counterbalancing ones, as in the previous Experiments: Reference-gamble extremeness, which counterbalances the assignment of the extremeness of the reference gamble across tradeoff sizes, as shown in Table 11; and the assignment of the extremeness conditions to the tree range conditions, which varies the extremeness conditions across the three range conditions in accordance with Table 12. The third between-participants factor was progress through the choice tasks. The chance device factor was excluded because, as we referred previously, it did not affect the experimental results of Experiment 3.

Table 11

Assignment of Reference-Gamble Extremeness to Tradeoff Sizes (Experiment 4)[a]

| | S-range and O-range | | | | | | P-range | | | | | |
| | Large-amount condition | | | High-probability condition | | | Large-amount condition | | | High-probability condition | | |
Extremeness condition	Small tradeoff	Intermediate tradeoff	Large tradeoff	Small tradeoff	Intermediate Tradeoff	Large tradeoff	Small tradeoff	Intermediate tradeoff	Large tradeoff	Small tradeoff	Intermediate tradeoff	Large tradeoff
1.1	11-12	14-25	17-42	42-44	27-40	12-36	17-18	19-25	21-34	34-35	26-33	18-31
1.2	17-19	12-23	16-40	34-36	29-42	14-38	21-22	18-24	20-33	30-31	27-34	19-32
1.3	14-16	19-32	11-34	38-40	21-34	19-44	19-20	22-29	17-30	32-33	23-30	22-35
2.1	11-12	17-29	14-38	42-44	23-36	16-40	17-18	21-27	19-32	34-35	24-31	20-33
2.2	14-16	11-21	19-44	38-40	32-44	11-34	19-20	17-23	22-35	32-33	29-35	17-30
2.3	17-19	16-27	12-36	34-36	25-38	17-42	21-22	20-26	18-31	30-31	25-32	21-34

[a]The tradeoff sizes are indicated by the number of winning cards in each pair. See Table 10.

Table 12

Assignment of Extremeness Conditions to Range Conditions (Experiment 4)[a]

Range Condition	Counterbalancing Condition											
	1	2	3	4	5	6	7	8	9	10	11	12
S-range	1.1	1.1	1.2	1.2	1.3	1.3	2.1	2.1	2.2	2.2	2.3	2.3
O-range	1.2	1.3	1.1	1.3	1.1	1.2	2.2	2.3	2.1	2.3	2.1	2.2
P-range	1.3	1.2	1.3	1.1	1.2	1.1	2.3	2.2	2.3	2.1	2.2	2.1

[a]For the extremeness conditions, see Table 11.

Procedure and measures. Each experimental session was run by computer (in the laboratory of ISPA-IU) with at most 20 participants at a time and lasted about 30 minutes. The procedure and measures were the same as in Experiment 3.

Results of Experiment 4

More information on the results of Experience 4 is presented in Appendix L.

Conflict: Variable construction. Again conflict was obtained by a principal component analysis conducted on the five conflict measures. The first component was extracted. This component, the conflict factor, had an eigenvalue of 1.92, explained 38.38% of the total variance, and loaded positively on all the five measures: Decision time (.39), decision difficulty (.65), decision uncertainty (.62), preference equality (.74), and attribute-weight equality (.65). The reliability analysis revealed a standardized Cronbach alpha of .59 and an average inter-item correlation of .22. There was no increase in the value of alpha when an item was deleted, attesting to the content validity of the all items. Therefore, we constructed a composite measure of conflict by deriving the (standardized) scores on the principal component and then linearly transforming them to scales from 0 to 1.

Conflict: Test of hypotheses. One linear regression (regression 1) was performed across all the 18 tasks in order to test *H6.2* and *H7.2* (the moderating effects of outcome and probability ranges on the relation between tradeoff size and conflict, respectively), and *H6.3* and *H7.3* (the effect of progress through the choice tasks on the moderating effects of outcome and probability ranges, respectively). Conflict was the dependent variable and the independent variables were range condition, tradeoff size, reference gamble, and progress through the choice tasks. The analysis included: Two contrasts between the three range conditions, one between the S-range and O-range conditions, and other between the S-range

and P-range conditions; two polynomial contrasts (linear and quadratic) between the small, intermediate, and large tradeoffs; a contrast between the large-amount condition and the high-probability condition; two polynomial contrasts (linear and quadratic) between the first six tasks, the intermediate six tasks, and the last six tasks; and 46 contrasts capturing the interactions between the independent variables. Regarding the progress through the choice tasks, the linear contrast compares the first to the last six tasks, and the quadratic contrast the intermediate to the first and the last six tasks.

Four other linear regression analyses were conducted across the last six tasks. One analysis (regression 2) again tested *H6.2* and *H7.2*. This analysis included all contrasts mentioned previously, except those associated with progress through the choice tasks. The other three analyses (regressions 3, 4 and 5) evaluated the specific shape of the relation between tradeoff size and conflict in each range condition. These analyses included all contrasts included in regression 1, except those associated with progress through the choice tasks and range conditions.

Figure 21 shows the relation between tradeoff size and conflict by range condition across all the decision tasks. The results of regression 1 demonstrated an effect, although not significant, $t(1890) = -0.68$, $p = .25$, of the interaction of the contrast between the S-range and the O-range conditions with tradeoff size (linear contrast): When the outcome range increased, the relation between tradeoff size and conflict tended to change in a downward direction, providing directional support for *H6.2*. There was also an effect, but again not significant, $t(1890) = 0.99$ $p = .16$, of the interaction of the contrast between the S-range and the P-range conditions with tradeoff size (linear contrast): When the probability range increased, the relation between tradeoff size and conflict tended to change in an upward direction, providing directional support for *H7.2*.
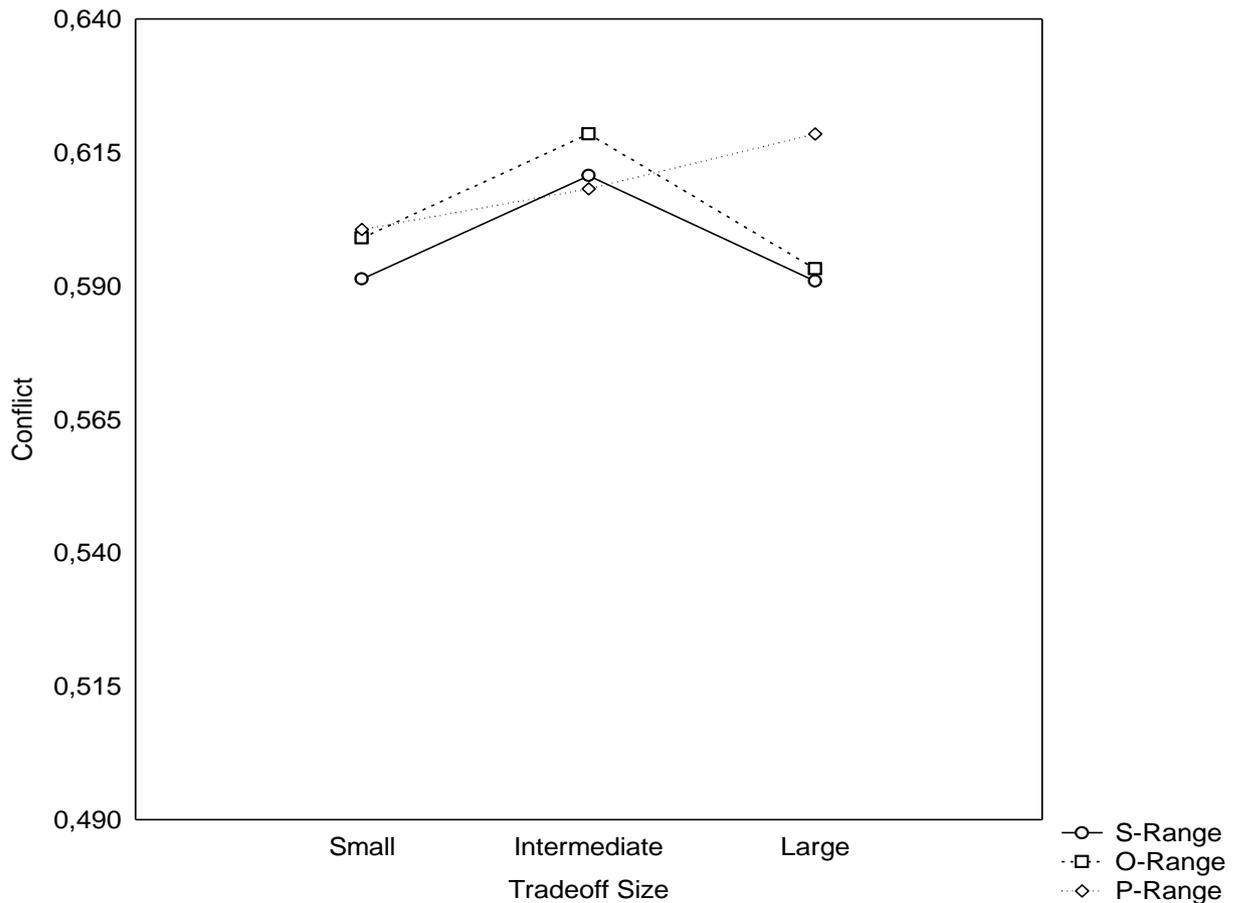
Figure 21. Relation between tradeoff size and conflict by range conditions across all decision tasks (Experiment 4).

Furthermore, in support of *H6.2,* there was a significant effect of the interaction of the contrast between the S-range and the O-range conditions with tradeoff size (linear contrast) and progress through the choice tasks (linear contrast), $t(1890) = -2.65$, $p = .01$: The moderating effect of outcome range became more pronounced with the progress through the choice tasks, consistent with *H6.3*. In support of *H7.2*, there was a significant effect of the interaction of the contrast between the S-range and the P-range conditions with tradeoff size (linear contrast) and progress through the choice tasks (linear contrast), $t(1890) = 2.80$, $p = .01$: The moderating effect of probability range became more pronounced with the progress through the choice tasks, consistent with *H7.3*. We also found a significant main effect of progress through the choice tasks (linear contrast), $t(1890) = -4.20$, $p < .001$: Conflict was greater in the first six tasks than in the last six tasks.

Figure 22 shows how the relation between tradeoff size and conflict was moderated by outcome and probability range across the last six tasks. Regression 2 revealed that the

interaction effect of the contrast between the S-range and the O-range conditions with tradeoff size (linear contrast) was now significant: When the outcome range increased, the relation between tradeoff size and conflict changed in a downward direction, $t(630) = -2.49$, $p = .01$, consistent with *H6.2*. The interaction effect of the contrast between the S-range and the P-range conditions with tradeoff size (linear contrast) was also now significant, $t(630) = 2.49$, $p = .01$: When the probability range decreased, the relation between tradeoff size and conflict changed in an upward direction, consistent with *H7.2*.
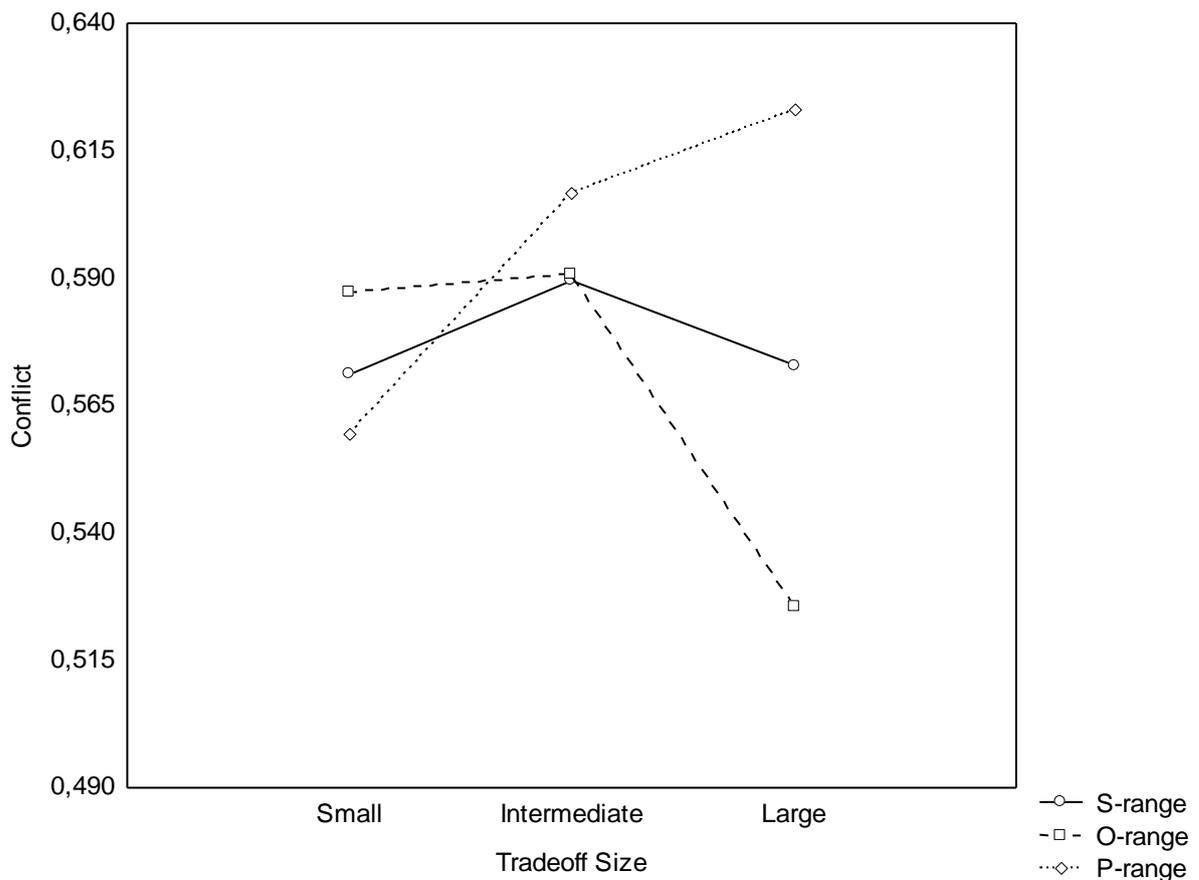
Figure 22. Relation between tradeoff size and conflict by range conditions across the last six tasks (Experiment 4).

Furthermore, there was a negative relation between tradeoff size and conflict in the O-range condition, $t(213) = -1.92$, $p = .06$ (marginally significant effect, regression 3), and a positive relation in the P-range condition, $t(207) = 2.12$, $p = .03$ (regression 4). In the S-range condition there was an inverse U-shaped relation, but the effect was not significant, $t(210) = .68$, $p = .50$ (regression 5).

Model estimation and parametric hypotheses test. In Experiment 4, seven parameters were estimated from the 3 (range condition) × 2 (reference gamble) × 3 (tradeoff size) = 18 levels of conflict observed across the last six tasks. Two of these were the auxiliary parameters. The other five were the estimated levels of preliminary conflict.[23] The estimates are given in Appendix L. The goodness-of-fit of the estimated model was $R^2 = .59$.

When the outcome range increased, the preliminary conflict from concern about argumentation increased, $t(11) = 1.04$, $p = .16$, consistent with *H6.1*. At the same time, the preliminary conflict from concern about sacrifice decreased, $t(11) = -1.37$, $p = .20$. Nevertheless, the difference in the preliminary conflict from concern about sacrifice was not as great as the difference in the preliminary conflict from concern about argumentation $t(11) = -1.22$, $p = .25$.

When the probability range decreased, the preliminary conflict from concern about argumentation decreased, $t(11) = -1.12$, $p = .14$, consistent with *H7*.1. However, at the same time, the preliminary conflict from concern about sacrifice increased, $t(11) = 3.12$, $p = .01$. Furthermore, the difference in the preliminary conflict from concern about sacrifice was greater than the difference in the preliminary conflict from concern about argumentation, $t(11) = 2.35$, $p = .04$.

Complementary analysis: Manipulation check. As in Experiment 3, to validate the manipulation of the weight of the outcome attribute versus the weight of the probability attribute we analyzed the choice probabilities of the riskier option (which is superior along the outcome attribute). The gambles in the S-range condition were again constructed so that they would generate pairwise indifference between them, i.e., so that the outcome and the probability attribute would be equally weighted. In the O-range condition and in the P-range condition, the gambles were constructed so that participants would prefer the riskier gamble over the safer one, i.e., so that the outcome attribute would receive a greater weight than the probability attribute.

As previously, to check how the manipulations affected the participants' choice patterns, we conducted a LOGIT analysis, in which we regressed choice of the riskier gamble on a contrast between the S-range condition and the O-range condition, and on a contrast between the S-range condition and the P-range condition.

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[23]The preliminary conflict from concern about sacrifice in the P-range condition had to be set to 1 in order to estimate the remaining parameters.

Figure 23 shows the effect of each range condition on choice. The results revealed an effect, even though not significant, of the contrast between S-range and O-range, $\chi^2(1) = 2.58$, $p = .11$, and a significant effect of the contrast between S-range and P-range, $\chi^2(1) = 24.69$, $p < .001$: The choice of the riskier gamble was greater in O-range than in S-range, and greater in P-range than in S-range, as expected. In particular, the proportion of participants that chose the riskier gamble was .45 in the S-range condition, which was significantly different from the chance level, $p = .02$ (binomial test). In the O-range and P-range conditions, the proportion of participants that chose the riskier gamble was .58 and .69, respectively, which were also significantly different from the chance level ($p < .001$ and $p < .001$, binomial tests). Thus, increasing the outcome range or decreasing the probability range increased the choice of the riskier gamble, but the effect was larger when decreasing the probability range than when increasing the outcome range. This difference was significant, $\chi^2(1) = 3.75$, $p = .04$.
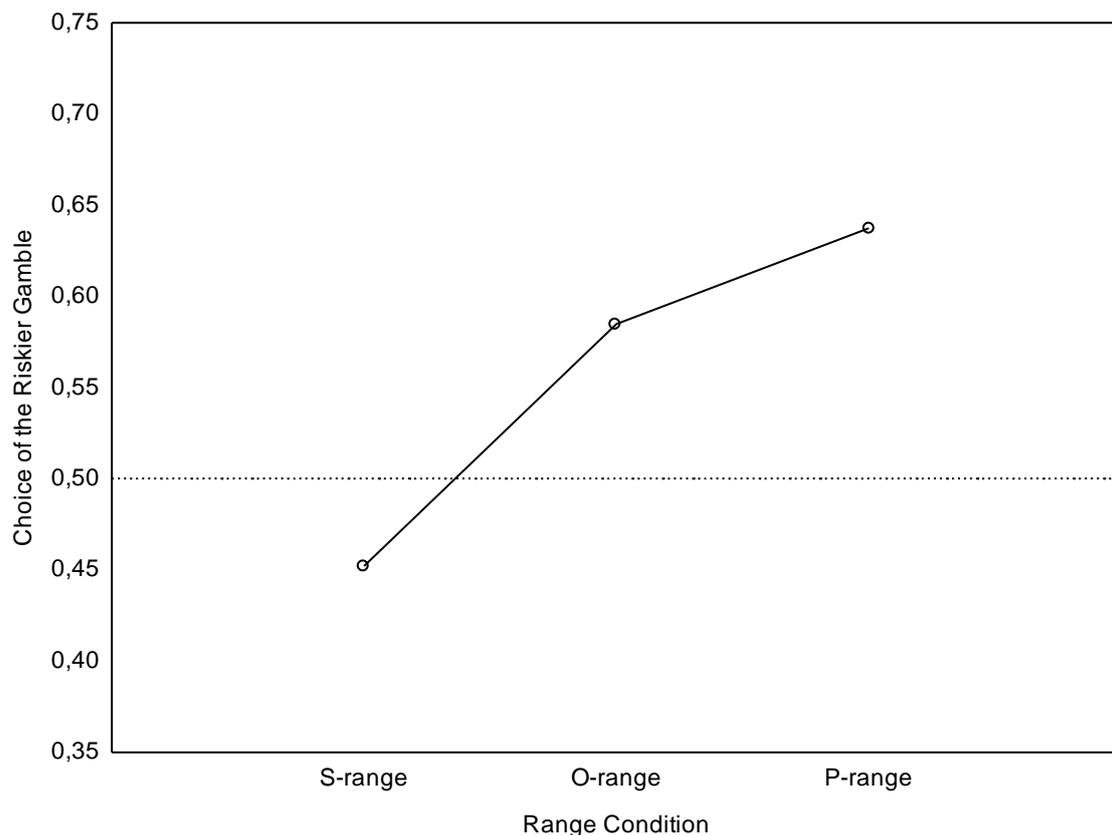
Figure 23. Choice of the riskier gamble by range conditions (Experiment 4).

These results show that either increasing the outcome range or decreasing the probability range increased the weight of the outcome attribute as it was expected by the range sensitivity principle (Fischer, 1995). The outcome attribute became more determinant of

choice than the probability attribute, and thus, potential became preferred to security, as revealed by a greater choice of the riskier gamble both in the outcome range and in the probability range conditions. Nevertheless, the effect of the probability range was stronger than the effect of outcome range. Furthermore, as in Experiment 3, in the standard condition the probability attribute was still more heavily weighted than the outcome attribute, and thus, security was preferred to potential, as revealed by the greater choice of the safer gamble.

Moreover, the effects of the outcome range manipulation on choice probabilities corroborated the findings of Experiment 3. However, the results were less strong (and did not reach significance) in this Experiment. This was most likely due to two reasons. Firstly, in Experiment 3 we developed a stronger manipulation of outcome range than in Experiment 4. That is, whereas in the former case we increased the range of the outcome values by 161% in the standard condition and by 522% in the outcome range condition, in the latter, the increase was much smaller especially in what concerns the outcome range manipulation: The outcome values were increased by 137% in the standard condition and by 271% in the outcome range condition. Secondly, it is probable that the contrast between manipulations has removed some of the effect of the outcome range manipulation. That is, because the effect of the probability range itself has revealed to be stronger than the effect of the outcome range, the probability range manipulation reduced the impact of the outcome range manipulation.

Discussion of Experiment 4

The hypotheses concerning the moderating effects of outcome and probability ranges on the relation between tradeoff size and conflict received reliable support, as well as the ones concerning the effects of progress through the choice tasks on the moderating effects. The hypotheses concerning the effects of outcome and probability range on the sacrifice and argumentation mediators received only directional support. The double-mediation model accounted for 59% of the variation in conflict, which was clearly worse than in Experiment 3. A more detailed analysis revealed that this was probably due to a greater variation in the preliminary conflict across reference-gamble conditions, explaining why the parametric hypothesis tests yielded mainly directional support.

The effects of outcome range on conflict replicated the findings of Experiment 3. The three hypotheses were confirmed: When the outcome range was increased the preliminary conflict from concern about argumentation increased and the relation between tradeoff size and conflict became more negative (or less positive). In addition, as in Experiment 3, when

the outcome range increased, the preliminary conflict from concern about sacrifice decreased, which also contributed to the negative change in the relation between tradeoff size and conflict.

The two hypotheses concerning the effects of probability range on conflict were also supported: Decreasing the probability range decreased the concern about argumentation and generated a more positive (or less negative) relation between tradeoff size and conflict. However, the parameter estimation of the model revealed that the positive change in the relation between tradeoff size and conflict was not only due to the decrease in the preliminary conflict from concern about argumentation (as we predicted), but also, and mostly, to the increase in the preliminary conflict from concern about sacrifice (the effect of probability range on the sacrifice mediator was stronger than the effect on the argumentation mediator).

These results suggest that when decreasing the probability range attention shifts away from argumentation and toward sacrifice. As expected, when the probability range is decreased, it becomes easier to argue in favor of the riskier gamble seeing that there is no longer a strong argument in favor of security (the probability differences are small relatively to the outcome differences). But even so, it seems that probability is still a concern. And for this reason attention shifts toward sacrifice. In other words, participants become concerned about the probability that they must forego when choosing the riskier gamble.

Furthermore, the two hypotheses that addressed the effects of progress through the choice tasks were also confirmed: Both moderating effects of outcome and probability ranges became stronger in the last six tasks.

Finally, consistent with Experiment 3, our results showed a main effect of progress through the choice tasks on conflict. Conflict again decreased as the participants proceeded through the choice tasks, which supports the interpretation that as people become more familiar with the tasks, they become more confident in their decisions, and thus, the level of conflict decreases.

To summarize, in Experiments 3 and 4 we focused on choices involving gains and investigated the effect of differential attribute weight on conflict arousal. In Experiment 5 we extend the investigation of the effect of differential attribute weight to choices involving losses.

Experiment 5:

Losses and Outcome Weight –

Increasing Outcome Range and Decreasing Probability Range

In Experiments 3 and 4 we addressed the effects of differential attribute weight on conflict arousal in choices involving gains. The results demonstrated that both increasing the outcome range and decreasing the probability range increased the weight of the outcome attribute. More importantly, they supported the predictions that the two outcome weight manipulations differentially moderated the relation between tradeoff size and conflict: The relation became more negative (or less positive) when increasing the outcome range but more positive (or less negative) when decreasing the probability range. In addition, both moderating effects became stronger as participants proceeded in the experimental situation. In Experiment 5, we examine the effects of differential attribute weight on conflict arousal in losses, and the same experimental results are expected. There is, however, one key difference. In gains, increasing the outcome weight means increasing the preference for potential, which countervails the common preference for the safer gamble, and thus, increases the choice of the riskier gamble. In losses, it means increasing the preference for security, which countervails the common preference for the riskier gamble, and thus, increases the choice of the safer gamble.

Preferences and Outcome Weight in Losses

A well-established difference between gains and losses involves the preference pattern of the decision makers. As first demonstrated by Kahneman and Tversky (1979) and further investigated by many researchers, people are generally risk averse for gains and risk seeking for losses, as entailed by the S-shaped utility function of prospect theory (Kahneman & Tversky, 1979). That is, there is more risk aversion for gains than for losses, and more risk seeking for losses than for gains.

As we already discussed, to be risk averse, in choices between two positive gambles, means that people prefer to (try) win something, even if the amount is small, rather than to take a (greater) risk and win nothing. This implies that, in gains, probability of winning tends to be more important than amount to win. Therefore, security (a more probable gain) is preferred over potential, and thus, gamble *y* (€7.00, 61%) is preferred to gamble *z* (€15.00, 36%), i.e., the safer gamble is preferred over the riskier one. To be risk seeking, in choices

between two negative gambles, means that people prefer to take a (greater) risk because they do not want to lose. This implies that, in losses, probability of loosing tends to be more important than the amount to lose. Therefore, people prefer potential (a lowest probability of incurring a loss) over security, and thus, gamble *z'* (€-15.00, 36%) is preferred to gamble *y'* (€-7.00, 61%), i.e., the riskier gamble is preferred over the safer gamble.

In sum, it can be assumed that people tend to focus on the probability attribute both in gains and losses. However, while in gains this focus implies that security is preferred over potential, which leads to a greater choice of the safer gamble, in losses, it implies that potential is preferred over security, which leads to a greater choice of the riskier gamble.

As supported by the previous Experiments, even though probability tends to be the most important attribute, the outcome attribute can be more heavily weighted and more determinant of choice. As in Experiment 4, in the present Experiment, we expect to increase the outcome weight by manipulating the outcome and the probability ranges. The main difference is that, in gains, increasing the outcome weight increases the choice of the riskier option, whereas in losses, it should increase the choice of the safer gamble. That is, both in choices involving gains and in choices involving losses, increasing the weight of the outcome attribute countervails the prior importance of the probability attribute because the outcome differences become larger relatively to the probability differences, which provides a strong argument in favor of the opposite choice. Nevertheless, while in gains we are providing an argument for potential (larger gain), counteracting the common preference for security (more probable gain), which leads to an increase of the choice of the riskier gamble; in losses, we are providing an argument for security (lower loss), counteracting the common preference for potential (less probable loss), which in consequence leads to an increase of the choice of the safer option, or conversely, to a decrease of the choice of the riskier gamble.

Furthermore, in losses, as in gains, differential attribute weight should not only affect the decision maker's preferences but also the arousal of conflict, as we discuss next.

Conflict and Outcome Weight in Losses

In general, the double-mediation model predicts an inverse U-shaped relation between tradeoff size and conflict. It would be reasonable to assume that just as in gains (as a result of the common preference for the safer option), in losses, the common preference for the riskier option would provide an argument in favor of the riskier gamble, decreasing the concern about argumentation. Nevertheless, we expect exactly the contrary, i.e., we expect that the

concern about argumentation will increase rather than decrease. That is, although people can ultimately prefer the riskier gamble, choices involving negative outcomes will always be more difficult to perform because it is contradictory to argue in favor of a negative gamble. This implies that the preliminary conflict from concern about argumentation will increase relatively to the preliminary conflict from concern about sacrifice. Moreover, because the conflict from preliminary impression is the drive to devote attention to this concern during subsequent deliberation, and because only the conflict from deliberation is affected by tradeoff size, the negative mediating effect of the concern about argumentation will be accentuated relatively to the positive mediating effect of concern about sacrifice. Thus, a negative relation between tradeoff size and conflict should arise.

In sum, we expect an overall negative relation between tradeoff size and conflict when decisions involve losses. Nonetheless, it is also expected that differential attribute weight will affect the shape of the relation. We investigate the impact of an increased outcome range and a decreased probability range on conflict arousal. These effects are expected to be identical to those for gains, and thus, the same hypotheses will be tested in this Experiment.

In what concerns the effect of the outcome range manipulation we expect that:

H6.1. When the outcome range increases, the preliminary conflict from concern about argumentation will increase.

H6.2. When the outcome range increases, the relation between tradeoff size and conflict will change in a downward direction.

Increasing the outcome range, i.e., the magnitude of the outcome differences between the gambles, means that larger outcomes become larger and smaller ones become smaller (either gains or losses). The tradeoff rate is manipulated so that the differences in outcome (the amount of gain or loss) become larger relatively to the probability differences (which are maintained because the probability range is preserved). In gains this strengths the argument for potential (larger gain) while maintaining the argument for security (more probable gain). In losses, it strengths the argument for security (a smaller loss) while maintaining the argument for potential (less probable loss). In either case, the decision maker is left with two arguments to choose, i.e., with no reason to prefer one gamble over the other, and arguing unilaterally in favor of one of the gambles becomes more difficult. Thus, the preliminary conflict from concern about argumentation will increase and the relation between tradeoff size and conflict will become more negative (or less positive).

In what concerns the effect of the probability range manipulation we expect that:

H7.1. When the probability range decreases, the preliminary conflict from concern about argumentation will decrease.

H7.2. When probability range decreases, the relation between tradeoff size and conflict will change in an upward direction.

Decreasing the probability range, i.e., the magnitude of the probability differences between the gambles, means that higher probabilities become lower and lower ones become higher (either in gains or in losses). The tradeoff rate is manipulated so that the differences in probability (of winning or losing) become smaller relatively to the differences in outcome (which are maintained because the outcome range is preserved). In gains, this weakens the strength of the argument for security (more probable gain) while maintaining the strength of the argument for potential (larger gain). In losses, it weakens the strength of the argument for potential (less probable loss) while maintaining the strength of the argument for security (a smaller loss). In either case, the decision maker is left with an argument to choose (the argument in favor of potential in the case of gains and the argument in favor of security in the case of losses), and thus, arguing unilaterally in favor of one of the gambles (in favor of the riskier gamble in gains or the safer gamble in losses) becomes easier. Therefore, the preliminary conflict from concern about argumentation will decrease and the relation between tradeoff size and conflict will become more positive (or less negative).

In what concerns the effect of progress through the choice tasks on the moderating effects of outcome and probability ranges, we expect that preliminary impression will be formed progressively as participants proceed in the experimental situation because sensitivity to ranges will be acquired during the Experiment. Thus, the moderating effects will become more pronounced in the latter than in the earlier tasks:

H6.3. The moderating effect of outcome range on the relation between tradeoff size and conflict will become stronger with progress through the choice tasks.

H7.3. The moderating effect of probability range on the relation between tradeoff size and conflict will become stronger with progress through the choice tasks.

Method of Experiment 5

Participants. A total of 120 psychology students from ISPA-IU participated in the study and received a voucher of €7.50 for their participation.

Materials and stimuli. The data were again collected through a computerized questionnaire developed in *Turbo Pascal*, similar to the one of Experiment 4. The difference between the two Experiments is the outcome sign. Thus, each one of the 18 decisions tasks consisted in a dyadic choice between gambles implying a tradeoff between probability of losing and amount to lose (instead of gambles implying a tradeoff between probability of winning and amount to win).

The stimuli were gambles yielding an outcome x with probability p or a zero outcome with probability 1-p and were obtained by reversing the sign of the outcomes of the stimuli of Experiment 4. Accordingly, three sets of stimuli, comprising three range conditions, were developed: S-range (standard range), O-range (outcome range increased) and P-range (probability range decreased). In the S-range condition, participants should be pairwise indifferent between the gambles. In the O-range and P-range conditions, participants should prefer the safer gamble over the riskier one. Lower probabilities (i.e., the riskier gambles) had lower (more negative) expected values in all the three conditions. In the S-range condition, this compensates for the common preference for the riskier gamble in losses; in the O-range condition, is the result of the increased outcome range; and in the P-range condition, is the result of the decreased probability range.

Design, procedure and measures. The design, procedure, and measures were the same as in Experiment 4.

Results of Experiment 5

More information on the results of Experience 5 is presented in Appendix M.

Conflict: Variable construction. Conflict was obtained by a principal component analysis conducted on the standard five conflict measures. One component, the conflict factor, was extracted. This component, presented an eigenvalue of 1.94, explained 38.80% of the total variance, and loaded positively on the five measures: Decision time (.34), decision difficulty (.75), decision uncertainty (.72), preference equality (.72), and attribute-weight equality (.48). The internal consistency reliability analysis on the conflict measure revealed a standardized Cronbach alpha of .58, which did not increase when an item was deleted, attesting to the content validity of the all items. The average inter-item correlation was .22. Therefore, we constructed the conflict factor by deriving the (standardized) scores on the principal component and then by linearly transforming them to scales from 0 to 1.

Conflict: Test of hypotheses. One linear regression analysis (regression 1) was performed across all the 18 decision tasks in order to test *H6.2* and *H7.2* (the moderating effects of outcome and probability ranges on the relation between tradeoff size and conflict, respectively), and *H6.3* and *H7.3* (the effect of progress through the choice tasks on the moderating effects of outcome and probability ranges, respectively). Conflict was the dependent variable and the independent variables were range condition, tradeoff size, reference gamble, and progress through the choice task. The analysis included: Two contrasts between the three range conditions, one between the S-range and O-range conditions and another between the S-range and P-range conditions; two polynomial contrasts (linear and quadratic) between the small, intermediate, and large tradeoffs; a contrast between the large-amount condition and the high-probability condition; two polynomial contrasts (linear and quadratic) between the first six tasks, the intermediate six tasks, and the last six tasks; and 46 contrasts capturing the interactions between the independent variables.

The results of regression 1 showed a significant main effect of tradeoff size (linear contrast), $t(2106) = -2.87$, $p < .01$, as expected: There was an overall negative relation between tradeoff size and conflict in losses, as can be seen in Figure 24. The main effect of progress through the choice tasks (linear contrast) was also significant, $t(2106) = -2.22$, $p = .03$: Conflict decreased as the participants proceeded in the experimental situation.
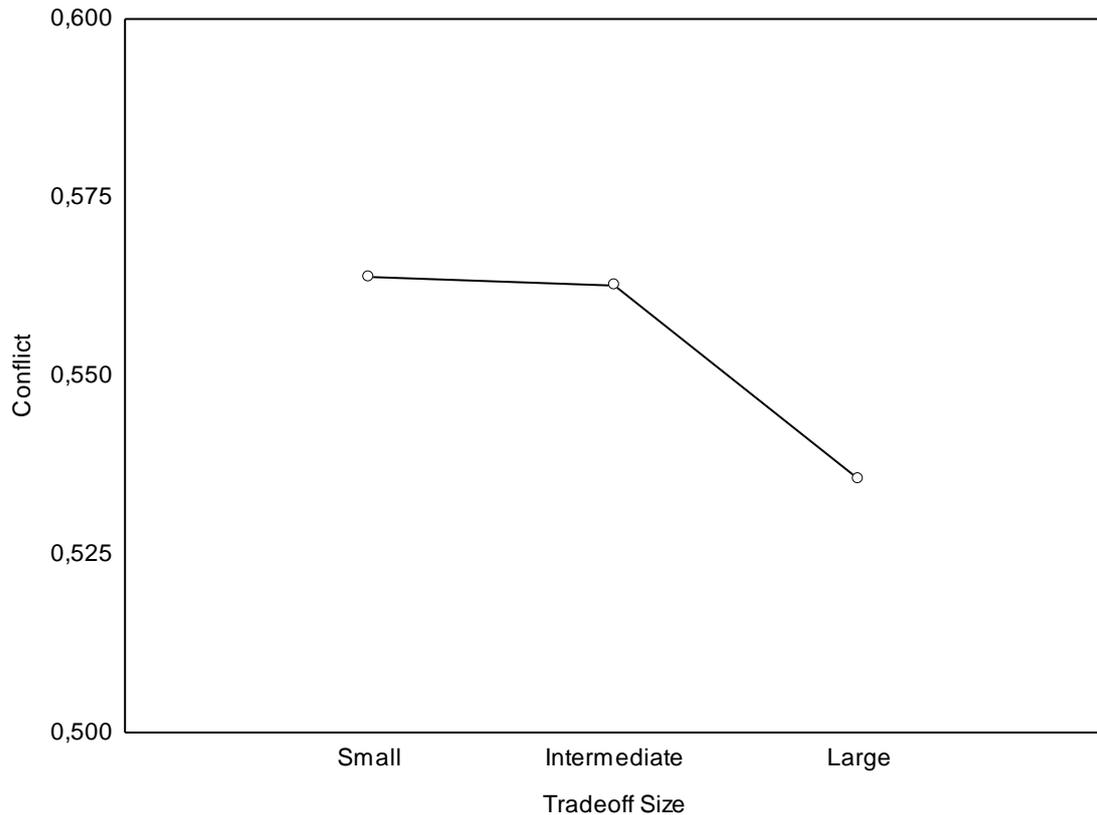
Figure 24. Overall relation between tradeoff size and conflict in losses.

Figure 25 shows the relation between tradeoff size and conflict by range condition across all the 18 decision tasks. Regarding the moderating effect of outcome range, predicted by *H6.2*, the results of regression 1 revealed a very weak and non significant effect of the interaction of the contrast between S-range and O-range with tradeoff size (linear contrast), $t(2106) = -0.04$, $p = .49$: When the outcome range increased the relation between tradeoff size and conflict did not change, not supporting *H6.2*. The interaction effect of the contrast between S-range and P-range with tradeoff size (linear contrast), $t(2106) = 0.60$, $p = .27$, was also not significant, but it provided directional support for *H7.2*: When the probability range increased, the relation between tradeoff size and conflict tended to change in an upward direction in the P-range condition (see Figure 25).
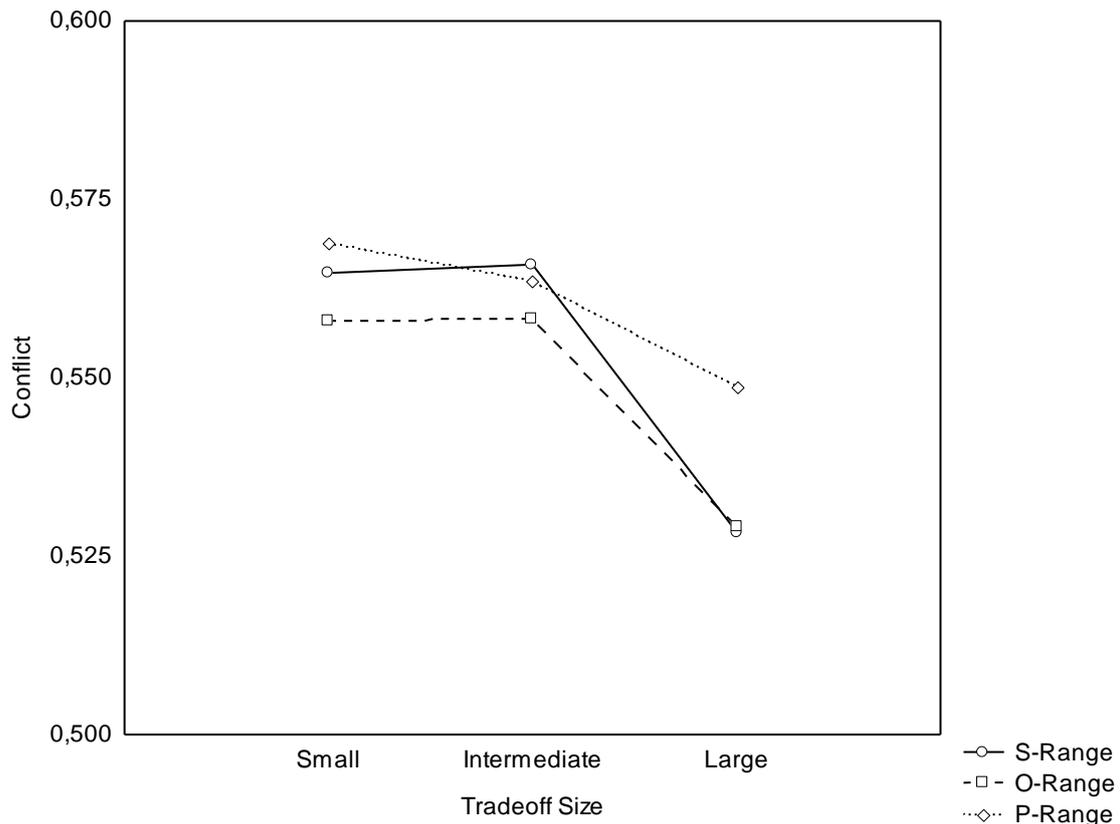
Figure 25. Relation between tradeoff size and conflict by range conditions across all decision tasks (Experiment 5).

Regression 1 also demonstrated that the interaction effect of the contrast between the S-range and O-range conditions, tradeoff size (linear contrast), and progress through choice tasks (linear contrast), was not significant, $t(2106) = -0.62$, $p = .27$, providing only directional support for *H6.3*. The interaction effect of the contrast between the S-range and P-range conditions, tradeoff size (linear contrast), and progress through choice tasks (linear contrast), was also not significant, $t(2106) = 0.81$, $p = .21$, providing only directional support for *H7.3*.

In order to evaluate the specific shape of the relation between tradeoff size and conflict in each range condition across all 18 decision tasks, another three linear regression analyses were conducted (regressions 2, 3 and 4). The independent variables were all the contrasts included previously, except those concerning the range conditions. There was a significant negative relation in the S-range condition, $t(702) = -2.14$, $p = .03$ (regression 2), and a marginally significant negative relation in the O-range condition, $t(702) = -1.68$, $p = .09$ (regression 3). In the P-range condition the relation was negative, but the effect was not significant $t(702) = -1.16$, $p = .25$ (regression 4).

Although progress through the choice tasks had no significant effect on the moderating effects of outcome and probability range, a regression analysis was performed across the last six tasks in order to again test *H6.2* and *H7.2* (regression 5). This analysis included all the contrasts of regression 1, except those associated with progress through the choice tasks. The experimental results were in general not affected. Only the interaction effect of the contrast between the S-range and P-range conditions with tradeoff size (linear contrast) became slightly stronger in support of *H7.2*, even though not yet significant, $t(702) = 1.02$, $p = .15$: As can be seen in Figure 26, when the probability range increased, the relation between tradeoff size and conflict tended to changed in an upward direction.
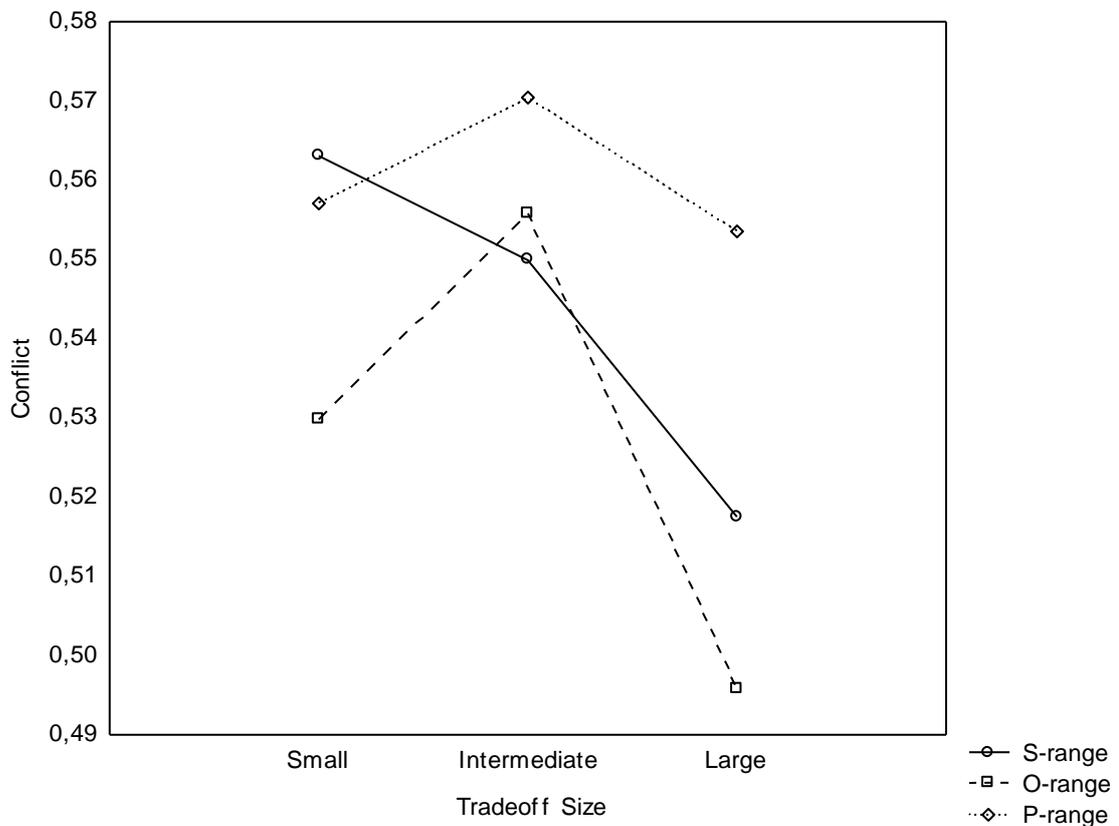
Figure 26. Relation between tradeoff size and conflict by range conditions across the last six decision tasks (Experiment 5).

Model estimation and parametric hypotheses test. Although given the above results, we expected no significant effects of the range conditions on the levels of preliminary conflict; we proceeded with the model estimation and the parametric hypothesis test. In Experiment 5, thirteen parameters were estimated from the 3 (range condition) $\times$ 2 (reference gamble) $\times$ 3 (tradeoff size) = 18 levels of conflict observed across the last six tasks. One was

the auxiliary parameter and the other twelve were the estimated levels of preliminary conflict.[24] The estimates are given in Appendix M. The goodness-of-fit of the estimated model was $R^2 = .85$.

As expected neither the outcome range manipulation nor the probability range manipulation produced reliable changes on preliminary conflict. Nevertheless, it can be observed that when the outcome range increased, the preliminary conflict from concern about argumentation tended to decrease, $t(5) = -0.46$, $p = .33$, which is inconsistent with *H6.1*. The preliminary conflict from the concern about sacrifice was not affected by the increased outcome range, $t(5) = 0.51$, $p = .63$.

When the probability range decreased, the preliminary conflict from concern about argumentation also tended to decrease, $t(5) = -0.58$, $p = .29$, providing directional support for *H7*.1. However, at the same time, when the probability range decreased, the preliminary conflict from concern about sacrifice tended to increase, $t(5) = 1.07$, $p = .33$. In addition, the difference in the preliminary conflict from concern about sacrifice was about as great as the difference in the preliminary conflict from concern about argumentation, $t(5) = .80$, $p = .46$.

Complementary analysis: Manipulation check. Again to validate the manipulation of the weight of the outcome attribute versus the weight of the probability attribute, we analyzed the choice probabilities of the riskier option (which is superior along the outcome attribute). As previously, the gambles in S-range condition were developed so that they would generate pairwise indifference, i.e., so that the outcome and the probability attributes would be equally weighted. In O-range and P-range conditions, the gambles were constructed so that participants would prefer the safer gamble over the riskier one, i.e., so that the outcome attribute would receive a greater weight than the probability attribute.

As in Experiments 3 and 4, to check how the manipulations affected the participant's choice patterns, we conducted a LOGIT analysis, in which we regressed choice of the riskier gamble on a contrast between the S-range condition and the O-range condition and on a contrast between the S-range condition and the P-range conditions.

The effect of each range condition on choice is depicted in Figure 27. As this Figure shows, the choice of the riskier gamble decreased when increasing the outcome range and when decreasing the probability range. Nevertheless, the effect of the contrast between S-range and P-range was (marginally) significant, $\chi^2(1) = 2.71$, $p = .10$, but the effect of the

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[24] The arbitrary scaling constant had been set to 1 in order to estimate the remaining parameters.

contrast between S-range and O-range was not, $\chi^2(1) = 0.01$, $p = .93$. The proportion of participants that chose the riskier gamble was .50 in the S-range condition, .48 in the O-range condition, and .45 in the S-range condition. These proportions were significantly different from the chance level in the P-range condition, $p = .01$, but not in the S-range condition nor in the O-range condition, $p = .85$ and $p = .22$, respectively (binomial tests). Furthermore, the effect of increasing the outcome weight on choice was larger when decreasing the probability range than when increasing the outcome range, but the difference was not significant, $\chi^2(1) = 0.81$, $p = .37$.
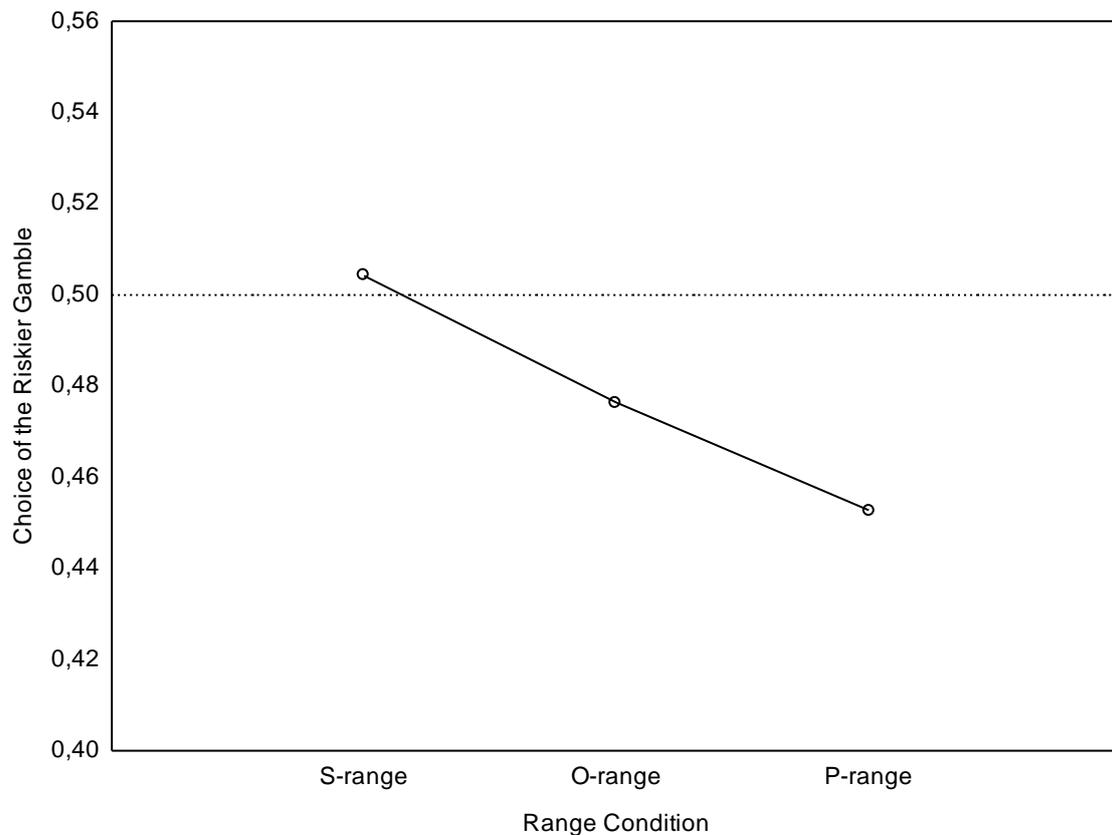
Figure 27. Choice of the riskier gamble by range conditions (Experiment 5).

In accordance to the range sensitivity principle (Fischer, 1995), the results of Experiment 5 demonstrated that both the outcome and the probability range manipulations increased the weight of the outcome attribute also in choices involving losses, as revealed by the increase of the choice of the safer option in these conditions. In the standard range condition, the safer and the riskier gamble were equally chosen, meaning that both attributes were equally weighted, and thus, equally determinant of choice. In the outcome range

condition and in the probability range condition the safer gamble was chosen more often than the riskier one, meaning that the outcome attribute was more heavily weighted, and thus, more determinant of choice than the probability attribute. Moreover, the effect of the (decreased) probability range on the choice of the safer gamble was stronger than the effect of the (increased) outcome range, which is consistent with the results for gains.

However, the effects of outcome and probability ranges were weaker than expected in that, in all three conditions, the choice probabilities were closer to the chance level in losses than in gains.

Discussion of Experiment 5

The results of Experiment 5 demonstrated that, although increasing the outcome range or decreasing the probability range increased the outcome weight in decisions involving losses, none of the manipulations produced significant effects on the preliminary conflict, and consequently, on the relation between tradeoff size and conflict, not even when participants became more familiar with the experimental situation. Nonetheless, we obtained directional support for the effects of probability range and progress through the choice tasks.

The two hypotheses that addressed the effects of outcome range were therefore not confirmed. Increasing the outcome range did not increase the preliminary conflict from concern about argumentation, nor did it change the relation between tradeoff size and conflict. In addition, the parameter estimation of the model revealed a slight tendency to a decrease, rather than to an increase, of the preliminary conflict from argumentation when the outcome range increased, nevertheless, this was a very weak and unreliable result. The sacrifice mediator was also not affected by the increased outcome range.

Furthermore, the hypotheses that concerned the effects of probability range received only directional support: When the probability range decreased, the concern about argumentation decreased (but not significantly) and the relation between tradeoff size and conflict tended to be more positive (or less negative). The parameter estimation of the model also revealed that the positive change in the relation between tradeoff size and conflict was due to a decrease in the preliminary conflict from concern about argumentation, as predicted, but also to an increase in the preliminary from concern about sacrifice. These effects were equally strong. In losses, the sacrifice and the argumentation mediators were equally affected by the probability range manipulation, however, in gains, the effect on the sacrifice mediator

was stronger than the effect on the argumentation mediator. This was likely due to the fact that, in losses, the effects were much weaker and less reliable.

In agreement with the results of the previous Experiments, the results on the effect of the probability range on conflict arousal seem to support our proposal that decreasing the probability range involves a process of shift of attention between the two sources of conflict, in which attention shifts away from argumentation toward sacrifice. People become less concerned with finding a strong argument to choose given that argumentation favors the choice of the safer gamble (the smaller loss), but more concerned about contra-argumentation because they are still worried about probability (people do not want to lose).

The hypotheses concerning the effects of progress through the choice tasks also received only directional support: The progress through the choice tasks affected the strength of the moderating effects of the outcome and probability ranges (but not significantly), especially in what concerns the moderating effect of probability range, which became closer to significance when it was tested across the last six tasks. Moreover, the level of overall conflict was also affected by the progress through the choice tasks, and this effect was reliable: The participants experienced a greater conflict in the first six tasks than in the last six tasks. These results are consistent with our previous interpretation that, as participants proceed in the experimental situation, they become more familiar with the experimental situation, and, by becoming more familiar with the tasks, the confidence in their decisions increases, which decreases the level of conflict.

Finally, our results also demonstrated an overall negative relation between tradeoff size and conflict as expected. As we argued in the introduction of this Experiment, there is always some contradiction in arguing in favor of one negative gamble (it is difficult to find a positive argument in favor of a negative gamble). Thus, when choices involve losses, conflict is always complicated to resolve, even though this difficulty can, to some extent, be alleviated by the choice context. In accordance, the relation between tradeoff size and conflict was significantly negative in the standard range condition and in the outcome range condition. In the probability range condition, there was also a tendency to a negative relation, but the results were not reliable. This is not surprising given that, the expected and observed effect in this condition (although again not reliable) was to generate a more positive (or less negative) relation between tradeoff size and conflict.

In Experiment 5 we investigated how two outcome weight manipulations affected the decisional conflict in choices involving losses. In the next section we summarize and discuss the findings of Experiments 3, 4, and 5.

Summary of Experiments 3, 4 and 5

The main aim of Chapter 3 was to examine the effects of differential attribute weight on decisional conflict in gains (Experiments 3 and 4) and in losses (Experiment 5). Specifically, the goal was to study the impact of an increased outcome range manipulation (Experiments 3, 4, and 5) and of a decreased probability range manipulation (Experiments 4 and 5) on the process of conflict arousal.

Our results support the double-mediation model in the domain of risky choice. Differential attribute weight has an impact on the decisional conflict by affecting the preliminary conflict from concern about argumentation and about sacrifice, and thus, moderating the relation between tradeoff size and conflict. Furthermore, we have confirmed that, although the effect of outcome and probability ranges on attribute weighting is identical, i.e., both manipulations increase the weight of the outcome attribute, the moderating effect on the relation between tradeoff size and conflict is not.

In addition, the effects of the outcome and probability ranges on the argumentation and sacrifice mediators support the conclusion that the psychological process underlying differential attribute weighting is a shift of attention (between the two conflict sources), although depending on the specific manipulation being considered, attention shifts away from sacrifice toward argumentation (outcome range manipulation), or, toward sacrifice and away from argumentation (probability range manipulation). This shift of attention leads to a more negative (or less positive) relation between tradeoff size and conflict when the outcome range is increased but to a more positive (or less negative) relation when the probability range is decreased.

We can also conclude that sensitivity to ranges is indeed acquired during the Experiment, and that because experience is necessary so that a preliminary impression can be formed, the effect of the manipulations become stronger in the latter tasks, i.e., as participants proceed in the experimental situation.

Furthermore, we have demonstrated that participants experienced a lower conflict level when only one chance device was used than when multiple chance devices were used

(Experiment 3), and a lower conflict level in the latter than in the earlier six tasks (Experiments 3, 4, and 5). Also in the study concerning the peanuts effect (which we addressed in the discussion of Experiment 3), a linear regression performed across all the decision tasks (with range condition, tradeoff size, progress through the choice tasks, and reference gamble as independent variables) revealed that conflict significantly decreased as participants proceeded in the experimental situation, $t(1704) = -3.78$, $p < .001$ (see Appendix I). This results support our interpretation that when people became more familiar with the choice tasks, they became more confident in their decisions, and thus, the level of conflict decreases.

On the whole, the findings are consistent across gains (Experiments 3 and 4) and losses (Experiment 5). Nevertheless, the effects of the manipulations on attribute weighting and on conflict arousal were much weaker and much less reliable in losses than in gains. Experiment 5 was designed in the exact same way of Experiments 3 and 4. In fact, in Experiment 5, the variance explained by the conflict factor and the reliability of the conflict measure were about the same as in Experiments 3 and 4. Furthermore, the variation in conflict accounted by the double-mediation model was larger in Experiment 5 than in Experiments 3 and 4.

The difference between the Experiments was the sign of the outcomes. Our results demonstrate that choices are more inconsistent in losses that in gains, as revealed by choice probabilities closer to chance level in losses (Experiment 5) than in gains (Experiments 3 and 4), which is in agreement with previous research (e.g., Hershey & Schoemaker, 1980; Hogarth & Einhorn, 1990; Kühberger et al., 1999; Scholten & Read, 2010a). This was probably why the manipulations of outcome weight produced a weak impact on attribute weighting and no significant impact on conflict arousal in losses, while in gains they did. Because choices are more inconsistent, participants' reactions to manipulations in losses are less discriminated, or less differentiated, than their reaction to manipulations in gains. As a consequence, manipulations must be more pronounced in losses than in gains: The monetary differences as well as the probability differences between the gambles have to be larger in losses, so that people can increase their confidence in the decisions, which strengthens the effects of the manipulations on attribute weighting and on conflict arousal.

The manipulations of outcome weight involved a manipulation of the tradeoff rate, in that the magnitude of the outcome differences was increased relatively to the magnitude of the probability differences. Therefore, it is fair to say that in chapter 3 we examined how the

relation between tradeoff size and conflict was moderated by tradeoff rate. In our studies, we assumed that the manipulation of tradeoff rate had no influence on tradeoff size, nonetheless, it can be argued that it did influence the tradeoff size, and thus, that the rational underlying the effect of the range manipulations on conflict (on the relation between tradeoff size and conflict) can differ from what was hypothesized, as discussed below.

In general, the double-mediation model predicts an inverse U-shaped relation between tradeoff size and conflict, which can change of shape under the effect of moderating factors, such as outcome range or probability range. Nevertheless, it could be argued that increasing the outcome differences also increased the tradeoff size, even though the probability differences were kept constant: The small, intermediate, and large tradeoffs all became larger as a result of the increased outcome range. Therefore, the outcome range manipulation did not in fact produce a change in the relation between tradeoff size and conflict by affecting the two mediators, but rather, a movement to the right side of the inverse U-shaped curve, and thus, a downward change in the relation. Likewise, it could be argued that decreasing the outcome differences also decreased the tradeoff size, even though the outcome differences were kept constant: The small, intermediate, and large tradeoffs all became smaller as a result of the decreased probability range. Therefore, the probability range manipulation did not in fact produce a change in the relation between tradeoff size and conflict by affecting the two mediators, but rather, a movement to the left side of the inverse U-shaped curve, and thus, an upward change in the relation.

At the outset it seems a plausible alternative to our findings, nevertheless, it fails on closer scrutiny because it does not explain the effects of an increased outcome range and of a decreased probability range on attribute weighting. That is, it does not explain why both manipulations would increase the weight of the outcome attribute relatively to the probability attribute, as it should do according to the range-sensitivity principle and as it did in our Experiments. In fact, range sensitivity works through the effect of range manipulations on tradeoff rate, not through their effect on tradeoff size.

CHAPTER 4: GENERAL DISCUSSION

The main purpose of this research was to apply the double-mediation model (Scholten & Sherman, 2006) to risky choice, investigating the process of conflict generation in single-outcome gambles. The double-mediation model provided an accurate description of how conflict was related to the tradeoff size (to the size of the tradeoffs between the attributes of the options, i.e., gambles), how this relation was mediated by the two conflict sources sacrifice and argumentation, and how it was moderated by third variables in the choice context. The third variables were both situational (outcome sign, elicitation preference method, and differential attribute weight) and individual (decision maker's thinking style).

Until now, the double-mediation model had only been applied to the domain of riskless choice, specifically, to choices between consumer goods involving tradeoffs between their attributes. We have extended its application to the risky choice domain, specifically to decisions between gambles involving elementary tradeoffs between probability and outcome. Our studies allow the conclusion that when conflict is examined as a function of tradeoff size, the process of conflict generation follows the same psychological mechanisms and the double-mediation model captures a common dimension of conflict in riskless and risky choice.

Nonetheless, other dimensions of conflict that are specific to risky choice can be revealed by different experimental arrangements, for instance, the conflict between the anticipated disappointment and the anticipated elation, i.e., the conflict between a person's feeling that the choice outcome will turn out to be worse (anticipated disappointment) or better (anticipated elation) than the expectation (see Bell, 1985, and Loomes & Sugden, 1986). Another example is the conflict between people's motivation to evaluate risk (security or potential) and the aspiration level, as proposed by the security-potential/aspiration theory (Lopes, 1987, 1995; Schneider & Lopes, 1986; Schneider, 1992). In other words, it is the conflict between, on the one hand, a person's tendency to assign a greater weight to the worst (security) or to the best (potential) outcome, and, on the other hand, the level of the lowest outcome that a person considers acceptable. Even so, the double-mediation model uncovers a process of conflict generation that is new in the analysis of risky choice, and that applies equally well to riskless choice.

In this dissertation we have investigated conflict arousal in choices involving positive outcomes (gains) and involving negative outcomes (losses). In chapter 2, we examined how

third variables in the choice context affected the decisional conflict in situations where gains were contrasted with losses. In chapter 3, we examined how distinct range manipulations of outcome weight affected the decisional conflict in gains and in losses, i.e., we investigated the effects of context manipulations within each outcome sign condition.

Conflict arousal was significantly affected when gains were contrasted with losses. Yet, the same did not occur when the manipulations were examined within gains and losses. In the latter case, the manipulations have demonstrated not to be strong enough to produce reliable effects in losses as they did in gains. As it was discussed in the previous section, choices are more inconsistent in losses than in gains, making the manipulations within losses weaker than in gains. In other words, reactions in losses are less discriminated than reactions in gains.

One could argue that choice inconsistency should also be greater for losses than for gains in Experiments 1 and 2. An analysis of the choice probabilities revealed that neither in Experiment 1, nor in Experiment 2, choice probabilities were closer to chance level in losses than in gains, which is not surprising because of the direct contrast between gains and losses.[25] Another form to assess choice inconsistency, which was used in Experiment 1, is to evaluate the consistency between the decisions made in two separate occasions, in the present case, between the decisions made in the two parts of the Experiment. A LOGIT analysis, in which we regressed decision inconsistency on a contrast between gains and losses, revealed that choices were indeed more inconsistent in losses than gains, $\chi^2(1) = 9.75$, $p < .01$.[26]

Scholten and Read (2010a) argued that a greater choice inconsistency in losses than in gains is due to preference heterogeneity (i.e., people have different preferences, and as a consequence, choice probabilities come closer to chance level), and to preference uncertainty (i.e., conflict). In their study, preference uncertainty was assessed by decision time: They found longer decision times for losses than for gains. Nevertheless, as Scholten and Read (2010a, p. 32) noted, they "left the question of why there is a greater preference uncertainty in losses."

Our investigation on decisional conflict notably demonstrates that people experience a greater conflict when deciding between losses than between gains. The results were obtained

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[25]In Experiment 1, the choice probability of the riskier gamble was .53 in gains and .47 in losses. In Experiment 2, the choice probability of the riskier gamble was .49 in gains and .43 in losses.
[26]More information about the results concerning the analyses performed in the general discussion section is presented in Appendix N.

by using a composite measure of conflict, rather than, by using decision time alone. In order to check if our results hold when only the decision time measure is considered, we run two linear regressions analyses (decision time was the dependent variable and outcome sign the independent one): Decision times were indeed longer in losses and in gains, $t(3454) = 4.44$, $p < .001$ (Experiment 1), and, $t(2734) = 5.25$, $p < .001$ (Experiment 2).

Moreover, the present research not only confirms that the level of conflict is higher in losses than in gains, as also provides an answer to Scholten and Read's (2010a) question. By applying the double-mediation model we were able to demonstrate that conflict is greater in losses essentially because it is contradictory to argue in favor of a negative gamble. In fact, in losses, because conflict is high due to the difficulty in argumentation, people become focused on looking for a positive argument to choose, and thus, their attention shifts toward argumentation and away from sacrifice.

Just as there is no formal definition of conflict, there is no standard procedure for measuring it. Rather, there are several measures that can be used as conflict indicators. Because conflict is a unidimensional concept and there is no criterion (or reason) that leads us to opt for a particular measure, a global measure of conflict (assessed by several measures) was used in this research, as we previously referred. This means that we focused on the common tendencies of each measure, or in other words, on its communalities. Factor loadings provide some information about the 'relative importance' of each measure as a conflict manifestation: The higher the loading of a measure, the greater the importance of that measure as a conflict indicator, and conversely, the lower the loading, the smaller the importance of that measure as a conflict indicator.

Although the lower the factor loading, greater is the uniqueness of a measure, every measure has uniqueness by itself, i.e., has its own particularities, and thus, the examination of the specific role of each measure on the decision making process would be an avenue for future research. Although much more research is needed, Pleskac and Busemeyer (2010) recently went into this direction by developing a theory, the two-stage dynamic signal detection theory (2DSD), that accounts for the effects of three measures (choice, choice time, and choice confidence) in the judgment process. Pleskac and Busemeyer (2010) found that choice and choice time reflect the amount (quantity) and value (quality) of the evidence (information that favors one of the options) gathered until the choice is made, whereas, choice confidence also reflects the amount of evidence gathered after the choice is made and the way in which all the evidence is assembled into a rating of confidence.

The application of the double-mediation model to risky choice also discloses information about the decision making process. As it was originally proposed by the decision field theory (Busemeyer & Diederich, 2002; Busemeyer & Townsend, 1993; Diederich, 1997), it seems that making a choice implies passing through two stages: The initial preliminary impression and the subsequent deliberation phase.

Furthermore, the double-mediation model, although grounded on decision field theory, encompasses several aspects that were not considered by this theory, and for this reason, adds some new information to this description of the choice process. First, conflict has a mobilizing or a paralyzing effect on the decision process, depending on the stage where the decision makers are. In the preliminary impression phase, conflict has a mobilizing effect, i.e., the preliminary conflict is the drive for focused deliberation (the greater the preliminary conflict aroused by a concern, the stronger the drive to devote attention to that concern during subsequent deliberation). In contrast, in subsequent deliberation, conflict has a paralyzing effect, which causes vacillation between the options. Second, in the deliberation phase, the decision maker compares the options along their attributes and becomes involved in a process of pro- and contra-argumentation (causing vacillation between the options), which stops, and thus a decision is made, when pro-argumentation wins out over contra-argumentation. Conflict is resolved through argumentation, rather than through sacrifice.

Pro-argumentation is therefore a key feature in the double-mediation model. Pro-argumentation has also a fundamental role in the reason based choice theory (Shafir et al., 1993; Simonson 1989), which suggests that decisions are based on the reasons for selecting one option instead of the other. Thus, the reason based choice theory also provides a relevant contribute to the comprehension of the decisional conflict.

By considering that a decision involves making tradeoffs between the attributes, the double-mediation model assumes that the decision making process is attribute-based. That is, decision makers evaluate the options by comparing them on each attribute (one after the other), and then select the one that was most favored by these comparisons. Although there are some exceptions (Restle, 1961; Tversky, 1969, and more recently, Brandstätter, Gigerenzer, & Hertwig, 2006; González-Vallejo, 2002), nearly all models in risky choice (and in decision making in general), including the decision field theory, assume an alternative-based decision process, rather than an attribute-based one. In an alternative-based processing, the decision maker evaluates each option on all attributes (i.e., the options are separately evaluated), assigns an overall value to each option, and then selects the one with highest

value. This way, the decision field theory and the double-mediation model presuppose distinct decision processes, and for this reason, it seems more reasonable to consider them as complementary theories, instead of thinking about moving toward integration.

The view that choices involve tradeoffs between the attributes, and thus, an attribute-based processing, is not unique to the risky choice domain. Recently, it has also been applied to the domain of intertemporal choice, i.e., to choices involving delayed outcomes rather than immediate ones as in risky or in riskless choice. An example is the choice between gaining €80 now or €100 in six months. Scholten and Read (2006, 2010b) developed the tradeoff model, an innovative model in the domain of intertemporal choice, which posits that people choose by making attribute-based tradeoffs instead of alternative-based discounts.[27] As risky choices entail tradeoffs between probability and outcome, intertemporal choices entail tradeoffs between time and outcome, and thus, people chose by directly weighting the differences in time against the differences in outcome (e.g., money). For instance, as Scholten and Read (2010b, p. 938) asserted, "people make intertemporal choices by weighing how much more they will receive or pay if they wait longer against how much longer the wait will be."

Although the tradeoff model, as the double-mediation model, is anchored in the concept of tradeoffs, involving an attribute-based decision process; it is a model about choice and not about conflict. Future investigations ought to address the process of conflict generation in intertemporal choice. As Read and Roelofsma (2003, p. 140) stated, intertemporal choices "involve intertemporal tradeoffs, which are often difficult when we must choose between a smaller-sooner payoff or penalty, and a larger-later one." Examining how conflict is aroused in intertemporal choices, and if it reflects the same psychological mechanisms of risky and riskless choice, would extend the application of double-mediation model to the domain of intertemporal choice, but more importantly, it would add an important insight into the three fundamental/basic domains of behavioral decision making and economic psychology (riskless choice, risky choice, and intertemporal choice).

The present research has extended the application of the double-mediation model to risky choice, as well as to the study of individual differences in decisional conflict. We

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[27]Models of intertemporal choice (whether normative or descriptive) assume that people discount future consequences (outcomes), that they evaluate the options independently by assigning a discounted value (of the delayed outcome) to each option, and that they compare these (discounted) values in order to choose the option with the highest value (e.g., Loewenstein & Prelec, 1992; Prelec & Loewenstein, 1991; Scholten & Read, 2006, 2010b).

focused on how the individual differences in the decision maker's thinking style affected conflict arousal in risky choice. Future research could broaden the scope of investigation to the study of individual motivational differences, such as the individual differences in the self regulatory focus (regulatory focus theory, Higgins, 1997, 1998) and the individual differences in tendency to achieve security or potential (security-potential/aspiration theory, Lopes, 1987, 1995; Schneider & Lopes, 1986; Schneider, 1992).

According to the security-potential/aspiration theory (Lopes, 1987, 1995; Schneider & Lopes, 1986; Schneider, 1992), people differ in their tendency to prefer security (avoid bad outcomes) or potential (to attain good outcomes). As it was already discussed, this theory predicts that security-minded people generally prefer the safer option over the riskier one, especially in gains, because in losses conflict between the tendency to prefer security and the aspiration level may arise, and thus, both the safer and the riskier option can be chosen. Conversely, potential-minded people generally prefer the riskier option over the safer one, especially in losses, because in gains conflict between the tendency to prefer potential and the aspiration level may arise, and thus, both the riskier and the safer option can be chosen. Between these two groups, are the cautiously-hopeful people, which combine some degrees of caution and hope, and thus, might prefer either the safer or the riskier option, depending on the choice set under consideration (Lopes & Oden, 1999). The security-potential/aspiration theory is a theory of choice that contemplates the role of conflict in the decision process (the conflict between security/potential and aspiration level, or the conflict security and potential). Nevertheless, it gives no information on how conflict is resolved or on how it relates to tradeoff size. The application of the double-mediation model may well provide a valuable contribution in this matter.

The regulatory focus theory (Higgins, 1997, 1998) posits that there are two motivational systems that guide the way in which people experience pleasure (success) or pain (failure): The prevention and the promotion one. When people are prevention focused, they are guided by safety, security, and protection needs, focusing on duties, obligations, and responsibilities. They are motivated to avoid mismatches between the actual and the desired end state, experiencing pleasure in the absence of negative outcomes (non losses) or pain in the presence of negative outcomes (losses). When people are promotion focused, they are guided by nurturance, growth, and development needs, focusing on hopes, aspirations, and accomplishment. They are motivated to approach matches between the actual and the desired end state, experiencing pleasure in the presence of positive outcomes (gains) or pain in the

absence of positive outcomes (non gains). Thus, a focus on prevention implies a greater sensitivity to negative outcomes (losses/non losses), but a focus on prevention implies a greater sensitivity to positive outcomes (gains/non gains). Indeed, negative outcomes are experienced more intensely than positive ones in a prevention focus, and the reverse happens in a promotion focus (Idson, Liberman, & Higgins, 2000; Liberman, Idson, & Higgins, 2005).

At first glance, as Scholer, Zou, Fujita, Stroessner, and Higgins (2010) noted, the security and potential motivations may be similar to the prevention versus promotion motivations, nevertheless, they are different: While security seekers are oriented to avoid failure and the potential seekers to approach success, both prevention and promotion focused people are oriented toward success (the strategies however may be of approach or avoidance).

From this follows that, security versus potential, and, prevention versus promotion motivations, have differential effects on risk preferences. A security motivation is more predictive of (risk averse) preferences when gains are involved (because in losses the theory predicts that both options can be chosen due to conflict), and a potential motivation is more predictive of (risk seeking) preferences when losses are involved (because in gains the theory predicts that both options can be chosen due to conflict). In contrast, a prevention focused motivation was demonstrated to be associated with preferences in losses, whereas promotion focus was not. In fact, and although the study was focused on losses, the strength of promotion focus did not affect risk preferences, neither in losses nor in gains (Scholer et al., 2010). Scholer et al. (2010) found that in losses, a prevention focus leads to a greater preference for the riskier option when this option offers a chance of not incurring a loss (maintain the status quo), and to a greater preference for the safer option when both options offer the possibility of not incurring a loss. When none of the options offers the possibility of eliminating the loss, the motivational focus was unrelated to choice.

Despite more evidence could be valuable to substantiate these findings, the question arises whether the effects of motivational regulatory focus and of motivational tendency to evaluate risk on decisional conflict also differ, and if so, what are the differences. Research is necessary to answer to this question. For instance, in gains, as it was discussed elsewhere, a security focus means that people want to avoid bad outcomes, and therefore, that they give more importance to the probability attribute. Thus, the argument for security is viewed as a particularly cogent one and the level of preliminary conflict from concern about argumentation decreases relatively to the level of preliminary conflict from concern about sacrifice. In turn, a prevention focus means that people are oriented to avoid mismatches (they

are sensitive to negative outcomes), so it could be argued that, because this is only in question in losses, in gains, both attributes would be equally important and the two conflict sources would arouse a similar level of preliminary conflict. Nevertheless, it could also be argued that a prevention focus, like a security focus, also means that people are oriented to satisfy security needs, and this would lead to less preliminary conflict from concern about argumentation than from concern about sacrifice. Investigating how these two motivational approaches affect the two mediators of the double-mediation model would provide an important insight to the understanding of decisional conflict.

Conflict is not only an elementary feature of choice, it also has relevant implications for how people make decisions. Choice deferral is perhaps one of its major implications. Decision makers tend to select the no-choice option when they cannot identify the best option because it provides a way to minimize the error in situations of preference uncertainty (Dhar & Simonson, 2003). In accordance, several empirical findings (e.g., Dhar, 1996, 1997a; Dhar & Nowlis, 1999; Dhar & Simonson, 2003; Luce, 1998; Tversky & Shafir, 1992) have demonstrated that in situations of free choice, i.e., when a decision maker is not forced to select one of the available options, the experience of conflict influences the probability to defer choice. A greater conflict increases the tendency to not consummate choice, because people tend to seek additional information (more options) or even to give up the choice (maintain the status quo). This may have many undesirable economic consequences for several different areas such as marketing, business or public policy, in that, for instance, it may decrease a person's purchase, investment, or voting probability. Even the decision maker itself may be affected. For example, while searching for more options, the initial ones may no longer be available, or the search may not compensate the additional costs involved (monetary, temporal, physical, emotional, etc.).

Although not in the domain of risky choice, we conducted a study to check the effects of a forced versus a free choice context on decisional conflict. Half of the participants were assigned to the forced choice condition and the other half to the free choice condition. The forced choice condition consisted in choosing between two consumer products involving a tradeoff between two attributes. In the free choice condition, a no-choice option was added. (The design and method were similar to those in the present research.)

Choice deferral is a way to escape from the decisional conflict, therefore, it was expected that conflict would be greater in forced choice than in free choice, and that, in the free choice condition, the selection of the no-choice option would be greater in situations of

high conflict. In what concerns the relation between tradeoff size and conflict, a positive relation was expected when the attributes are of differential importance (see Scholten & Sherman, 2006). In situations of free choice, it was expected that there would be no relation between tradeoff size and conflict, because, as referred elsewhere, the double-mediation model assumes conflict aversion, and thus, it can only be applied, and the decision making process that it describes can be detected, when choice deferral is not possible.

To explore how conflict was affected by the choice context (forced versus free choice), a linear regression analysis was performed (see Appendix N). The dependent variable was conflict and the independent variables were choice context (forced versus free choice), choice (choice of one of the products versus choice of the no-choice option), tradeoff size (small, intermediate, and large), and reference gamble (the tradeoff size varied in relation to option x, which is superior along the more important attribute or with respect to option y, which is superior along the less important attribute). The results demonstrated that conflict did not differ by choice context condition: The participants in the forced choice condition experienced the same amount of conflict as the participants in the free choice condition, $t(2291) = -0.38$, $p = .70$. Nevertheless, the choice of the no-choice option indeed coincided with a greater amount of conflict, $t(2291) = 6.67$, $p < .001$. Moreover, in the free choice context, only 6% of the participants selected the no-choice option. In what concerns the relation between tradeoff size and conflict, the results showed an overall positive relation $t(2291) = 4.68$, $p < .001$, which did not differ with choice context condition, $t(2291) = 1.03$, $p = .30$.

These results suggest that having the possibility to defer choice did not work as an escape from conflict, and thus, that in the free choice condition, participants ignored the presence of the no-choice option and decisions were made as if it was a forced choice context. In the free choice condition, the participants were told that if they could not decide between the two products, they had the opportunity not to choose either, by selecting the alternative 'none of the options'. This probably led the participants to view the no-choice option as an option with no benefits, so that choosing one of the products, though having to resolve the decisional conflict, was preferable to selecting the no-choice option and gaining nothing. As the proverb says, "a bird in the hand is worth two in the bush". More research is thus needed to examine the impact of different framings of the no-choice option on the probability to defer choice, and to further investigate how choice deferral affects the decisional conflict in riskless choice as well as in risky choice.

As a final point, we would like to emphasize that this dissertation examined conflict in its own right; we have analyzed the process of conflict generation and how choice context affects it. This analysis did not only provide a better understanding of decisional conflict itself, but also, of the decision making process in general. Moreover, we addressed issues that should not be overlooked when talking about risky choice, but which had not been investigated until now, making it an important contribution within the study of risky choice behavior.

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APPENDICES

Appendix A: Stimuli Construction – Experiment 1

The gambles of the gains condition in Experiment 1 were constructed on the basis of estimates of prospect theory (Tversky & Kahneman, 1992). The intention was to create an experimental condition which generated pairwise indifference between the gambles.

According to Tversky and Kahneman's (1992) parameterization of prospect theory, for a gamble i, the subjectively expected value of obtaining outcome x_i with probability p_i is:

$$v(x_i, p_i) = w(p_i)v(x_i),$$

where v assigns a value to outcome x_i and w assigns a weight to probability p_i. For positive outcomes, the value function is

$$v(x_i) = x_i^{\alpha} \tag{B1}$$

and the probability-weighting function is

$$w(p_i) = \frac{p_i^{\gamma}}{[p_i^{\gamma} + (1 - p_i)^{\gamma}]^{1/\gamma}}. \tag{B2}$$

Tversky and Kahneman (1992) estimated the parameters at $\hat{\alpha} = .88$ and $\hat{\gamma} = .61$. Given these estimates, we started by specifying a gamble that yielded €7.50 upon drawing one of 36 winning cards from a complete deck of 52 cards. We computed the value of the outcome, $x_i = 7.50$, from Equation B1 and the weight of the probability, $p_i = 36/52$, from Equation B2. Then, to construct 17 gambles that would be subjectively equivalent to this gamble, we selected 17 alternative probabilities from the interval [16/52, 36/52], computed their weights from Equation 2, and derived their correspondent outcome values from Equation 3:

$$v(x_i) = w(36/52)v(7.50)/w(p_i). \tag{B3}$$

Although according to prospect theory these gambles should generate pairwise indifference, we anticipated that this would generate preference for safer gambles rather than indifference. An indication came from a choice study in which, averaged across pairs of gambles, the range of outcome values was increased by 7%, but the probability of choosing riskier gambles was only .36 (Scholten, 2002, Experiment 2). This was probably due to the

common preference for the safer gamble in gains (due to risk aversion) when the probability of the nonzero outcome is not very low. In an attempt to move this probability toward .50, creating a stronger conflict between probability and outcome, we submitted the outcome values resulting from Equation A3 to a transformation that would increase their range but preserve their geometric average:

$$v(x_i^*) = \left[\frac{v(x_i)}{\prod_{i=1}^{n} [v(x_i)]^q} \right]^{\frac{1}{1-qn}} , \tag{B4}$$

where n is the number of outcome values ($n = 18$) and q is the factor that increases their range ($0 \leq q < 1/n$). Specifically, we set $q = .033040$, which increased the range of outcome values by 161%. The resulting outcome values were converted back to outcomes:

$$x_i^* = v^{-1}[v(x_i^*)] , \tag{B5}$$

where

$$v^{-1}(x_i) = x_i^{1/\alpha} .$$

The outcomes were rounded to the nearest €0.50. These outcomes are presented in Table 2.

Appendix B: Frequency and Specification of Winning/Losing Cards –

Experiment 1

Table 13

Winning/losing cards (Experiment 1)

Frequency	Specification A	Specification B
16	Figure	Figure
17	Hearts or a Figure of Diamonds	Spades or Figure of Clubs
18	Black Number	Red Number
19	Red Number or Ace of Spades	Black Number or Ace of Hearts
20	Even Number	Even Number
21	Ace of Clubs or Even Number	Ace of Diamonds or Even Number
23	Black Number or Even Number of Hearts	Red Number or Even Number of Spades
24	Ace or Even Number	Ace or Even Number
25	Number of Diamonds or Figure	Number of Clubs or Figure
26	Black Card	Red Card
27	Red Card or Ace of Spades	Black Card or Ace of Hearts
28	Black Card or Red Ace	Red Card or Black Ace
30	Red Card or Figure of Clubs	Black Card or Figure of Diamonds
31	Black Card or Even Number of Hearts	Red Card or Even Number of Spades
32	Odd Number or Figure	Odd Number or Figure
34	Red Card or Black Figure	Black Card or Red Figure
35	Black Card or Number of Diamonds	Red Card or Number of Clubs
36	Number	Number

Appendix C: Results - Experiment 1

Conflict: Principal Component Analysis
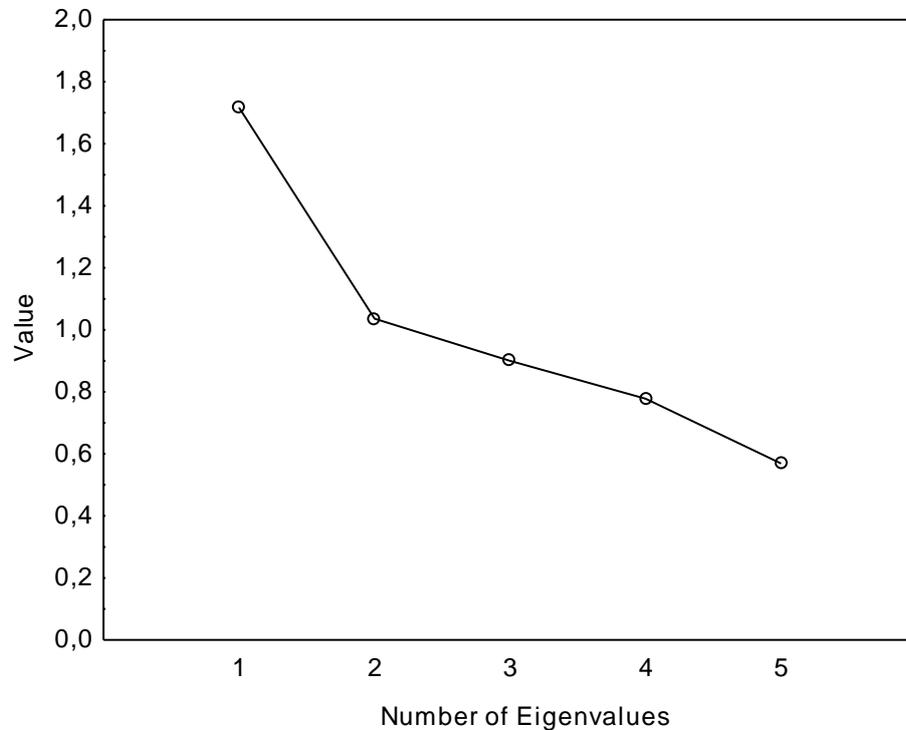
Figure 28. Principal component analysis - scree plot (Experiment 1).

Table 14
Eigenvalues

	Eigenvalue	% Total variance	Cumulative Eigenvalue	Cumulative %
1	1,7169	34,3370	1,7169	34,3370
2	1,0360	20,7201	2,7529	55,0571
3	0,9000	18,0004	3,6529	73,0575
4	0,7782	15,5633	4,4310	88,6208
5	0,5690	11,3792	5,0000	100,0000

Table 15
Factor Loadings

Measure	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Decision Time	0,3591	0,5878	0,7120	0,0976	-0,0949
Decision Uncertainty	0,7302	-0,2672	-0,0420	-0,3938	-0,4884
Decision Difficulty	0,7807	-0,1350	0,0458	-0,2329	0,5621
Preferece Equality	0,6250	-0,1419	-0,1958	0,7387	-0,0725
Decision Inconsistency	0,2337	0,7621	-0,5923	-0,1171	-0,0120
Expl.Var	1,7169	1,0360	0,9000	0,7782	0,5690
Prp.Totl	0,3434	0,2072	0,1800	0,1556	0,1138

Conflict: Reliability Analysis

Table 16
Reliability Analysis - Alpha de Cronbach

Valid N	3456
Cronbach alpha	0,4420
Standardized alpha	0,4803
Average inter-item corr.	0,159

Table 17
Reliability Analysis by Measure

Measure	Itm-Totl Correl.	Alpha if deleted
Decision Time	0,1565	0,4333
Decision Uncertainty	0,3845	0,2408
Decision Difficulty	0,4390	0,1679
Preferece Equality	0,3145	0,4475
Decision Inconsistency	0,0948	0,4577

Conflict: Hypotheses Test

In the following linear regression analyses: CR denotes the contrast between preference elicitation method conditions (choice versus rejection); GL denotes the contrast between outcome sign conditions (gains versus losses); RG denotes the contrast between reference gamble conditions (large-amount condition versus high-probability condition); ISL denotes the quadratic contrast between tradeoff size conditions (intermediate versus small and large tradeoffs); SL denotes the linear contrast between tradeoff size conditions (small versus large tradeoffs); MS denotes the contrast between the interaction of preference elicitation method with outcome sign conditions (choice-gains-and-rejection-losses versus choice-losses-and-rejection-gains); the other variables denote the interactions between these contrasts.

Table 18
Parameter Estimates - Regression 1

	Conflict Param.	Conflict t	Conflict p
Intercept	0,5058	196,4842	0,0000
CR	0,0078	3,0192	0,0026
GL	0,0110	4,2617	0,0000
RG	-0,0002	-0,0945	0,9247
ISL	0,0039	2,1286	0,0334
SL	0,0058	1,8543	0,0638
GLRG	-0,0028	-1,0760	0,2820
GLISL	0,0008	0,4421	0,6584
GLSL	-0,0076	-2,4249	0,0154
RGISL	-0,0003	-0,1397	0,8889
RGSL	0,0009	0,2867	0,7743
GLRGISL	-0,0008	-0,4423	0,6583
GLRGSL	-0,0024	-0,7566	0,4493
CRGL	-0,0080	-3,1213	0,0018
CRRG	-0,0024	-0,9186	0,3584
CRISL	0,0013	0,7230	0,4697
CRSL	-0,0045	-1,4293	0,1530
CRGLRG	-0,0005	-0,2014	0,8404
CRGLISL	0,0024	1,3177	0,1877
CRGLSL	-0,0011	-0,3417	0,7326
CRRGISL	0,0000	-0,0150	0,9881
CRRGSL	0,0023	0,7189	0,4722
CRGLRGISL	-0,0016	-0,8679	0,3855
CRGLRGSL	0,0001	0,0275	0,9780

Table 19
Parameter Estimates - Regression 2

	Conflict Param.	Conflict t	Conflict p
Intercept	0,4948	135,6249	0,0000
CR	0,0158	4,3325	0,0000
RG	0,0025	0,6925	0,4887
ISL	0,0031	1,1899	0,2342
SL	0,0135	3,0192	0,0026
RGISL	0,0006	0,2135	0,8310
RGSL	0,0033	0,7362	0,4617
CRRG	-0,0018	-0,5060	0,6129
CRISL	-0,0011	-0,4196	0,6748
CRSL	-0,0034	-0,7674	0,4430
CRRGISL	0,0016	0,6018	0,5474
CRRGSL	0,0022	0,4878	0,6257

Table 20
Parameter Estimates - Regression 3

	Conflict Param.	Conflict t	Conflict p
Intercept	0,5168	142,2609	0,0000
CR	-0,0003	-0,0724	0,9423
RG	-0,0030	-0,8295	0,4070
ISL	0,0047	1,8217	0,0687
SL	-0,0018	-0,4043	0,6860
RGISL	-0,0011	-0,4124	0,6801
RGSL	-0,0015	-0,3330	0,7392
CRRG	-0,0029	-0,7937	0,4275
CRISL	0,0037	1,4462	0,1483
CRSL	-0,0056	-1,2550	0,2096
CRRGISL	-0,0016	-0,6257	0,5316
CRRGSL	0,0024	0,5290	0,5969

Table 21
Parameter Estimates - Regression 4

	Conflict Param.	Conflict t	Conflict p
Intercept	0,4980	134,8645	0,0000
GL	0,0190	5,1467	0,0000
RG	0,0021	0,5745	0,5657
ISL	0,0026	0,9798	0,3273
SL	0,0104	2,2890	0,0222
GLRG	-0,0023	-0,6096	0,5422
GLISL	-0,0016	-0,6104	0,5417
GLSL	-0,0066	-1,4522	0,1466
RGISL	-0,0002	-0,0869	0,9307
RGSL	-0,0014	-0,3013	0,7632
GLRGISL	0,0008	0,2967	0,7667
GLRGSL	-0,0025	-0,5467	0,5847

Table 22
Parameter Estimates - Regression 5

	Conflict Param.	Conflict t	Conflict p
Intercept	0,5136	143,1550	0,0000
GL	0,0029	0,8183	0,4133
RG	-0,0026	-0,7269	0,4674
ISL	0,0052	2,0462	0,0409
SL	0,0013	0,3049	0,7605
GLRG	-0,0033	-0,9166	0,3595
GLISL	0,0032	1,2628	0,2068
GLSL	-0,0087	-1,9852	0,0473
RGISL	-0,0003	-0,1110	0,9117
RGSL	0,0032	0,7216	0,4706
GLRGISL	-0,0024	-0,9401	0,3473
GLRGSL	-0,0023	-0,5232	0,6009

Table 23
Parameter Estimates- Regression 6

	Conflict Param.	Conflict t	Conflict p
Intercept	0,5058	196,4842	0,0000
MS	0,0080	3,1213	0,0018
GL	0,0110	4,2617	0,0000
RG	-0,0002	-0,0945	0,9247
ISL	0,0039	2,1286	0,0334
SL	0,0058	1,8543	0,0638
GLRG	-0,0028	-1,0760	0,2820
GLISL	0,0008	0,4421	0,6584
GLSL	-0,0076	-2,4249	0,0154
RGISL	-0,0003	-0,1397	0,8889
RGSL	0,0009	0,2867	0,7743
GLRGISL	-0,0008	-0,4423	0,6583
GLRGSL	-0,0024	-0,7566	0,4493
MSGL	-0,0078	-3,0192	0,0026
MSRG	0,0005	0,2014	0,8404
MSISL	-0,0024	-1,3177	0,1877
MSSL	0,0011	0,3417	0,7326
MSGLRG	0,0024	0,9186	0,3584
MSGLISL	-0,0013	-0,7230	0,4697
MSRGSL	0,0045	1,4293	0,1530
MSRGISL	0,0016	0,8679	0,3855
MSRGSL	-0,0001	-0,0275	0,9780
MSGLRGISL	0,0000	0,0150	0,9881
MSGLRGSL	-0,0023	-0,7189	0,4722

Parametric Hypotheses Test

In Experiment 1 the auxiliary parameters, the arbitrary scaling constant and the drive-capacity parameter were estimated at $\hat{\gamma} = 0.72$ and $\hat{\alpha} = 1.31$ (respectively). The preliminary conflict from concern about argumentation was estimated at $\hat{A}_0 = 0.32$ in the gains condition and at $\hat{A}_0 = 0.59$ in the losses condition. The preliminary conflict from concern about sacrifice was estimated at $\hat{S}_0 = 0.88$ in the gains condition and at $\hat{S}_0 = 0.51$ in the losses condition. Furthermore, the preliminary conflict from concern about argumentation was estimated at $\hat{A}_0 = 0.37$ in the choice condition and $\hat{A}_0 = 0.54$ in the rejection condition. The preliminary conflict from concern about sacrifice was estimated at $\hat{S}_0 = 0.80$ in the choice condition and $\hat{S}_0 = 0.59$ in the rejection condition.

Appendix D: Construction of the Rational-Experiential Inventory

(Portuguese Version)

To measure the style of thinking of the participants we adapted the rational-experiential inventory, REI (Pacini & Epstein, 1999). We started by translating the REI to Portuguese. The questionnaire consisted of two scales and a total of 40 items: Items 1 to 20 evaluated rationality and items 21 to 40 evaluated experientiality. Moreover, as Pacini and Epstein (1999) suggested, each scale can be sub-divided into the engagement and ability subscales. Accordingly, items 1, 3, 5, 6, 7, 10, 11, 15, 18, and 20 measured rational engagement, items 2, 4, 8, 9, 12, 13, 14, 16, 17, and 19 measured rational ability, items 21, 25, 26, 30, 31, 32, 33, 34, 36, and 38 measured experiential engagement, and items 22, 23, 24, 27, 28, 29, 35, 37, 39, and 40 measured experiential ability. Moreover, items 3, 6, 10, 13, 14, 15, 16, 17, 19, 20, 21, 23, 24, 25, 26, 27, 28, 31, 35, 38, and 39 were positively worded, whereas items 1, 2, 4, 5, 7, 8, 9, 11, 12, 18, 22, 29, 30, 32, 33, 34, 36, 37, and 40 were negatively worded.[28] The answering scale was a 5 point rating scale: (1) strongly disagree; (2) disagree; (3) nor agree or disagree; (4) agree; (5) strongly agree.

The questionnaire was preceded by a cover page instructing the participants that the questionnaire was composed by a set of affirmations, that the task was to mark with a cross (X) the option with which they most identify, that there were no right or wrong answers, and that it was anonymous and the answers confidential. To avoid possible order effects, 5 other versions of the questionnaire were developed. Specifically, to counterbalance the order of presentation of the items, we constructed 2 other versions in which we altered the order of the items but maintained the order of the scales. To counterbalance the order of presentation of the scales, we developed another 3 versions in which we maintained the order of the items but inverted the order of the scales. The questionnaires were pre-tested on 66 psychology students from ISPA-IU (each version of the questionnaire was applied to 11 participants). The rational and experiential ratings were coded from 1 (strongly disagree) to 5 (strongly agree) in the positive items and from 5 (strongly disagree) to 1 (strongly agree) in the negative items. Rationality and experientiality were obtained by summing the ratings on all the respective items. Both rationality and experientiality increase as the score increases.

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[28]A total of 21 items were positively worded and 19 were negatively worded as in the version of Pacini and Epstein (1999).

In order to confirm the items distribution in two independent scales, we performed a principal component analysis with varimax rotation on the 40 items. Two components were extracted. The first component had an eigenvalue of 8.40 and explained 21.00% of the total variance. The second component had an eigenvalue of 5.26 and explained 13.16% of the total variance. Together they accounted for 34.17% of the total variance. Component 1 corresponded to the experientiality scale and component 2 to the rationality scale. Table 14 presents the items and respective loadings on each scale. Accordingly, the first 20 items (with exception of items and 13, 15 and 17) presented a positive larger weight (higher loadings) on the second component, and the last 20 items (with exception of item 37) presented a positive and larger weight (higher loading) on the first component. Overall, the results were similar to those obtained by Pacini and Epstein (1999) in that relatively strong and weak items in their study (with high and low saturation on the target scales) tended to be relatively strong and weak items in our study as well. Note that the last items of each scale tended to be the weakest items (with lower loadings), which is consistent with Pacini and Epstein (1999) seeing that they ordered the items of each scale according to their weight (the lower the item number in each scale, the stronger the item).

Table 24

Factor Structure of the Portuguese Rationality-Experientiality Inventory

Item No.	Rationality Scale	E	R
5	I don't like to have to do a lot of thinking.	-0,05	0,77
3	I enjoy intellectual challenges.	0,04	0,75
9	Reasoning things out carefully is not one of my strong points.	0,07	0,73
2	I'm not that good at figuring out complicated problems.	0,25	0,71
6	I enjoy solving problems that require hard thinking.	0,20	0,70
11	Thinking hard and for a long time about something gives me little satisfaction.	0,09	0,69
4	I am not very good at solving problems that require careful logical analysis.	-0,01	0,63
1	I try to avoid situations that require thinking in depth about something.	-0,11	0,63
10	I prefer complex problems to simple problems.	0,10	0,59
8	I am not a very analytical thinker.	-0,01	0,55
7	Thinking is not my idea of an enjoyable activity.	0,10	0,53
16	I have no problem thinking things through carefully.	0,01	0,48
12	I don't reason well under pressure.	0,27	0,43
18	Knowing the answer without having to understand the reasoning behind it is good enough for me.	0,05	0,33
20	Learning new ways to think would be very appealing to me	0,02	0,20
19	I usually have clear, explainable reasons for my decisions	0,00	0,18
14	I have a logical mind.	0,03	0,15
13	I am much better at figuring things out logically than most people.	0,30	0,14
15	I enjoy thinking in abstract terms	0,11	0,10
17	Using logic usually works well for me in figuring out problems in my life.	0,26	0,05

Item No.	Experientiality Scale	E	R
23	Using my gut feelings usually works well for me in figuring out problems in my life.	0,81	-0,03
24	I believe in trusting my hunches.	0,79	0,12
25	Intuition can be a very useful way to solve problems.	0,77	-0,03
29	If I were to rely on my gut feelings, I would often make mistakes.	0,76	0,12
21	I like to rely on my intuitive impressions.	0,73	0,09
35	I hardly ever go wrong when I listen to my deepest gut feelings to find an answer.	0,73	0,19
30	I don't like situations in which I have to rely on intuition.	0,70	0,11
22	I don't have a very good sense of intuition.	0,68	0,20
31	I think there are times when one should rely on one's intuition.	0,61	0,23
26	I often go by my instincts when deciding on a course of action.	0,60	0,01
28	When it comes to trusting people, I can usually rely on my gut feelings.	0,60	-0,21
39	I can usually feel when a person is right or wrong, even if I can't explain how I know.	0,60	-0,11
27	I trust my initial feelings about people	0,53	-0,22
38	I tend to use my heart as a guide for my actions.	0,51	-0,09
36	I would not want to depend on anyone who described himself or herself as intuitive.	0,45	0,05
33	I don't think it is a good idea to rely on one's intuition for important decisions.	0,42	0,07
40	I suspect my hunches are inaccurate as often as they are accurate.	0,42	0,11
32	I think it is foolish to make important decisions based on feelings.	0,34	0,20
37	My snap judgments are probably not as good as most people's.	0,30	0,31
34	I generally don't depend on my feelings to help me make decisions.	0,27	0,11

Another two principal component analyses (one for each scale) were conducted. The purpose of these analyses was to examine the composition of each scale and respective subscales, and to reduce the questionnaire in order to prevent its length would jeopardize the cooperativeness of the participants (seeing that they complained that it was very repetitive). In the rationality scale, one component was extracted. This component presented an eigenvalue of 5.69, explained 28.43% of the total variance, and loaded positively on all items. The factor loadings ranged from .10 to .76. By analyzing the line plot of factor loadings depicted in Figure 29, two distinct groups of items can be identified: One with loadings higher than .4 and other with loadings lower than .4. Therefore, we determined .4 as a cutoff value and the items with loadings below this value were removed from the scale: Items 13, 14, 15, 17, 18, 19, and 20.
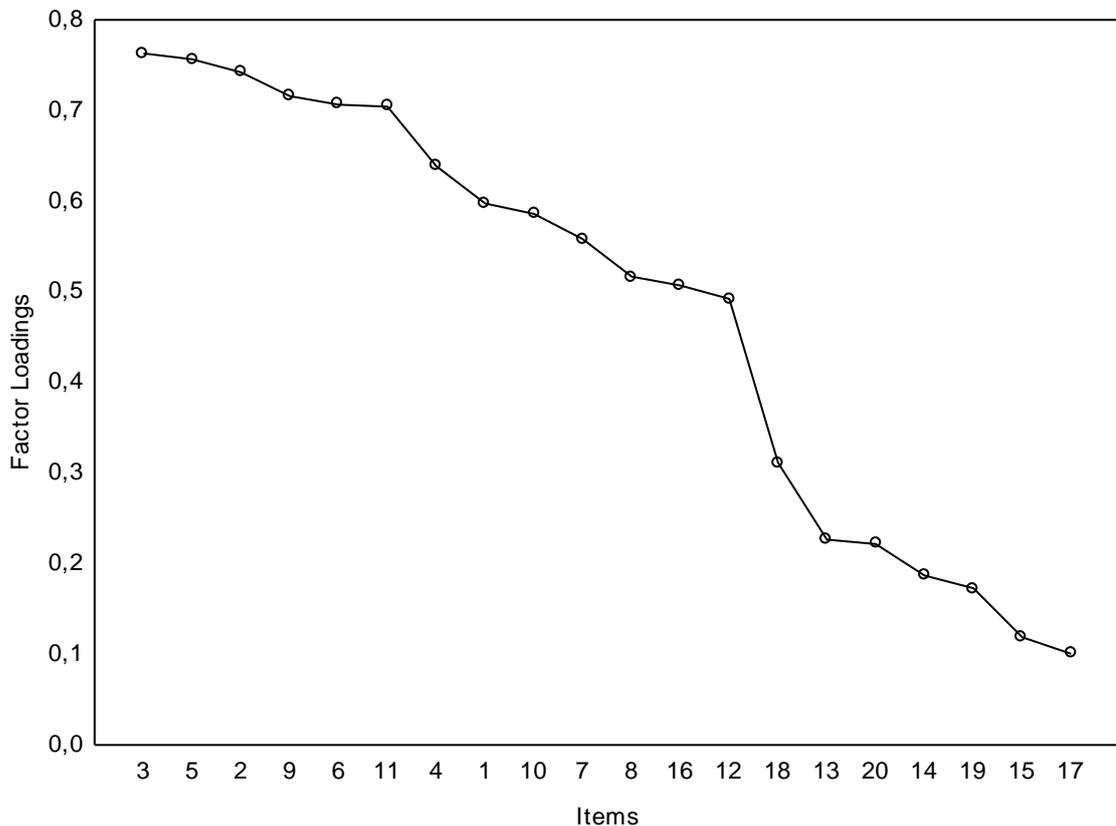
Figure 29. Factor loadings of the rationality scale.

In the experientiality scale, one component was also extracted, which presented an eigenvalue of 7.08 and explained 35.40% of the total variance. This component presented positive loadings on all items. The factor loadings ranged from .26 to .77. The analysis of the

line plot of factor loadings, depicted in Figure 30, does not allow a clear identification of the items to be removed as in the rationality scale. Nonetheless, to maintain the same number of items in both scales, we removed the 7 items with the lowest loadings from the experientiality scale: Items 32, 33, 34, 36, 37, 38, and 40.
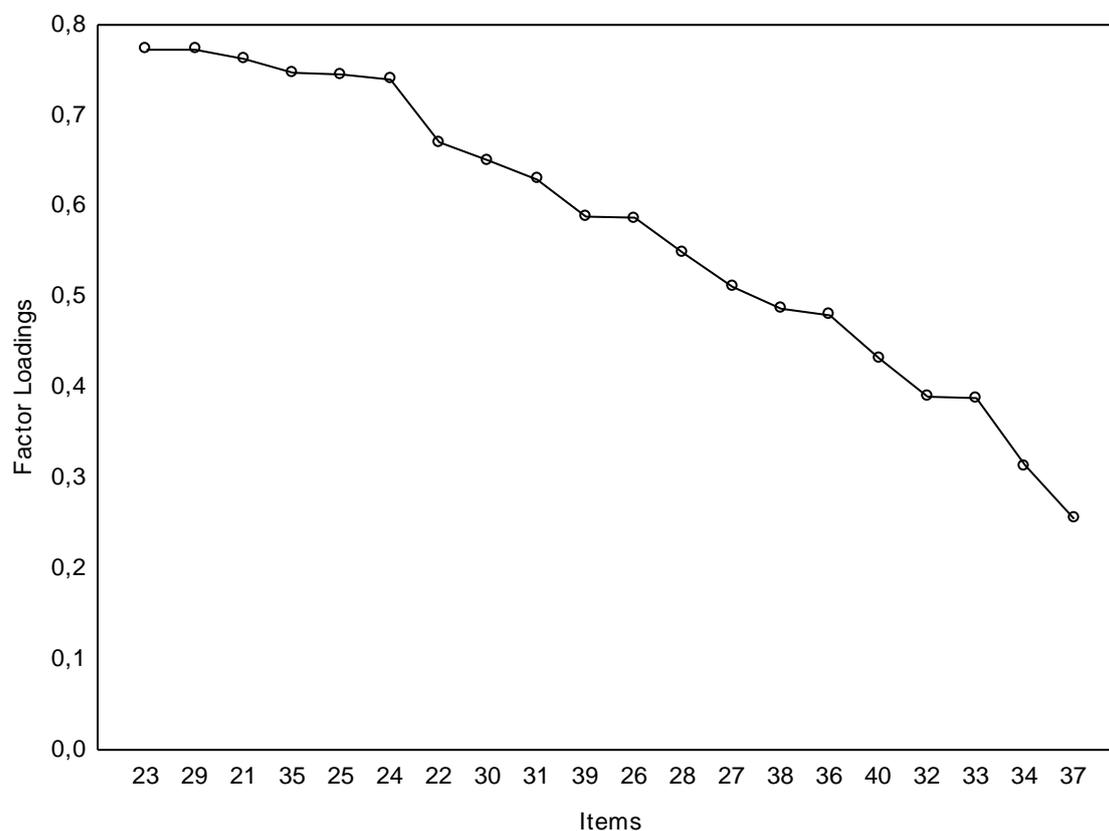
Figure 30. Factor loadings of the experiential scale.

Pacini and Epstein (1999) suggested that each scale could be divided into two subscales, ability and engagement; nevertheless, our results did not support this structure, neither on the rationality scale nor on the experientiality scale. A rotated two factor solution was conducted for each scale, but the results still did not support the subscales division.

In order to test the internal consistency of the scales, two reliability analyses (one on each scale) were conducted. The analysis of the rationality scale revealed a standardized Cronbach alpha of .84, which increased to .88 when excluding the 7 items with the lowest loadings. The analysis of the experientiality scale revealed a standardized Cronbach alpha of .89, which increased to .90 when excluding the 7 items with the lowest loadings. These results indicate a good internal consistency of the scales and support the reduction of the

questionnaire to the 26 strongest items. Furthermore, these results are similar to the ones obtained by Pacini and Epstein (1999): Alpha of .90 for the rationality scale, and alpha of .87 for the experientiality scale.

On the basis of the above results, we constructed a reduced (Portuguese) version of REI (Appendix D), not considering the engagement and ability subscales and excluding the items 13, 14, 15, 17, 18, 19, and 20 from the rationality scale, and the items 32, 33, 34, 36, 37, 38, and 40 from the experientiality scale.

Appendix E: Rational-Experiential Inventory

(Reduced Portuguese Version)

For each statement, mark with a cross (X) the option with which you most identify, according to the following scale: (1) Strongly Disagree; (2) Disagree; (3) Nor Agree or Disagree; (4) Agree; (5) Strongly Agree.

	Strongly Disagree				Strongly Agree
1. I try to avoid situations that require thinking in depth about something.	1	2	3	4	5
2. I'm not that good at figuring out complicated problems.	1	2	3	4	5
3. I enjoy intellectual challenges.	1	2	3	4	5
4. I am not very good at solving problems that require careful logical analysis.	1	2	3	4	5
5. I don't like to have to do a lot of thinking.	1	2	3	4	5
6. I enjoy solving problems that require hard thinking.	1	2	3	4	5
7. Thinking is not my idea of an enjoyable activity.	1	2	3	4	5
8. I am not a very analytical thinker.	1	2	3	4	5
9. Reasoning things out carefully is not one of my strong points.	1	2	3	4	5
10. I prefer complex problems to simple problems.	1	2	3	4	5
11. Thinking hard and for a long time about something gives me little satisfaction.	1	2	3	4	5
12. I don't reason well under pressure.	1	2	3	4	5
13. I have no problem thinking things through carefully.	1	2	3	4	5
14. I like to rely on my intuitive impressions.	1	2	3	4	5

For each statement, mark with a cross (X) the option with which you most identify, according to the following scale: (1) Strongly Disagree; (2) Disagree; (3) Nor Agree or Disagree; (4) Agree; (5) Strongly Agree.

	Strongly Disagree				Strongly Agree
15. I don't have a very good sense of intuition.	1	2	3	4	5
16. Using my gut feelings usually works well for me in figuring out problems in my life.	1	2	3	4	5
17. I believe in trusting my hunches.	1	2	3	4	5
18. Intuition can be a very useful way to solve problems.	1	2	3	4	5
19. I often go by my instincts when deciding on a course of action.	1	2	3	4	5
20. I trust my initial feelings about people.	1	2	3	4	5
21. When it comes to trusting people, I can usually rely on my gut feelings.	1	2	3	4	5
22. If I were to rely on my gut feelings, I would often make mistakes.	1	2	3	4	5
23. I don't like situations in which I have to rely on intuition.	1	2	3	4	5
24. I think there are times when one should rely on one's intuition.	1	2	3	4	5
25. I hardly ever go wrong when I listen to my deepest gut feelings to find an answer.	1	2	3	4	5
26. I can usually feel when a person is right or wrong, even if I can't explain how I know.	1	2	3	4	5

Appendix F: Results - Experiment 2

Conflict: Principal Component Analysis
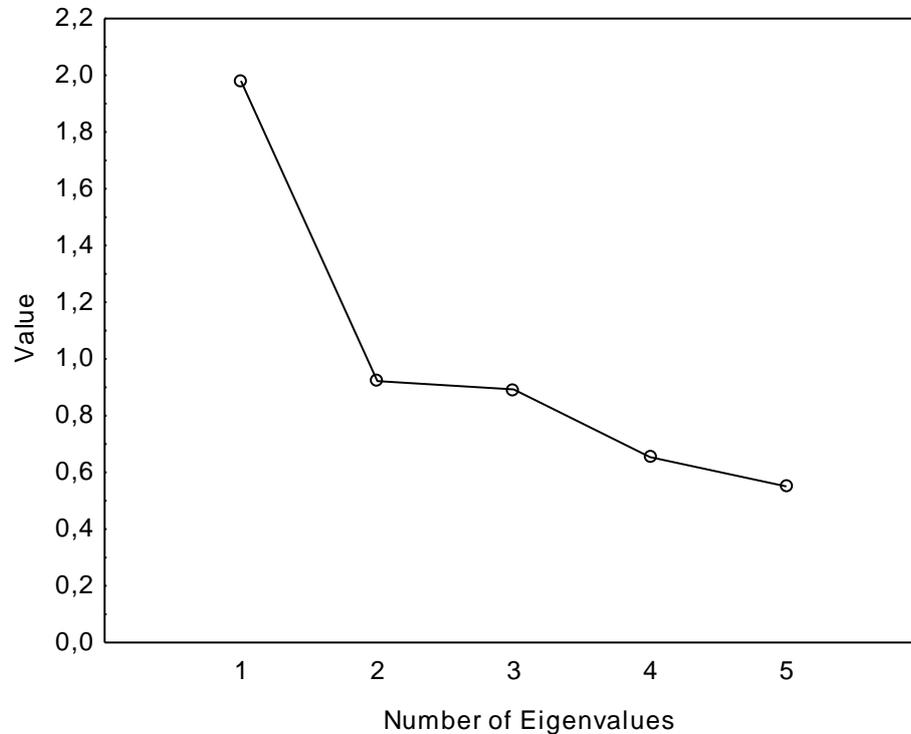
Figure 31. Principal component analysis conducted on the five conflict measures - scree plot.

Table 25
Eigenvalues

	Eigenvalue	% Total variance	Cumulative Eigenvalue	Cumulative %
1	1,9805	39,6095	1,9805	39,6095
2	0,9222	18,4431	2,9026	58,0526
3	0,8927	17,8544	3,7954	75,9070
4	0,6541	13,0825	4,4495	88,9895
5	0,5505	11,0105	5,0000	100,0000

Table 26
Factor Loadings

Measure	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Decision Time	-0,3834	0,9156	-0,1190	-0,0168	0,0136
Decision Uncertainty	-0,7168	-0,1046	0,4042	-0,2694	0,4892
Decision Difficulty	-0,6967	-0,0536	0,5013	0,0974	-0,5009
Preferece Equality	-0,6805	-0,1677	-0,3476	0,6026	0,1579
Attribute-Weight Equality	-0,6093	-0,2046	-0,5856	-0,4568	-0,1876
Expl.Var	1,9805	0,9222	0,8927	0,6541	0,5505
Prp.Totl	0,3961	0,1844	0,1785	0,1308	0,1101

Conflict: Reliability Analysis

Table 27
Reliability Analysis - Alpha de Cronbach

Valid N	2736
Cronbach alpha	0,4786
Standardized alpha	0,6057
Average inter-item corr.	0,2378

Table 28
Reliability Analysis by Measure

Measure	Itm-Totl Correl.	Alpha if deleted
Decision Time	0,1810	0,4671
Decision Uncertainty	0,4494	0,2458
Decision Difficulty	0,4477	0,2468
Preferece Equality	0,3597	0,4812
Attribute-Weight Equality	0,2861	0,4846

Rationality Scale: Reliability Analyses

Table 29
Reliability Analysis - Alpha de Cronbach (13 Items)

Valid N	2736
Cronbach alpha	0,7671
Standardized alpha	0,7655
Average inter-item corr.	0,2115

Table 30
Reliability Analysis by Measure - 13 Items

	Itm-Totl Correl.	Alpha if deleted
Item1	0,4890	0,7411
Item2	0,2372	0,7660
Item3	0,5804	0,7302
Item4	0,2704	0,7632
Item5	0,6288	0,7242
Item6	0,4631	0,7454
Item7	0,3979	0,7518
Item8	0,4343	0,7481
Item9	0,4975	0,7415
Item10	0,5401	0,7370
Item11	0,2528	0,7652
Item12	-0,0371	0,7994
Item13	0,3673	0,7549

Table 31
Reliability Analysis - Alpha de Cronbach (12 Items)

Valid N	2736
Cronbach alpha	0,7994
Standardized alpha	0,7892
Average inter-item corr.	0,2487

Table 32
Reliability Analysis by Measure - 12 Items

	Itm-Totl Correl.	Alpha if deleted
Item1	0,5442	0,7743
Item2	0,1801	0,8060
Item3	0,6309	0,7644
Item4	0,2145	0,8033
Item5	0,6835	0,7584
Item6	0,4723	0,7823
Item7	0,4173	0,7874
Item8	0,4383	0,7854
Item9	0,5025	0,7793
Item10	0,5663	0,7731
Item11	0,2008	0,8055
Item13	0,3911	0,7896

Experientiality Scale: Reliability Analyses

Table 33
Reliability Analysis - Alpha de Cronbach (13 Items)

Valid N	2736
Cronbach alpha	0,7861
Standardized alpha	0,7944
Average inter-item corr.	0,2338

Table 34
Reliability Analysis by Measure - 13 Items

	Itm-Totl Correl.	Alpha if deleted
Item14	0,6082	0,7543
Item15	0,3944	0,7741
Item16	0,4218	0,7715
Item17	0,4855	0,7665
Item18	0,4961	0,7646
Item19	0,4524	0,7688
Item20	0,1922	0,7973
Item21	0,3217	0,7820
Item22	0,5112	0,7629
Item23	0,4068	0,7732
Item24	0,4347	0,7714
Item25	0,3707	0,7761
Item26	0,3824	0,7751

Table 35

Reliability Analysis - Alpha de Cronbach (12 Items)

Valid N	2736
Cronbach alpha	0,7973
Standardized alpha	0,8020
Average inter-item corr.	0,2562

Table 36
Reliability Analysis by Measure - 12 Items

	Itm-Totl Correl.	Alpha if deleted
Item14	0,6090	0,7666
Item15	0,3111	0,7954
Item16	0,4683	0,7801
Item17	0,4998	0,7779
Item18	0,5379	0,7733
Item19	0,4849	0,7787
Item21	0,2685	0,8016
Item22	0,5413	0,7727
Item23	0,3971	0,7878
Item24	0,4569	0,7822
Item25	0,3745	0,7890
Item26	0,3977	0,7868

REI: Principal component analysis
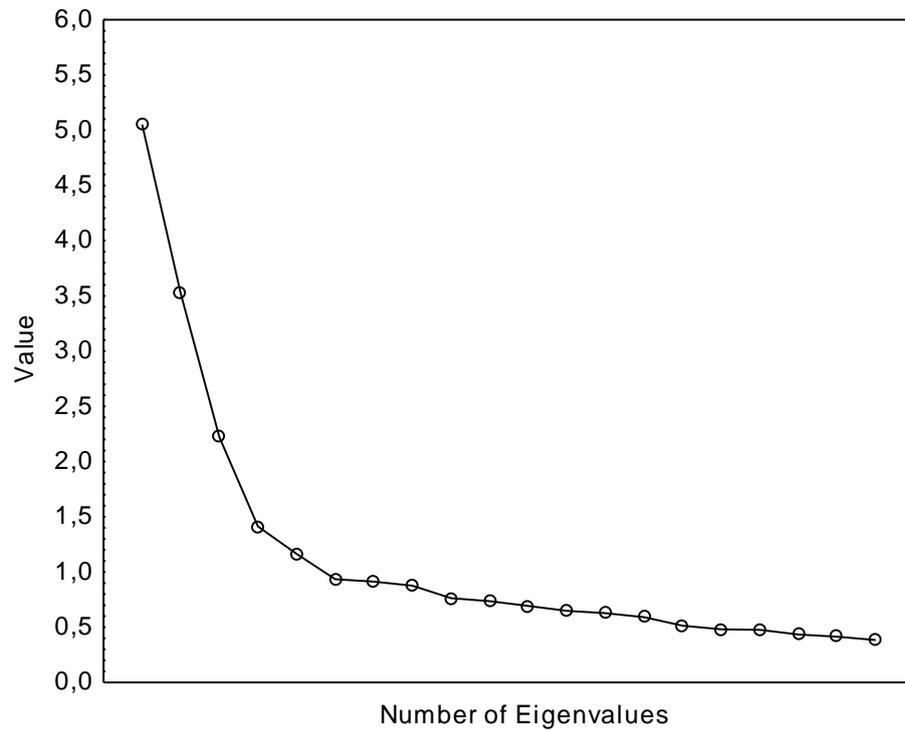
Figure 32. Principal component analysis conducted on the 24 REI items - scree plot.

Table 37
Eigenvalues

	Eigenvalue	% Total variance	Cumulative Eigenvalue	Cumulative %
1	5,0518	21,0490	5,0518	21,0490
2	3,5213	14,6719	8,5730	35,7210
3	2,2212	9,2549	10,7942	44,9758
4	1,4117	5,8821	12,2059	50,8579
5	1,1639	4,8494	13,3698	55,7074

Conflict: Hypotheses Test

In the following linear regression analyses: GL denotes the contrast between outcome sign conditions (gains versus losses); RG denotes the contrast between reference gamble conditions (large-amount condition versus high-probability condition); ISL denotes the quadratic contrast between tradeoff size conditions (intermediate versus small and large tradeoffs); SL denotes the linear contrast between tradeoff size conditions (small versus large tradeoffs); RE1 denotes the first contrast between thinking style conditions (low-rationality-

and-low-experientiality versus high-rationality-and-or-high-experientiality); RE2 denotes the second contrast between thinking style conditions (low-rationality-and-high-experientiality versus high-rationality); RE3 denotes the third contrast between thinking style conditions (high-rationality-and-low-experientiality versus high-rationality-and-high-experientiality); and the other variables denote the interactions between these contrasts.

Table 38

Parameter Estimates- Regression 1

	Conflict Param.	Conflict t	Conflict p
Intercept	0,5166	159,9690	0,0000
RE1	0,0096	5,1374	0,0000
RE2	0,0064	2,4350	0,0150
RE3	0,0043	0,9334	0,3507
GL	0,0233	7,2170	0,0000
RG	0,0032	0,9783	0,3280
ISL	0,0037	1,6105	0,1074
SL	0,0083	2,1009	0,0357
RGISL	0,0007	0,3066	0,7592
RGSL	-0,0025	-0,6244	0,5324
GLRG	0,0013	0,4174	0,6764
GLISL	0,0025	1,0729	0,2834
GLSL	-0,0072	-1,8319	0,0671
GLRGISL	-0,0003	-0,1178	0,9063
GLRGSL	0,0020	0,5029	0,6151
RE1GL	-0,0019	-1,0064	0,3143
RE1RG	-0,0009	-0,4725	0,6366
RE1ISL	0,0003	0,2205	0,8255
RE1SL	-0,0030	-1,3058	0,1917
RE1RGISL	-0,0001	-0,0992	0,9210
RE1RGSL	-0,0001	-0,0300	0,9760
RE1GLRG	-0,0030	-1,6079	0,1080
RE1GLISL	0,0003	0,2164	0,8287
RE1GLSL	0,0015	0,6446	0,5193
RE1GLRGISL	-0,0011	-0,8183	0,4133
RE1GLRGSL	-0,0003	-0,1466	0,8835
RE2GL	0,0028	1,0515	0,2931
RE2RG	-0,0007	-0,2692	0,7878
RE2ISL	0,0008	0,4443	0,6568
RE2SL	0,0002	0,0540	0,9569
RE2RGISL	0,0014	0,7739	0,4391
RE2RGSL	0,0053	1,6412	0,1009
RE2GLRG	-0,0007	-0,2689	0,7880
RE2GLISL	0,0003	0,1569	0,8753
RE2GLSL	-0,0036	-1,1159	0,2646
RE2GLRGISL	-0,0020	-1,0883	0,2766
RE2GLRGSL	0,0006	0,1733	0,8624

	Conflict Param.	Conflict t	Conflict p
RE3GL	-0,0029	-0,6306	0,5283
RE3RG	0,0040	0,8692	0,3848
RE3ISL	-0,0040	-1,2502	0,2114
RE3SL	-0,0029	-0,5112	0,6092
RE3RGISL	-0,0011	-0,3493	0,7269
RE3RGSL	-0,0065	-1,1703	0,2420
RE3GLRG	0,0020	0,4270	0,6694
RE3GLISL	-0,0001	-0,0430	0,9657
RE3GLSL	0,0000	0,0027	0,9978
RE3GLRGISL	0,0012	0,3855	0,6999
RE3GLRGSL	0,0005	0,0973	0,9225

Table 39

Parameter Estimates - Regression 2

	Conflict Param.	Conflict t	Conflict p
Intercept	0,4933	106,6286	0,0000
RE1	0,0115	4,2887	0,0000
RE2	0,0036	0,9657	0,3344
RE3	0,0071	1,0918	0,2751
RG	0,0018	0,3915	0,6955
ISL	0,0012	0,3753	0,7075
SL	0,0156	2,7452	0,0061
RGISL	0,0010	0,2962	0,7671
RGSL	-0,0045	-0,7869	0,4315
RE1RG	0,0021	0,7926	0,4282
RE1ISL	0,0000	0,0028	0,9977
RE1SL	-0,0045	-1,3615	0,1736
RE1RGISL	0,0009	0,5020	0,6158
RE1RGSL	0,0003	0,0814	0,9352
RE2RG	0,0000	-0,0002	0,9998
RE2ISL	0,0005	0,2006	0,8410
RE2SL	0,0038	0,8167	0,4143
RE2RGISL	0,0035	1,2999	0,1939
RE2RGSL	0,0047	1,0247	0,3057
RE3RG	0,0020	0,3087	0,7576
RE3ISL	-0,0039	-0,8426	0,3996
RE3SL	-0,0029	-0,3588	0,7198
RE3RGISL	-0,0024	-0,5129	0,6081
RE3RGSL	-0,0071	-0,8849	0,3764

Table 40
Parameter Estimates - Regression 3

	Conflict Param.	Conflict t	Conflict p
Intercept	0,5399	119,7929	0,0000
RE1	0,0077	2,9600	0,0031
RE2	0,0092	2,4982	0,0126
RE3	0,0014	0,2170	0,8283
RG	0,0045	1,0001	0,3175
ISL	0,0061	1,9228	0,0547
SL	0,0011	0,1928	0,8472
RGISL	0,0004	0,1353	0,8924
RGSL	-0,0005	-0,0871	0,9306
RE1RG	-0,0039	-1,4907	0,1363
RE1ISL	0,0006	0,3131	0,7543
RE1SL	-0,0015	-0,4738	0,6357
RE1RGISL	-0,0012	-0,6574	0,5111
RE1RGSL	-0,0004	-0,1266	0,8993
RE2RG	-0,0014	-0,3856	0,6999
RE2ISL	0,0011	0,4308	0,6667
RE2SL	-0,0034	-0,7608	0,4469
RE2RGISL	-0,0006	-0,2253	0,8218
RE2RGSL	0,0059	1,3002	0,1938
RE3RG	0,0059	0,9287	0,3532
RE3ISL	-0,0042	-0,9266	0,3543
RE3SL	-0,0028	-0,3644	0,7156
RE3RGISL	0,0001	0,0259	0,9793
RE3RGSL	-0,0060	-0,7688	0,4421

Parametric Hypotheses Test

In Experiment 2 the auxiliary parameters, the arbitrary scaling constant and the drive-capacity parameter, were estimated at $\hat{\gamma} = 1.40$ and $\hat{\alpha} = 4.76$, respectively.

The preliminary conflict from concern about argumentation was estimated at $\hat{A}_0 = 0.47$ in the gains condition and at $\hat{A}_0 = 0.57$ in the losses condition. The preliminary conflict from concern about sacrifice was estimated at $\hat{S}_0 = 0.53$ in the gains condition and at $\hat{S}_0 = 0.57$ in the losses condition. These estimates allow us to test *H1.2.1*.

In what concerns the analyses of the levels of preliminary conflict from concern about sacrifice and argumentation as a function thinking style, the preliminary conflict from concern

about sacrifice was estimated at $\hat{S}_0 = 0.74$ and the preliminary conflict from concern about argumentation at $\hat{A}_0 = 0.69$.

Moreover, when rationality was high, the preliminary conflict from concern about argumentation and from concern about sacrifice was estimated at $\hat{A}_0 + \hat{S}_0 = 0.54$ when experientiality was low and at $\hat{A}_0 + \hat{S}_0 = 0.53$ when experientiality was high (main effect of experientiality). When analyzing the interaction effect between experientiality and source of conflict, the preliminary conflict from concern about sacrifice when high experientiality and from concern about argumentation when low experientiality was .54 and the preliminary conflict from concern about sacrifice when low experientiality and from concern about argumentation when high experientiality was .52. Both the main and the interaction effect allow us to test *H3*.

When both rationality and experientiality were low the preliminary conflict from concern about argumentation was estimated at $\hat{A}_0 = 0.29$ and the preliminary conflict from concern about sacrifice at $\hat{S}_0 = 0.29$. When either or both rationality and experientiality were high, the preliminary conflict from concern about argumentation was estimated at $\hat{A}_0 = 0.25$ and the preliminary conflict from concern about sacrifice at $\hat{S}_0 = 0.27$. These estimates allow us to test *H4.1*.

Finally, when rationality was high, the preliminary conflict from concern about argumentation and the preliminary conflict from sacrifice were estimated at $\hat{A}_0 = 0.25$ and $\hat{S}_0 = 0.28$, respectively. When rationality was low but experientiality was high the preliminary conflict from concern about argumentation and the preliminary conflict from sacrifice were estimated at $\hat{A}_0 = 0.29$ and $\hat{S}_0 = 0.2$, respectively. These estimates allow us to test *H5.1* and *H5.2*.

Appendix G: Stimuli Construction - Experiment 3

The gambles of the O-range condition in Experiment 3 were constructed on the basis of estimates of prospect theory (Tversky & Kahneman, 1992) as previously. The intention was to create an experimental condition, the O-range condition, in which the outcome range was increased, so that it would generate a greater preference for the riskier gamble than for the safer one.

The procedure was similar to the one described in Appendix A, except that in order to increase the preference for the riskier gamble, we set $q = .044226$ (Equation B4), which increased the range of outcome values by 522%.

The resulting outcome values were converted back to outcomes trough Equation B5 and were rounded to the nearest €0.50. These outcomes are presented in Table 6.

Appendix H: Results - Experiment 3

Conflict: Variable Construction/ Principal Component Analysis
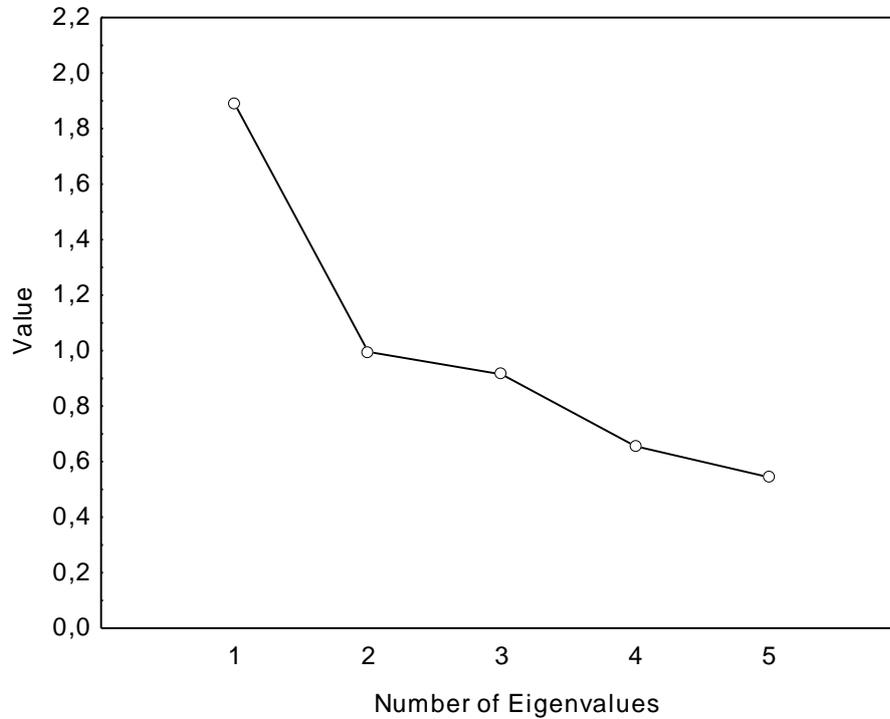
Figure 33. Principal component analysis - scree plot (Experiment 3).

Table 42
Eigenvalues

	Eigenvalue	% Total variance	Cumulative Eigenvalue	Cumulative %
1	1,8901	37,80154	1,890077	37,8015
2	0,9957	19,91329	2,885741	57,7148
3	0,9146	18,29153	3,800318	76,0064
4	0,6557	13,11366	4,456001	89,1200
5	0,5440	10,87998	5,000000	100,0000

Table 43
Factor Loadings

Measure	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Decision Time	0,4494	-0,0703	0,8741	0,0471	0,1640
Decision Uncertainty	0,6886	-0,3851	-0,3488	-0,0988	0,4960
Decision Difficulty	0,7088	-0,4546	-0,0356	-0,1524	-0,5162
Preferece Equality	0,6633	0,3845	-0,1617	0,6176	-0,0675
Attribute-Weight Equality	0,5211	0,6985	-0,0385	-0,4889	-0,0088
Expl.Var	1,8901	0,9957	0,9146	0,6557	0,5440
Prp.Totl	0,3780	0,1991	0,1829	0,1311	0,1088

Reliability Analysis

Table 44
Reliability Analysis - Alpha de Cronbach

Valid N	2592
Cronbach alpha	0,4736
Standardized alpha	0,5792
Average inter-item corr.	0,2185

Table 45
Reliability Analysis by Measure

Measure	Itm-Totl Correl.	Alpha if deleted
Decision Time	0,2083	0,4476
Decision Uncertainty	0,4165	0,2759
Decision Difficulty	0,4786	0,1946
Preferece Equality	0,3293	0,4814
Attribute-Weight Equality	0,1958	0,4890

Conflict: Hypotheses Test

In the following linear regression analyses: P denotes the contrast concerning the effect of progress through choice tasks (first six tasks versus last six tasks); CD denotes the contrasts between chance device condition (single device versus multiple device); SO denotes the contrast between range conditions (S-range versus O-range); RG denotes the contrast between reference gamble conditions (large-amount condition versus high-probabilitycondition); ISL denotes the quadratic contrast between tradeoff size conditions (intermediate versus small and large tradeoffs); SL denotes the linear contrast between tradeoff size conditions (small versus large tradeoffs); and the other variables denote the interactions between these contrasts.

Table 46
Parameter Estimates- Regression 1

	Conflict Param.	Conflict t	Conflict p
Intercept	0,5734	172,9692	0,00
P	-0,0227	-6,8351	0,00
CD	0,0144	4,3529	0,00
SO	-0,0081	-2,4496	0,01
RG	0,0018	0,5478	0,58
ISL	0,0065	2,7588	0,01
SL	0,0050	1,2314	0,22

	Conflict Param.	Conflict t	Conflict p
CDSO	-0,0005	-0,1590	0,87
CDRG	0,0000	-0,0039	1,00
CDISL	0,0015	0,6276	0,53
CDSL	-0,0046	-1,1276	0,26
SORG	-0,0020	-0,5986	0,55
SOISL	0,0017	0,7121	0,48
SOSL	-0,0166	-4,0859	0,00
RGISL	-0,0014	-0,5943	0,55
RGSL	-0,0048	-1,1742	0,24
CDSORG	-0,0025	-0,7614	0,45
CDSOISL	-0,0015	-0,6393	0,52
CDSOSL	0,0061	1,4956	0,13
CDRGISL	-0,0025	-1,0503	0,29
CDRGSL	0,0033	0,8160	0,41
SORGISL	-0,0022	-0,9186	0,36
SORGSL	0,0024	0,5803	0,56
CDSORGISL	0,0019	0,7946	0,43
CDSORGSL	0,0002	0,0531	0,96
PCD	-0,0037	-1,1301	0,26
PSO	-0,0039	-1,1834	0,24
PRG	-0,0037	-1,1198	0,26
PISL	0,0019	0,8118	0,42
PSL	-0,0052	-1,2873	0,20
PCDSO	0,0062	1,8793	0,06
PCDRG	-0,0002	-0,0470	0,96
PCDISL	0,0013	0,5430	0,59
PCDSL	-0,0003	-0,0692	0,94
PSORG	-0,0025	-0,7446	0,46
PSOISL	0,0027	1,1530	0,25
PSOSL	-0,0150	-3,6918	0,00
PRGISL	-0,0011	-0,4636	0,64
PRGSL	-0,0012	-0,2915	0,77
PCDSORG	0,0057	1,7186	0,09
PCDSOISL	0,0024	1,0272	0,30
PCDSOSL	0,0006	0,1404	0,89
PCDRGISL	-0,0001	-0,0468	0,96
PCDRGSL	0,0004	0,0923	0,93
PSORGISL	0,0019	0,8002	0,42
PSORGSL	0,0033	0,8144	0,42
PCDSORGISL	-0,0025	-1,0601	0,29
PCDSORGSL	-0,0032	-0,7986	0,42

Table 47
Parameter Estimates- Regression 2

	Conflict Param.	Conflict t	Conflict p
Intercept	0,5507	113,8455	0,0000
CD	0,0107	2,2085	0,0274
SO	-0,0120	-2,4895	0,0129
RG	-0,0019	-0,3920	0,6952
ISL	0,0084	2,4540	0,0143
SL	-0,0002	-0,0382	0,9696
CDSO	0,0057	1,1788	0,2387
CDRG	-0,0002	-0,0349	0,9722
CDISL	0,0027	0,8046	0,4212
CDSL	-0,0049	-0,8178	0,4136
SORG	-0,0045	-0,9204	0,3575
SOISL	0,0044	1,2819	0,2001
SOSL	-0,0316	-5,3144	0,0000
RGISL	-0,0025	-0,7270	0,4673
RGSL	-0,0060	-1,0015	0,3168
CDSORG	0,0032	0,6559	0,5120
CDSOISL	0,0009	0,2666	0,7898
CDSOSL	0,0066	1,1178	0,2639
CDRGISL	-0,0026	-0,7540	0,4510
CDRGSL	0,0037	0,6206	0,5350
SORGISL	-0,0003	-0,0814	0,9352
SORGSL	0,0057	0,9530	0,3408
CDSORGISL	-0,0006	-0,1825	0,8552
CDSORGSL	-0,0030	-0,5094	0,6106

Table 48
Parameter Estimates - Regression 3

	Conflict Param.	Conflict t	Conflict p
Intercept	0,5628	86,0552	0,0000
D	0,0050	0,7617	0,4465
RG	0,0026	0,3909	0,6960
ISL	0,0040	0,8720	0,3835
SL	0,0314	3,8811	0,0001
DRG	-0,0033	-0,5110	0,6095
DISL	0,0018	0,4002	0,6891
DSL	-0,0115	-1,4238	0,1550
RGISL	-0,0022	-0,4804	0,6311
RGSL	-0,0116	-1,4376	0,1510
DRGISL	-0,0019	-0,4252	0,6708
DRGSL	0,0067	0,8312	0,4062

Table 49
Parameter Estimates- Regression 4

	Conflict Param.	Conflict t	Conflict p
Intercept	0,5387	75,3583	0,0000
CD	0,0164	2,2923	0,0222
RG	-0,0063	-0,8881	0,3748
ISL	0,0127	2,5145	0,0122
SL	-0,0318	-3,6419	0,0003
CDRG	0,0030	0,4203	0,6744
CDISL	0,0036	0,7210	0,4712
CDSL	0,0018	0,2041	0,8383
RGISL	-0,0028	-0,5441	0,5866
RGSL	-0,0003	-0,0330	0,9737
CDRGISL	-0,0032	-0,6303	0,5287
CDRGSL	0,0007	0,0757	0,9397

Parametric Hypotheses Test

In Experiment 3 the arbitrary scaling constant and the drive-capacity parameter were estimated at $\hat{\gamma}$ = 1.03 and $\hat{\alpha}$ = 1.59, respectively. The preliminary conflict aroused by concern about argumentation was estimated at $\hat{A}_0$ = 0.44 in the S-range condition and at $\hat{A}_0$ = 1.00 in the O-range condition. The preliminary conflict from concern about sacrifice was set to 1 in the S-range condition and estimated at $\hat{S}_0$ = 0.39 in the O-range condition.

Manipulation Check

In the following analyses SO denotes the contrast between range conditions (S-range versus O-range).

Table 50
Likelihood Type 3 Test

	Degr. Of Freedom	Log-Likelihood	Chi-Square	p
SO	1	-1773,2057	169,0012	0,0000

Table 51
Parameter Estimates

	Estimate	Wald Stat.	p
Intercept	0,2890	49,4640	0,0000
SO	0,5247	163,0019	0,0000
Scale	1,0000		

Appendix I: Results - Peanuts Effect Study

In the following analyses: SPE denotes the contrast between range conditions (S-range versus PE-range); RG denotes the contrast between reference gamble conditions (large-amount condition versus high-probability condition); ISL denotes the quadratic contrast between tradeoff size conditions (intermediate versus small and large tradeoffs); SL denotes the linear contrast between tradeoff size conditions (small versus large tradeoffs); P denotes the contrast concerning the effect of progress through choice tasks (first six tasks versus last six tasks); and the other variables denote the interactions between these contrasts.

Manipulation Check by Range Condition

Table 52
Likelihood Type 3 Test

	Degr. Of Freedom	Log-Likelihood	Chi-Square	p
SPE	1	-1193,3054	9,5395	0,0020

Table 53
Parameter Estimates

	Estimate	Wald Stat.	p
Intercept	-0,1446	8,9314	0,0028
SPE	0,1492	9,5126	0,0020
Scale	1,0000		

Manipulation Check by Reference Gamble Condition

Table 54
Likelihood Type 3 Test: S-Range

	Degr. Of Freedom	Log-Likelihood	Chi-Square	p
RG	1	-589,6588	1,3674	0,2423

Table 55
Parameter Estimates: S-Range

	Estimate	Wald Stat.	p
Intercept	-0,2942	18,2707	0,0000
RG	-0,0805	1,3663	0,2425
Scale	1,0000		

Table 56
Likelihood Type 3 Test: PE-Range

	Degr. Of Freedom	Log-Likelihood	Chi-Square	p
RG	1	-598,8768	0,7825	0,3764

Table 57
Parameter Estimates: PE-Range

	Estimate	Wald Stat.	p
Intercept	0,0046	0,0046	0,9457
RG	0,0602	0,7822	0,3765
Scale	1,0000		

Regression Analysis

Table 58
Parameter Estimates- Regression (Last 6 Tasks)

	Conflict Param.	Conflict t	Conflict p
Intercept	0,5091	79,0791	0,0000
SPE	0,0060	0,9348	0,3502
RG	0,0041	0,6443	0,5196
ISL	0,0035	0,7626	0,4459
SL	0,0157	2,0235	0,0433
SPERG	-0,0015	-0,2259	0,8214
SPEISL	-0,0022	-0,4743	0,6354
SPESL	-0,0046	-0,5942	0,5525
RGISL	-0,0066	-1,4219	0,1554
RGSL	-0,0017	-0,2234	0,8232
SPERGISL	-0,0028	-0,6003	0,5485
SPERGSL	0,0128	1,6548	0,0983

Table 59
Parameter Estimates- Regression (All 12 Tasks)

	Conflict Param.	Conflict t	Conflict p
Intercept	0,5259	118,6828	0,0000
P	-0,0168	-3,7837	0,0002
SPE	0,0022	0,5004	0,6168
RG	0,0084	1,8994	0,0577
ISL	0,0063	2,0124	0,0443
SL	0,0128	2,3639	0,0182
PSPE	0,0038	0,8577	0,3912
PRG	-0,0043	-0,9632	0,3356
PISL	-0,0028	-0,8889	0,3742
PSL	0,0029	0,5342	0,5933
SPERG	0,0018	0,4150	0,6782
SPEISL	0,0001	0,0180	0,9856
SPESL	-0,0040	-0,7361	0,4618
RGISL	-0,0033	-1,0494	0,2942
RGSL	-0,0040	-0,7310	0,4649
PSPERG	-0,0033	-0,7432	0,4575
PSPEISL	-0,0022	-0,7168	0,4736
PSPESL	-0,0006	-0,1150	0,9085
PRGISL	-0,0033	-1,0454	0,2960
PRGSL	0,0022	0,4110	0,6812
SPERGISL	-0,0039	-1,2560	0,2093
SPERGSL	0,0043	0,7941	0,4272
PSPERGISL	0,0012	0,3716	0,7102
PSPERGSL	0,0085	1,5759	0,1152

Appendix J: Stimuli Construction - Experiment 4

The gambles of the three range conditions in Experiment 4 were again constructed on the basis of estimates of prospect theory (Tversky & Kahneman, 1992). The purpose was to generate pairwise indifference between the gambles in the S-range condition and a greater preference for riskier gambles in the O-range condition (i.e., by increasing the outcome range) and in the P-range condition (i.e., by decreasing the probability range).

The probability-weighting function from prospect theory (Equation B2) cannot be explicitly solved for probabilities, and thus, it cannot be used for constructing the gambles of the P-range condition. For this reason, instead of using this function, we used an alternative probability-weighting function (e.g., Goldstein & Einhorn, 1987; Lattimore, Baker, & Witte, 1992; Tversky & Fox, 1995):

$$w(p_i) = \frac{\delta\, p_i^{\gamma}}{\delta\, p_i^{\gamma} + (1 - p_i)^{\gamma}}\,. \tag{C1}$$

Minimizing the departure from the probability-weighting function in Equation B2, the parameters were estimated at $\hat{\delta} = .73$ and $\hat{\gamma} = .54$.

The procedure was the same as before, we started by specifying a gamble that yielded €7.50 upon drawing one of 36 winning cards from a complete deck of 52 cards. The value of the outcome €7.50 was computed from Equation B1 and the weight of the probability 36/52 from Equation C1. Then, to construct 17 gambles that would be subjectively equivalent to this gamble, 17 other probabilities were chosen from the interval [11/52, 36/52) and (36/52, 44/52], which correspond to the probabilities of the S-range and of the O-range conditions, respectively. The probabilities weights were computed from Equation C1 and the corresponding outcome values from Equation B3.

In order to obtain the probabilities of the P-range condition, the probability weights were transformed so that their range would be decreased but their geometric mean preserved:

$$w(p_i^{*}) = \left[w(p_i) \cdot \prod_{i=1}^{n} [w(p_i)]^{q} \right]^{\frac{1}{1+qn}}, \tag{C2}$$

where n is the number of probability weights ($n = 18$) and q is the factor that decreases their range ($q \geq 0$).

We set $q = .0536$, decreasing the probability range by 50%, and the resulting probability weights were then converted back to probabilities:

$$p_i^* = w^{-1}[w(p_i^*)], \tag{C3}$$

where $w^{-1}(p_i) = \dfrac{1}{1+[\delta(1-p_i)/p_i]^{1/\gamma}}$.

The obtained probabilities were rounded to the nearest 1/52.

To obtain the outcomes of the three range conditions, the procedure was similar to the previous: The outcome values, already computed from Equation B3, were transformed by Equation B4. Specifically, we set $q = .0290$ for the S-range and P-range conditions, increasing the range of the outcome values by 137%, and $q = .0362$ for the O-range condition, increasing the range of outcome values by 271%. The resulting outcome values were converted back to outcomes through Equation B5 and rounded to the nearest €0.50.

Appendix K: Frequency and Specification of Winning Cards –

Experiment 4

Table 60

Winning cards

Frequency	Specification A	Specification B
11	Number of Hearts or Black Ace	Number of Spades or Red Ace
12	Figure of Diamonds, Spades or Clubs	Figure of Clubs, Hearts or Diamonds
14	Card of Hearts or Ace of Spades	Card of Spades or Ace of Hearts
16	Figure	Figure
17	Hearts or a Figure of Diamonds	Spades or Figure of Clubs
18	Black Number	Red Number
19	Red Number or Ace of Spades	Black Number or Ace of Hearts
20	Even Number	Even Number
21	Ace of Clubs or Even Number	Ace of Diamonds or Even Number
22	Number of Spades or Card of Hearts	Number of Hearts or Card of Spades
23	Black Number or Even Number of Hearts	Red Number or Even Number of Spades
24	Ace or Even Number	Ace or Even Number
25	Number of Diamonds or Figure	Number of Clubs or Figure
26	Black Card	Red Card
27	Red Card or Ace of Spades	Black Card or Ace of Hearts
29	Number of Diamonds, Spades or Clubs or Red Ace	Number of Clubs, Hearts or Diamonds or Black Ace
30	Red Card or Figure of Clubs	Black Card or Figure of Diamonds
31	Black Card or Even Number of Hearts	Red Card or Even Number of Spades
32	Odd Number or Figure	Odd Number or Figure
33	Card of Diamonds, Black Ace or Black Number	Card of Clubs, Red Ace or Red Number
34	Red Card or Black Figure	Black Card or Red Figure
35	Black Card or Number of Diamonds	Red Card or Number of Clubs
36	Number	Number
38	Black Ace or Number	Red Ace or Number
40	Figure of Hearts or Number	Figure of Spades or Number
42	Black King, Ace or Number	Red King, Ace or Number
44	Black Number or Red Card	Red Number or Black Card

Appendix L: Results - Experiment 4

Conflict: Principal Component Analysis
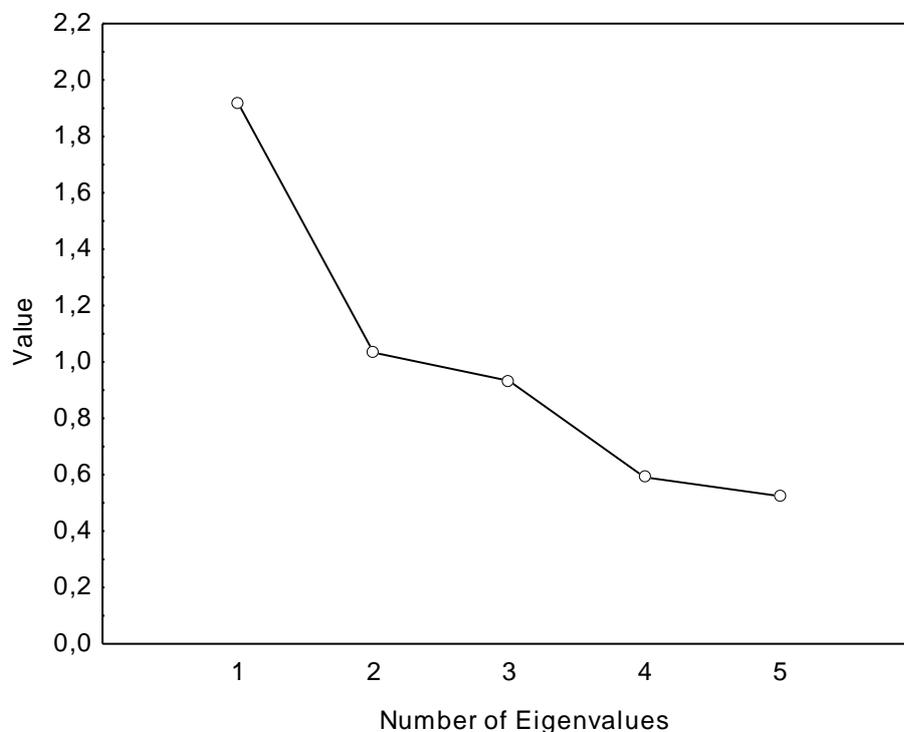
Figure 34. Principal component analysis - scree plot (Experiment 4).

Table 61
Eigenvalues

	Eigenvalue	% Total variance	Cumulative Eigenvalue	Cumulative %
1	1,9188	38,3760	1,9188	38,3760
2	1,0335	20,6705	2,9523	59,0465
3	0,9329	18,6579	3,8852	77,7044
4	0,5910	11,8200	4,4762	89,5244
5	0,5238	10,4756	5,0000	100,0000

Table 62
Factor Loadings

Measure	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Decision Time	-0,3913	0,2272	0,8757	0,1671	0,0237
Decision Uncertainty	-0,6164	-0,5655	-0,1610	0,5210	0,0534
Decision Difficulty	-0,6482	-0,5180	0,1425	-0,5092	-0,1787
Preferece Equality	-0,7357	0,3457	-0,2187	-0,1560	0,5167
Attribute-Weight Equality	-0,6513	0,5237	-0,2685	0,0895	-0,4705
Expl.Var	1,9188	1,0335	0,9329	0,5910	0,5238
Prp.Totl	0,3838	0,2067	0,1866	0,1182	0,1048

Conflict: Reliability Analysis

Table 62
Reliability Analysis - Alpha de Cronbach

Valid N	1944
Cronbach alpha	0,4378
Standardized alpha	0,5860
Average inter-item corr.	0,2245

Table 63
Reliability Analysis by Measure

Measure	Itm-Totl Correl.	Alpha if deleted
Decision Time	0,153765	0,429286
Decision Uncertainty	0,369628	0,248992
Decision Difficulty	0,430133	0,171511
Preferece Equality	0,340312	0,438214
Attribute-Weight Equality	0,237324	0,444608

Conflict: Hypotheses Test

In the following analyses: PL denotes the linear contrast concerning the effect of progress through choice tasks (first six tasks versus last six tasks); PQ denotes the quadratic contrast concerning the effect of progress through choice tasks (intermediate versus first and last six tasks); SO denotes the contrast between range conditions (S-range versus O-range); SP denotes the contrast between range conditions (S-range versus P-range); RG denotes the contrast between reference gamble conditions (large-amount condition versus high-probability condition); ISL denotes the quadratic contrast between tradeoff size conditions (intermediate versus small and large tradeoffs); SL denotes the linear contrast between tradeoff size conditions (small versus large tradeoffs); and the other variables denote the interactions between these contrasts.

TABLE 64
Parameter Estimates- Regression 1

	Conflict Param.	Conflict t	Conflict p
Intercept	0,6034	148,0182	0,0000
PL	-0,0210	-4,2040	0,0000
PQ	0,0017	0,5875	0,5569
SO	0,0002	0,0263	0,9790
SP	0,0057	0,9815	0,3265
RG	0,0043	1,0540	0,2920

	Conflict Param.	Conflict t	Conflict p
ISL	0,0045	1,5632	0,1182
SL	0,0020	0,3922	0,6950
SORG	0,0029	0,4992	0,6177
SPRG	-0,0098	-1,7025	0,0888
SOISL	0,0029	0,7240	0,4691
SOSL	-0,0048	-0,6825	0,4950
SPISL	-0,0050	-1,2149	0,2246
SPSL	0,0070	0,9888	0,3229
RGISL	-0,0008	-0,2903	0,7716
RGSL	-0,0058	-1,1577	0,2471
SORGISL	-0,0009	-0,2144	0,8302
SORGSL	0,0024	0,3381	0,7353
SPRGISL	0,0009	0,2306	0,8176
SPRGSL	0,0031	0,4435	0,6574
PLSO	-0,0117	-1,6605	0,0970
PLSP	0,0066	0,9330	0,3509
PLRG	0,0079	1,5739	0,1157
PLISL	0,0000	0,0003	0,9998
PLSL	-0,0039	-0,6408	0,5217
PLSORG	-0,0068	-0,9629	0,3357
PLSPRG	0,0052	0,7309	0,4649
PLSOISL	-0,0031	-0,6250	0,5320
PLSOSL	-0,0229	-2,6473	0,0082
PLSPISL	0,0014	0,2760	0,7826
PLSPSL	0,0238	2,7951	0,0052
PLRGISL	0,0031	0,8620	0,3888
PLRGSL	-0,0066	-1,0901	0,2758
PLSORGISL	-0,0069	-1,3903	0,1646
PLSORGSL	0,0060	0,6923	0,4888
PLSPRGISL	0,0048	0,9596	0,3374
PLSPRGSL	-0,0078	-0,9109	0,3625
PQSO	0,0013	0,3258	0,7446
PQSP	-0,0035	-0,8682	0,3854
PQRG	0,0039	1,3619	0,1734
PQISL	-0,0029	-1,4547	0,1459
PQSL	-0,0026	-0,7206	0,4712
PQSORG	0,0024	0,6004	0,5483
PQSPRG	-0,0098	-2,4002	0,0165
PQSOISL	-0,0042	-1,4483	0,1477
PQSOSL	0,0038	0,7605	0,4470
PQSPISL	-0,0012	-0,4182	0,6759
PQSPSL	-0,0004	-0,0744	0,9407
PQRGISL	-0,0034	-1,6680	0,0955
PQRGSL	0,0002	0,0636	0,9493
PQSORGISL	0,0012	0,4318	0,6660
PQSORGSL	-0,0100	-2,0080	0,0448
PQSPRGISL	0,0039	1,3753	0,1692
PQSPRGSL	0,0045	0,8856	0,3760

Table 65
Parameter Estimates- Regression 2

	Conflict Param.	Conflict t	Conflict p
Intercept	0,5807	80,6010	0,0000
SO	-0,0129	-1,2705	0,2044
SP	0,0158	1,5433	0,1233
RG	0,0082	1,1410	0,2543
ISL	0,0075	1,4781	0,1399
SL	0,0006	0,0706	0,9437
SORG	-0,0064	-0,6271	0,5308
SPRG	0,0051	0,5024	0,6156
SOISL	0,0040	0,5663	0,5714
SOSL	-0,0315	-2,4938	0,0129
SPISL	-0,0024	-0,3278	0,7432
SPSL	0,0312	2,4888	0,0131
RGISL	0,0056	1,1111	0,2670
RGSL	-0,0126	-1,4166	0,1571
SORGISL	-0,0090	-1,2821	0,2003
SORGSL	0,0184	1,4538	0,1465
SPRGISL	0,0019	0,2570	0,7973
SPRGSL	-0,0091	-0,7274	0,4673

Table 66
Parameter Estimates- Regression 3

	Conflict Param.	Conflict t	Conflict p
Intercept	0,5779	47,1969	0,0000
RG	0,0095	0,7719	0,4411
ISL	0,0058	0,6835	0,4950
SL	0,0010	0,0629	0,9499
RGISL	0,0128	1,5010	0,1349
RGSL	-0,0219	-1,4379	0,1520

Table 67
Parameter Estimates- Regression 4

	Conflict Param.	Conflict t	Conflict p
Intercept	0,567840	44,29	0,00
RG	0,001853	0,14	0,89
ISL	0,011451	1,29	0,20
SL	-0,030905	-1,92	0,06
RGISL	-0,003445	-0,39	0,70
RGSL	0,005756	0,36	0,72

Table 68
Parameter Estimates- Regression 5

	Conflict Param.	Conflict t	Conflict p
Intercept	0,5965	48,3104	0,0000
RG	0,0134	1,0820	0,2805
ISL	0,0051	0,5776	0,5642
SL	0,0318	2,1229	0,0349
RGISL	0,0075	0,8475	0,3977
RGSL	-0,0217	-1,4501	0,1485

Parametric Hypotheses Test

In Experiment 4, the arbitrary scaling constant and the drive-capacity parameter were estimated at $\hat{\gamma} = 0.98$ and $\hat{\alpha} = 1.70$, respectively. The preliminary conflict from concern about argumentation was estimated at $\hat{A}_0 = 0.62$ in the S-range condition, at $\hat{A}_0 = 0.96$ in the O-range condition, and at $\hat{A}_0 = 0.50$ in the P-range condition. The preliminary conflict from concern about sacrifice was estimated at $\hat{S}_0 = 0.64$ in the S-range condition, at $\hat{S}_0 = 0.45$ in the O-range condition, and had been set to 1 in the P-range condition.

Manipulation Check

In the following analyses: SO denotes the contrast between the S-range condition and the O-range condition, and SP denotes the contrast between the S-range condition and the P-range condition.

Table 69
Likelihood Type 3 Test

	Degr. Of Freedom	Log-Likelihood	Chi-Square	p
SO	1	-1311,6488	2,5755	0,1085
SP	1	-1322,7059	24,6897	0,0000

Table 70
Parameter Estimates

	Estimate	Wald Stat.	p
Intercept	0,2382	26,5208	0,0000
SO	0,1046	2,5679	0,1091
SP	0,3256	24,2854	0,0000
Scale	1,0000		

Appendix M: Results - Experiment 5

Conflict: Principal Component Analysis
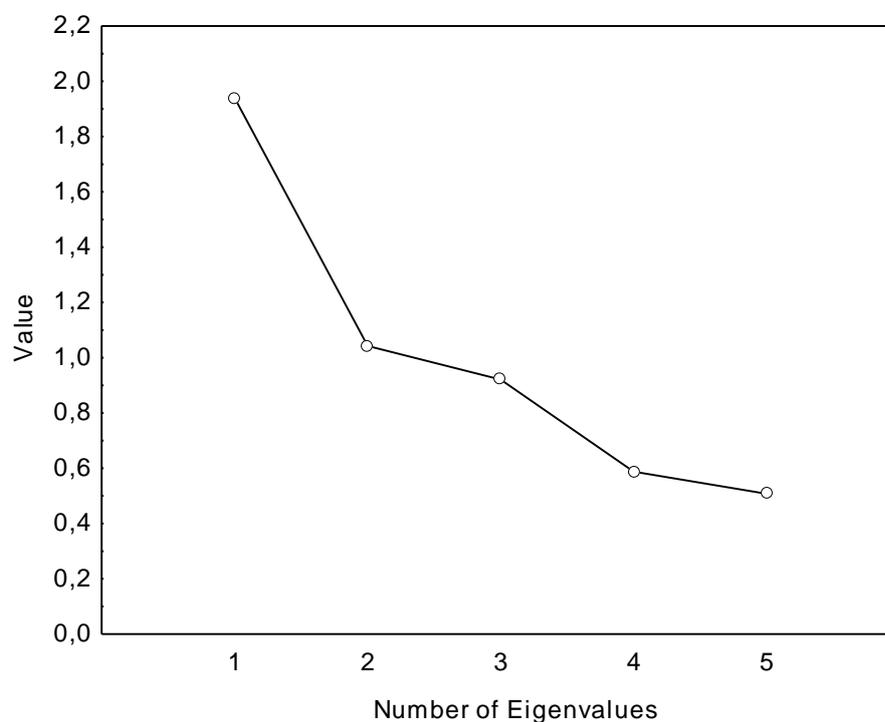
Figure 35. Principal component analysis - scree plot (Experiment 5).

Table 71

Eigenvalues

	Eigenvalue	% Total variance	Cumulative Eigenvalue	Cumulative %
1	1,9401	38,8013	1,9401	38,8013
2	1,0427	20,8534	2,9827	59,6546
3	0,9213	18,4268	3,9041	78,0815
4	0,5880	11,7596	4,4921	89,8411
5	0,5079	10,1589	5,0000	100,0000

Table 72

Factor Loadings

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
Decision Time	0,3379	-0,4339	-0,8318	-0,0748	-0,0055
Decision Uncertainty	0,7232	-0,3463	0,3088	-0,1109	0,4994
Decision Difficulty	0,7461	-0,2727	0,2976	-0,1554	-0,5063
Preferece Equality	0,7161	0,3411	-0,1036	0,6000	-0,0059
Attribute-Weight Equality	0,4831	0,7374	-0,1865	-0,4311	0,0468
Expl.Var	1,9401	1,0427	0,9213	0,5880	0,5079
Prp.Totl	0,3880	0,2085	0,1843	0,1176	0,1016

Conflict: Reliability Analysis

Table 73
Reliability Analysis - Alpha de Cronbach

Valid N	2160
Cronbach alpha	0,4762
Standardized alpha	0,5805
Average inter-item corr.	0,2218

Table 74
Reliability Analysis by Measure

Measure	Itm-Totl Correl.	Alpha if deleted
Decision Time	0,1652	0,4718
Decision Uncertainty	0,4834	0,1946
Decision Difficulty	0,4826	0,1974
Preferece Equality	0,3777	0,4873
Attribute-Weight Equality	0,1543	0,4989

Conflict: Hypotheses Test

In the following analyses: PL denotes the linear contrast concerning the effect of progress through choice tasks (first six tasks versus last six tasks); PQ denotes the quadratic contrast concerning the effect of progress through choice tasks (intermediate versus first and last six tasks); SO denotes the contrast between range conditions (S-range versus O-range); SP denotes the contrast between range conditions (S-range versus P-range); RG denotes the contrast between reference gamble conditions (large-amount condition versus high-probability condition); ISL denotes the quadratic contrast between tradeoff size conditions (intermediate versus small and large tradeoffs); SL denotes the linear contrast between tradeoff size conditions (small versus large tradeoffs); and the other variables denote the interactions between these contrasts.

Table 75
Parameter Estimates- Regression 1

	Conflict Param.	Conflict t	Conflict p
Intercept	0,5540	137,1612	0,0000
PL	-0,0110	-2,2230	0,0263
PQ	-0,0007	-0,2448	0,8066
SO	-0,0055	-0,9634	0,3354
SP	0,0065	1,1375	0,2555
RG	0,0008	0,2055	0,8372

	Conflict Param.	Conflict t	Conflict p
ISL	0,0043	1,5168	0,1295
SL	-0,0142	-2,8708	0,0041
SORG	-0,0062	-1,0800	0,2803
SPRG	-0,0011	-0,1979	0,8431
SOISL	0,0006	0,1485	0,8820
SOSL	-0,0002	-0,0351	0,9720
SPISL	-0,0027	-0,6715	0,5020
SPSL	0,0042	0,5992	0,5491
RGISL	-0,0028	-0,9661	0,3341
RGSL	-0,0079	-1,5893	0,1121
SORGISL	-0,0047	-1,1581	0,2469
SORGSL	-0,0080	-1,1501	0,2502
SPRGISL	-0,0008	-0,2043	0,8381
SPRGSL	-0,0046	-0,6517	0,5147
PLSO	-0,0119	-1,7116	0,0871
PLSP	0,0102	1,4512	0,1469
PLRG	0,0038	0,7779	0,4367
PLISL	0,0024	0,6935	0,4881
PLSL	0,0021	0,3459	0,7295
PLSORG	-0,0084	-1,2106	0,2262
PLSPRG	0,0043	0,6084	0,5430
PLSOISL	0,0040	0,8103	0,4178
PLSOSL	-0,0053	-0,6213	0,5344
PLSPISL	0,0006	0,1190	0,9053
PLSPSL	0,0070	0,8143	0,4156
PLRGISL	-0,0012	-0,3488	0,7273
PLRGSL	-0,0025	-0,4210	0,6738
PLSORGISL	0,0002	0,0344	0,9726
PLSORGSL	0,0152	1,7884	0,0738
PLSPRGISL	-0,0020	-0,3995	0,6896
PLSPRGSL	-0,0024	-0,2825	0,7776
PQSO	-0,0009	-0,2249	0,8221
PQSP	0,0000	-0,0047	0,9963
PQRG	0,0009	0,3100	0,7566
PQISL	-0,0007	-0,3715	0,7103
PQSL	0,0017	0,4920	0,6228
PQSORG	0,0014	0,3491	0,7271
PQSPRG	-0,0040	-0,9938	0,3204
PQSOISL	-0,0022	-0,7862	0,4318
PQSOSL	-0,0024	-0,4739	0,6356
PQSPISL	0,0004	0,1526	0,8787
PQSPSL	-0,0009	-0,1874	0,8513
PQRGISL	0,0016	0,7866	0,4316
PQRGSL	-0,0033	-0,9501	0,3421
PQSORGISL	-0,0026	-0,8987	0,3689
PQSORGSL	0,0018	0,3623	0,7172
PQSPRGISL	-0,0016	-0,5537	0,5799
PQSPRGSL	-0,0050	-1,0012	0,3169

Table 76
Parameter Estimates- Regression 2

	Conflict Param.	Conflict t	Conflict p
Intercept	0,5530	79,9027	0,0000
PL	-0,0093	-1,0918	0,2753
PQ	0,0002	0,0475	0,9621
RG	0,0081	1,1746	0,2405
ISL	0,0064	1,3174	0,1881
SL	-0,0181	-2,1388	0,0328
RGISL	0,0027	0,5617	0,5745
RGSL	0,0047	0,5583	0,5768
PLRG	0,0080	0,9432	0,3459
PLISL	-0,0022	-0,3646	0,7155
PLSL	0,0004	0,0381	0,9696
PLRGISL	0,0006	0,1009	0,9197
PLRGSL	-0,0153	-1,4608	0,1445
PQRG	0,0035	0,7085	0,4789
PQISL	0,0011	0,3073	0,7587
PQSL	0,0050	0,8435	0,3992
PQRGISL	0,0057	1,6447	0,1005
PQRGSL	-0,0002	-0,0308	0,9754

Table 77
Parameter Estimates- Regression 3

	Conflict Param.	Conflict t	Conflict p
Intercept	0,5485	77,9699	0,0000
PL	-0,0229	-2,6857	0,0074
PQ	-0,0016	-0,3210	0,7483
RG	-0,0053	-0,7590	0,4481
ISL	0,0049	0,9904	0,3223
SL	-0,0144	-1,6787	0,0937
RGISL	-0,0074	-1,4941	0,1356
RGSL	-0,0159	-1,8481	0,0650
PLRG	-0,0046	-0,5369	0,5915
PLISL	0,0064	1,0598	0,2896
PLSL	-0,0032	-0,3068	0,7591
PLRGISL	-0,0011	-0,1733	0,8625
PLRGSL	0,0126	1,2179	0,2237
PQRG	0,0023	0,4584	0,6468
PQISL	-0,0030	-0,8480	0,3967
PQSL	-0,0006	-0,1035	0,9176
PQRGISL	-0,0010	-0,2788	0,7805
PQRGSL	-0,0015	-0,2466	0,8053

Table 78
Parameter Estimates- Regression 4

	Conflict Param.	Conflict t	Conflict p
Intercept	0,5605	79,7194	0,0000
PL	-0,0008	-0,0932	0,9258
PQ	-0,0007	-0,1456	0,8842
RG	-0,0003	-0,0426	0,9660
ISL	0,0016	0,3264	0,7442
SL	-0,0100	-1,1624	0,2455
RGISL	-0,0036	-0,7210	0,4711
RGSL	-0,0124	-1,4418	0,1498
PLRG	0,0081	0,9351	0,3501
PLISL	0,0030	0,4888	0,6251
PLSL	0,0090	0,8583	0,3910
PLRGISL	-0,0032	-0,5197	0,6034
PLRGSL	-0,0050	-0,4703	0,6383
PQRG	-0,0031	-0,6307	0,5285
PQISL	-0,0003	-0,0918	0,9269
PQSL	0,0008	0,1309	0,8959
PQRGISL	0,0000	0,0058	0,9954
PQRGSL	-0,0083	-1,3607	0,1740

Table 79
Parameter Estimates- Regression 5

	Conflict Param.	Conflict t	Conflict p
Intercept	0,5437	78,3902	0,0000
SO	-0,0165	-1,6807	0,0933
SP	0,0167	1,7177	0,0863
RG	0,0038	0,5468	0,5847
ISL	0,0075	1,5348	0,1253
SL	-0,0138	-1,6262	0,1044
SORG	-0,0160	-1,6305	0,1034
SPRG	0,0071	0,7340	0,4632
SOISL	0,0069	0,9821	0,3264
SOSL	-0,0031	-0,2631	0,7926
SPISL	-0,0025	-0,3679	0,7130
SPSL	0,0121	1,0214	0,3074
RGISL	-0,0056	-1,1371	0,2559
RGSL	-0,0071	-0,8308	0,4064
SORGISL	-0,0019	-0,2782	0,7809
SORGSL	0,0053	0,4441	0,6571
SPRGISL	-0,0013	-0,1814	0,8561
SPRGSL	-0,0020	-0,1701	0,8650

Parametric Hypotheses Test

In Experiment 5 the drive-capacity parameter was estimated at $\hat{\alpha} = 2.20$ and the arbitrary scaling constant had been set to 1 in order to estimate the remaining parameters. The preliminary conflict aroused by concern about argumentation was estimated at $\hat{A}_0 = 0.69$ in the S-range condition, at $\hat{A}_0 = 0.66$ in the O-range condition, and at $\hat{A}_0 = 0.65$ in the P-range condition. The preliminary conflict aroused by concern about sacrifice was estimated at $\hat{S}_0 = 0.50$ in the S-range condition, at $\hat{S}_0 = 0.52$ in the O-range condition, and at $\hat{S}_0 = 0.55$ in the P-range condition.

Manipulation Check

In the following analyses: SO denotes the contrast between S-range and O-range condition, and SP denotes the contrast between S-range and P-range.

Table 80
Likelihood Type 3 Test

	Degr. Of Freedom	Log-Likelihood	Chi-Square	p
SO	1	-1493,1579	0,0079	0,9292
SP	1	-1494,5071	2,7064	0,0999

Table 81
Parameter Estimates

	Estimate	Wald Stat.	p
Intercept	-0,0891	4,2709	0,0388
SO	-0,0054	0,0079	0,9292
SP	-0,1004	2,7019	0,1002
Scale	1,0000		

Appendix N: Results - General Discussion

In the following analyses: GL denotes the contrast between outcome sign conditions (gains versus losses); C denotes the contrast between the two choice contexts (forced versus free choice); RG denotes the contrast between reference gamble conditions (large-amount condition versus high-probability condition); ISL denotes the quadratic contrast between tradeoff size conditions (intermediate versus small and large tradeoffs); SL denotes the linear contrast between tradeoff size conditions (small versus large tradeoffs); CH denotes the contrast between choices (choice of the no-choice option versus choice of one of the products); and the other variables denote the interactions between these contrasts.

Choice Inconsistency Versus Outcome Sign (LOGIT Analysis)

Table 82
Likelihood Type 3 Test - Experiment 1

	Degr. Of Freedom	Log-Likelihood	Chi-Square	p
GL	1	-2255,8089	9,7459	0,0018

Table 83
Parameter Estimates - Experiment 1

	Estimate	Wald Stat.	p
Intercept	-0,5823	268,5964	0,0000
GL	0,1108	9,7274	0,0018
Scale	1,0000		

Decision Time Versus Outcome Sign (Regression Analysis)

Table 84
Parameter Estimates - Experiment 1

	Decision Time Param.	Decision Time t	Decision Time p
Intercept	3,5040	212,8825	0,0000
GL	0,0731	4,4420	0,0000

Table 85
Parameter Estimates - Experiment 2

	Decision Time Param.	Decision Time t	Decision Time p
Intercept	3,4391	195,6142	0,0000
GL	0,0924	5,2555	0,0000

Forced Versus Free Choice (Linear Regression Analysis)

Table 86
Parameter Estimates- Regression 1

	Conflict Param.	Conflict t	Conflict p
Intercept	0,3800	96,1590	0,0000
C	-0,0015	-0,3848	0,7004
RG	0,0063	1,6248	0,1043
ISL	0,0021	0,7651	0,4443
SL	0,0223	4,6759	0,0000
CRG	-0,0021	-0,5320	0,5948
CISL	0,0014	0,4987	0,6180
CSL	0,0049	1,0290	0,3036
RGISL	0,0017	0,6014	0,5476
RGSL	-0,0100	-2,0917	0,0366
CRGISL	-0,0001	-0,0307	0,9755
CRGSL	-0,0038	-0,7978	0,4251
CH	0,1497	6,6725	0,0000