In the winning mood: Affect in the Iowa gambling task

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Abstract

The present research aimed to test the role of mood in the Iowa Gambling Task (IGT; Bechara et al., 1994). In the IGT, participants can win or lose money by picking cards from four different decks. They have to learn by experience that two decks are overall advantageous and two decks are overall disadvantageous. Previous studies have shown that at an early stage in this card-game, players begin to display a tendency towards the advantageous decks. Subsequent research suggested that at this stage, people base their decisions on conscious gut feelings (Wagar & Dixon, 2006). Based on empirical evidence for the relation between mood and cognitive processing-styles, we expected and consistently found that, compared to a negative mood state, reported and induced positive mood states increased this early tendency towards advantageous decks. Our results provide support for the idea that a positive mood causes stronger reliance on affective signals in decision-making than a negative mood.

Keywords: mood, decision-making, gut feelings, Iowa gambling task, intuition.

1 Introduction

Many of us are familiar with the phenomenon that we feel that something is right or wrong, or that one choice option is better than another, without necessarily being able to explain where this "gut feeling" comes from or what it is based on. When people make a decision, one thing they can do is rely on such affective reactions towards decision-options. Decision-makers can also base their decision on a cognition-based, rule-governed and precise analysis of the different options. This distinction between decision-making based on feelings and decision-making based on thorough deliberation is a prominent distinction in psychology and decision-making research (e.g., Betsch et al., 2003; Epstein, 1994; Evans, 2008; Hogarth, 2005; Kahneman, 2003; Lieberman, 2000; Wilson, 2002). The central question we ask here is whether mood is a moderator of people's reliance on feelings versus deliberation in decision-making. In line with others, we define mood states as diffuse affective states that are not linked to specific stimuli and that are relatively long-lasting (e.g., Frijda, 1986; Russell, 2003; see for differences between mood and emotions Zeelenberg et al., 2008). Based on empirical evidence for the relationship between mood and information processing (see Clore et al., 1994 for a review), we aim to explore whether people in a positive mood state are more likely to base their decisions on their gut feelings than people in a negative mood state.

1.1 Affect in decision-making

Cognitive psychologists traditionally assumed that affective processes play only a small role in decision-making. However, some recent findings suggest that affect can in fact be important in decisions (e.g., Bechara et al., 1997; Cohen & Blum, 2002; Kahneman, 2003; Wagar & Dixon, 2006; Zajonc, 1980; and see the framework of emotional functions proposed by Pfister and Böhm, 2008). For example, according to Damasio (1994), decision-processes may be based on affective signals. Specifically, people use somatic markers, that is emotion-based, physiological signals. These signals are formed in situations in which people repeatedly experience rewards or punishments. Reliance on such affective reactions towards different response options may play a particularly important role when decisions have to be made in an uncertain environment. In the present research we aim to investigate when such affective signals guide behaviour in a laboratory task that models decision-making under uncertainty: the Iowa Gambling Task (IGT).

In the IGT (Bechara et al., 1994; Bechara et al., 1997) participants can win or lose money by picking cards from four different decks, two overall advantageous and two overall disadvantageous. Decks A and B, the bad decks, involve relatively high immediate rewards with the turning of each card, but even higher losses with the turning of some cards, resulting in an overall net loss for every 10 cards turned. Decks C and D are the good decks, with the combinations of moderate rewards with the turning of each card and relatively small losses with the turning of some cards resulting in an overall net gain for every 10 cards turned. At an early stage in this card-game, after experiencing the first big losses in the bad decks, players start to display a tendency towards the advantageous decks. Research suggests that this tendency is guided by affective signals (Bechara et al., 1996, 1997; Damasio, 1994; Wagar & Dixon, 2006).

Our focus here is on the influence of mood on reliance on feelings in the IGT in this early stage of the game. Based on recent work (e.g., Dunn et al., 2006; Maia & McClelland, 2004; Wagar & Dixon, 2006), we define such feelings in the IGT as conscious gut feelings about which decks are good and which decks are bad. These arise early in the game, after the first high losses in the bad decks. Reliance on gut feelings can be contrasted to reliance on more certain, quantitative knowledge, arrived at through analytical thinking and detailed conscious processing. We believe that, compared to a negative mood, a positive mood causes people to rely more strongly on their gut feelings in the IGT. This would result in better performance early in the IGT in a positive mood than in a negative mood, due to a stronger feeling-based tendency towards the advantageous decks, when people are still highly uncertain (Maia & McClelland, 2004; Wagar & Dixon, 2006) about which strategy is right. We will now explain our ideas in more detail.

Initially, researchers from the Iowa laboratory (e.g., Bechara et al., 1994; 1997; Damasio, 1994) claimed that affective signals can operate not only consciously (as a "gut feeling" about the goodness or badness of a given response option), but also nonconsciously. However, evidence for the role of unconsciously operating affective signals in the Iowa gambling task has been reviewed critically (e.g., Dunn et al., 2006; Maia & McClelland, 2004). Dunn and colleagues (2006) argue that evidence for a lack of conscious knowledge that players in the IGT have about which decks are good and which decks are bad is weak. People's awareness about which decks are good and which decks are bad probably arises earlier in the game than other researchers previously claimed (e.g., Bechara et al., 1994; 1997; Damasio, 1994).

In the current paper, we are concerned with the conditions related to people's reliance on conscious gut feelings in decision-making in the IGT. Maia and McClelland

(2004) identified three levels of awareness in the IGT (cf. e.g., Dienes & Scott (2005), who made similar categorizations of different levels of awareness; and see Price and Norman, 2008). At Level 0, participants have no conscious knowledge at all about which decks are good and which decks are bad and they do not have a preference for the good decks. At Level 1, participants do show a conscious preference, but do not appear to have explicit knowledge about the basis for this preference. They are not able to explain why they prefer certain decks and they appear to base their behaviour on conscious gut feelings. At Level 2, participants have gained knowledge about the relative values involved in the decks and they can use this knowledge to explain their preference for the good decks. They have explicit, fully verbalizable knowledge of the task itself, not just of their preferences. They have now reached full awareness in the IGT. Maia and McClelland (2004) provided evidence against the claim that affective signals can guide behaviour unconsciously, when awareness is still at Level 0. Based on this evidence, Dunn and colleagues (2006) conclude that the claim that affective signals can operate nonconsciously remains questionable and requires stronger empirical support.

We were interested in the question whether mood might moderate whether or not people would rely on gut feelings (or Level 1 awareness), early in the IGT. Wagar and Dixon (2006) provided evidence that consciously accessible affective reactions influence card selections early in the IGT, prior to Level 2 awareness. That is, participants began to choose advantageously before they were able to explain why. They formed affective signals, measurable in the form of galvanic skin responses (GSRs) to the different decks. They showed higher GSRs when they were about to select a card from a bad deck than when they went for a good deck. This difference in anticipatory GSRs was correlated with a subsequent behavioural preference for the good decks (Wagar & Dixon, 2006). Bringing together this evidence for affective guidance in the IGT prior to Level 2 (or full) awareness with the evidence against affective guidance when awareness is still at Level 0 (completely absent), we conclude that at an early stage of the IGT, people base their responses on conscious gut feelings towards the different decks of cards, that is Level 1 awareness.

1.2   Mood and gut feelings

The idea that people base their decisions on feelings at an early stage of the IGT is completely in line with previous research showing that judgments and decisions can be driven by gut feelings (e.g., Murphy & Zajonc, 1993; Strick et al., in press; Wilson, 2002; Wilson et al., 1993; Zajonc, 1980). Reliance on gut feelings in decision-making may fluctuate. People can rely on their

first affective reactions towards various decision options, but they can also rely on a more careful, deliberative decision-strategy. If individuals adopt an analytical processing style, gut feelings are of less importance in guiding decision-making (e.g., Wilson et al., 1993). We suggest that the use of affect-based or deliberation-based decision-strategies may be moderated by mood. Based on empirical evidence for the relation between mood and cognitive processing-styles, we expect that mood might influence reliance on affective signals in the IGT, thereby affecting the tendency towards the advantageous decks in the early stage of the task.

Mood has consistently been found to influence the way that people process information (e.g., Bless & Schwarz, 1999; Bolte et al., 2003; Fiedler, 1988; Hänze & Hesse, 1993; Isen, 1999; Isen & Means, 1983; Ruder & Bless, 2003; Schwarz & Clore, 1996; see Clore et al., 1994 for a review; see Martin & Clore, 2001 for a discussion of theoretical accounts). A number of studies have shown that in a happy mood, people rely more strongly on general knowledge structures, such as stereotypes (Bodenhausen et al., 1994) and scripts (Bless et al., 1996) than in a sad mood. Moreover, in a sad mood, individuals are more likely to deliberate than in a happy mood. For instance, several studies showed a differential impact of argument strength under different mood states (see e.g., Bless & Schwarz, 1999 for a review).

Here, we focus on a different way in which mood can influence judgment and decision-making. Our core idea is that mood influences the reliance on feelings. Some of our recent results are in line with this idea. In a study manipulating mood and affect-based versus cognition-based, deliberative decision-strategies, we found that a positive mood matched well with affect-based decision-making, whereas a negative mood matched well with deliberative decision-making (De Vries et al., in press). Based on our idea that mood influences reliance on gut feelings, we expect that mood influences decision-making in the IGT. We suggest that people in a happy mood tend to rely on their feelings when they make decisions, which would enhance their performance in the IGT when awareness is at Level 1, while people in a sad mood are more cautious and rely on their feelings less.

1.3   The present research

The three studies reported in this paper aimed to test whether mood moderates the tendency towards the advantageous decks in the early stage of the IGT, when awareness appears to be at Level 1 (a preference for the good decks, without explicit knowledge about the basis for this preference) and affective signals apparently guide decisions in this card-game (Wagar & Dixon, 2006). We suggest that, compared to a negative mood, a positive

mood leads to stronger reliance on these affective processes. Therefore, we hypothesized that, in the early stage of the game, when awareness is at Level 1, people in a positive mood will choose more cards from the advantageous decks than people in a negative mood.

In order to test mood influences in the different stages of the IGT, with awareness increasing from Level 0 (absent) through 1 (gut feelings) to 2 (full awareness, with correct explanations), we focused on five subsequent blocks of 20 card selections (e.g., Bechara et al., 2000; Evans et al., 2005). In the first stage of the game (roughly cards 1 to 20, Block 1), players sample the four decks. Participants start playing the IGT with no knowledge or experiences regarding the game at all. With awareness still at Level 0 (absent), we did not expect an effect of mood on choice behaviour in Block 1.

After participants have experienced the first losses in the disadvantageous decks, players begin to display a preference for choosing cards from the advantageous decks, but show no signs of knowledge about the basis for this preference, that is the values of the gains and losses involved in the different decks of cards. Awareness is at Level 1 and decisions appear to be based on affective guidance (Bechara et al., 1997; Wagar & Dixon, 2006). Wagar and Dixon (2006) consistently showed that around card 20 (the beginning of Block 2: cards 21–40), participants began showing an affective preference, as was shown by higher anticipatory GSRs towards the good (versus the bad) decks. Moreover, this difference in anticipatory GSRs was strongly correlated to a behavioural preference for the good decks in terms of card selections during those trials when awareness was still at Level 1 (gut feelings). In addition, participants were still highly uncertain about the right strategy in the game during the trials of Block 2 (Maia & McClelland, 2004; Wagar & Dixon, 2006). We were interested in mood influences on performance in this second stage of the game (Block 2), when awareness appears to be at Level 1. Later in the game, explicit, Level 2 awareness is acquired about the relative values involved in the four decks of cards, enabling participants to explain their preference for the advantageous decks and increasing their certainty about the right strategy to play the game (e.g., Bechara et al., 1997; Wagar & Dixon, 2006).

Our main focus was on block 2 of the IGT. We hypothesized that people in a positive mood would outperform people in a negative mood in this second block. We did not expect mood effects in any of the other blocks. To test this hypothesis, we had participants play the IGT, after measuring (Study 1) or manipulating (Studies 2 and 3) their mood. Because of our a priori prediction that mood would be related to IGT performance in Block 2 and not in any of the other blocks, we tested our prediction by looking at this specific Block 2 correlation in Study 1 or

contrast in Studies 2 and 3 (Rosenthal & Rosnow, 1985). We also conducted additional analyses on the pooled data of the three separate studies, which enabled us to test the robustness of mood effects on performance in the IGT in an overall analysis.

2 Study 1

2.1 Overview and predictions

In this first Study, we expected that naturally occurring differences in mood would be related to performance in Block 2 of the IGT, but not to performance in any of the other blocks. We first measured mood. After a short filler task, participants played the IGT.

2.2 Method

Participants. Fifty-three students from the Radboud University Nijmegen participated. They received three euros for their participation of 30 minutes.

Procedure. The experimenters, who were blind for condition and regarding the hypothesis under test, told participants that they would work on two independent studies. First, mood was assessed on a computerized 9-point response scale, anchored with 'not at all' and 'very much'. This scale consisted of three items (Cronbach's alpha = .78) to measure positive affect: 1. To what extent do you feel happy at the moment? 2. To what extent do you feel positive at the moment? 3. To what extent do you feel cheerful at the moment? Mood scores were obtained by calculating the mean score for each participant on this scale. After a short, unrelated filler task (drawing a map of the campus), the gambling task (IGT) was introduced to participants. We used the original, standard version of the IGT (Bechara et al., 1994). Participants were given a loan of €2000, - in play money, and had to draw cards from four decks in front of them. Beforehand, the total number of cards to be drawn (100) was unknown to the participants. Each card would generate a profit and, unpredictably, some cards would also generate a loss. The participants' task was to play in such a way that they would win as much money as possible. Participants had to learn by experience which strategy worked best. Playing mostly from the disadvantageous decks would lead to an overall loss (€250,- in every ten cards), whereas playing mostly from the advantageous decks would lead to an overall gain (€250,- in every ten cards).

Following a common way to score performance in the IGT, we calculated scores for the performance of each participant on the IGT for five consecutive blocks of 20 cards by subtracting the number of cards picked from the bad decks from the number of cards picked from the good decks (e.g., Bechara et al., 2000; Evans et al., 2005). The

higher a score, the more cards are drawn from the advantageous decks. The game lasted approximately 20 minutes. Finally, participants were paid, debriefed, and thanked for participation.

2.3 Results and discussion

We calculated correlations between mood and the five IGT block scores. In accordance with our prediction, mood was found to be significantly related to performance in the second stage of the game (block 2: cards 21–40), after experiencing the first losses in the disadvantageous decks, $r(53) = .35$, $p < .011$. As expected, there were no significant correlations between mood and performance in the other blocks (block 1: $r(53) = -.08$, $p < .61$; block 3: $r(53) = -.03$, $p < .85$; block 4: $r(53) = -.20$, $p < .15$, & block 5: $r(53) = .04$, $p < .78$). These results support our ideas concerning the relation between reliance on affective guidance and mood; the more positive their mood state, the more cards participants chose from the advantageous decks. In Studies 2 and 3 we further explored these ideas by experimentally manipulating mood.

3 Study 2

3.1 Overview and predictions

In Study 2, we tested our prediction that mood would influence performance in the IGT. Specifically, we predicted that a positive mood would result in better performance in Block 2 of the IGT than a negative mood. We did not expect mood effects in any of the other blocks. To test our predictions, we first manipulated mood. Next, participants played the IGT.

3.2 Method

Participants and design. Fifty-two students from the Radboud University Nijmegen were randomly assigned to a positive or negative mood condition. For a participation of 30 minutes they received 3 euros.

Mood manipulation. Participants watched a short video clip (2.5 minutes) in order to induce either a positive or a negative mood state. In the positive mood condition they watched a funny fragment (from the Muppet Show), while in the negative mood condition they watched a sad fragment (from Schindler's List). These film clips have previously been shown to induce the mood state intended. After watching the positive mood fragment, participants scored significantly higher on a 9 point-mood scale than after watching the negative mood fragment (e.g., De Vries et al., in press).
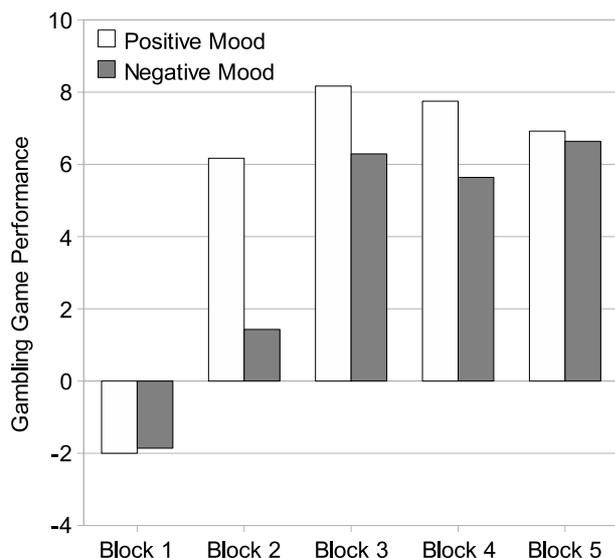
Figure 1: Gambling game performance as a function of mood: Study 2.

Procedure. Participants were told that they would be working on two different studies. They were given instructions for the "first study", allegedly concerned with the evaluation of film clips, and for the "second study", the gambling task. Then, the experimenter left the room and participants watched the happy or sad video clip. The experimenter, who was blind for condition and regarding the hypothesis under test, subsequently re-entered the room, and the gambling game immediately started. The procedure of the gambling task was identical to Study 1. Evaluation of the film clips took place at the end of the experiment, after the IGT. Participants were asked several questions about the film clip they had watched, such as "How did you like the film clip you watched earlier in this experiment?" When probed for suspicion, none of the participants was able to identify the goal of this study.

3.3 Results and Discussion

We tested whether mood influenced choice behaviour in the IGT. In Block 2, mood affected the number of cards chosen from the good decks minus the number of cards chosen from the bad decks. A t-test revealed that performance in block 2 was better for participants in the positive mood condition ($M = 6.17$) than for participants in the negative mood condition ($M = 1.43$), $t(50) = 2.14$, $p < .04$, Cohen's $d = .61$ (medium to large effect; Cohen, 1992), see Figure 1. Again, as expected, mood did not affect performance in any of the other blocks, ($ps > .36$).

In block 2, players in the positive mood condition performed significantly better than players in the negative mood condition.

Study 2 also supported our hypothesis that mood affects performance in the IGT, in the early stage of the game. Compared to a negative mood state, a positive mood state enhanced the tendency towards choosing cards from the advantageous decks. These results are in line with our idea that compared to a negative mood state, a positive mood state results in stronger reliance on feelings in decision-making.

In Study 3, we aimed to replicate our findings with the use of a computerized version of the IGT. One of the strengths of the IGT is its robustness in face of changes in the way it is administered, including whether it is administered manually or in a computerized form (Dunn et al., 2006). Use of a computerized version instead of a face-to-face version of the IGT would enable us to rule out any possible unwanted influences of the experimenter on the behaviour of participants.

4 Study 3

4.1 Overview and predictions

Again, we predicted that a positive mood would result in better performance in Block 2 of the IGT than a negative mood. We did not expect mood effects in any of the other blocks. After a mood manipulation, participants played a computerized version of the IGT.

4.2 Method

Participants and design. Thirty-two students from the Radboud University Nijmegen were randomly assigned to a positive or negative mood condition. As in the previous studies, they received 3 euros for a participation of 30 minutes.

Procedure. Study 3 only differed from Study 2 in the use of a computerized version of the IGT instead of a face-to-face version. Except for the way of administration, this version of the IGT was similar to the standard, original version that we used in the previous studies. The four decks of cards were represented on the computer screen. To pick a card, participants could click on one of those four decks. Information on how much money they won by choosing this card would then appear in the middle of the screen. If the card they chose also resulted in a loss, information about how much money they lost would subsequently appear in the middle of the screen. During the game, a green bar in the top of the screen constantly represented the total amount of money, which was updated after every decision. After 100 card pickings, the game automatically stopped. Finally, participants were debriefed, paid, and thanked for their participation. When probed for suspicion, none of the participants was able to identify the goal of this study.

4.3   Results and discussion

We aimed to test whether the number of cards chosen from the good decks minus the number of cards chosen from the bad decks depended on mood state. Positive mood participants again outperformed negative mood participants in block 2 (Ms = 3.55 vs. -1.71), $t(30)$ = 2.30, $p < .03$, Cohen's d = .65 (medium to large effect; Cohen, 1992), see Figure 2. No significant effects of mood on performance in blocks 1, 3 and 4 were obtained ($ps >$ .37). Performance in block 5 was better for participants in the negative mood condition (M = 12.86) than for participants in the positive mood condition (M = 5.77), $t(30)$ = 2.88, $p < .01$, Cohen's d = .81 (large effect; Cohen, 1992). Since this result has not been obtained in the previous two studies, caution about its interpretation is warranted. A possible explanation for this finding might be that participants in a negative mood rely on analytical information processing, and therefore prefer to base their decisions on explicit, Level 2 awareness, which has been well established by the end of the game.

Study 3 further illustrates the robustness of the effect of mood on decisions made in block 2 of the IGT. We replicated this effect in this study in which a computerized version of the IGT was used instead of a face-to-face version. Again, players in a positive mood performed better than players in a negative mood in the second stage of the game. By using a computerized version of the IGT, we could further standardize our procedure. While the experimenters in Studies 1 and 2 were blind for condition and regarding the hypothesis under test and therefore unlikely to have had an unwanted influence on the results, use of a computerized version further excludes possible influences of the experimenter on the decisions made by participants.

In block 2, players in the positive mood condition performed significantly better than players in the negative mood condition. In block 5, players in the negative mood condition performed significantly better than players in the positive mood condition.

5   Additional analyses

In accordance with our predictions, we consistently found that mood was related to (Study 1), or influenced (Studies 2 and 3) performance in Block 2 of the IGT. These results are in line with our idea that a positive mood results in stronger reliance on gut feelings in decision-making. However, in Study 3, we also found that mood influenced performance in Block 5 of the IGT. While this result was not expected, it is in accordance with our general line of reasoning on how mood influences reliance on feelings and reliance on explanation-based knowledge. To be better able to judge how to interpret the results found in
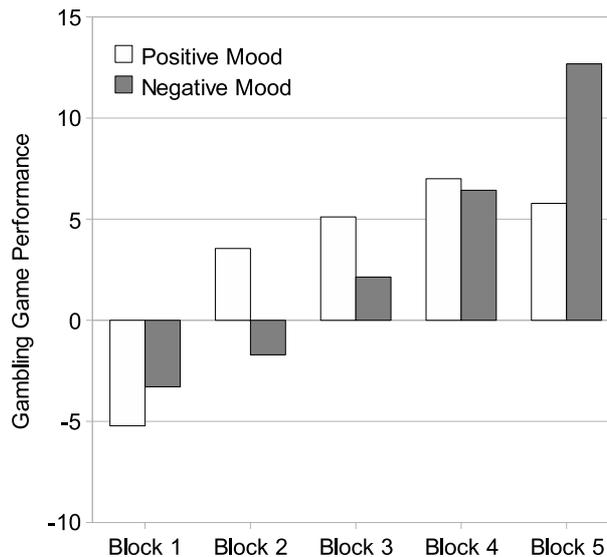

Figure 2: Gambling game performance as a function of mood: Study 3.

the three separate studies, we decided to perform additional analyses. By pooling the data of the three separate studies with relatively small numbers of participants, we could conduct an overall analysis that would allow us to draw stronger conclusions about how mood affects performance in the IGT. Specifically, we aimed to test the robustness of the mood effect in block 2 which we found in all studies, and of the mood effect in block 5 that we found only in Study 3.

The data of the three studies (N = 137) were pooled and analyzed in the following way. First, a correlation matrix for mood and the five IGT block scores was calculated for each study separately, with Study as a between subject factor in the design. Since Mood had only two possible scores in Studies 2 and 3 (i.e., negative or positive), pointbiserial correlations were calculated for mood and each of the five IGT block scores in Studies 2 and 3. Next, we conducted a multiple regression analysis on the pooled within group correlations, with the five IGT block scores as predictors and mood as the dependent variable. This model significantly predicted mood scores, $F(5,136)$ = 3.34, $p < .01$, R^2 = .11, Adjusted R^2 = .08.

Confirming our main hypothesis, performance in Block 2 was positively correlated with mood such that the more positive the mood state of the participant, the better the performance in this early stage of the IGT, Beta = .34, $t(131)$ = 3.89, $p < .001$. None of the other block scores for performance in the IGT were significantly related to mood, see Table 1 for an overview of regression weights and correlations in our overall multiple regression model. Our finding that the relation between choice behaviour in the IGT and mood was significant only in

Table 1: Regression weights and correlations for IGT performance (Blocks 1–5) with mood in overall analysis on pooled data from Studies 1–3.

| Predictor | Beta | t | p | Correlations | |
				Zero-order	Partial
Block 1	−.07	−.85	.40	−.05	−.07
Block 2	.34	3.89	.00	.30	.32
Block 3	.00	.01	.99	.05	.00
Block 4	−.08	−.88	.38	−.04	−.08
Block 5	−.07	−.77	.44	−.05	−.07

the case of mood scores and block 2 implies that there is an interaction between block and mood, which is driven by block 2.[1] We therefore conclude that mood only influences performance in block 2 of the IGT. Performance in the other blocks does not seem to be affected by the mood state that players are in.

6　General discussion

In three studies, we investigated the role of mood in the Iowa Gambling Task and demonstrated that mood affects performance on the IGT. We showed that naturally occurring differences in mood states (Study 1) as well as experimental manipulations of mood states (Studies 2 and 3), influenced decisions about card selections in the IGT. We consistently found that at an early stage of the IGT, after experiencing the first losses in the bad decks, participants in a happy mood state outperformed participants in a sad mood state. An additional analysis on the pooled data of the three reported studies confirmed that in block 2 of the IGT, people in a happy mood state chose more cards from the advantageous decks than people in a negative mood state.

We interpret our findings in terms of mood influencing reliance on affective signals in decision-making. In previous studies using the IGT, others (e.g., Bechara et al., 1997; Wagar & Dixon, 2006) have shown that players may base their decisions on affective signals towards decision alternatives during an early stage of the game, that is before players are able to explain which alternatives are best. We focused on one of the factors that may facilitate or inhibit reliance on affective signals in decision-making. We suggest that an individual's mood

state functions as a moderator of the type of process that guides decision-making. Specifically, in a happy mood state, people probably rely more strongly on affective reactions toward different decision-options, whereas in a sad mood state, people adopt a more careful, analytical decision-strategy.

Our research advances on studies concerning the link between mood and cognitive processing styles (e.g., Bless & Schwarz, 1999). We provide empirical evidence for the influence of mood on behavioural responses in a laboratory task that models decision-making under uncertainty. Previous studies showed that, compared to a negative mood state, a positive mood enhances reliance on general knowledge structures. The present studies suggest that, compared to a negative mood state, a positive mood state may increase reliance on affective cues as well.

While our results show that a positive mood can lead to better decisions than a negative mood, one should not infer that this always holds true. Whether a positive mood results in better decisions than a negative mood might largely depend on the decision task at hand. Several factors might play an important role here, and in future research several hypotheses with regard to such factors could be studied. For example, when faced with a decision task that requires decision-makers to follow strict rules in order to make good decisions, reliance on affective reactions might cause distractions from the optimal, analytical strategy (e.g., Shiv et al., 2005; see also Dijksterhuis et al., 2006). In such cases, a sad mood seems to be more adaptive, because it may lead decision-makers to rely on their deliberations.

On the other hand, thinking too much can sometimes result in less optimal preferences and decisions and reduce satisfaction with decision-outcomes (Wilson et al., 1993; Wilson, 2002). Sad decision-makers might sometimes suffer from overanalyzing reasons for their preferences, resulting in suboptimal decision-outcomes. Another factor that might be important is the complexity of the task. Some recent findings suggest that thoughtful deliberation is not necessarily the best strategy when decision-tasks are complex in terms of the amount of information involved (e.g., Dijksterhuis, 2004; Wilson, 2002). Finally, mood can influence the subjective quality of decision-outcomes through its fit versus non-fit with a decision-strategy, with a negative mood resulting in a better subjective quality when a deliberative decision-strategy is applied and a positive mood resulting in a better subjective value when an affect-based, intuitive decision-strategy is applied (De Vries et al., in press).

To conclude, we believe that the mood state of the decision-maker can affect both the process and the quality of decisions, but that there is no "right mood" for decision-making in general. Our studies showed that,

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[1]The interaction between block and mood was also tested with repeated measures analyses of variance with mood as the between subjects factor (Studies 2 and 3) or as a continuous factor (Study 1) and block as the repeated measures factor. These analyses showed the same statistically significant interaction between mood and block.

in an early stage of the Iowa Gambling Task, a positive mood is the winning mood.

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