

# Incidental Sadness Biases Social Economic Decisions in the Ultimatum Game

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Recent dual-process models of decision making have suggested that emotion plays an important role in decision making; however, the impact of incidental moods (i.e., emotions unrelated to the immediate situation) on decisions remains poorly explored. This question was investigated by inducing 2 basic emotional states (amusement or sadness) that were compared with a neutral-emotion control group. Decision making was assessed with a well-studied social task, the Ultimatum Game. In this task, participants had to make decisions to either accept or reject monetary offers from other players, offers that varied in their degree of unfairness. Emotion was induced with short movie clips. Induced sadness interacted with offer fairness, with higher sadness resulting in lower acceptance rates of unfair offers. Induced amusement was not associated with any significant biases in decision making. These results demonstrate that even subtle incidental moods can play an important role in biasing decision making. Implications of these results in regards to the emotion, cognitive neuroscience, and clinical literatures are discussed.

*Keywords:* emotion, decision making, game theory

Until very recently, the impact of emotional states on decision making has been strikingly neglected. However, recent behavioral and neuropsychological research has shown that certain neural structures that provide and incorporate information of an affective nature are in fact essential to effective decision making (Damasio, 1994). Driven by this understanding, dual-process models of decision making have emerged, attempting to incorporate emotional influences in the decision process by positing the reciprocal modulation of an affective, intuitive system (“System 1”) and a logical, deliberative component (“System 2”; Stanovich & West, 2000; Sloman, 2002). Acknowledging that emotions are indeed important to the study of decision making, research is now endeavoring to examine the precise influence of different types of emotions on our decisions. For example, Loewenstein and Lerner (2003) have identified two categories of emotional influences: expected (i.e., task-driven) emotions and immediate emotions (such as incidental moods). The latter are particularly noteworthy, as they may be unconscious and unrelated to the decision at hand, but nonetheless have the potential to influence decision making in important ways.

Previous research has found that latent emotional states can alter people’s goals, attitudes, and risk perceptions, and there has been

some, albeit limited, work on how differently valenced emotions can influence social decision making (Forgas, 2003; Zajonc, 2000). In comparison to neutral and negative moods, positive affect has been associated with higher confidence, more optimistic framing, and greater cooperation (Forgas, Bower, & Moylan, 1990). Positive mood states are also linked to more global processing (Gasper, 2004), more creative and divergent thinking, and higher task satisfaction (Clapham, 2001; Gasper, 2004; Isen & Shaker, 1982). In contrast, negative emotions, such as sadness, are usually associated with lower confidence, more risk-averse behaviors, and more analytic and vigilant processing style (Clark & Isen, 1982; Isen & Daubman, 1984). Specific incidental moods may also have carryover effects on decision making. For instance, induced disgust and sadness were found to respectively eliminate or reverse the endowment effect in economic decisions, whereby selling prices tend to exceed buying prices for the same object (Lerner, Small, & Loewenstein, 2004). Despite this empirical evidence, the impact of incidental emotion on decision making has been noticeably understudied thus far. In the present study, therefore, we undertook to extend this research by systematically examining the influence of induced task-irrelevant emotion on realistic economic decisions. Evidence that these induced emotions indeed affect decisions would be an important contribution to current efforts to construct more comprehensive models of human judgment and decision making (Sanfey, Loewenstein, McClure, & Cohen, 2006).

## The Present Study

To explore such affective influences on decision making, we used the Ultimatum Game (UG), first used by Guth, Schmittberger, and Schwarze (1982), which combines a consequential economic choice framework with important social components. The UG has been extensively studied in the experimental economic literature, with a corresponding rich behavioral literature, but to date it has not been

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examined in conjunction with emotion manipulations (for a summary of UG research, see Camerer, 2003). The game involves one player, known as the proposer, making a monetary offer to another player (the responder) concerning an amount of money that the two must split between them. The responder must then either accept or reject this offer. If the offer is accepted, the money is split as proposed. But if the offer is rejected, neither player receives anything. Both players are fully aware of the rules and consequences of the game, and the game is typically played with real money, provided by the experimenter.

Standard economic models predict that responders should accept any nonzero offers (e.g., a couple of cents from a \$10 pot) on the grounds that even trivial amounts are preferable to no gain at all (i.e., if the offer is rejected). Empirically, however, about half of all unfair offers (defined as approximately 30% or less of the pot) are typically rejected. The evidence further suggests that when confronted with an unfair offer, responders often experience a conflict between an emotional “reject” decision engendered by the unfairness of the offer and a more reasoned “accept” decision based on the desire to maximize one’s economic return. Responders playing the UG typically report feeling angry and insulted in the face of unfair offers, prompting them to often reject these types of offers (Pillutla & Murnighan, 1996). These negative emotions associated with perceived unfairness of monetary offers can lead people to sacrifice sometimes considerable financial gain to punish their partners. These rejections are made even when interactions are anonymous, suggesting that rejections are not made as a strategic measure to maximize future potential rewards.

This finding, remarkably robust across several cultures and monetary amounts, demonstrates how expected (i.e., task-related) emotions can influence decision making in nontrivial ways. Recent physiological (Van’t Wout, Kahn, Sanfey, & Aleman, 2006) and neuroimaging (Sanfey, Rilling, Aronson, Nystrom, & Cohen, 2003) studies of the UG have indeed found that responders’ emotion and arousal levels increase when presented with unfair offers and that this increase is reliably associated with the rejection of unfair offers. The responder role in the UG thus provides an ideal venue to study whether incidental emotions can additionally bias decision making and potentially interact with important task-based emotions (e.g., indignation or anger) or whether these emotional states are too subtle to have tangible consequences on economic decisions (for research involving emotion and proposer decisions, see Haselhuhn & Mellers, 2005).

In the current study, two types of emotion were induced (positive and negative), as well as a neutral control condition. On the basis of previously cited research, we hypothesized that a positive incidental emotion (i.e., amusement), as compared with a neutral or sad one, would increase optimistic framing. More optimistic framing may focus attention on the potential gains associated with each offer rather than on the negative emotional consequences of receiving an unfair offer. This could result in higher acceptance rates of unfair offers and, potentially, in a positive correlation between experienced amusement and such acceptance rates. In contrast, research has suggested that individuals in a negative mood are more negative and critical in their attitudes and judgment toward others and self (Forgas, 2003). We therefore hypothesized that sadness may increase such pessimistic framing, which may focus the responder’s attention on the negative emotional consequences of unfair offers (i.e., being treated unfairly) rather than the

potential monetary rewards. This may in turn make responders more likely to be offended by unfair offers, which could prompt lower acceptance rates of unfair offers in the sad condition. We therefore predicted a negative correlation between experienced sadness and these acceptance rates.

Active emotions of amusement and sadness were selected because they are distinct from the typical task-induced emotions of camaraderie and indignation, usually triggered by fair and unfair offers, respectively, as our aim was to assess the impact of task-unrelated affect. Amusement and sadness emotions are also noteworthy for their opposite motivational tendencies (i.e., approach and withdrawal, respectively), a dimension increasingly recognized as a valid and functional classification of emotion (Davidson, 2003).

## Method

### *Participants*

A total of 119 participants (96 women and 23 men) were recruited from the pool of psychology undergraduate students at the University of Arizona (ages 18–46 years,  $M = 19.2$ ,  $SD = 2.8$ ). Each was randomly assigned to one of the three experimental conditions (neutral,  $n = 41$ ; sadness,  $n = 39$ ; or amusement,  $n = 39$ ). To ensure that students were sufficiently motivated to make real decisions, they were paid 10% of their actual earnings in the UG task, so that most students received between \$4 and \$7 in cash. In addition, they received course credit for completing the experiment.

### *Mood Induction (Video Clips)*

To induce mood, we used short movie clips of 3–5 min duration, a method widely and successfully used to induce emotion (Gross & Levenson, 1995). Twenty-one different clips were piloted before this study. Each clip was assessed by 20 participants who provided ratings of their emotional state on viewing the clip. For each clip, 16 basic emotions were rated on an 8-point Likert scale, with each distinct emotion measured as a single item. The clip pilot participants were not used in the actual UG task. The clips were selected from commercial movies, including dramas (sadness condition), comedies (amusement condition), and documentaries (neutral condition). For each emotion (i.e., sadness, amusement, or neutral mood), the three clips that most reliably and discriminantly evoked the target affect were selected and used. The final set of stimuli included clips from the films *The Champ*, *Liar Liar*, and a documentary on Emma Goldman, for the sadness, amusement, and neutral conditions, respectively.

Using a between-subjects design, two clips aimed at inducing the same type of emotion (two sadness, two amusement, or two neutral clips) were shown to each participant over the course of the experiment. The clips were displayed on a different computer than the UG task. Clip order was counterbalanced across participants. The true purpose of this task (i.e., mood induction) was concealed from participants in the UG experiment, with clip viewing presented as a separate study, ostensibly unrelated to the UG. Participants were told that they would later be asked questions about the clip content.

### *Decision Task (UG)*

Participants were first given thorough instructions about the UG and were asked to fill out a short questionnaire aimed at assessing

their understanding of the rules as well as their expectations about the game. They then played the UG in the role of responder, receiving one-time monetary offers from 16 different proposers, presented in a randomized order. The entire experimental task consisted of two blocks of eight offers, each involving a \$10 split, with one clip viewing preceding each block. A computerized version of the UG was used, with participants told that they would be playing the game over a computer network with partners located at other universities. On each trial, participants first saw a picture of their partner (i.e., proposer) for that trial on the computer screen for 4 s. These pictures were selected from a pool of actual UG players' photographs from previous studies (Sanfey et al., 2003). Participants then saw the proposer's offer and had a maximum of 10 s to decide to either accept or reject this offer. On deciding by way of a key press, the outcome of the offer was presented for 4 s, and the next offer sequence followed. All participants saw the same set of offers. These offers varied in fairness level, including 3 fair offers (\$5), 6 moderately unfair offers ( $3 \times \$4$  and  $3 \times \$3$ ), and 7 highly unfair offers ( $4 \times \$2$  and  $3 \times \$1$ ). Participants were informed they would be playing for actual money at the beginning of the experiment and reminded of this before each block.

### Emotion Induction Check

Following the experimental task, participants were asked to evaluate their emotional experience in response to the clips, with the same rating scale used in the pilot study. This was done to assess the primary emotion(s) induced by the clips and to control for appropriate induction of the targeted affect. Participants then completed a 12-item questionnaire aimed at assessing their susceptibility to the mood induction procedure. This instrument included a measure of emotional susceptibility (Caprara, Renzi, Alcini, D'Imperio, & Travaglia, 1983) and emotional contagion. These measures were aimed at assessing the extent to which participants' affect is typically influenced by external situations and others' affect. Reliability coefficients (Cronbach's alpha) of these scales were obtained from the present data, confirming satisfactory levels of internal consistency (i.e., .79 and .73 for emotional contagion and emotional susceptibility, respectively). Finally, qualitative measures based on participant observation and debriefing were used to verify the effectiveness of emotional induction and how well participants believed the two tasks represented separate experiments.

## Results

### Emotion Manipulation

Self-reported emotion ratings of the clips (on a scale ranging from 0 to 8) were used to conduct an emotional manipulation check. A strong and discrete mood induction was confirmed by separate analyses of variance (ANOVAs) on self-reported sadness,  $F(2, 85) = 111.59$ , and amusement,  $F(2, 85) = 21.52$ ,  $ps < .001$ . More specifically, participants in the sadness group reported higher degrees of sadness ( $M = 5.87$ ) in response to the clips than individuals in the neutral ( $M = 1.87$ ) and amusement ( $M = 0.28$ ) conditions (Bonferroni correction,  $ps < .001$ ). In contrast, the amusement group reported more amusement ( $M = 5.26$ ) than did

the neutral ( $M = 2.30$ ) and sadness ( $M = 2.29$ ) groups (Bonferroni correction,  $ps < 0.001$ ). Separate  $t$  tests revealed that these sadness and amusement ratings, in their respective target emotion conditions, did not differ from those obtained in the pilot study ( $Ms = 5.53$  and  $5.78$  for sadness and amusement, respectively), supporting the validity of these retrospective ratings. In addition, ratings obtained on a variety of discrete emotions in the neutral group were all consistently low (average ratings under 2.5, on a scale ranging from 0 to 8).

Further analyses indicated that participants' self-reported emotional susceptibility ( $M = 1.66$ ,  $SEM = 1.03$ ) and contagion ( $M = 3.23$ ,  $SEM = 0.92$ ) were low to moderate. It is important to note that separate ANOVAs revealed that participants' emotional contagion and emotional susceptibility did not differ across conditions. Mean emotional contagion ratings were  $3.29$  ( $SEM = 0.16$ ),  $3.10$  ( $SEM = 0.12$ ), and  $3.3$  ( $SEM = 0.16$ ) for the amusement, neutral, and sadness conditions, respectively. Average emotional susceptibility ratings were  $1.66$  ( $SEM = 0.17$ ),  $1.79$  ( $SEM = 0.16$ ), and  $1.54$  ( $SEM = 0.16$ ) for the amusement, neutral, and sadness conditions, respectively. Any significant behavioral differences between incidental emotion conditions are thus not likely to originate from a difference in susceptibilities to the mood induction procedure.

Finally, it is noteworthy that acceptance rates in the neutral group were comparable to those from previous UG studies, providing an important behavioral response check. Specifically, the neutral group accepted all fair offers and accepted just over half (56%,  $SEM = 5.5\%$ ) of unfair (i.e., \$1–\$3) offers.

### Decision Making

Acceptance rates were calculated for each type of offer (i.e., \$1–\$5), dividing the number of offers accepted for a given category of offers by the total number of offers responded to (therefore eliminating offers that yielded no responses within the allotted time). A repeated measures analysis of covariance was conducted with offer acceptance rate as the dependent variable, offer amount (i.e., fairness level) as the within-subject variable (\$1, \$2, \$3, \$4, or \$5), and self-reported ratings of sadness and amusement as covariates. A significant main effect of offer amount,  $F(3, 85) = 9.69$ ,  $p < .001$ , and a significant Sadness  $\times$  Offer Amount interaction,  $F(3, 85) = 3.04$ ,  $p < .05$ , with Huynh-Feldt corrections, were revealed. A main effect of sadness approached statistical significance ( $p = .06$ ). No significant main effect of amusement, or an Amusement  $\times$  Offer Amount interaction, emerged.

Two aggregate acceptance rates, and related earnings, were then computed for fair (i.e., \$4–\$5) and unfair (i.e., \$1–\$3) offers, respectively, as debriefing and questionnaire data suggested that \$4 offers, like \$5 offers, were considered fair by the majority of participants. These two acceptance rates were compared across three different levels of experienced sadness, revealing that higher levels of reported sadness for the clips resulted in lower acceptance rates (see Figure 1). A significant negative correlation between clip-related sadness ratings and acceptance rates of unfair offers ( $r = -.24$ ,  $p < .05$ ) further supported this inverse relationship.

To further investigate the Sadness  $\times$  Offer interaction, two-tailed  $t$  tests were also conducted to compare the neutral and sadness groups on acceptance rates of fair and unfair offers. Compared with the neutral condition, induced sadness resulted in

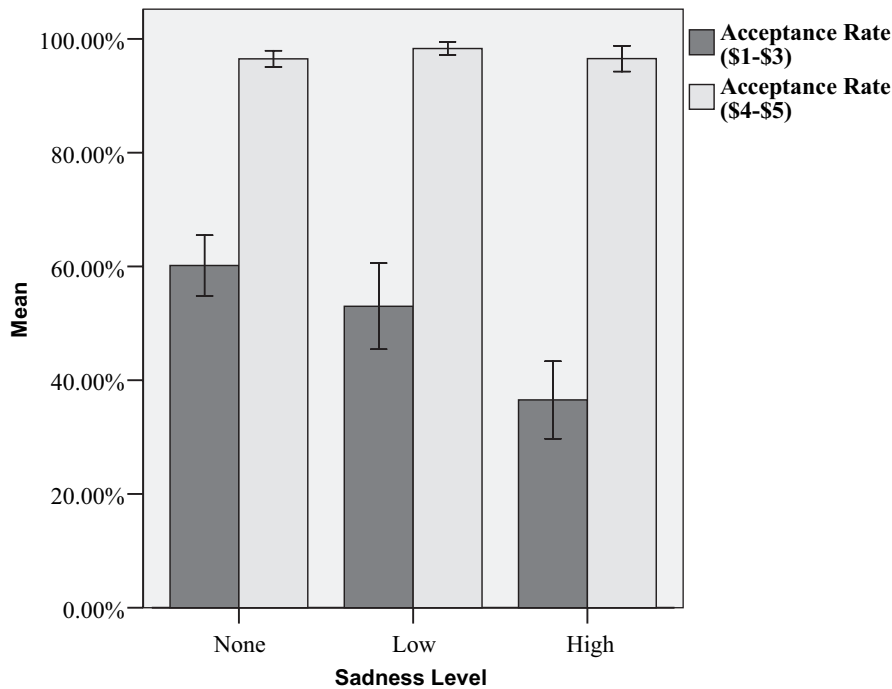


Figure 1. Interaction between reported clip-induced sadness and offer acceptance rates. Error bars represent standard errors of the mean.

significantly lower acceptance of unfair (i.e., \$1–\$3) offers,  $t(116) = 2.01, p < .05$  ( $d = .433$ ; see Figure 2). This pattern was further reflected in participants' total earnings, as the sadness group earned on average \$4.70 less than the neutral group (\$12.60 vs. \$17.30) from all unfair offers,  $t(116) = 2.08, p < .05$ , out of a maximum gain of \$29. In contrast to unfair offers, and as expected, participants' responses to fair (i.e., \$4–\$5) offers did not reveal any significant mood effect, showing equivalent acceptance rates across conditions (average acceptance rate = 98%,  $SEM =$

0.72%). In addition, no significant difference in average acceptance rates of unfair offers were found between the neutral (56.2%,  $SEM = 5.5\%$ ) and amusement (55.8%,  $SEM = 5.3\%$ ) groups.

### Discussion

The present results suggest that subtle and transient emotional states unrelated to the task at hand can noticeably affect decisions to accept or reject monetary offers in a commonly used economic

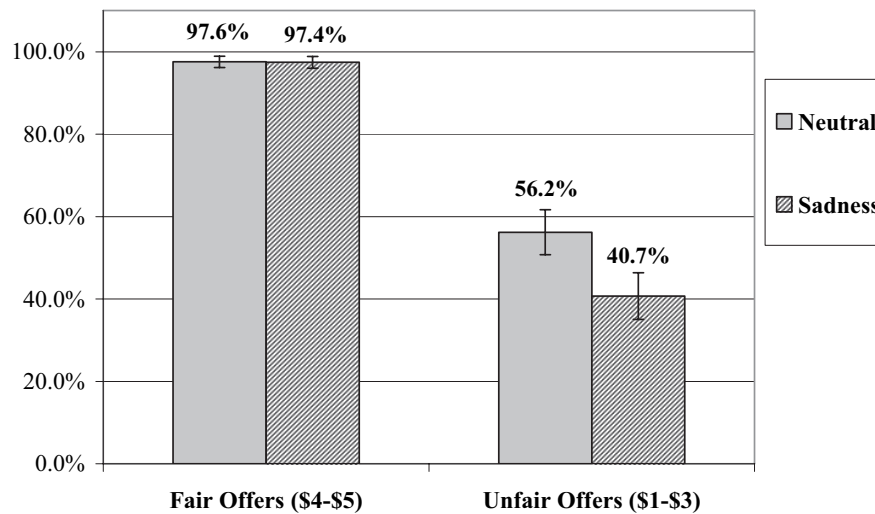


Figure 2. Acceptance rates of fair and unfair offers by emotion condition. Error bars represent standard errors of the mean.



task. More specifically, an incidental sad mood appears to result in lower acceptance of unfair monetary offers, even when the alternative is no gain at all. More important, this type of emotional carryover was observed in a social interactive context, despite the nontrivial task-related emotions associated with the decision. The mood effect was observed across different levels of unfairness, based on monetary amounts deemed unfair by participants (e.g., \$1–\$3), but was not present for “fair” (\$4–\$5) offers. Although induced amusement did not have a significant effect on decision-making performance, this could be due to a shorter lasting induction of this mood state, despite high and comparable self-report ratings of amusement and sadness in their respective conditions.

The fact that induced sadness appears to lower acceptance rates of more unfair offers begs the question of what distinguishes this incidental emotion and its specific impact on decision making. Our findings are consistent with our initial hypothesis, namely that sadness may focus the responder’s attention on the negative emotional consequences of unfair offers rather than the positive impact of accepting such offers (i.e., monetary reward), thereby prompting lower acceptance rates of unfair offers. In addition, although information processing was not explicitly tested, our findings are consistent with motivational theories on the processing consequences of affect, whereby sadness is likely to promote a more vigilant processing style, reflecting a motivation to enhance the processing of information related to potentially threatening and harmful situations (Forgas, 2003). Such enhanced processing would again make individuals in a sad mood more likely to focus on the threatening aspect of being treated unfairly (in contrast with individuals in neutral or positive moods), thus potentially leading to more rejections of these unfair offers.

Our findings also have important clinical implications, as little research has been done on the impact of sadness on decision making. Although some basic decision tasks have been used with depressed individuals, evincing more short-sighted decisions and poorer performance among those who are depressed (Must et al., 2006; Rubinsztein, Michael, Underwood, Tempest, & Sahakian, 2006), there are virtually no studies on how depression can affect simple, real-life economic decisions, particularly within a social interactive context. Sad mood being one of the primary symptoms of depression (per the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders*; American Psychiatric Association, 1994), assessing the impact of background sadness on decision making, as done in the present research, appears to be an important step toward addressing this empirical gap.

Notably, the present results are consistent with cognitive models of depression (Beck, 1976; Gotlib & Neubauer, 2000; Henriques & Davidson, 2000), namely that information processing in sad or depressed individuals is characterized by increased sensitivity to negative aspects of a situation (e.g., being denied money) and/or diminished salience of positive events (e.g., monetary reward), both of which would indeed result in more rejections of unfair offers. Although depression is not equivalent to incidental sadness, some evidence suggests that overlapping neural systems are involved in the experience of both transient sadness and chronic sadness in depression (Mayberg et al., 1999). Therefore, in addition to contributing to the emotion and decision-making literature, these results do have important implications for theoretical models of depression, as they provide evidence of tangible monetary repercussions of a sad mood state, which may at least partially

overlap with a depressed state. These findings also suggest that experiencing a sad mood, for instance when one is mildly to moderately depressed, may have important and unexpected emotional and social consequences. Sad or depressed individuals may not be as passive and listless as commonly described in the clinical literature. In contrast to individuals experiencing neutral mood, they may in fact be more self-focused, more defensive, and potentially more susceptible to expressing anger, an approach-based emotion.

Finally, these findings have broader implications for the investigation of the neural basis of social decision making, as it may help focus future neuroimaging studies of the cognitive and emotional correlates of economic decisions. For instance, specific neural regions associated with deliberative processes (dorsolateral prefrontal cortex), emotional processing (insula), and cognitive conflict (anterior cingulate cortex) have been proposed as underlying decisions in the UG (Sanfey et al., 2003). The present results suggest that incidental mood states may further modulate such neural processes. For example, sadness, in comparison to neutral incidental emotion, may result in enhanced insular activation on presentation of unfair offers, reflecting emotional (i.e., System 1) priming. Alternatively, lower acceptance rates associated with sadness could reflect an increased competition of both deliberative and automatic systems (e.g., dorsolateral prefrontal cortex, insular, and anterior cingulate cortex activation) with resulting higher conflict.

In conclusion, we found that task-irrelevant incidental emotions can have a significant impact on social economic decision making. Accordingly, this research raises new questions about the finer level emotional and motivational basis of such mood carryover effects. What economic models deem “irrational” (i.e., turning down tangible monetary gain), however, appears likely to reflect a more ingrained and adaptive mechanism, which can be further exacerbated by subtle, and likely not so subtle, incidental mood states.

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