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Morality is Supreme: The Roles of Morality, Fairness and Group Identity in the Ultimatum Paradigm

Wenxuan Liu [iD], Hua Wang, Huanjie Zhu, Xiaoyan Zhu [iD], Xianyou He, Wei Zhang [iD]

Key Laboratory of Brain, Cognition and Education Sciences (South China Normal University), Ministry of Education, Guangdong Key Laboratory of Mental Health and Cognitive Science, Center for Studies of Psychological Application, School of Psychology, South China Normal University, Guangzhou, People's Republic of China

Correspondence: Wei Zhang; Xianyou He, Key Laboratory of Brain, Cognition and Education Sciences (South China Normal University), Ministry of Education, Guangdong Key Laboratory of Mental Health and Cognitive Science, Center for Studies of Psychological Application, School of Psychology, South China Normal University, Zhongshan Avenue West 55, Tianhe District, Guangzhou, 510631, People's Republic of China, Email psycheungwai@163.com; xianyouhe@163.com

Purpose: A large number of decision-making need to be carried out in the context of social interactions. Previous studies have demonstrated the impact of fairness perception, moral judgment, and group identity on decision-making. However, there is no clear conclusion as to how the effect of these factors existing simultaneously on decision-making and the extent to which these factors play a role.

Methods: We manipulated the moral quality of proposers to explore the issue of whether morality has an impact on fairness perception and manipulated the moral quality of proposer and responder simultaneously forming group identity to explore whether group identity has an impact on the effect of morality on fairness in decision-making.

Results: Participants displayed a higher acceptance rates for positive moral proposers than the negative moral proposers regardless of the fairness of the allocation of money (Experiment 1) and group identity (Experiment 2). However, the effect of group identity was working, though it partially supported the In-group Preference (Experiment 1 and Experiment 2 combined analysis). We hold that the group identity was influenced by morality.

Conclusion: When making an economic decision, morality has the supreme influence on individuals.

Keywords: economic decision-making, fairness, morality, group identity, ultimatum paradigm

Introduction

In complex social environments, many of our decisions are made in the context of social interactions, which will further affect oneself and others.[1] Therefore, when making decisions, individuals need to consider both their own interests and those of others, which inevitably leads to conflicts. How to resolve conflicts between self-interest and others' interests is an important part of social decision-making.[2] Research on the trade-off mechanism between these two types of interests is also an important foundation for our understanding of social decision-making.

Fairness, Morality and Social Decision-Making

During social decision-making process, fairness and morality are the basic norms of people's social interaction. A sense of fairness can promote effective cooperation to achieve higher quality of social coordination.[3] However, unfair treatment can trigger resentments and cause people to expend resources to punish those individuals who commit unfair practices.[4–6] In the studies on the impact of fairness perception on social interaction, the ultimatum game (UG) is a classic paradigm often applied to explore decision-making preferences and strategies.[7,8] The paradigm sets the two players of the game as the proposer and the responder, respectively, and they are required to allot a fund under anonymous conditions. The

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proposer first proposes a scheme for the allocation of money, and the responder makes choices. If they accept the scheme, the money will be distributed accordingly. But if not, both of them will achieve no earnings.

Traditional economic decision-making theory emphasizes the egoistic hypothesis, holding that individuals are rational and driven by personal interests, and proposes the concept of "rational people", which holds that people's behavior is based on the principle of pursuing the maximization of benefits, so the responder should accept any non-zero allocation.[9] However, individual's motivation to make decisions in a complex social environment is more intricate than the egoistic hypothesis.[5] Researchers have discovered that besides pure-profit orientation, fairness is a critical factor that influences individual behaviors in social decision-making as well.[10] Substantial experiments have revealed that the allocation ratio of the money is generally 50%. When it is less than 40%, it is more likely to be rejected.[11] What is more, the rejection rate increases as the allocation amount decreases.[2,12] When the amount of money divided is only about 20 to 30% of the total, responders will feel unfair and reject the scheme as punishment to the proposer.[7] But when it is less than 20%, the rejection probability reaches up to 50%.[13] Previous studies on the ultimatum paradigm have focused on the outcomes of allocation schemes and have proposed an "inequity aversion"[14] to explain the responders' seemingly "irrational" rejection behavior, which states that there is fairness preference in human society, people display a strong preference for fairness in asset allocation scenarios[6] and show strong aversion to unfair allocation,[15] indicating that people are influenced by fairness perception when making economic decisions.

Morality, as an important part of social culture, is also a significant criterion for treating others. Moral judgment can be defined as a good or bad evaluation of individuals' behaviors or characteristics, basing on a series of virtues required by culture or subculture.[16] Saltzstein argues that moral judgment included three processes: interpreting or characterizing the situation, choosing appropriate morality norms to resolve conflicts in a characterized situation, and making decisions based on the situation and related morality norms.[17] The mainstream holds that there are two pathways for individuals to make a moral judgment: teleological reasoning and deontological reasoning.[18] The teleological reasoning was a process of accurate analyses of costs and benefits from individuals, while deontological reasoning was a spontaneous process of emotional response.[19] Specifically, teleological reasoning is based on a definite outcome, which holds that the behavior producing the benefit is moral, and vice versa is immoral; deontological reasoning is based on social norms and standards, which holds that the behavior according to the standards is moral, and vice versa is immoral.

Research has found that moral judgment plays a role in people's early cognitive processing.[20] When it is needed to form the first impression of strangers, people will prioritize moral information (honesty, trustworthiness) over social information (warmth, ability).[21,22] In addition, a moral factor further affects an individual's decision-making.[23] Delgado in the trust game found that the perception of morality will affect cooperative behavior in subsequent economic decision-making, and people are more likely to trust players with positive morality and are more willing to take risks and make investments with them.[24] The reasons for the above results may be that people have a trust bias in positive moral people[24,25] or hold higher moral expectations of them,[20] thus promoting the social cooperation of both parties. This suggests that moral judgments may affect social cognitive processes such as an individual's social trust and expectation of others, thereby further influencing an individual's social decision-making. The above research shows that moral judgment and fairness preference have an impact on people's decision-making, respectively. But there is no clear conclusion as to when faced with unfair behaviors by others, whether the moral quality of others will have an impact on individuals' perception of fairness and result in different decision-making behaviors. From the above, we can draw a conclusion that people can spontaneously make moral judgments about the behavior of others according to social norms. In the present study, in addition to using the ultimatum paradigm, a series of short sentences of moral behaviors, including negative moral behaviors and positive moral behaviors, were used to manipulate the moral quality of proposers, which is consistent with deontological reasoning. When participants read these descriptive sentences of proposers, based on social norms and their life experiences, they will make corresponding positive or negative moral judgments.

In addition, decision-making is also related to individual factors, such as gender. We also take into account the influence of the proposed gender in experiment 1. Previous studies have found that women and men follow different strategies in economic decision-making. Women were thought to be more empathetic and followed deontological principles in decision-making,[26,27] while men were more rational and followed interests principles despite the risk of harming the benefits of others.[28] There are also differences in risk tolerance that women being less risk-seeking and risk-averse than men.[29] However, these studies just

focused on the gender differences between men and women acting as decision-makers whereas ignored the non-decision-makers. When apologizing to others, compared to men, women were found warmer and therefore elicited greater forgiveness.[30] In the present study, we investigated the gender differences of non-decision-makers (proposers) in the ultimatum paradigm, specifically, whether the gender of the proposers affects the fairness perception and acceptance rates of responders and even further affects the effect of moral judgment on fairness perception.

Group Identity and Social Decision Making

In social decision-making, people will automatically make distinctions among interactive objects as in-group or out-group members by using certain labels. This distinction can help people form the perception of whether they belong to the same social group and the recognition of their membership of a group, and thus generate group identity and experience the connection of the psychological relationship between themselves and the group,[31,32] which further affects their psychological processing and decision-making during the interaction.[33,34] For example, Wang et al found that moderately and extremely unfair proposals of in-group members and fair and moderately unfair proposals of out-group members induced more exogenous attention.[35]

The early fairness evaluation was also affected by the group identity of the two interactive parties. The unfair proposals provided by in-group members were perceived as a stronger violation of fairness rules, while those unfair offers provided by the out-group members were perceived as reasonable or expected.[35,36] In recent years, some researchers have also begun to focus on the impact of group identity on the implementation of fairness norm.[34–39] McLeish and Oxoby's experiments set up three conditions of priming identity, including common identity, discriminative identity and non-specific identity, and then compared the results of the UG game under these conditions.[33] The results showed that participants who initiated the common identity condition exhibited the most cooperative behaviors, while those who initiated the discriminative identity exhibited the least cooperative behaviors. Although scholars generally agree that the fairness norms will be affected by the group during the implementation process, there are still discrepancy in its effect direction, mechanism and boundary. Whether group identity will hinder or promote the implementation of fairness norms is still an open question. Wang employed the Minimal Group Paradigm (MGP) to manipulate the group identity of the interactive parties and asked the responders to complete the ultimatum game with the in-group and out-group members, respectively, turning out that the acceptance rate of in-group unfair proposal was significantly higher than that of the out-group.[35] Jordan also adopted the MGP to manipulate group identity and observe whether children as third-party bystanders would punish others for their selfish behavior, suggesting that children would punish others more severely when out-group members provided unfair offers to in-group members.[40] Researchers generally use "in-group favoritism" and "inter-group bias" to explain this result.[41] That is to say, when the group identity is divided and recognized, it will prompt individuals to show In-group Preference Effect; namely, they will become more kind, tolerant, and altruistic towards the in-group,[42] but more suspicious, indifferent, and even hostile to the out-group.[43] This explanation is consistent with the view of Mere Preference Theory, which holds that people are willing to evaluate in-group members with a positive attitude when group distinctions are formed and recognized,[32] driving people to be voluntary to tolerate the unfair behavior of in-group members. In other words, the negative violations from the in-group members and the positive evaluation of group identity offset each other, thus reducing the possibility and intensity of punishment for the in-group.[34]

Other researchers contended that Black Sheep Effect (BSE) occurs when group identity conflicts with fairness norm, meaning that people will impose more severe punishments and sanctions on the in-group for their unfair behavior.[44,45] Mendoza found that the unfair behavior of the in-group bears more severe sanctions than that of the out-group.[46] Wu and Gao used the MGP to manipulate the group identity of the in-group and out-group with Chinese children aged 3 to 6 and explored how children at different developmental stages dealt with the conflict between group identity and fairness norm. It turned out that both boys and girls aged 5 to 6 will punish in-group offenders, indicating that there existed a signal to maintain the fairness norm of the group.[39] For the BSE, researchers mainly employ the Normal Focus Theory proposed based on the perspective of in-group norm to explain it, which holds that in-group members comply with similar values and norms. People often anticipate that in-group members are trustworthy. If the behavior of them deviates from people's expectations, other members in the group will generate strongly negative emotions (such as anger, disgust and so on), which in turn leads to severe sanctions.[47] If in-group members violate core principles of the group, their violations will

be regarded as a potential threat to the whole group, and thus, people will severely punish the in-group members for their unfair behaviors.[34]

For individuals, the simplest manipulation of cues regarding a group, such as a random label, is enough to form a consciousness of belonging to a common group.[48] McLeish and Oxoby primed the social group identity of the participants by asking them to recall what they had experienced with the group.[33] Lv also proposed the concept of "group shared experience" to examine the impact of shared experience of unfairness in a group on individual's behavior and sense of injustice.[49] Therefore, we used "group shared experience" to arouse the group identity of participants in the ultimatum task. Specifically, we primed the moral perception of participants themselves by asking them to read a series of scenarios including moral information, and then, they needed to react as requested. If they reacted positively, they were positive moral priming group, and if they reacted negatively, they were negative moral priming group. Participants had the same moral experiences as the proposers were in-group members, if not, they were out-group members.

Overview of Study

From the above literature, it can be seen that individuals making social and economic decisions are affected by fairness perception, which is manifested in accepting fair proposal while rejecting unfair one. However, in social and economic decision-making, people are also affected by moral judgment and group identity besides fairness perception. In the present study, we attempted to examine the impact of these factors on decision-making in an environment that encompasses economic and moral contexts and the extent to which these three factors play a role. We managed to address two issues whether the moral quality of others influences individuals' fairness perception when making decisions and whether group identity influences the effect of morality on fairness perception.

In Experiment 1, we adopted the ultimatum game paradigm to manipulate the moral quality of proposers by presenting their prior background information,[50] including the positive moral and negative moral behaviors, in order to allow participants to make corresponding moral judgments to them. In addition, we have set up three allocations in UG, including fair and unfair allocations, with the latter was further divided into moderately unfair allocation and extremely unfair allocation. The purpose of this experiment was to investigate whether the moral judgment will affect the perception of fairness and whether this influence further has an impact on behavior in the decision-making task involving economic and moral contexts. Based on this question, we proposed two hypotheses:

H 1.1: If morality affects the fairness perception of participants, the acceptance rates of positive moral proposer are higher than those of negative moral proposer in unfair allocations.

H 1.2: If fairness perception is not affected by morality, the acceptance rates of fair allocation are always higher than unfair allocations.

In addition, we took the gender of proposers into account. Generally, the warmth of women will make us more lenient of them , so we assumed that

H 1.3: Individuals are more receptive to women than men when faced with unfair allocations; even though proposers were negative moral, the acceptance rate of female proposers is also higher than that of male in fair and unfair allocations.

The purpose of Experiment 2 was to investigate whether group identity influences the effect of morality on fairness perception. In addition to manipulating the moral quality of proposers, we also primed the moral quality of participants in order to arouse their group identity to proposers. That is, the positive (negative) moral priming group with the positive (negative) moral proposers were in-group members, with the negative (positive) moral proposers were out-group members. If group identity influences the decision-making, there are two directions: the In-group Preference and the BSE. Based on this question, we also proposed two hypotheses:

H 2.1: If In-group preference affects the effect of morality on fairness perception, individuals will perform a higher acceptance rate of moderately and extremely unfair proposals of the in-group than the out-group;

H 2.2: If BSE affects the effect of morality on fairness perception, individuals will perform a lower acceptance rate of moderately and extremely unfair proposals of the in-group than the out-group;

Pilot Material Ratings
Method
Participants
Forty college students (20 females), aged between 18 and 25 years (M_{age} = 20.68 ± 2.07), were recruited locally to take part in the material ratings. All the participants from South China Normal University and have basic reading comprehension ability. The pilot material ratings and the following experiments were carried out in accordance with the recommendations of the Institute Ethics Committee, South China Normal University, with written informed consent was obtained from all participants in accordance with the Declaration of Helsinki. The protocol was approved by the Institute Ethics Committee, South China Normal University.

Materials and Task
A total of 200 short sentences of moral behaviors were created, including four types: 50 short sentences of positive moral behaviors performed by men (eg, "He adopted a large number of stray cats"), 50 short sentences of negative moral behaviors performed by men (eg, "He cheated on his partner for many times"), 50 short sentences of positive moral behaviors performed by women (eg, "She adopted a large number of stray dogs"), and 50 short sentences of negative moral behaviors performed by women (eg, "She had multiple induced abortions due to her debauchery").

All the four kinds of short sentences were 10–20 words in length and were randomized to form an online moral judgment questionnaire. Participants were instructed to read and rate these sentences on a 9-point scale at their own self-pace (1 for *morally very positive* and 9 for *morally very negative*). Specifically, participants are first presented with instructions for the questionnaire to clarify their task, following the basic demographic information was collected. And next, the short sentences presented on the screen one by one, and participants were allowed to rate these short sentences according to the perception of morality of themselves.

Results
Paired-sample *t*-test were conducted in SPSS 26.0. The results of the pilot material ratings confirmed that there was a significant difference between positive moral (7.69 ± 0.63) and negative moral sentences (2.33 ± 0.71), t (99) = 54.42, p < 0.001. There was also a significant difference of the sentences between positive moral (7.77 ± 0.07) and negative moral behaviors (2.26 ± 0.10) performed by men, t (49) = 44.59, p < 0.001. Meanwhile, we also found a significant difference of the sentences between positive moral (7.61 ± 0.10) and negative moral behaviors (2.40 ± 0.10) performed by women, t (49) = 34.35, p < 0.001. However, there was no significant difference between the positive moral sentences performed by men and by women (p = 0.200) and negative moral sentences performed by men and by women (p = 0.330), respectively.

According to the ratings, we eliminated some short sentences that are more related to personal economic level (eg, "She likes money and believes that money is supreme") or some short sentences with less discrimination (eg, "He lets self-interest take precedence over the collective interests"). After that, we selected 100 short sentences in a random way as experimental stimuli, composed by 25 stimuli of each type as mentioned above.

Experiment 1
In Experiment 1, we attempted to explore whether the different moral qualities and gender of proposers have an impact on fairness perception in the ultimatum game.

Method
Participants
Using G-power 3.1.9, when the medium effect size of 0.25 and the power value of 0.8, the minimum sample size was calculated for 19 people. A different group of 60 healthy students of South China Normal University (27 females) who were right-handed, had normal or corrected-to-normal vision, and were aged between 20 and 25 years (M_{age} = 22.19 ±

1.38) were recruited locally and paid for their participation. In this and all subsequent experiments, participants provided basic demographic information.

Design

The ultimatum paradigm was used as the task of Experiment 1. Experiment 1 involved a 2 (moral behavior: positive morality vs negative morality; within-subjects) × 3 (fairness of the allocation of money: moderately unfair 7:3, extremely unfair 9:1, fair 5:5, the number after the colon is the amount obtained by the participants; within-subjects) × 2 (the gender of virtual proposer: male proposer vs female proposer; between-subjects) mixed factorial design. The dependent variables were the acceptance rate. Participants were randomly divided into two groups: the male proposer group and the female proposer group (30 participants in each group).

Materials

100 short sentences of moral behaviors, including 50 short sentences of positive moral behaviors and 50 short sentences of negative moral behaviors (half of them performed by male and half by female). There was a significant difference between positive moral (7.53 ± 0.63) and negative moral sentences (2.37 ± 0.61), $t(49) = -111.19$, $p < 0.001$.

Procedure

The stimuli were presented on E-prime 2.0. During Experiment 1, participants were asked to assume themselves as the responders to make the decision (accept or reject) for the allocation of a fixed sum of money proposed by the virtual proposer. If the responder (participant) was willing to accept the allocation of money proposed by virtual proposer, the money will be split according to the proposal. However, if the responder was willing to reject the proposal, both responder and proposer received nothing. In order to increase the ecological validity of the experiment, participants were instructed to read the depicted information, which included the background information of the virtual proposer, the relationship between the virtual proposer and the participant, and the scene of the allocation of money.

Examples of the depicted information are shown as follows:

Suppose that you have a colleague named Xiao Zhang, you two have received an additional subsidy because of your excellent work. It is known that Xiao Zhang and you contributed equally in this work, and this subsidy will be allocated by Xiao Zhang. You can choose to accept the allocation of money to get the amount offered by Xiao Zhang or you can reject the proposal, but neither of you can get the money.

After reading the depicted information, the short sentence of moral behavior of the proposer was presented (eg, He cheated on his partner for many times), followed by the allocation of money. The testing procedure consisted of 150 testing trials: 25 positive moral and 25 negative moral depictions, which were paired with three allocations of money (fair, moderately unfair, and extremely unfair) and presented randomly. Participants were instructed to make the decision to acceptance or rejection the proposal.

After the testing trial, participants need to answer several questions to ensure they can have full comprehension of the instruction and the proposals for allocation of money. The descriptions of the question are shown as follows: (a) Which of the following proposals is the allocation of money proposed by Xiao Zhang? (b) What is the relationship between Xiao Zhang and you? (c) If you reject the proposal, how much will Xiao Zhang and you get, respectively?

Results and Discussion

We performed an analysis of variance (ANOVAs) using spss 26.0 for the acceptance rate of allocation of money in Experiment 1, see Table 1. For the results of acceptance rate, there was no significant main effect of the gender of virtual proposer, $F(1, 58) = 0.60$, $p = 0.442$, $\eta^2 = 0.01$. However, we found a significant main effect of the moral behavior of proposers, $F(1, 58) = 34.84$, $p < 0.001$, $\eta^2 = 0.38$, as well as a main effect of the fairness of the allocation of money, where the acceptance rate of fair allocation was the highest (0.90 ± 0.02), followed by moderately unfair allocation (0.37 ± 0.03), and extremely unfair allocation was the lowest (0.11 ± 0.03), $F(2, 57) = 254.46$, $p < 0.001$, $\eta^2 = 0.81$.

We found a significant interaction between the moral behavior and the fairness of the allocation of money, $F(2, 57) = 11.73$, $p < 0.001$, $\eta^2 = 0.17$, which revealed that the acceptance rate was significantly higher for positive moral proposer

Table 1 ANOVA for the Acceptance Rate of Allocation of Money in Experiment 1 (N = 60)

Factors	F	p	η^2
Gender	0.60	0.442	0.01
Moral behavior	34.84	<0.001	0.38
Fairness of allocation	254.46	<0.001	0.81
Gender × Moral behavior	0.09	0.772	<0.01
Gender× Fairness of allocation	0.16	0.800	<0.01
Moral behavior × Fairness of allocation	11.73	<0.001	0.17
Gender × Moral behavior × Fairness of allocation	2.36	0.113	0.04

(1.00 ± 0.00) than that for negative moral proposer (0.80 ± 0.04) in the fair proposal, F (1, 58) = 21.46, $p < 0.001$, $\eta^2 = 0.27$. We also found this similar effect in the moderately unfair proposal (0.51 ± 0.04 vs.0.23 ± 0.03, for positive and negative moral proposer, respectively), F (1, 58) = 60.42, $p < 0.001$, $\eta^2 = 0.51$, and in the extremely unfair proposal (0.19 ± 0.04 vs 0.03 ± 0.01, for positive and negative moral proposer, respectively), F (1, 58) = 17.61, $p < 0.001$, $\eta^2 = 0.23$. The mean acceptance rate of the allocation of money in positive and negative moral proposers is shown in Figure 1.

However, neither the interaction between the fairness of the allocation of money and the gender of virtual proposer, F (2, 57) = 0.16, $p = 0.800$, $\eta^2 < 0.01$, nor the interaction between the moral behavior and the gender of virtual proposer was significant, F (1, 58) = 0.09, $p = 0.772$, $\eta^2 < 0.01$. Meanwhile, we also found no significant three-way interaction between the moral behavior, the fairness of the allocation of money and the gender of virtual proposer, F (2, 57) = 2.36, $p = 0.113$, $\eta^2 = 0.04$.

In line with the hypothesis, the results of Experiment 1 showed an interaction between moral behavior and the fairness of the allocation of money, suggesting that positive morality had an effect on inhibiting the perception of unfairness and increasing the probability of cooperation. In Experiment 2, we tried to investigate whether group identity has an influence on the effect of morality on fairness perception by inducing participants' positive or negative moral
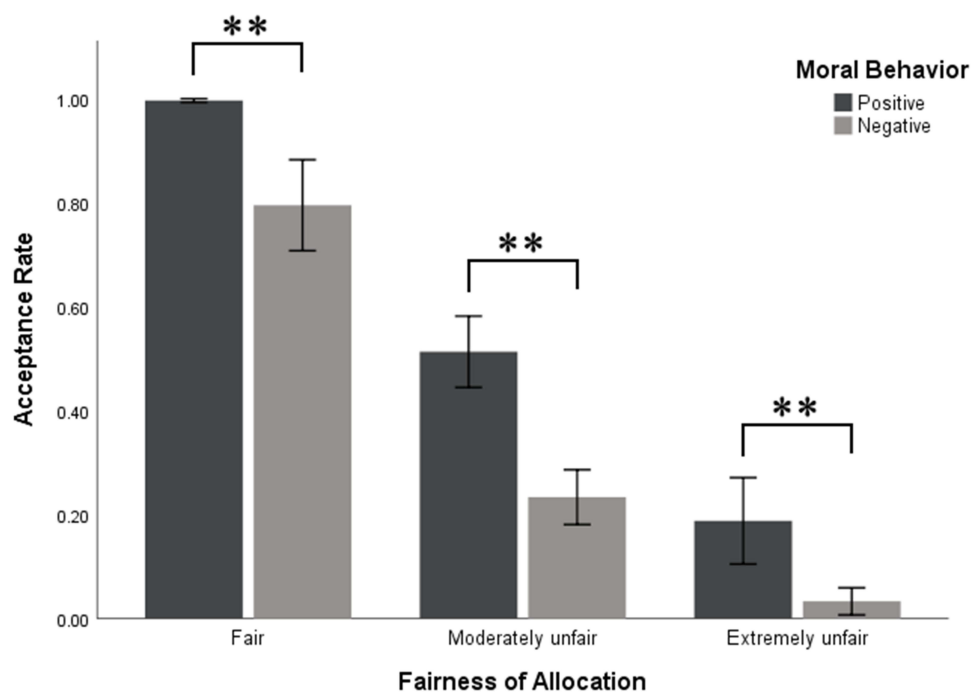

Figure 1 The mean acceptance rate from ANOVAs used to test the differences in fairness of allocation of money for the moral behavior of virtual proposer in Experiment 1. The acceptance rate of proposals from positive moral proposer was higher than those from negative moral proposer in fair moderately unfair and extremely unfair allocation of money. Error bars represent 95% confidence intervals.
Note: Data are the mean ± SD (n = 60). **$p < 0.001$.

experiences. We did not find the effect of gender on decision-making in Experiment 1, so in this experiment, we did not take gender into account.

Experiment 2
Method
Participants
Using G-power 3.1.9, when the medium effect size is 0.25 and the power value is 0.8, the minimum sample size was calculated for 20 people. A different group of 60 healthy students (30 females) from South China Normal University who were right-handed, had normal or corrected-to-normal vision, and aged between 20 and 25 years (M_{age} = 22.92 ± 1.90) were recruited locally and paid for their participation.

Design
The ultimatum paradigm was identical to that of Experiment 1. Experiment 2 involved a 2 (moral behavior: positive morality vs negative morality; within-subjects) × 3 (fairness of the allocation of money: moderately unfair 7:3, extremely unfair 9:1, fair 5:5, the number after the colon is the amount obtained by the participants; within-subjects) × 2 (moral priming: positive vs negative; between-subjects) mixed factorial design. The dependent variable was the acceptance rate. Participants were randomly divided into two groups: the positive moral priming group and the negative moral priming group.

Materials
Short Sentences of Moral Behaviors
A total of 40 short sentences of moral behaviors were selected from Experiment 1, in which 20 of the sentences described positive moral behaviors (7.73 ± 0.50) and 20 of the sentences described negative moral behaviors (2.15 ± 0.46). A paired-sample *t*-test using SPSS 26.0 with the sense of morality on a 9-point scale showed a significant difference between morally positive sentences (7.73 ± 0.50) and morally negative sentences (2.15 ± 0.46), t (1, 19) = 132.55, $p < 0.001$.

Moral Priming
Based on the previous study, we compiled 10 scenarios which describe situations that are common in everyday life. There are both positive moral and negative moral behaviors in each scenario, for example, in the "mistakenly receiving an email from a colleague", the positive moral behavior is "A's mailbox mistakenly receives important material that should have been sent to Colleague B, which is important for B's promotion but will hinder A's future. But A still forwarded the email to B"; the negative moral behavior is "A deletes the mistakenly received mail".

A different group of 19 students (M_{age} = 22.74 ± 1.28) were instructed to read and rate these scenarios on a 9-point scale in terms of "the moral value of behavior" (1 for *morally very positive* and 9 for *morally very negative*) and "the rationality of situation and behavior" (1 for *very rational* and 9 for *very irrational*). In particular, the stimulus was presented on E-prime 2.0. The 10 scenarios with corresponding moral behavior or immoral behavior will be presented in the screen randomly. At the same time, introductions will appear below the sentence to ask participants to react. Participants need to make judgment about the figures of these scenarios, first rating "the moral value of behavior" and then rating "the rationality of situation and behavior". Five scenarios were selected (in other, mistakenly receiving emails from colleagues, picking up a stranger's wallet, hearing a friend's secret, selling a bad cake, examination), forming 10 positive moral scenarios and 10 negative moral scenarios. The results of the paired-sample *t*-test using SPSS 26.0 showed that there was a significant difference between the morally positive (7.43 ± 2.42) and negative behaviors (2.13 ± 2.04) for each scenario, t (94) = 13.87, $p < 0.001$.

Procedure
The procedures for Experiment 2 were similar to those of Experiment 1. However, at the beginning of this experiment, the participants were randomly divided into the positive moral priming group (30 participants, 21 females) and the negative moral priming group (30 participants, 21 females). Participants were instructed to read and immerse themselves in the scenarios at their self-paced. Then, they were told to press the button to enter the next screen, where the behavior

corresponding to this scenario will be present. After reading the corresponding behavior, the participant needs to press the "F" key to indicate they can imagine they were really acting the same behavior (eg, in the "Pick up a Stranger's Wallet" scenario, the negative moral priming group needs to press "F" to leave the cash behind and throw the wallet in the trash; the positive moral priming group needs to press "F" to return the wallet to the owner and did not take anything, see Figure 2). Formal experimental trials were not allowed to enter until participants had responded to five moral scenarios. The five moral scenarios were presented once in random order.

In Experiment 2, both equitable and inequitable allocations appeared 40 times (the 7:3 allocation and the 9:1 allocation appeared 20 times, respectively). In order to balance the genders, positive moral behavior and negative moral behavior for men and women appeared 10 times in the fair allocation of money, respectively, and 5 times for moderately unfair and extremely unfair allocation of money.

The process for a formal trial in Experiment 2 is illustrated in Figure 3. The testing procedure consisted of 80 presentation trials. At the beginning of each testing trial, a black fixation point was presented (500ms), followed by the presentation of information about the proposer (2000ms), and then a blank black screen was displayed (200ms). After the black screen offset, the allocation of money put forward by the virtual proposer was presented on the screen, and the participants needed to press one of the two buttons to decide to accept or refuse this allocation (the "F" key indicates rejection and the "J" key indicates acceptance). Following the decision of the participants, the feedback on the amount of money they get was presented on the screen (1000ms). The interval between the two trials was 700ms. Before the experiment began, the participants practiced eight trials to familiarize themselves with the process.

Results and Discussion

Statistical analyses were conducted in SPSS 26.0. A three-way repeated-measures ANOVA revealed that the main effect of moral behavior was significant, $F(1, 58) = 14.54$, $p < 0.001$, $\eta^2 = 0.72$. We also found that the main effect of the fairness of the allocation of money was significant, where the acceptance rate of fair allocation was the highest (0.87 ± 0.03), followed by moderately unfair allocation (0.66 ± 0.03), and the extremely unfair allocation was the lowest (0.30 ± 0.03), $F(2, 57) = 105.43$, $p < 0.001$, $\eta^2 = 0.65$. However, there was no significant main effect of moral priming, $F(1, 58) = 0.25$, $p = 0.620$, $\eta^2 < 0.01$.

The results revealed a significant interaction between moral behavior and the fairness of the allocation of money, $F(2, 57) = 23.32$, $p < 0.001$, $\eta^2 = 0.29$. Specifically, in fair (positive: 0.97 ± 0.02, negative: 0.75 ± 0.04), moderately unfair (positive: 0.94 ± 0.02, negative: 0.38 ± 0.05) and extremely unfair (positive: 0.50 ± 0.05, negative: 0.08 ± 0.03) allocation of money, the acceptance rates of proposer with the positive moral behavior were higher than those of

You have been going through the stressful days at hand for quite some time. Someday, you picked up a stranger's wallet, which contains hundreds of dollars in cash, as well as the owner's driver's license, ID card and other documents.

Pressing the "F" key and you leave the cash behind and throw the wallet in the trash.

Figure 2 Example of single negative moral priming in Experiment 2. The negative behavior presented the screen, participants were asked to read and immerse themselves in the scenarios and then press the "F" key to commit negative moral behavior.
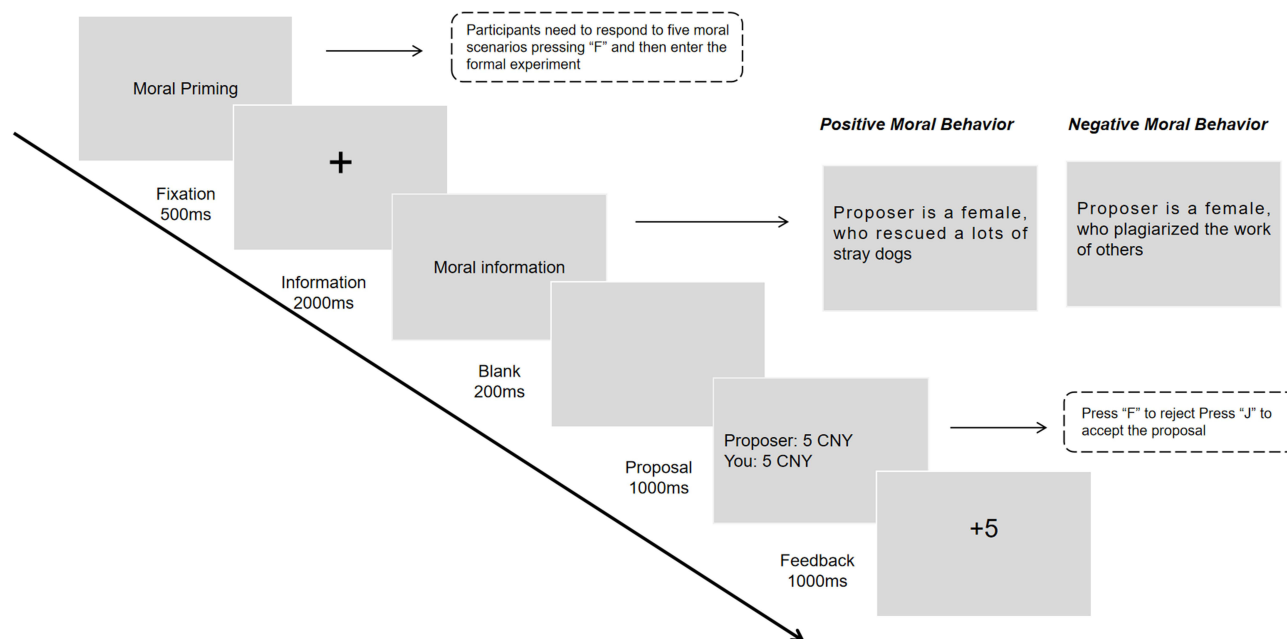
Figure 3 The experimental procedure of Experiment 2 is displayed on the left. Examples of moral information regarding proposer are displayed on the right. In this example, the proposer put the fair allocation of money.

proposer with the negative moral behavior (fair:, $F (1, 58) = 32.45$, $p < 0.001$, $\eta^2 = 0.36$; moderately unfair:, $F (1, 58) = 149.02$, $p < 0.001$, $\eta^2 = 0.72$; extremely unfair: $F (1, 58) = 85.26$, $p < 0.001$, $\eta^2 = 0.60$; see Figure 4).

However, neither the interaction between moral priming and moral behavior, $F (1,58) = 0.04$, $p = 0.835$, $\eta^2 < 0.01$, nor the interaction between moral priming and the fairness of allocation of money was significant, $F (2, 57) = 0.03$, $p = 0.952$, $\eta^2 < 0.01$. Meanwhile, we also found no significant three-way interaction between moral priming, moral behavior, and the fairness of the allocation of money, $F (2, 57) = 0.42$, $p = 0.646$, $\eta^2 < 0.01$.

In Experiment 2, the results were similar to Experiment 1, which found that participants always gave a higher acceptance rate to positive moral proposer rather than negative moral one in either positive moral priming group or negative moral priming group. In other words, there was no difference between positive and negative moral priming groups, that is, group identity had no influence on decision-making. The ineffectiveness of group identity due to the short sentences used in the present study contained moral judgment. In order to further explicitly explore the effect of group identity and to extent rule out the influence of moral factors, we combined Experiment 1 and Experiment 2 to analyze.

Experiment 1 and Experiment 2 Combined Analysis

Given the nearly identical experimental design and procedures were used in Experiments 1 and 2, we tried to combine the two datasets, creating three types of moral priming (positive moral priming, negative moral priming, and no priming) as an additional, between-subjects factor in the analysis, in order to further explicitly investigate the effect of group identity on the decision-making.

Similar to the results of Experiment 2, 2 (moral behavior: positive moral vs negative moral) × 3 (fairness of the allocation of money: moderately unfair 7:3, extremely unfair 9:1, fair 5:5, the number after the colon is the amount obtained by the participants) × 3 (moral priming: positive, negative, no priming) three-way repeated-measures ANOVA revealed that the main effect of moral behavior was significant, $F (1, 117) = 174.32$, $p < 0.001$, $\eta^2 = 0.60$, the main effect of the fairness of the allocation of money, where the acceptance rate of fair allocation was the highest $(0.87 ± 0.02)$, followed by moderately unfair allocation $(0.56 ± 0.02)$, and extremely unfair allocation was the lowest $(0.23 ± 0.02)$, $F (2, 116) = 263.44$, $p < 0.001$, $\eta^2 = 0.69$, and the main effect of the moral priming was also significant, $F (2, 116) = 23.94$, $p < 0.001$, $\eta^2 = 0.29$, which manifested that the priming of group identity was effective.
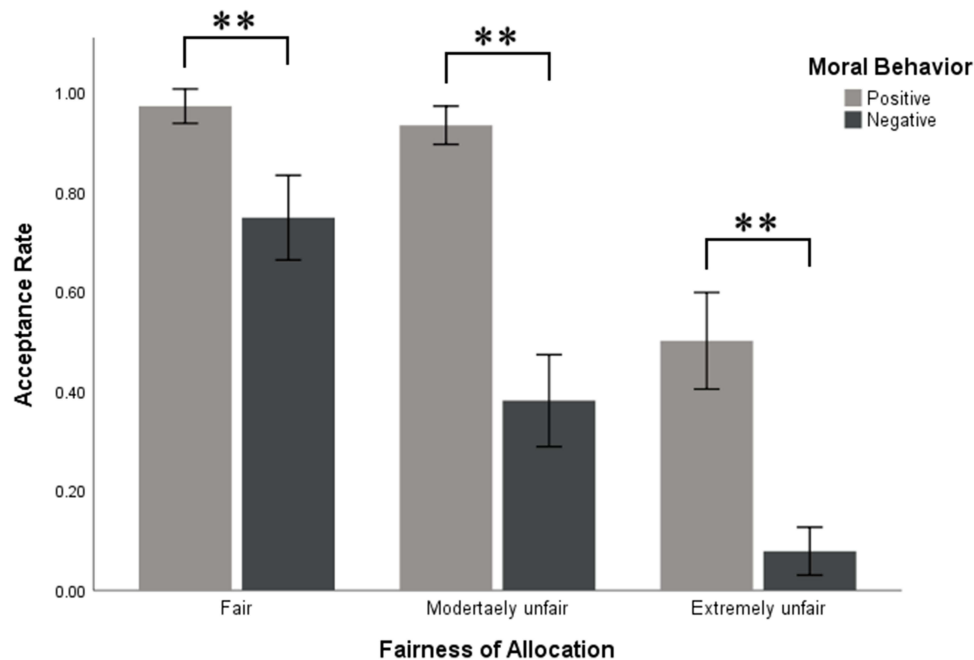
Figure 4 The mean acceptance rate from ANOVAs used to test the differences in fairness of allocation of money for the moral behavior of virtual proposer in Experiment 2. The acceptance rate of proposals from positive moral proposer was higher than those from negative moral proposer in fair moderately unfair and extremely unfair allocation of money. Error bars represent 95% confidence intervals.
Note: Data are the mean ± SD (n = 60). **p < 0.001.

We found a significant interaction between moral behavior and the fairness of the allocation of money as Experiment 1 and Experiment 2, $F (2, 116) = 36.08, p < 0.001, \eta^2 = 0.24$, which revealed that the acceptance rate was significantly higher for positive moral proposer (0.98 ± 0.01) than that for negative moral proposer (0.76 ± 0.03) in the fair allocation, $F (1, 117) = 49.09, p < 0.001, \eta^2 = 0.30$), moderately unfair allocation $(0.79 \pm 0.02$ vs 0.33 ± 0.03, for positive and negative moral proposer, respectively), $F (1, 117) = 232.53, p < 0.001, \eta^2 = 0.67$, and in the extremely unfair allocation $(0.40 \pm 0.03$ vs 0.06 ± 0.06, for positive and negative moral proposer, respectively), $F (1, 117) = 116.67, p < 0.001, \eta^2 = 0.50$.

Additionally, we found a significant interaction between the moral priming and moral behavior, $F (2, 117) = 7.66, p = 0.001, \eta^2 = 0.17$. For positive moral proposers, the acceptance rates of them in the positive (0.82 ± 0.03) and negative moral priming groups (0.79 ± 0.03) were significantly higher than those in the no priming group $(0.57 \pm 0.02), F (2, 117) = 30.80, p < 0.001, \eta^2 = 0.35$. For negative moral proposers, the difference of acceptance rate in the positive moral priming group (0.40 ± 0.03), negative moral priming group (0.41 ± 0.03) and no priming group (0.35 ± 0.02) was not significant, $F (2, 117) = 1.03, p = 0.360, \eta^2 = 0.02$.

We also found a significant interaction between moral priming and the fairness of the allocation of money, $F (4, 234) = 9.24, p < 0.001, \eta^2 = 0.14$. For fair allocation condition, there was no significant difference in the acceptance rates among the positive moral priming group (0.87 ± 0.03), the negative moral priming group (0.85 ± 0.03) and the no priming group (0.90 ± 0.02), $F (2, 117) = 0.57, p = 0.569, \eta^2 = 0.01$; For moderately unfair allocation condition, the acceptance rates in the positive (0.66 ± 0.04) and negative moral priming groups (0.65 ± 0.04) were significantly higher than those in the no priming group $(0.37 \pm 0.03), F (2, 117) = 29.44, p < 0.001, \eta^2 = 0.34$. Similarly, for extremely unfair allocation condition, the acceptance rates in the positive (0.30 ± 0.04) and negative moral priming group (0.28 ± 0.04) were significantly higher than those in the no priming group (0.11 ± 0.03), $F (2, 117) = 10.32, p < 0.001, \eta^2 = 0.15$.

More importantly, we found a significant three-way interaction between the moral priming, the depicted moral behavior and the fairness of the allocation of money, $F (4, 234) = 7.06, p < 0.001, \eta^2 = 0.11$. Under the moderately unfair allocation and extremely unfair allocation conditions, when the moral behavior of proposer was positive, the acceptance rates in the positive (moderately unfair: 0.94 ± 0.04, extremely unfair: 0.51 ± 0.07) and negative moral priming groups (moderately unfair: 0.93 ± 0.04, extremely unfair: 0.49 ± 0.07) were significantly higher than those in the no priming group (moderately unfair: 0.51 ± 0.03, $F (2, 117) = 57.12, p < 0.001, \eta^2 = 0.50$; extremely unfair: 0.19 ± 0.05, $F (2, 117) = 11.98, p < 0.001, \eta^2 = 0.17$). However,

there was no significant difference among the positive moral priming (1.00 ± 0.17), negative moral priming (0.95 ± 0.17) and no priming groups (1.00 ± 0.01) in the fair allocation, $F (2, 117) = 3.00$, $p = 0.054$, $\eta^2 = 0.05$.

For the proposer with negative moral behavior, when the allocation of money was fair and extremely unfair, the acceptance rate in the positive (fair: 0.74 ± 0.06, extremely unfair: 0.10 ± 0.03), the negative moral priming groups (fair: 0.77 ± 0.06, extremely unfair: 0.06 ± 0.03) and the no priming group (fair: 0.80 ± 0.04, extremely unfair: 0.03 ± 0.02) was no significant difference, $Fs (2, 117) < 0.5$, $ps > 0.050$, $\eta^2 s < 0.05$. Meanwhile, when the allocation of money was moderately unfair, the acceptance rate in the positive moral priming group (0.38 ± 0.05) was marginal significant higher than the no priming group (0.23 ± 0.04), but there was no significant difference between the negative moral priming group (0.37 ± 0.05) and the positive moral priming group, as well as the no priming group, $F (2, 117) = 3.55$, $p = 0.032$, $\eta^2 = 0.06$, see Figure 5.

For positive moral priming group, the acceptance rate of positive moral proposer was significantly higher than that of negative moral proposer in the fair allocation, $F (1, 117) = 19.16$, $p < 0.001$, $\eta^2 = 0.14$, the moderately unfair allocations, $F (1, 117) = 91.99$, $p < 0.001$, $\eta^2 = 0.44$. And the extremely unfair allocation, $F (1, 117) = 50.03$, $p < 0.001$, $\eta^2 = 0.30$.

For negative moral priming group, the acceptance rate of positive moral proposer was significantly higher than that of negative moral proposer in the fair allocation, $F (1, 117) = 10.68$, $p = 0.001$, $\eta^2 = 0.08$, the moderately unfair allocation, $F (1, 117) = 94.21$, $p < 0.001$, $\eta^2 = 0.45$, and the extremely unfair allocation, $F (1, 117) = 10.16$, $p = 0.002$, $\eta^2 = 0.08$.
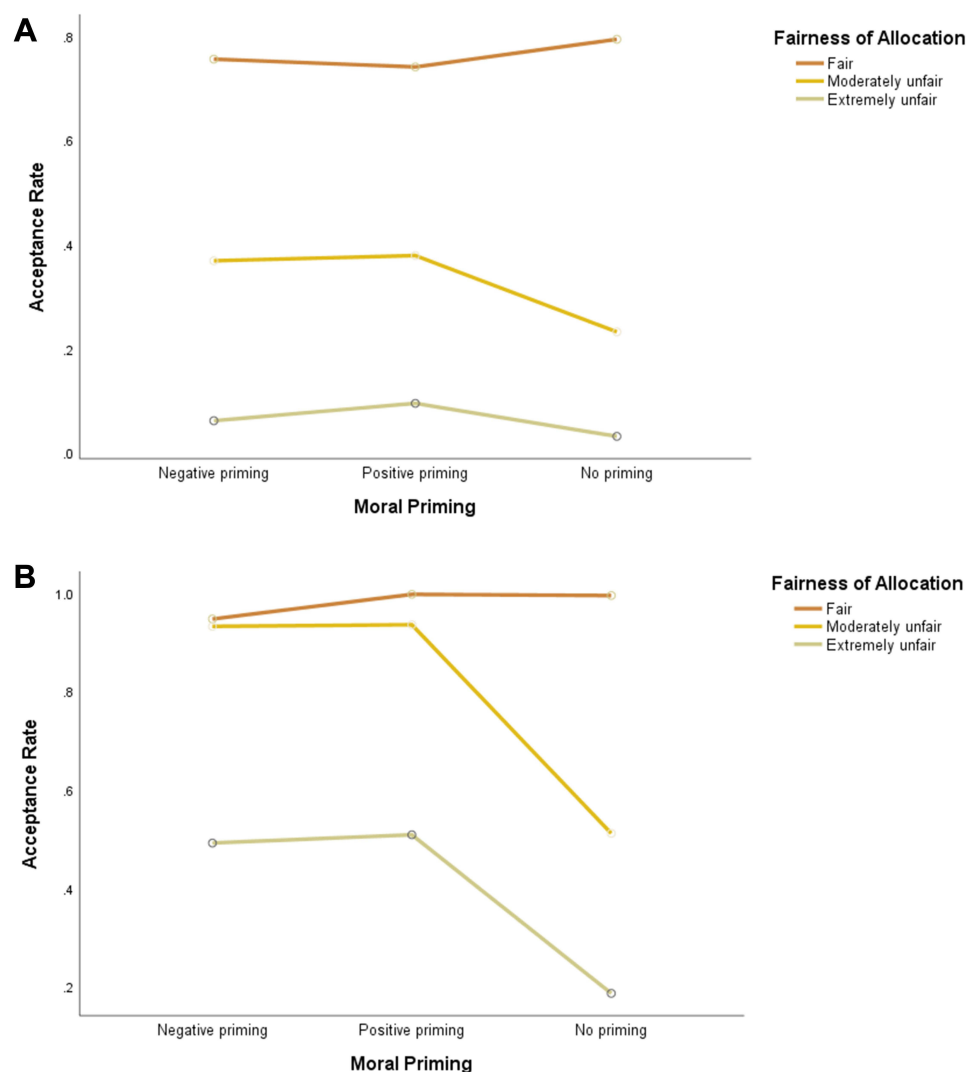

Figure 5 The three-way interaction between the moral priming, the fairness of the allocation of money and the moral behavior. (**A**) The condition of the moral behavior in this diagram was negative. (**B**) The condition of the moral behavior in this diagram was positive.
Note: Data are the mean ± SD (n = 120). **$p < 0.001$.

Table 2 The Mean Acceptance Rate in Experiment 1 and Experiment 2 Joint Analysis (N = 120)

Moral Priming	Allocation of Money	Moral Behavior		F	p	η^2
		Positive	Negative			
No priming	Fair	1.00 ± 0.01	0.80 ± 0.04	23.57	<0.001	0.17
	Moderately unfair	0.51 ± 0.03	0.23 ± 0.04	46.33	<0.001	0.28
	Extremely unfair	0.20 ± 0.05	0.03 ± 0.02	14.01	<0.001	0.11
Positive priming	Fair	1.00 ± 0.02	0.74 ± 0.06	19.16	<0.001	0.14
	Moderately unfair	0.94 ± 0.04	0.38 ± 0.05	91.99	<0.001	0.44
	Extremely unfair	0.51 ± 0.06	0.10 ± 0.03	50.03	<0.001	0.30
Negative priming	Fair	0.95 ± 0.02	0.76 ± 0.06	10.68	<0.001	0.08
	Moderately unfair	0.93 ± 0.04	0.37 ± 0.05	94.21	<0.001	0.45
	Extremely unfair	0.49 ± 0.06	0.06 ± 0.03	54.15	<0.001	0.32

For no priming group, the acceptance rate of positive moral proposer was significantly higher than that of negative moral proposer in the fair allocation, $F (1, 117) = 23.57$, $p < 0.001$, $\eta^2 = 0.17$, and the moderately unfair allocation, $F (1, 117) = 46.33$, $p < 0.001$, $\eta^2 = 0.28$. However, there was no significant difference of the acceptance rate in the extremely allocation, $F (1, 117) = 2.63$, $p = 0.108$, $\eta^2 = 0.02$, see Table 2.

General Discussion

People are generally affected by various factors when they make social decisions. In this study, two experiments are employed to explore which factors influence us the most in economic decision-making among fairness, morality and group identity. In Experiment 1, we found that no matter how fair the allocation of money was, people's acceptance rate of the proposals of the individual with positive morality was higher than that of people with negative morality, indicating that the fairness of allocations will be affected by the morality of proposers. People are more inclined to rely on morality in economic decision-making. Previous studies have also found that moral judgment can affect people's perception of fairness and their decision-making. Zhan explored the impact of moral judgment and the fairness of proposals on responders' decision-making, reporting that responders were more willing to accept the unfair proposals put forward by people with positive morality than those by people with negative morality. Besides, responders rejected unfair proposal of negative moral people more than positive moral people.[51] However, there was no difference in participants' acceptance rates between male and female proposers. That is to say, when faced with unfair behaviors that undermine our benefits, we will treat male and female equally. The reason may be that the emotion aroused by the characteristics of female making us treat their more mercy was offset by the disgust of the unfair behaviors.

In Experiment 2, we added moral priming to examine whether group identity will have an impact on the effects of morality on the perception of fairness in people's preference in decision-making. The results show that responders always displayed a higher acceptance rate of proposals of people with positive morality either when they were faced with in-group or out-group. Although previous research has revealed that group values will influence our social decision-making,[37,38] the results of Experiment 2 show that group values do not seem to affect the effect of morality on the perception of fairness, which means that morality has a great influence in economic decision-making. This is consistent with previous research. Zhan, for instance, found that unfair behaviors that violate fairness norm can be quickly detected, and this early evaluation process was modulated by social factors such as moral judgment.[51] In other words, people will rely more on moral judgment to make decisions not affected by the perception of fairness or group identity.

From Experiment 1 and Experiment 2, we can draw a conclusion that people are more likely to reject fair allocation from people with negative morality than those from people with positive morality. Otherwise, they tend to accept moderately and extremely unfair allocation from positive moral individuals more than negative moral ones, which is in line with the social intuition model. The social intuition model indicated that individuals are driven by emotions when making moral judgment,[52] and moral emotion is even more important than other types of emotions.[53] Immoral behaviors will induce negative moral emotions, such as disgust,[54] and moral behaviors will generate positive moral emotions, such

as gratitude.[55] Negative emotions elicited by immoral behaviors can decrease an individual's acceptance rate of unfair allocation of money.[56,57] Morett also pointed out that the emotion of disgust caused by immoral behavior will increase the rejection rate of unfair allocation of money in UG.[58] On the contrary, individuals hold a trust bias towards positive moral people, which can promote mutual social cooperation.[25] What is more, moral behavior can inspire positive emotions like gratitude. At this point, people will choose economic cooperation even at the expense of sacrificing greater personal economic interests.[55] This behavior actually reflects the mutual compensation between moral reward and economic reward. Studies have shown that people are willing to sacrifice economic interests for moral value in the trade-off between morality and fairness of the economic decisions.[24,59] People sacrifice their own interests in order to increase the well-being of others as they accept unfair proposals from positive moral people.[60] However, people tend to sacrifice their own interests to punish evildoers as they reject the fair behavior of people with negative morality.[61] Therefore, the moral reward induced by the unfair behavior of positive moral person compensates for the cost of unfair allocation of money, while the economic loss caused by rejecting the fair plan of negative moral person can be compensated by the moral reward gained from punishing negative moral person.

We also found that there was no significant difference in the acceptance rates of the allocations of positive moral proposers and negative moral proposers between positive and negative moral priming groups. This may be due to the assimilation effect that occurs when people are faced with a positive moral person and a sense of moral identity to the positive group. This sense of identity will make people temporarily stand in the same moral position as the target group, so they will actively avoid fighting with them and support the group in the subsequent situation.[62] Therefore, the effect of moral priming is perhaps concealed by the assimilation effect, and both positive priming and negative priming participants are willing to sacrifice economic interests for moral value, that is, participants will show a higher acceptance rate of unfair proposal from positive moral proposers. While in the face of a group or individual with negative morality, the historical experience and cognition of negative moral identity will make people feel disgust and make it difficult to generate moral identity, and thus urges people to reject non-zero allocation which violates the traditional rational Economic Man hypothesis. Meanwhile, the unfair economic proposal also accelerates this process,[63] and thus show a low acceptance rate of the fair proposal of negative moral proposers. In short, the effect of the assimilation to positive individuals and the difficulty in generating moral identity for negative individuals may simultaneously override the effect of group identity, which makes no difference between positive and negative moral priming groups.

In order to further explore the influence of the effect of group identity on social decision-making, we conducted a joint analysis of Experiment 1 and Experiment 2. Our results, to some extent, support the In-group Preference. Specifically, for the positive moral priming group, the acceptance rates of the proposers with positive morality were significantly higher than the no priming group in moderately unfair allocation and extremely unfair allocation, which reveals that the acceptance rates of the unfair in-group proposals were significantly higher than those of the out-group; for negative moral priming group, there was no significant difference in the acceptance rates of the proposers with negative morality between their and the no priming group in moderately unfair allocation and extremely unfair allocation. The acceptance rates of the negative moral priming group for negative moral proposers did not significantly lower than the no priming group, that is, the punishment for the in-group member was not strengthened, which is inconsistent with the BSE; however, it can negatively support the In-group Preference which can be explained by the view of Mere Preference Theory. The reason why there is no significant difference in the acceptance rates of negative moral proposers between the negative moral priming group and the no priming group may also be the difficulty in generating moral identity for negative individuals. People are generally more resistant to immoral behavior, resulting in the psychological defense mechanism offsetting the effect of negative moral priming.

Although the results seem to support the Mere Preference Theory to some extent, we must emphasize that our results only partially support In-group Preference. The In-group Preference Effect includes two effects, being more kind, tolerant and altruistic towards the in-group,[42] but more suspicious, indifferent and even hostile to the out-group.[43] That is, besides the positive and negative moral priming group should show a higher acceptance rate for the in-group than the out-group, they should show a lower acceptance rate for the out-group than the in-group. However, our results showed that the acceptance rates of the positive moral priming group for negative moral proposer and the acceptance rates of the negative moral priming group for positive moral proposer were higher than the no priming group in moderately and extremely

unfair allocations. We hold that this is due to the fact that the moral sensitivity of participants in Experiment 2 was increased via moral priming. In other words, the sensitivity caused by moral priming may have a crucial impact on an individual's decision-makings and even influence the effect of group identity. Although this finding to some extent demonstrates the great influence of morality in decision-making, it even further impacts the accuracy of the experimental manipulation, affecting the group identity of participants. In the present study, we focused on how to prime the group identity within a moral context. In this way, morality cannot be excluded from group identity. Therefore, the impact of morality on group identity can be justified in future research.

In the present study, we utilized the two players of the UG, manipulating the moral quality of the proposer to explore the issue of whether morality has an impact on fairness perception and manipulating the moral quality of the proposer and responder simultaneously forming group identity to explore whether group identity has an impact on the effect of morality on fairness in decision-making. However, we did not find a comprehensive theory to include all the constructs of our study. In addition, we only used the social intuition model to explain the impact of morality and the Mere Preference Theory to explain the impact of group identity, but we cannot find a general theory explaining the impact of morality and group identity simultaneously. A reasonable explanation covering fairness, morality and group identity can be developed in future studies.

Our research has drawn a preliminary conclusion that morality has an impact on people's perception of fairness and group identity. However, the mechanism behind these issues is not yet clear. Therefore, future research can employ precise techniques like Event-related Potential or Functional Magnetic Resonance Imaging technology to solve this problem. Furthermore, the present study only investigated the effect of morality on the inferior unfair condition (in other words, the participants had less money allocated); however, it did not consider the effect on the superior unfair condition (in other words, the participants had more money allocated). Therefore, moral situations with higher ecological validity can be applied to further explore the impact of moral judgment on superior unfair decision-making and individual differences.

Conclusion

In the present study, economic and moral contexts were combined in the ultimatum paradigm to explore which factors have the most influence among fairness, morality, and group identity in social decision-making. The results revealed that people are inclined to be affected by moral judgment to making decisions. Moreover, the effect of group identity was working though it partially supported the In-group Preference. The group identity does not fully work because the priming shared experiences including moral information, which in turn influences the efficacy of group identity. To sum up, we can draw a conclusion that when making an economic decision, morality has the supreme influence on individuals.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Disclosure

The authors declare that they have no competing interests.

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