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The rich get richer and the poor get poorer: On risk aversion in behavioral decision-making

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Abstract

Some studies have found that choices become more risk averse after gains and more risk seeking after losses, although other studies have found the opposite. The latter tend to use hypothetical cases that encourage deliberation. In the current study, we examined the effects of prior gains and losses on a task designed to encourage less reflective decision making, the Iowa Gambling Task (IGT). Fifty participants conducted a manipulated decision-making task in which one group gained money, whereas the other group lost money, followed by the IGT. Participants who experienced a prior monetary loss displayed more risky choice behavior on the IGT than subjects who experienced a prior gain. These effects were not mediated by a positive or negative affect, although the sample size may have been too small to detect a small effect.

Keywords: implicit decision-making, reward, punishment, Iowa Gambling Task, monetary choices, risk behavior.

1 Introduction

Kahneman and Tversky (1979) noted that people are often risk averse for gains and risk seeking for losses. Whether people consider a consequence of their choice as a loss or as a gain is dependent on their point of reference. This reference point, which is often equivalent to the current wealth position, plays a key role in the theory of choice.

It should be possible to manipulate perceptions of the domain (gain or loss) with actual prior gains or losses. People may see their starting point, before the gain or loss, as the reference point. If they had lost money, for example, they may see new gambles as in the domain of losses, and they therefore might be risk seeking. Earlier studies of the effect of gains and losses show conflicting results. Thaler and Johnson (1990) found the opposite results — which they called a "house money effect" — although their participants would take risks to gain back all of their loss. Weber and Zuchel (2005) review this literature and find some conditions that support the Prospect Theory prediction. Aside from their result, however, most of the results consistent with Prospect Theory are from studies that use more realistic situations such as investment, rather than hypothetical tasks.

Some traditional economic studies addressing theories of decision-making assume that decision-making is based on deliberate evaluations of varying option-outcome scenarios, that is, people weigh the pros and cons of various choices against each other and base their decision on the outcome of this comparison. These kinds of choices can be characterized as deliberate, and carefully thought-out.

However, some recent psychological studies addressing decision-making show that decisions can also be driven by less carefully thought-out choices (Dijksterhuis, Bos, Nordgren, & van Baaren, 2006), are often implicit and automatic (Hastie, 2001), and are based on "gut-feelings" (Damasio, 1996) or emotions (Loewenstein et al., 2001; Sanfey, Loewenstein, McClure, & Cohen, 2006). Recently, Sanfey et al. (2006) made a clear distinction between these two psychological systems involved in economic decision-making: an emotional system, which involves the activation of automatic processes and a deliberative system involving controlled processes, with each having separate neural substrates. In the present contribution, we want to apply this recent knowledge to risk aversion. Is risk aversion after gains the consequence of people's deliberate, conscious decisions to avoid risk? Or is the case that risk aversion can largely automatic, whereby people's current reference point leads them to pursue less risky options without deliberately weighting all outcome scenarios?

In the present study we examined the role of reference point in a task designed to encourage automatic, emo-

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tional driven decision-making, the Iowa Gambling Task (IGT). During the IGT participants have to select cards from four decks that range in probability and magnitude of rewards and punishments (Bechara, Damasio, Damasio, & Anderson, 1994; Bechara, Damasio, & Damasio, 2000). To translate our hypothesis pertaining to risk aversion to the IGT, it is necessary to explain the IGT in some detail. In the IGT, participants can repeatedly choose (usually up to 100 times) between four decks of cards. Two of the decks (e.g., A and B) are disadvantageous. They produce large immediate gains, but these gains are followed by large losses, leading to an overall loss in the long run. The other remaining decks (e.g., C and D) are advantageous. The gains are modest but consistent and the losses are small. Consistently choosing these decks leads to gains in the long run. This means that people who are risk seeking would be predominantly choose decks A and B, leading to losses in the long run. Conversely, people who are risk averse will predominantly choose decks C and D, leading to overall gain. This means that risk aversion translates into better performance (overall gains) on the IGT, whereas risk seeking would translate into poor performance (overall losses).

The psychological process that determines people's behavior in the IGT is crucial to our hypothesis that risk aversion is not only based on deliberately weighting all outcome scenarios. A general consensus is that people performing the IGT at some point steer towards certain (profitable) decks, in rather automatic way. Whether this automatic behavior is entirely unconscious is still subject to debate; see Maia and McClelland (2004), and Dunn et al. (2006). Behavior on the IGT can be seen as a form of implicit learning (Reber, 1993), whereby behavior changes before people can verbalize why they do what they are doing. Therefore, the IGT can be regarded as an instrument capable of assessing intuitive and emotion-based decision-making processes.

In addition to our central aim – to test the relative automaticity of risk aversion – we have another goal. Economic studies addressing theories of decision-making often rely on hypothetical situations and choices in which participants are confronted with monetary gambles without any real consequences. Although the use of real incentives is often not crucial for the outcome of experiments, using real incentives has an important role to play in establishing the quality, credibility, and generalizability of experimental data (Beattie and Loomes, 1997).

In the present study, we addressed this point by using real monetary remunerations in order to mimic real-life decision-making more closely. For the purpose of the present study, we experimentally manipulated the reference point. That is, participants first performed a manipulated gamble-task in which they either gained or lost money as a result of their performance (in actuality, they had no influence on these gains or losses). Note that this experimental set-up comes close to real-life situations in which a person's reference point (real or perceived) is often the result of their prior choices.

It is known that individual differences can influence behavioral decision-making. These individual difference variables include reward sensitivity (Franken & Muris, 2005), gender (Overman, 2004), and age (Wood, Cox, Davis, Busemeyer, & Koling, 2005). In line with previous research (Peters & Slovic, 2000), we expected that our experimental manipulation would have an effect on participants' affect. More precisely, a prior gain would yield an increase of positive affect, whereas an earlier loss would result in an increase of negative affect. It has been suggested that affect might influence decision-making (Ashby, Isen, & Turken, 1999; Loewenstein et al., 2001). Positive affect can promote increased sensitivity to losses (Isen, Nygren, & Ashby, 1988). In the present study, we investigated whether the above-mentioned individual differences and affect may have an additional effect on the participants' decision-making.

The main hypothesis was that people who experienced a prior gain on a gambling task performed better (i.e., made more advantageous choices as a consequence of risk aversion) on the IGT as compared to persons who experienced a prior loss. Furthermore, we asked whether this effect was influenced by subjective affect, and various other individual differences.

2 Method

2.1 Participants

Fifty undergraduate psychology students (11 males) were recruited to participate in the present study. Their mean age was 20.6 years (SD = 3.2). All participants received course credits for participating and could gain additional money depending on their performance on the IGT, ranging between 1 and 6 €. Participants were randomized into two groups: a Prior Loss (PL) group (n = 25; 5 males) or a Prior Gain (PG) group (n = 25; 6 males). All subjects signed informed consent prior to the beginning of the experiment.

2.2 Instruments

For the present study we used the computerized version of the IGT to measure decision-making (Bechara, Tranel, & Damasio, 2000; we used the same monetary outcomes but substituted Euros for dollars). This task consists of 100 successive trials, which were split into five 20-trial blocks for analysis, in which subjects are instructed to try to gain as much money as possible by drawing cards from one of four decks. The decisions to choose from the

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decks are motivated by reward and punishment schedules inherent in the task. Two of the decks (i.e., A and B) are disadvantageous, producing immediate gains (large rewards) but these are accompanied by larger losses in the long run (larger punishments). The C and D decks are advantageous: gains are modest but more consistent and losses are smaller. See Bechara, Tranel, & Damasio, 2000, for the payoff and probability scheme of the IGT. The net-score (the number of advantageous decks choices minus the number of disadvantageous decks choices) was used as dependent variable. A higher score indicates that a subject is more often choosing advantageous decks. There is general consensus that the "IGT has proved to be a sensitive, ecologically valid measure of decision-making" (Dunn et al., 2006).

The BIS/BAS Scales (Carver & White, 1994) were presented as a self-report questionnaire that has been constructed to assess individual differences in personality dimensions that reflect the sensitivity of two motivational systems, the aversive and appetitive system (BIS and BAS; Gray, 1987). The BIS/BAS Scales consist of 20 items that can be allocated to two primary scales: the Behavioral Inhibition System scale (BIS; 7 items) and the Behavioral Approach System scale (BAS; 13 items). The BAS can be divided into 3 subscales: Fun Seeking (4 items), Reward Responsiveness (5 items), and Drive (4 items). The Dutch version of the BIS/BAS Scales has been described in previous studies (Franken, 2002; Franken, Muris, & Rassin, 2005). Cronbach's alphas for various scales were found to range from .61 to .79.

The Positive and Negative Affect Scales (PANAS; Watson, Clark, & Tellegen, 1988) were administered as a measure of positive and negative affect. The PANAS is a 20-item bidimensional mood inventory with a 5-point Likert-scale response format. Positive affect reflects the extent to which a person feels enthusiastic, active, and alert, whereas negative affect is a general dimension of subjective distress and unpleasurable engagement that subsumes a variety of aversive mood states, including anger, contempt, disgust, guilt, fear, and nervousness (Watson et al., 1988). Psychometric properties of the PANAS scales are good (Boon & Peeters, 1999; Watson et al., 1988).

2.3 Procedure and manipulation

Participants were told that they participated in a gambling study and that we aimed to investigate decision-making qualities. First, participants completed all questionnaires. Subsequently, half of the subjects carried out the "loss" version of the manipulated IGT, while the other half conducted the "gain" version of the manipulated IGT. For both groups, we used a fixed, pseudo-random, gain/loss schedule irrespective of the choices that participants made. This manipulated IGT was programmed to yield a gain of four € in the PG group and a loss of 10 € in the PL group. Irrespective of the card choice, there was always a pre-determined pattern of gains/losses. The proportion of cards with losses were in all tasks and all decks 50%. There were no differences among the A, B, C, and D decks, they were all equal. The difference between the PL and PG condition was were the amount of losses, which were of course larger in the PL condition. In order to make the reference point (i.e., gain or loss) more salient (Heath, Larrick, & Wu, 1999), participants in the PG group were told that they gained money above average on this task, whereas participants in the PL group were told that they lost more than average on this task. In addition, participants were instructed that complete new rules applied to the second game, that they needed to employ other decision-strategies in order to gain money, and that other decks would be advantage and disadvantage. Again, they were told that some decks would be more advantageous than others. Furthermore, all participants were told that their prior loss or gain would be the starting point for the second task. In other words, the PG group started with an initial credit of four €, and the PL group started with an initial debt of 10 €. After the manipulated IGT, subjects completed the PANAS for a second time in order to measure whether the experimental manipulation resulted in a change of affect. Finally, participants carried out the "real" IGT, which measured their actual behavioral decision-making.

2.4 Analysis

In order to test the main hypothesis, an hierarchical regression analysis was carried out with the IGT net-score as dependent variable and age, gender, group, affect (pre minus post affect scores[1]), and BIS, and BAS as covariates. We entered gender and age in the first block of the regression, group in the second, positive and negative affect in the third, and BIS and BAS in the fourth block. Additionally, differences on affect (pre versus post) were tested using a 2 (time) x 2 (group) ANOVA. Further, in order to investigate the performance of the two groups per block (i.e., 20 cards), a multivariate ANOVA (MANOVA) was performed with the scores on the five subsequent blocks as dependent variables.

2.5 Results

Figure 1 displays the mean IGT net scores of both groups over the five blocks. As can be seen in Table 1, the group variable made a unique and significant contribution to IGT-scores. Age, gender, affect, BIS, and BAS

[1]Using pre-manipulated IGT and post-manipulated IGT affect scores in the regression model yielded similar results.

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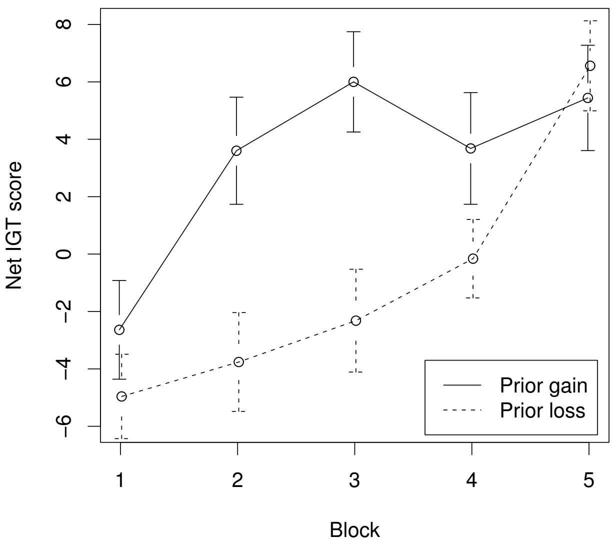

Figure 1: IGT score over the five blocks per group (with standard errors).

did not predict IGT-scores, indicating that these variables, including affect, had no influence on decision making.

Table 1: Results of hierarchical regression analyses predicting performance on the net score of the Iowa Gambling Task.

	B	S.E. B	β	Δ^2 R
Step 1				.01
Gender	0.49	1.27	−0.06	
Age	−2.94	9.54	−0.05	
Step 2				.15*
Group	−21.32	7.35	−0.40*	
Step 3				.00
Positive Affect	−0.17	0.62	−0.04	
Negative Affect	0.24	0.70	0.06	
Step 4				.02
BIS	−1.19	1.25	−0.15	
BAS	−0.18	0.85	−0.03	

BIS = Behavioral Inhibition System. BAS = Behavioral Approach System.
* $p < .001$.

There was a significant group x time effect for positive affect, F(1,48) = 10.32, p = .002, and negative affect F(1,48) = 31.54, p = .000001. More specifically, the manipulated IGT resulted in an increase in positive affect in the PG group and an increase in negative affect in the PL group. However, in the regression analysis, this change in affect did not influence the relation between the prior loss or gain and “real” IGT performance.

The MANOVA showed a significant multivariate effect, Wilks’ lambda = .75, F(5,44) = 2.89, p = .024. Follow-up MANOVAs performed on the participants performance on the separate blocks revealed a significant difference in the IGT scores for block 2, F(1,42) = 8.41, p = .006, and block 3, F(1,42) = 11.05, p = .002. The fact that only in blocks 2 and 3 participants in the PG group made more advantageous choices than participants in the PL group is consistent with our theorizing. In block 1, people are generally oblivious to the nature of the decks, leading to rather random choice behavior. In blocks 2 and 3, people are developing preferences for certain decks, leading to more systematic choices. Later during the task (blocks 4 and up), more and more people start to understand the nature of the decks, leading to consistent favorable (risk averse) choices irrespective of experimental condition.

3 Discussion

Our results show that a reference point manipulation using prior gains or losses affected decisions with monetary consequences. The study adds further experimental evidence that people who “have” make more risk-averse decisions, while the “have-nots” make more risk-seeking decisions. This phenomenon has frequently been observed from studies using hypothetical decision-making situations (Thaler & Johnson, 1990) and agrees with the increased risk aversion principle of Prospect Theory. This theory predicts exactly what we found, that is, prior losses put the subject in the domain of losses and prior gains have the opposite effect.

Insofar as the IGT is, as hypothesized, sensitive to non-deliberative mechanisms of decision making, our results show that risk seeking and risk aversion as a function of prior gains and losses does not need to be the result of a deliberate, well-considered choice strategy: risk seeking and risk aversion can be automatic and non-deliberately, it can be seen as a spontaneous process, steering people towards or away from risk.

A secondary goal was to investigate the role of emotions (affect). We successfully induced positive affect in the PG group and negative affect in the PL group. However, affect variables did not influence the relation between prior loss/gain and decision-making. Additional correlation analysis between positive/negative affect scores (i.e., pre, post, and pre-post difference scores) and IGT score showed that there were no significant links between affect and decision-making (all p’s > .05). Accordingly, from the present findings, it can be concluded that the effect of a reference point on behavioral decision was not mediated by positive or negative affect. This is in contrast with earlier findings of Peters and Slovic (2000),

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who found that high negative affect was associated with more avoidance of high-loss options and high positive affect was associated with more choices from high-gain options. An explanation for these different results might be that Peters and Slovic used a different version of the Iowa gambling task. Whereas we used the original task, Peters and Slovic used a gambling task that was on several points different from the original task. In addition, the present sample size may have insufficient power to detect a significant result concerning the influence of affect.

Although it is conceivable that, by the fifth block, PL participants might have thought that the risky decks could undo their prior loss, this could not occur in the second block, and the difference between PL and PG conditions was already present. Thus, we conclude that the PL does increase risk seeking in the IGT, as predicted by Prospect Theory.

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