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Sharing losses and sharing gains: Increased demand for fairness under adversity

Xiaolin Zhou [a,b,*], Yan Wu [a,c,d]

[a] Center for Brain and Cognitive Sciences and Department of Psychology, Peking University, Beijing 100871, China
[b] Key Laboratory of Machine Perception (Ministry of Education), Peking University, Beijing 100871, China
[c] Department of Psychology, School of Educational Sciences, Hangzhou Normal University, Hangzhou 310036, China
[d] Key Laboratory of Child Development and Learning Science (Ministry of Education), Southeast University, Nanjing 210096, China

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ABSTRACT

There is ample experimental evidence showing that people have a strong preference for equity in wealth allocation and social interaction. Although the behavior of gain sharing and responses to (un)fairness in allocation of wealth has been extensively investigated in studies employing economic exchange games, few studies have focused on how people respond to an unfair division of *loss* between individuals. In this study we developed a new variant of the ultimatum game and examined the participants' reactions to (un)fairness in both gain and loss sharing. Results from three experiments showed that the rejection rates to unfair offers were generally higher in the loss than in the gain domain. Moreover, participants were inclined to associate loss with "unfair" and gain with "fair", with stronger associations leading to higher rejection rates in the ultimatum game. Furthermore, in subjective rating, unfair offers were perceived as being more unfair in the loss than in the gain domain. These results demonstrate an increased demand for fairness under adversity and the importance of justice in liability sharing.

Introduction

Fairness is important to social interaction and social stability. A large number of studies, employing different economic games, suggest that people demand fairness in wealth allocation and are willing to sacrifice economic interests to punish unfair behavior (Camerer, 2003; Fehr, Fischbacher, & Gächter, 2002; Güth, Schmittberger, & Schwarze, 1982). Although fairness preference and altruistic behavior have been examined extensively in the context of asset (i.e., gain) distribution, little attention has been paid to this sort of decision-making behavior in the context of liability (i.e., loss) sharing, at least in studies employing strategic games. Equitable distribution of liabilities, as of gains, is a critical contributor to social justice. The main purpose of this study is to compare fairness preference in loss and gain domains and to investigate the possible mechanisms underlying the differences between domains.

Experimental studies on the fairness of wealth allocation often employ the ultimatum game (Güth et al., 1982), in which two anonymous players (a proposer and a responder) negotiate on the division of a given amount of money according to the following rule: The proposer makes an offer (i.e., a division scheme) to the responder and the responder can either accept or reject the offer; if the responder accepts, the pie is divided as proposed; if he rejects, neither player receives anything. According to standard game theories, a completely rational responder would accept any offer larger than zero since something is better than nothing. However, a great number of studies show that responders are unwilling to accept offers that leave them with approximately 20% of the pie or less (Camerer & Thaler, 1995). Studies manipulating the size of the stake and the population of players find essentially the same pattern of effects (Hoffman, McCabe & Smith, 1996; Henrich, McElreath, Barr et al., 2006).

Since potential losses tend to have a greater impact than equivalent gains upon people's choices (Kahneman, 1992; Tversky & Kahneman, 1981), the fairness preference behavior in liability sharing might not be the same as in gain sharing. As an initial effort to clarify this issue, Buchan, Croson, Johnson and Wu (2005) asked participants to act both as proposers and as responders. As proposers, participants stated how much money out of a $100 gain they would be willing to offer to responders and how much the responders should pay for a $100 loss. As responders, participants stated the minimal amount of money out of a $100 gain that they would accept and the maximal amount that they would be willing to pay for a $100 loss. Results showed that bargaining over losses entails higher demands on the part of the responders and higher offers on the part of the proposers than bargaining over gains, suggesting that unfairness looms larger in losses than in gains.

This study is important because it directly compared reactions to gain and to loss in strategic situations. Nevertheless, several aspects of the study limit its generality. First, participants played as both proposers and responders and it is unclear whether this manipulation would affect responders' decisions. Güth et al. (1982) found that the proposers' offers are more generous when participants play both

* Corresponding author. Department of Psychology, Peking University, Beijing 100871, China. Fax: +86 10 6276 1081.
E-mail address: xz104@pku.edu.cn (X. Zhou).

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positions. Second, participants did not receive specific offers when they decided what they would accept as responders. It is likely that they would accept a wider range of offers had they actually received them. Third, the participants made offers with the understanding that their wishes would not be negated by a second party. In other words, the participants behaved as they would in the dictator game, in which there is no negotiation process. In light of these limitations, the present study developed a variant of the ultimatum game and focused on responders' sensitivity to different levels of unfairness in gain and loss sharing. Experiments 1a and 1b, using respectively a within- and a between-participant design, examined how responders reacted to division schemes in the two domains. Experiment 2 examined whether the potential difference in fairness preference between domains would be modulated by the extent to which the personal outcome of acceptance or rejection was stressed. Experiment 3 was to investigate the possible mechanisms underlying the difference between domains, by employing the implicit association test (IAT; Greenwald, Nosek, & Banaji, 2003) in which words indicating "gain" or "loss" had the same or different manual responses as words expressing the "fair" or "unfair" concept and by examining the participants' subjective feelings towards unfairness in each division scheme.

We hypothesized that participants would react strongly to unfairness in both the gain and loss domains, with the rejection rate increasing as a function of the level of unfairness in the division schemes. Moreover, since losses loom larger than gains and have greater impact upon choice behavior, we expected that unfairness in division schemes would induce stronger reactions (i.e., higher rejection rates) on participants in liability sharing than in gain sharing. Furthermore, if participants intrinsically treat unfair offers as a kind of loss and fair offers as a kind of gain, we might expect to find stronger implicit associations between unfair and loss (fair and gain) than between unfair and gain (fair and loss).

Experiment 1

We used both within- and between-participant designs to obtain convergent evidence concerning fairness preference in the gain and loss domains. Since participants were exposed to every experimental condition in Experiment 1a, they could strategically respond to losses in comparison to gains and respond to gains in comparison to losses. Such comparisons would mar the interpretation of potential effects in the rejection rate. If, on the other hand, the same pattern of effects were obtained across the two designs, we could make more general conclusions concerning fairness preferences.

Method

Participants

A total of 145 undergraduate or graduate students (40 and 105 respectively for Experiments 1a and 1b) aging from 18 to 25 years were paid for their participation. About half of the participants in each sub-experiment were male. All the participants were right-handed and had no history of cognitive or psychiatric disorders. They did not major in psychology or economics and had not participated in similar experiments before.

Design

Each participant received a division scheme for 10 Chinese yuan (¥) in each trial and was asked to decide whether to accept the offer by pressing a response key. A 2 (domain: gain vs. loss) by 5 (fairness level: 5:5 vs. 4:6 vs. 3:7 vs. 2:8 vs. 1:9) factorial design was used, with domain as a within-participant factor in Experiment 1a and as a between-participant factor in Experiment 1b. Division schemes were 5/5, 4/6, 3/7, 2/8, 1/9 for the gain domain, and −5/−5, −6/−4, −7/−3, −8/−2, and −9/−1 for the loss domain, with the number before the slash indicating the offered amount to the responder and the number after the slash indicating the amount left to the proposer.

Procedure

Upon coming to the laboratory, each participant was told the rules of the game. For a division scheme in the gain domain, the standard rule of the ultimatum game was applied. For a division scheme in the loss domain, an "acceptance" decision would mean that the participant would get panelized for the amount offered and the proposer would get the rest, and a "rejection" decision would mean that each of them would incur a loss of ¥10. The participant was told that each scheme was collected previously from different students in another unspecified university and that both he and the proposer in each round would be paid according to his decision (after some kind of transformation to reduce the amount of money involved). This would effectively make each trial to be a "one-shot" game. The participant was told that he would be paid with a basic payment for participation plus or minus the amount of money he got or lost in the game. He was also told to make the "acceptance" or "rejection" decision, with the index finger of his left or right hand, as quickly as possible without elaborative thinking.

Unknown to the participant, the division schemes were manipulated by the experimenter, with 250 trials for each domain and 50 for each level of fairness. Offers were mixed in pseudorandom orders, with the restrictions that no more than 3 consecutive trials had the same offer and that no more than 4 consecutive trials were in the same domain (for Experiment 1a). Each trial began with the presentation of a photo of the ¥10 bill for 1000 ms, followed by a fixation sign at the center of the screen for another 1000 ms (Fig. 1). The photo was either colored or in black-and-white, indicating that the current trial was in the gain or loss domain. The correspondence between the color of photo and domain was counterbalanced over participants. Then a division scheme, in two lines of words (e.g., "you 2, he 8" in the gain domain or "you −8, he −2" in the loss domain), was presented until the participant made the "acceptance" or "rejection" decision. After an interval of 800 ms with a blank screen, the participant saw the outcome of his decision (e.g., "you 0, he 0" or "you −10, he −10") for 500 ms. The next trial began after another 1000 ms.

After the formal test, each participant rated, on a 7-point Likert scale, to what extent he believed that the offers came from other students. He was then paid and debriefed.

Results

The post-experiment rating indicated that participants generally believed in the setup of the experiment, with a mean score of 4.45 ± 1.55 for Experiment 1a and 5.32 ± 1.40 for Experiment 1b (7 indicating "truly believe" and 1 "do not believe at all"). Trials with RTs >3000 or <100 ms were excluded, accounting for 2.58% and 0.16% of the total data points in Experiments 1a and 1b, respectively. Here we focus on the rejection rates to different division schemes (Fig. 2).

Experiment 1a: Within-participant design

A 2 by 5 repeated-measures ANOVA showed that unfair division schemes were more frequently rejected than fairer ones, with the rejection rate increasing over the level of unfairness, $F(4, 156) = 105.78$, $p < .001$ (Fig. 2A). Importantly, the rejection rate was higher in the loss (45%) than in the gain (30%) domain, $F(1, 39) = 36.56$, $p < .001$, although this main effect was qualified by the interaction between domain and fairness level, $F(4, 156) = 10.12$, $p < .001$. Simple-effect tests showed that the difference between domains was significant at each fairness level, $p < .01$ or $p < .001$, although it appeared that the size of the difference increased as a function of the level of unfairness.

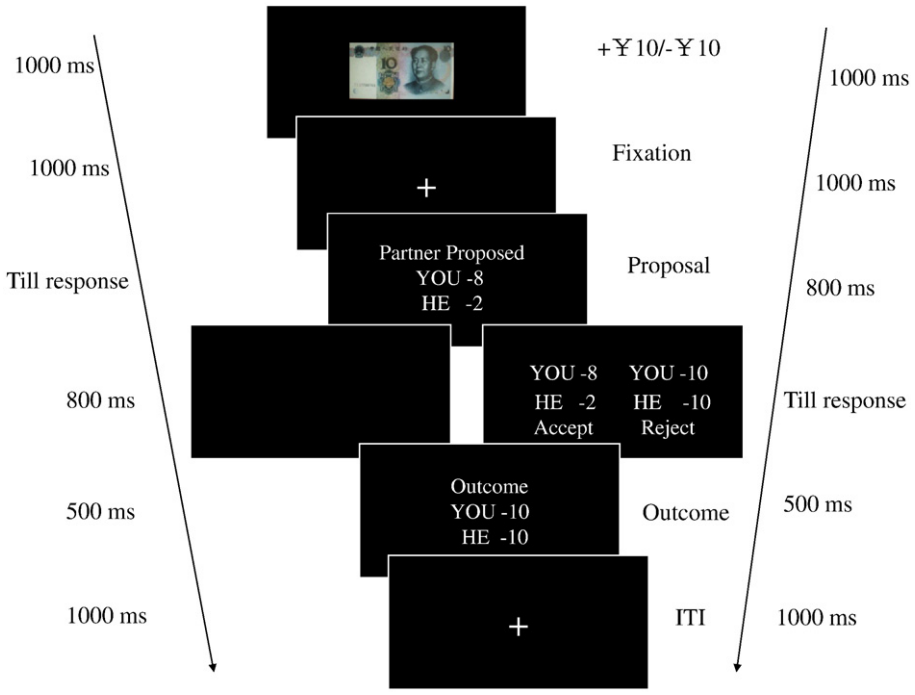

Fig. 1. Sequence of displays. In Experiments 1a, 1b and 3, participants were required to make an "acceptance" or "rejection" decision immediately upon seeing the division scheme (the third display); in Experiment 2, they were required to make a decision upon seeing the potential outcomes of the "acceptance" and "rejection" options (the fourth display in the right panel).

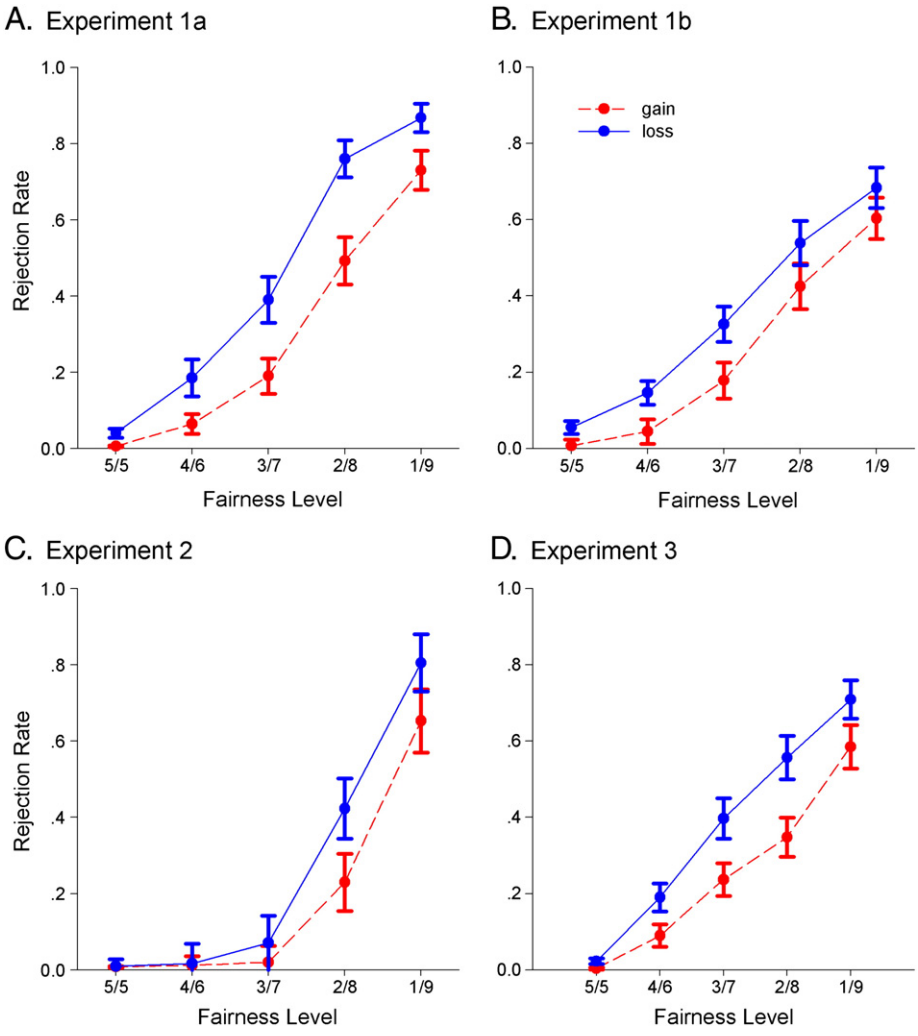

Fig. 2. The rejection rate in the ultimatum game as a function of the domain and fairness level in Experiments 1–3. Standard errors of the means are shown as error bars.

Experiment 1b: Between-participant design

Data from four students were excluded due to their misunderstanding of the game rules. An ANOVA with domain as a between-participant variable and fairness level as a within-participant variable found significant main effects of domain, $F(1, 99) = 4.62$, $p < .05$, and of fairness level, $F(4, 96) = 115.25$, $p < .001$ (Fig. 2B). The rejection rate was higher in the loss (35%) than in the gain (25%) domain. The interaction between the two variables was not significant, $F(4, 96) < 1$.

Discussion

Consistent with previous studies, this experiment showed that the rejection rate in the ultimatum game increases as the level of unfairness in monetary allocation increases. This finding indicates that people are willing to suffer financial losses, whether forgoing profits or paying more than the fair share, to pursue justice in wealth allocation or liability bearing.

Importantly, this experiment demonstrated a higher demand for fairness when participants had to share losses with others, consistent with Buchan et al. (2005). At similar levels of unfairness, participants were more likely to reject loss sharing schemes and suffer from more losses than to reject gain sharing offers and get nothing. This finding cannot be explained as due to strategic comparisons in making decisions between the two domains since the same pattern of effects was obtained in both within- and between-participant designs. Although such comparisons may have contributed to the increased overall rejection rate in Experiment 1a as compared with Experiment 1b, they cannot be the cause for the general finding of higher rejection rates in the loss than in the gain domain.

Tversky and Kahneman (1981) proposed that the displeasure associated with losing a certain amount of money is generally greater than the pleasure associated with winning the same amount and response to losses is more extreme than response to gains (i.e., loss aversion). Thus individuals in social settings are motivated more to avoid loss than to obtain equivalent gain (De Dreu, Carnevale, Emans, & Van de Vliert, 1994). From this perspective, one might predict that unfair offers in the loss domain should lead to *lower* rejection rates than equivalent offers in the gain domain. However, this experiment obtained a reversed pattern, consistent with the finding that loss-framed negotiators are more averse to making concessions than gain-framed negotiators (Kahneman, 1992).

Why do people show such inclination for greater fairness under adversity? There are two potential accounts. One assumes that people are more likely to link loss with "unfair" and gain with "fair" and they are sensitive to this link in making monetary decisions. At the same level of unfairness, a division scheme would be perceived as more unfair in the loss than in the gain domain and is therefore more likely to be rejected. This account will be tested in Experiment 3.

Another account assumes that people care not only about their own payoffs, but also about their payoffs relative to their partners' (Bohnet & Zeckhauser, 2004; Bolton & Ockenfels, 2000; Fehr & Schmidt, 1999). This social comparison is highlighted in the loss domain, as loss aversion may amplify inequity aversion. Take the most unfair offer for example. The rejection of the −9/−1 offer would cause the *proposer* an extra loss of ¥9 (i.e., losing ¥1 vs. losing ¥10), and the rejection of the 1/9 offer would lead to a decreased gain from ¥9 to 0 for the proposer. According to prospect theory (Kahneman, 1992; Tversky & Kahneman, 1981), losses tend to be more salient than gains on people's subjective valuation, and therefore a loss of ¥9 would be more painful for the proposer than a gain of nothing. Thus, from the responder's standpoint, rejecting an unfair offer in the loss domain would punish the proposer more strongly than rejecting an equivalent unfair offer in the gain domain. Such punishment may help the responder to maintain self-esteem and counteract negative emotions associated with being treated unfairly (Crockett, Clark, Tabibnia, Lieberman, & Robbins, 2008; Sanfey, Rilling, Aronson, Nystrom, & Cohen, 2003; Xiao & Houser, 2005).

Following this account, one may speculate that the specific way of presenting the division schemes in Experiment 1 might have focused the responder on interpersonal comparison between the potential gains of the two players (Handgraaf et al., 2003). This comparison might highlight the unfairness in division schemes, leading to higher rejection rates. Rather than asking the participants to make a decision upon seeing a division scheme, in Experiment 2, we explicitly presented the potential outcomes of decisions and asked the participants to make a choice upon seeing the potential outcomes (Fig. 1). This way of presentation may focus the participants more on their own payments and less on interpersonal comparison, reducing the overall rejection rates to unfair offers. The question is whether the difference between the loss and gain domains would also be modulated by this manipulation.

Experiment 2

Method

Participants

Twenty graduate and undergraduate students (7 male) averaging 21 years of age were paid for their participation. None of them had taken part in similar experiments before.

Design and procedure

Experimental design and procedures were the same as Experiment 1a, except that participants were asked to make a decision upon the presentation of potential outcomes, rather than upon the presentation of the division scheme (Fig. 1). After a scheme was presented for 800 ms, the potential outcomes of the acceptance decision (e.g., "you −8, he −2") and of the rejection decision (e.g., "you −10, he −10") were presented randomly on the left or right side of the screen, together with signs for "acceptance" and "rejection" options presented at the bottom. Participants were asked to press a response key on the corresponding side as quickly as possible.

Results

The post-experiment rating indicated that participants generally believe in the experimental setup, with a mean score of 5 ± 1.45. Trials with RT > 3000 or < 100 ms were excluded, accounting for 0.05% of the total data points. An ANOVA with domain and fairness level as within-participant variables revealed significant main effects of domain, $F(1, 19) = 21.24$, $p < .001$, and of fairness level, $F(4, 76) = 54.24$, $p < .001$ (Fig. 1C). The overall rejection rate was higher in the loss (27%) than in the gain (19%) domain. The interaction between domain and fairness level was significant, $F(4, 76) = 5.96$, $p < .005$. Further tests showed significant differences between domains for the unfair offer, 7 vs. 2% at the level of 3/7, $F(1, 19) = 12.30$, $p < .005$; 42 vs. 23% at the level of 2/8, $F(1, 19) = 13.61$, $p < .001$; and 81 vs. 65% at the level of 1/9, $F(1, 19) = 6.30$, $p < .05$.

To reveal the modulation of rejection rate by the presentation of potential outcomes, we compared Experiments 2 and 1a. The overall rejection rate was significantly lower in Experiment 2 (23%) than in Experiment 1a (37%), $F(1, 58) = 11.28$, $p < .005$. The interaction between experiment and fairness level was significant, $F(4, 232) = 4.92$, $p < .01$. It is clear from Fig. 2 that, compared with Experiment 1a, the overall rejection rates at levels of 4/6, 3/7, and 2/8 in Experiment 2 were significantly reduced; moreover, at levels of 4/6 and 3/7, the difference between the loss and gain domains was also significantly reduced, as indicated by the interaction between domain and experiment: $F(1, 58) = 5.05$, $p < .05$ and $F(1, 58) = 7.82$, $p < .01$, respectively.

Discussion

As expected, highlighting the outcomes associated with the "acceptance" and "rejection" options reduced the overall rejection rate to unfair offers. This reduction may come from the downplaying of interpersonal comparison and/or the stressing of concern for self-interest. This finding is consistent with the idea that the utility of outcome depends not only on one's own absolute outcome, but also on the comparison between this outcome and outcomes of relevant parties (Handgraaf et al., 2003).

Note that although the overall rejection rate was reduced in this experiment, as compared with Experiment 1a, the rejection rates to offers at the level of 1/9 did not differ between the experiments, $F(1, 58) < 1$. It is suggested that two motives, concern for fairness and concern for self-interests, drive the decision making behavior in the ultimatum game (Knoch et al., 2006). At modest levels of unfairness, where the two motives are of approximately equal strength, priming one of them would markedly alter the choice behavior. But at the extreme level of unfairness, concern for fairness may prevail over concern for self-interests and subtle priming of the latter, as was carried out here, may have no apparent effect upon choice selection.

Importantly, although priming the concern for self-interests reduced the difference in rejection rates between the two domains at levels of 4/6 and 3/7 (Fig. 2C and A), it did not change the overall pattern: higher demand for fairness under adversity survives even when concern for self-interests is primed.

Experiment 3

Experiment 3 examined the hypothesis that the increased rejection rate to unfair offers in the loss domain is partly due to the fact that unfairness is intrinsically related to loss and its impact upon the individuals' choices could be amplified by loss aversion. We first asked the participants to complete an implicit association test (IAT) to investigate whether there are stronger associations between loss and unfairness (gain and fairness) than between loss and fairness (gain and unfairness). Then we asked the same participants to respond to different division schemes, as in Experiments 1a and 2. This would allow us to examine the potential correlation between the strength of implicit associations and the rejection rate to unfair offers. Finally we asked the participants to give a subjective rating to the degree of unfairness in each division scheme. This would allow us to examine whether unfair offers elicited a stronger feeling of unfairness in the loss than in the gain domain and whether the strength of this feeling correlated with the rejection rate.

Method

Participants

Forty-eight graduate and undergraduate students (16 males) with an average age of 22 years participated in the experiment. None of them had participated in similar studies before.

Tasks and procedure

The IAT task involved a series of tests, starting with the initial discrimination block (20 trials) in which different manual responses were required to classify 10 words expressing the meaning of "fair" or "unfair". In the second block (20 trials), participants were required to make different responses to another 10 words expressing the meaning of "gain" or "loss". In the third (20 trials) and fourth (40 trials) blocks, participants responded to the mixed presentation of the above 20 words with the same manual responses. In the fifth block (20 trials), participants learned the reversed correspondence between "gain" and "loss" words and response keys. In the sixth (20 trials) and seventh (40 trials) blocks participants responded to the mixed presentation of "gain" and "loss" words and "fair" and "unfair" words again, but now with newly learned category-key correspondences. The third and fourth blocks were critical blocks in which participants were required to use the same key to categorize "gain" and "fair" words and another key to categorize "loss" and "unfair" words. The sixth and seventh blocks were also critical blocks, in which participants were required to use the same key to categorize "gain" and "unfair" words and another key to categorize "loss" and "fair" words. The presentation order of blocks 2–4 and blocks 5–7 was counterbalanced between participants. The IAT data was analyzed in two ways: one using a new scoring algorithm (Greenwald, Nosek, & Banaji, 2003) to calculate the *D* score for each participant, with higher scores reflecting greater implicit bias towards combinations of loss and unfair and of gain and fair; another using the raw RTs in the fourth and seventh blocks (Greenwald et al., 1998), with shorter RTs implying stronger associations between categories.

The ultimatum game had 10 trials for each division scheme. For the fairness evaluation, there were 2 trials for each division scheme. In each trial, a participant first saw a color photo of the ¥10 bill for 1000 ms, followed by a fixation sign for another 500 ms. Then a division scheme was presented at the centre of the screen, together with a slider on a ruler at the bottom of the screen. The two ends of the ruler were labeled as "fair" and "unfair", with the locations counterbalanced over the participants. Participants were asked to place the slider at a suitable location on the ruler to express their feeling of (un) fairness towards a particular scheme.

Results

IAT

Participants showed stronger implicit associations between loss and unfair and between gain and fair than between loss and fair and between gain and unfair, as indicated by the *D* score (0.96 ± 0.27) differing significantly from zero, $t(47) = 24.40$, $p < .001$. RTs to combinations of loss and unfair and of gain and fair (683 ms) were shorter than RTs to combinations of loss and fair and of gain and unfair (1118 ms), $F(1, 47) = 202.91$, $p < .001$.

Rejection rate in the ultimatum game

An ANOVA revealed significant main effects of domain, $F(1, 47) = 36.53$, $p < .001$, and of fairness level, $F(4, 188) = 79.05$, $p < .001$. The rejection rate was higher in the loss (38%) than in the gain (25%) domain. The interaction between domain and fairness level was significant, $F(4, 188) = 5.82$, $p < .01$. It is clear from Fig. 2D that the difference between the two domains appeared when the division schemes were unfair.

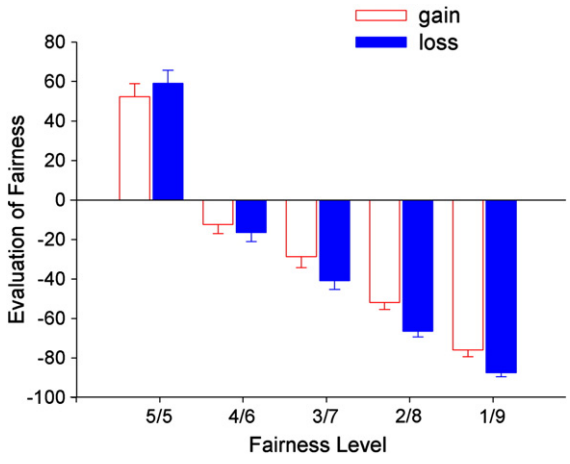

Fig. 3. The subjective evaluation of the (un)fairness in each division scheme in Experiment 3. Numbers on the Y-axis indicate the subjective rating, with 100 = extremely fair and −100 = extremely unfair. Standard errors of the means are shown as error bars.

Fairness evaluation

An ANOVA revealed significant main effects of domain, $F(1, 47) = 10.41$, $p < .01$, and of fairness level, $F(4, 188) = 184.25$, $p < .001$ (Fig. 3).The interaction between the two factors was also significant, $F(4, 188) = 4.13$, $p < .05$. Further tests showed that while the difference in rating for fairer offers (4/6, 5/5) was not significant between the two domains, $p > .1$, the difference at other levels of unfairness was significant ($p < .05$ or $< .01$), with unfair offers eliciting stronger feeling in the loss than in the gain domain.

Correlation analysis

Across participants, the *D* score correlated with the overall rejection rate, $r(47) = .322$, $p < .05$, with higher *D* score corresponding to higher rejection rate. For fairness evaluation, correlation analysis was carried out for each level. Across the gain and loss domains, the correlation was significant ($p < .05$) at the level of 4/6, $r(47) = -.309$, at the level of 3/7, $r(47) = -.476$, and at the level of 1/9, $r(47) = -.362$, although unexpectedly not at the level of 2/8, $r(47) = -.084$. Thus, in general, the more unfair a division scheme was perceived, the higher was the rejection rate to this scheme. Meditation analyses showed that the rejection rate was mediated by neither *D* score nor (un)fairness judgment.

Discussion

The IAT results support the hypothesis that the implicit links between loss and unfair and between gain and fair are stronger than the links between loss and fair and between gain and unfair. Thus in the loss domain, an unfair division scheme would be perceived as even more unfair, as indicated by the subjective rating data, and this would lead to a stronger inequity aversion and a higher rejection rate.

Results of the correlation analyses are in line with this reasoning. It is possible that unfairness in a division scheme leads to negative emotional responses on the responder. Unfairness in the loss domain and unfairness at a higher level may heighten these emotional responses, leading to higher rejection rates. Results of previous studies on the impact of emotional state upon choice behavior are consistent with this argument. For example, individuals in an incidental mood of sadness (elicited through movie clips) showed higher rejection rates to unfair offers in the ultimatum game than the emotionally neutral control group, and individuals having higher sadness rating showed higher rejection rates to unfair offers (Katia & Sanfey, 2007). Allowing responders to express emotions to anonymous proposers reduces their rejection rates to unfair offers (Xiao & Houser, 2005).

General discussion

This study obtained converging evidence showing that people in the face of adversity and having to share losses with others have an increased demand for fairness. At similar levels of unfairness in wealth allocation, people are more likely to reject unfair loss sharing schemes and suffer more losses than to reject unfair gain sharing offers and get nothing. This finding is consistent with a recent study showing that the fairness construct is more accessible and more likely to affect a third-party's judgment of the appropriateness of division schemes in the loss frame than in the gain frame (Leliveld, van Beest, van Dijk, & Tenbrunsel, 2009).

The reason for higher rejection rates to unfair offers in the loss domain may be that participants intrinsically link the loss frame with the concept of "unfairness", as indicated by IAT, and this link adds to the feeling of unfairness towards unfair offers in the loss domain, as indicated by the subjective rating and the correlation analyses in Experiment 3. Indeed, in a recent unpublished fMRI study employing a similar design, we found that compared with the gain frame, the loss frame activates dorsal anterior cingulate cortex (dACC) and left anterior insula, which are also responsive to unfair offers, as compared with fair offers (see Sanfey et al., 2003).

Fairness being regarded as more important in the loss than in the gain domain may have evolutionary roots. The ability to develop social fairness norms that apply to large groups of genetically unrelated individuals and to enforce these norms through altruistic sanctions is one of the distinct characteristics of the human species. Strong reciprocity—the combination of altruistic punishment and altruistic reward—has been crucial in the evolution of human cooperation (Fehr & Fischbacher, 2003). People reward others for cooperative, norm-abiding behaviors and punish violations of social norms. In aversive situations, the need to abide to social norms seems to be more urgent in that the violation of norms may threaten the survival of species.

Two issues still need to be explored. One is the suggestion that the same amount of change in monetary reward, say ¥1, has different subjective values in the loss and gain domains according to the curvilinear function of prospect theory (Tversky & Kahneman, 1981). At the level of −9/−1, for example, participants may perceive little difference between a smaller loss (i.e., ¥9) and a larger loss (¥10) in the loss domain because of the diminishing marginal utilities; in contrast, at the level of 1/9, participants may perceive a greater difference between a smaller win (i.e., ¥1) and no win at all in the gain domain because this change takes place closer to the reference point (zero). Thus losing one more Chinese yuan in the loss domain is less painful than getting nothing at the level of 1/9 in the gain domain, if the participants decide to make the "rejection" decision. This suggestion is, however, descriptive rather than explanatory because it says nothing about why the same amount of change in monetary reward has different subjective values in the two domains. More importantly, it assumes that participants care only about their own interests in making decisions. This assumption is not only inconsistent with many previous studies using strategic games (e.g., Fehr & Schmidt, 1999; Handgraaf et al., 2003; Rabin, 1993), but also inconsistent with Experiment 2 here in which highlighting the potential outcomes of the "acceptance" and "rejection" decisions and focusing the participants more on their self-interests did not change the overall difference in rejection rate between the loss and gain domains.

Another issue is related to the concept of "loss" in the context of the present setup. Because for ethical considerations we offered the participants a basic payment for participating in the ultimatum game, one might wonder whether participants really treated "loss" in a particular trial as loss, i.e., whether the participants' responses to unfair offers bear a meaningful resemblance to their behavior when real money out of their own pockets is involved. We believe that our experimental procedures ensured that such resemblance did exist. Participants were explicitly informed that the loss in a trial would result in a real loss (i.e., a certain amount of money being taken away from the basic payment). Moreover, as indicated in Experiment 3, the participants' subjective evaluations of the unfairness did change as a function of our manipulations and they showed more negative responses to the unfair division schemes in the loss than in the gain domain, suggesting that the participants treated the offers seriously. Nevertheless, future studies are needed to explicitly examine this resemblance.

To conclude, by extending the ultimatum game to liability sharing, this study demonstrates that unfairness looms larger in loss than in gain situations and that people show an increased demand for justice when they are under adversity. This finding may have a wide range of implications for our understanding of daily social life.

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