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Decision Under Uncertainty and Moral Emotions

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Abstract

The purpose of this paper is to examine the impact of moral emotions (guilt/innocence) on decisions under risk. We hypothesize that participants' aversion to risky choices and preference for risky choices vary as a function of their moral role (guilty/innocent), and thus of moral assumptions, rather than only in view of the gain–loss *formulation effects* (Tversky & Kahneman, 1981). The effect of moral values on individuals' choices leads to both people who evaluate themselves as guilty and those who feel of being a victim tending to make a choice (risky or riskless) that allows them to satisfy a moral goal: To re-establish justice**.** In two different experiments, we demonstrated that moral emotions appear to be the main determinant of individuals' preferences (risk-seeking or risk-aversion). Our participants make the risky or riskless choice prevailing over the *formulation effect* proposed by Tversky and Kahneman, in order to restore justice, either because they were guilty of a wrong-doing or because victims of a wrong-doing. Moral emotions lead us to prefer a risky or a riskless choice, regardless of whether they are generated by the task to be solved or by other situations unrelated to the task.

Keywords: moral emotions; decision under uncertainty; guilt; formulation effects.

Introduction

In this paper we will focus on the role that moral emotions, such as guilt, or innocence, play in determining people's choices under conditions of risk and uncertainty. We will try to answer to a number of questions: *do moral emotions lead us towards risk seeking or towards risk aversion*? Moreover, *does the way we judge ourselves, i.e. as being responsible and guilty, or innocent victims of wrong-doing, influence our preferences for risky or riskless choices*? And finally, *do we observe this influence only in the presence of moral emotions generated by the situation to be evaluated, or also in the presence of moral emotions regarding other domains, not directly related to the situation*?

The interest in the influence of moral emotions(e.g. guilt, innocence) on decisions under risk is threefold. Firstly, once it has been demonstrated that emotions have an effect on cognition in general, cognitive psychologists should *now* develop a finer understanding of the influence that *specific* emotions, such as feeling guilty, exert on *specific* cognitive

processes such as hypothesis-testing and decision-making. Secondly, the sense of responsibility, as well as the fear of guilt for having acted irresponsibly, i.e. the fear of failure to face up to their own responsibilities, are involved in almost all judgements and decisions people make in everyday life. An examination should thus be made of the influence of these emotional states on relevant cognitive processes such as decision-making or naive hypothesis testing. The third reason of interest is clinical in nature. The fear of guilt for having acted irresponsibly is currently recognized as being central to the emergence, development, and perpetuation of obsessions and compulsions (Mancini & Gangemi, 2004; Niler & Beck, 1989; Rachman, 1993;). Moreover, several studies have shown that intolerance of uncertainty, defined as aversion to risky choices and preference for riskless choices (Emmelkamp & Aardema, 1999; Mancini, D'Olimpio, Del Genio, Di Donna & Prunetti, 2002), is a central cognitive feature of OCD. We therefore deem it of importance to contribute, albeit indirectly, to understanding OCD, by studying the influence of guilt emotion on cognitive processes crucial for the maintenance of the disturb, such as decision-making under risk.

Traditionally, risk-aversion and risk-seeking have been explained invoking *formulation effect* (Kahneman & Tversky, 1979; 1984; Tversky & Kahneman, 1981): people's decisions under risk are influenced by whether choices are framed as losses or as gains.

Following the representational approach of Tversky and Kahneman, in this paper it is argued that individuals' (risk-seeking or risk-averse) choices mainly depend on the spontaneous framing of the decision problem in accordance with *how* individuals judge themselves and accordingly *represent themselves* as guilty or as victims of wrong-doing, rather than only in view of the gain–loss *formulation effects* (Tversky & Kahneman, 1981).

In general, we hypothesize that the effect of moral values on individuals' choices leads to both people who evaluate themselves as guilty and those who feel of being a victim tending to make a choice (risky or riskless) that allows them to satisfy a moral goal: To re-establish justice**.** Paying for one's own faults when guilty, and fighting for one's rights when the victim of a wrong-doing are moral values

which come into play in the choices, and go beyond the formulation effect.

The purpose of this paper is thus to examine the impact of moral emotions (guilt/innocence) on decisions under risk. With this aim two experiments were conducted.

We predicted that if individuals feel and represent themselves as guilty, then they had as a moral goal to expiate or to rectify. As a consequence they will make the choice (risky or riskless) which allows them to pursue this goal, regardless of whether the questions are formulated as gains or as losses (*formulation effect*). By contrast, we expected that if individuals felt and represented themselves as victim, then they have as a moral goal to assert their rights (to obtain justice). As a consequence they will make the choice (risky or riskless) which allows them to pursue this goal, also in this case regardless of whether the questions are formulated as gains or as losses (*formulation effect*). In all the experiments, we considered choices whose outcomes were a pecuniary penalty imposed on the individual. We predicted that individuals faced with decisions under risk would take into account *not only* the expectations of monetary outcomes *but also* the moral implications of these outcomes.

Experiment 1

In this experiment we investigated the influence of moral emotions (guilt-innocence) on individuals' choices (risk-seeking or risk-averse). Moral emotions were induced indirectly by asking participants to read one of two equivalent decision problems in which we manipulated individuals' moral role (guilty/victim) by giving differential instruction. In one version of the problem, the individual was guilty of doing wrong (context of guilt); in the other version the individual was the victim of a wrong-doing (context of innocence). The emotional states were thus generated by the situation to be evaluated and were directly connected to the event to be evaluated - the task. Moreover, the options of the decisional task were formulated in the following manner: the only option that allowed our guilty subject to rectify the wrong was the riskless one, by contrast, the option that allowed our victim participants to have a chance of obtaining justice was the risky one.

We predicted that 1. participants feeling guilty would prefer the riskless choice, i.e. the only morally right one (it allowed them to rectify the wrong-doing), regardless of whether the questions were formulated as gains or as losses. 2. "innocent" participants would prefer the risky choice, i.e. the only one that offered them a chance of asserting their rights (of obtaining justice), regardless of whether the questions were formulated as gains or as losses.

Method

Participants

Participants were 255 randomly undergraduate students recruited from the University of Verona. Their mean age was 20.2 years; they ranged in age from 18 to 27. All of the participants were volunteers.

The tests were run in four independent groups, each receiving one of the four versions of the decision problem (cf. Table 1). The design was 2 X 2 independent groups with the factors story format (context of guilt or context of innocence) and question option format (gain or loss).

Materials and Procedure

Participants received a paper with written instructions and a context story with its two answer alternatives. Participants were told to read the question options (concerning a decision problem) carefully and to take whatever time they required.

The problem format for the *context of guilt* was as follows:

As you come back home, you find a €1,200 speeding fine. You remember perfectly that you exceeded the speed limit that day, although you knew that there was a reasonable limit to respect and that speed traps were in place. You know you made a mistake and so you consider it a just fine.

In the *innocence version* these sentences read:

As you come back home, you find a €1,200 speeding fine. You remember perfectly that you did not use your car that day, but you are also absolutely sure that you cannot prove it. You know you did not do anything wrong and so you consider it an unjust fine.

The question format with *gain options* was as follows:

a—if you pay directly, you will save €400.

b—if you appeal against the sentence, there is a one-third probability that you will save €1,200 and a two-thirds probability that you will not save anything.

In the *loss version* these sentences read:

a—if you pay directly, you will pay €800.

b—if you appeal against the sentence, there is a one-third probability that you will not pay anything and a two-thirds probability that you will pay €1,200.

In all four conditions, participants were instructed to indicate which answer alternative they chose (a or b).

The expectations of monetary outcomes in the two versions of the decision problems were indistinguishable. The order of the two different options was randomized.

After the decisional task had been completed, a questionnaire was administered in order to check the effectiveness of the manipulation of the instructions (induction of guilt). All participants were requested to fill in a three item questionnaire (Manipulation Check Questionnaire) about guilt due to the fine during the task (*How guilty did you feel after reading the problem? How guilty did you feel about the penalty?*), and about the fairness of the penalty (*How fair is the penalty?*). Ratings of guilt were made within the range from 0 to 100, with anchors at 0 (not at all guilty) and 100 (totally guilty); ratings of the fairness of the penalty were made within the range from 0 to 100, with anchors at 0 (not at all fair) and 100 (totally fair).

Results

Manipulation Check Questionnaire. The analysis conducted on the manipulation check variables revealed that the manipulation of guilt was effective. 'Guilty' participants perceived more guilt from the fine ($M = 70.2$, $SD = 11.4$) than participants in the other condition (context of innocence) ($M = 18.6$, $SD = 10.5$) ($t(252) = 20,82$; $p < .001$). Moreover, as regards the fairness of the penalty, 'guilty' participants evaluated it as more just ($M = 65.8$, $SD = 12.4$) than 'innocent' participants ($M = 22.1$, $SD = 11.5$) ($t(252) = -11.8$; $p < .001$).

Decision Problem. The responses that participants gave for each of the four conditions are shown in Table 1. We examined the effect of our independent variables (story format versus question option format) on participants' choice. A logistic regression model of participants' choices was tested. The predictors entered included story format, question option format and their interaction. The model was statistically significant, $\chi2$ (3, N = 255) = 55.83; p < .001.

As predicted, Wald statistics revealed that only the story format predictor was significant ($p < .001$). Participants' risk-aversion responses occurred significantly more often when the outcome of the problem resulted from the protagonist's failure to behave responsibly and specifically from her or his infringement of a duty (context of guilt). A clear majority of respondents prefer saving €400 to a gamble that offers a one-third chance of saving €1,200. By contrast, risk-seeking responses occur much more often when the outcome of the problem infringes the protagonist's right (context of innocence). A larger majority of participants made a risk-seeking choice of the gamble (option b) over the sure loss of €800. The other two predictors (question option format; story format and question option format interaction) were not significant.

Table 1: percentages (and frequencies) of responses across the four conditions of experiment 1 (N=255).

		Emotions				
		Innocence			Guilt	
Question option	n	Risk-seeking	Risk-aversion	n	Risk-seeking	Risk-aversion
Gain	62	79 (49)	21 (13)	64	28 (18)	72 (46)
Loss	62	82 (51)	18 (11)	67	30 (20)	70 (47)

Conclusions

The results of Experiment 1 support our predictions. Regardless of the question option format (the *framing effect* invoked by Kahneman and Tversky), the story format appears to be a determinant of individuals' preferences (risk-seeking or risk-aversion). Therefore, participants' answers appeared to be based on the framing of the decision problem in accordance with the induced emotional state (guilt or innocence), rather than on the descriptions of the outcomes as given in the options.

Our subjects make the risky or riskless choice prevailing over the formulation effect proposed by Tversky and Kahneman, in order to restore justice either because they were guilty of a wrong-doing or because victims of a wrong-doing.

Experiment 2

Going back to one of our initial questions, in this experiment we will try to answer to the question: *do we observe the influence of the way we judge ourselves only in the presence of moral emotions generated by the situation to be evaluated, or also in the presence of moral emotions regarding other domains, not directly related to the situation?*

To this aim, in contrast to Experiment 1, Experiment 2 directly manipulated participants' moral emotions by asking them to write about a recent life event associated with their guilt or innocence. The emotional states were thus unrelated to the event to be evaluated - the task. The story in the problem was now the same for both groups. In this way, the differences in individuals' choices (risk-seeking or risk-averse) would only depend on the spontaneous framing of the decision problem in accordance with the induced emotional states—guilt/victim.

More specifically, in this study we tested a group of volunteer subjects assigned to two experimental conditions (guilt induction; innocence induction). As in the previous experiment, in the first condition (guilt induction) we compared the responses of two different groups of participants submitted to two formulations of the options following the story. The two kinds of option were options described as gains and options described as losses. In the innocence induction condition, we presented the same two kinds of option (gains/losses). As in the earlier experiment, in our task the option that allowed our guilty subject to expiate or rectify was the riskless one, while the option that allowed our victim participants to have a chance of obtaining justice was the risky one. Thus, we predicted that the preferences of participants assigned to guilt induction condition would be risk averse, regardless of whether the questions were formulated as gains or as losses. By contrast, preferences of participants induced to experience innocence would be risk seeking, regardless of whether the questions were formulated as gains or as losses.

Method

Participants

One hundred and thirty-two undergraduate students of the University of Palermo participated as volunteers in the experiment and were tested in large groups. Their mean age was 20 years, they ranged in age from 18 to 25. The tests were run in four independent groups, each receiving one of the four versions of the decision problem (cf. Table 2).

The design was 2 X 2 independent groups with the factors emotional states induction (guilt or innocence) and question option format (gain or loss). As in the previous experiments, participants received a paper with written instructions and a decisional problem with its two-answer alternatives. Participants were told to read the instructions and question options (concerning a decision problem) carefully.

Materials and Procedure

Emotional state was manipulated by having participants describe either a guilt or innocence event in their personal life. Participants in the guilt induction condition were asked to describe a guilt event in their recent life as vividly as possible and to include details of what they were feeling and thinking, whereas participants in the innocence induction condition were instructed to describe a recent life event in which they were innocent victims of wrong-doing. All participants were told they had 15min to recall and write the stories.

After writing the event, a Manipulation Check Questionnaire—Part 1 was administered in order to check the effectiveness of the induction. Participants were asked how guilty they felt after describing the event. As in Experiment 1, individuals rated their feelings of guilt within the range from 0 to 100, with anchors at 0 (not at all guilty) and 100 (totally guilty).

Participants were then given the same decisional problem as presented in Experiment 1, but in a neutral version, in which they were not told whether they were guilty or victims as regards the fine. The neutral version reads:

When you come back home, you find a €1,200 speeding fine.

The question formats with *gain* and *loss options* were the same as in the previous experiment. Also in this study, in all four conditions, participants were instructed to indicate which answer alternatives they would choose. The order of the two different options was randomized.

As in the previous study, after completing the decisional task, all participants were requested to fill in a Manipulation Check Questionnaire—Part 2 about the guilt felt because of the fine during the task, and about the fairness of the penalty.

Results

We analysed the data for guilt felt after the mental state induction (Manipulation Check Questionnaire —Part 1) using the *t*-test. Results revealed that the induction was effective. After writing about the past life event involving guilt, individuals perceived more guilt ($M = 68.1$, $SD = 14.1$) than individuals in the innocence condition ($M = 20.3$, $SD = 11.5$) ($t(130) = 9.776$; $p < .001$).

As regards our manipulation check variables completed by participants immediately after the decisional task (Manipulation Check Questionnaire —Part 2), we found, once again, that the manipulation of the emotional state was effective. "Guilty" participants perceived more guilt arising out of the fine ($M = 70$, $SD = 22.1$) than "innocent" participants ($M= 40.4$, $SD = 21$) ($t(130) = 4.036$; $p < .001$). Moreover, as regards the fairness of the penalty, guilty participants evaluated it as fairer ($M = 62.3$, $SD = 12.4$) than participants in the other condition ($M = 43.1$, $SD = 21.4$) ($t(130) = 4.055$; $p < .001$).

The responses that the participants gave for each of the four conditions are shown in Table 2. We examined the effect of our

independent variables (emotional state induction versus question option format) on participants choice. A logistic regression model of participants' choices was tested. The predictors entered included story format, question option format and their interaction. The model was statistically significant, $\chi2$ (3, $N = 132$) = 37.728; $p < 0.001$.

As expected, Wald statistics revealed that only the emotional state induction predictor was significant ($p<.001$). Participants' risk-aversion responses occurred much more often when individuals evaluated themselves as guilty. A clear majority of respondents (78%) preferred saving €400 over a gamble offering a one-third chance of saving €1200. By contrast, risk-seeking responses occurred much more often in the context of innocence. A larger majority of participants (73%) made a risk-seeking choice in which they preferred the gamble to the sure loss of €800. The other two predictors (question option format; story format and question option–format interaction) were not significant.

Table 2: percentages (and frequencies) of responses across the four conditions of experiment 2 (N=132).

| | Emotions | | | | | |
| | Innocence | | | Guilt | | |
Question option	n	Risk-seeking	Risk-aversion	n	Risk-seeking	Risk-aversion
Gain	30	67 (20)	33 (10)	36	25 (9)	75 (27)
Loss	30	80 (24)	20 (6)	36	19 (7)	81 (29)

Conclusion

Our hypotheses are fully supported by the data of this experiment. As in the previous study, participants' choices seemed to be mainly based on the framing of the decision problem in accordance with the induced emotional state (guilty or innocent), and thus on moral assumptions, rather than on the descriptions of the options. Once again, our participants prefer the risky or riskless choice prevailing over the gain-loss *formulation effect* invoked by Tversky and Kahneman in order to restore justice, either because they were guilty of a wrong-doing or because victims of a wrong-doing.

Discussion

We started our paper with a number of questions: *do moral emotions lead us towards risk seeking or towards risk aversion? Does the way we judge ourselves, i.e. as being responsible and guilty, or innocent victims of wrong-doing, influence our preferences for risky or riskless choices? Do we observe this influence only in the presence of moral emotions generated by the situation to be evaluated, or also in the presence of moral emotions regarding other domains, not directly related to the situation?*

The findings of the present studies seem to point to an affirmative answer. In 2 different experiments we found that moral emotions affect decision under risk. In general, the results of our experiments revealed that subjects preferences for risky or riskless choices vary as a function of their moral role (guilty/innocent), and thus of moral assumptions.

Both participants who were explicitly told they had behaved irresponsibly and guiltily, and participants who were told they were victims suffering injustice make the choice (risky or riskless) that allows them to satisfy a moral goal: To re-establish justice, regardless of the gain-loss formulation effect (Experiment 1). The same results were obtained in a second experiment, in which the emotional states were induced by asking participants to write about a life event involving either guilt or innocence. Also in this study, our participants make the risky or riskless choice in order to restore justice, either because they were guilty of doing wrong or because victims of a wrong-doing, regardless of the gain-loss *formulation effect* (Experiment 2).

Thus, our hypotheses were supported by the findings of both the experiments. Moral emotions appear to be the main determinant of individuals' preferences (risk-seeking or risk-aversion). They lead us to prefer a risky or a riskless choice, regardless of whether emotions are generated by the task to be solved or by other situations unrelated to the task. This effect prevails over the *gain-loss formulation effect* of Tverky & Kahneman. Moral emotions guides (risky or riskless) choices in an attempt to pursue the moral goal of re-establishing justice.

From a general point of view, our findings are consistent with a growing body of evidence that judgments and choices are influenced by emotions (e.g. fear, anger). For instance, Lerner and Keltner (2000; 2001) have provided some of the first evidence regarding how *specific* emotions influence specific cognitive process such us decisions under risk. In several studies, they found that fear and anger have opposite effects on risk perception. Whereas fearful people expressed pessimistic risk estimates and risk-averse choices, angry people expressed optimistic risk estimates and risk-seeking choices. These opposing patterns emerged for naturally occurring and experimentally induced fear and anger.

Clearly, future studies are necessary to replicate and extend our findings. As above mentioned, in our tasks the question options were formulated in a specific manner: the only option that allowed our guilty subject to rectify the wrong was the riskless one, by contrast, the option that allowed our victim participants to have a chance of obtaining justice was the risky one. Hence, the riskless choice was always associated with "justice" for guilty participants, whereas the risky choice was always associated with "justice" for the innocent victims. We did not vary the answer alternatives in order to obtain an option that was both risky and carry the moral goal for the guilty subjects, and an option that was both riskless and carry the moral goal for the innocent victims. Thus, it would be useful if further studies varied the link between risk level of the choice and "moral goal" that it carries. Although this change in the options formulation, according to the present findings, we expect that individuals will continue to prefer the choice (the risky or riskless one) which allows them to pursue the moral goal of re-establishing justice.

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