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Emotion Expression and Fairness in Economic Exchange

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Abstract: Research in economics and psychology has established that informal sanctions, particularly expressions of negative emotion, can enforce fair economic exchange. However, scholars are only beginning to understand the reasons informal sanctions affect economic outcomes. Here we provide direct empirical evidence that a preference to avoid negative emotion expression plays an important role in promoting fair exchange. We study one-shot Dictator games, where one subject has the right to determine a division of an amount of money between herself and her receiver. In relation to the standard game, there are significantly less profit-maximizing offers when receivers can react to offers with *ex post* written messages. Our data provide new perspectives on roles communication systems play in promoting economic efficiency in social environments, and support economic theories of decision that incorporate psychological factors such as guilt and self-deception.

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I. Introduction

Economic theorists increasingly emphasize the role of fairness in directing decisions (see, e.g., Bolton and Ockenfels, 2000; Fehr and Schmidt, 2002; Fehr, Gächter and Kirchsteiger, 1997) and the corresponding importance of monetary sanctions in promoting pro-social behaviors (see, e.g., Ostrom et. al., 1992; Yamagishi, 1986, 1988; Fehr and Gächter, 2000; Andreoni, et.al., 2003; Dickinson, 2001). Recently, an experimental literature has documented the importance of informal nonmonetary sanctions, particularly expressions of negative emotions or disapproval, in enforcing norms and promoting cooperation and fairness (see, e.g., Gächter and Fehr, 1999; Rege and Telle, 2004; Masclet et. al., 2003; Noussair and Tucker, 2005). However, the reasons negative emotion expressions affect economic outcomes are only beginning to be understood. One possibility is that disapproval effects are partially anticipatory. This is important, because *ex post* opportunities for emotion expression can be provided to varying degrees within institutional frameworks. If people try to avoid disapproval, then mechanisms can be designed to discourage norm violations even within contexts that include relatively anonymous trade with strangers (e.g., some types of internet exchange.) This paper provides rigorous empirical evidence that disapproval avoidance in fact promotes fair economic exchange.

Previous empirical results informing disapproval avoidance effects on economic exchange are indirect. One reason, as pointed out by Gächter and Fehr (1999), is that systematic evidence on this topic is difficult to gather from field studies due to significant measurement problems. This motivates laboratory methods, but many laboratory studies on this topic have used repeated public goods games. The result, as noted by Masclet et. al. (2003) in their interesting study of informal sanctions, is that disapproval effects are due to unknown combinations of factors including communication, reactions to disapproval, and attempts to avoid disapproval.

Communication and reaction effects on economic behavior, both of which require repeated interaction to effectively encourage norm obedience, have been well-demonstrated in previous laboratory work (see, e.g., Miller et. al., 2002 for the former,

and Masclet et. al., 2003 or Noussair and Masclet, 2005 for the latter). This literature, however, cannot inform the role of disapproval avoidance in social norm enforcement[1].

A key source of disapproval avoidance effects is as follows. An individual who wants to selfishly maximize earnings might also expect to feel guilt or shame from doing so[2]. Cognitive dissonance theory (see, e.g., Festinger, 1957; Tesser and Achee 1994; Aronson, 1995; Akerlof and Dickens, 1982; Rabin, 1994; and Konow, 2000), posits that people experience an unpleasant "tension" stemming from these opposite motivations (a desire to maximize earnings vs. a belief in fairness). One strategy to reduce this tension is to self-deceive by manipulating one's own beliefs in such a way that guilt is reduced and selfishness supported. For example, one could choose to believe that, if the situations were reversed, one's counterpart would make a selfish decision. However, if one's counterpart has an opportunity to express disapproval, and so reveal her true preferences, then it is no longer possible to manipulate one's own beliefs in this regard.

Cognitive dissonance theory leaves little room for individuals to avoid guilt or shame, and rescue a belief manipulation strategy, by committing *ex ante* not to observe a counterpart's *ex post* emotion expression.[3] The reason is that a decision not to observe a freely observable message would seem to imply a belief that one's counterpart is unsatisfied with the exchange, but such a belief is inconsistent with self-deception. Consequently, in order to avoid feelings of guilt or shame stemming from expressions of disapproval, individuals must act less selfishly.

Thus, our principal hypothesis is that *ex post* opportunities for emotion expression can promote fair economic outcomes, even in one-shot anonymous exchange.

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[1] One recent study, Rege and Telle (2004), offers indirect experimental evidence on disapproval avoidance. They compare decisions in a standard one-shot public goods game with anonymous contributions to an otherwise identical game where subjects' contribution decisions are made sequentially and in sight of all other participants. They find that contributions are higher in the latter condition, which is consistent with disapproval avoidance (or approval seeking.) However, because the contributions were sequential their data can also be explained by the standard economics of reciprocity and conditional cooperation (Kurzban and Houser, 2005), herding (Ferraro and Vossler, 2005) or perhaps because subjects come to an improved understanding of the game's incentives (Andreoni, 1995; Houser and Kurzban, 2002).

[2] Shame is a negative feeling stemming from external pressure, while the source of guilt is internal (see, e.g., Kandel and Lazear, 1992; Elster, 1996, 1998,1999; Batson 1991; and Shavell, 2002). Psychologists have long highlighted shame and guilt as intrinsic non-material costs associated with unfair behavior (see, e.g., Baumeister, et al., 1994) and these emotions have also been incorporated into a significant amount of recent economic theory (see, e.g., Charness and Dufwenberg, 2006; Dufwenberg, 2002; Jacob and Charles 2000; Kandel and Lazear, 1992; Bowles and Gintis, 2001 and Andreoni, 1990).

[3] To the extent this is possible it works against our main hypothesis, because we did not require dictators in our experiment to read any message that receivers sent.

We report data from novel one-shot dictator games that provide clean empirical evidence on this hypothesis. We compare decisions in a standard dictator game to decisions in otherwise identical games where, after dictators have completed their decisions, receivers have an opportunity (but not a requirement) to write a message to their respective dictators. The advantage of this design is that the *ex post* message from receivers cannot have any effect on material payoffs. Our design also rules out any effects connected to bilateral communication, leaving avoidance as the single salient source of behavioral differences.

We find that, in relation to standard dictator games, profit-maximizing offers are less frequent when receivers have the *ex post* opportunity to express emotions. An implication is that threats of (zero cost) emotion expression can promote fairness.

Our results complement Xiao and Houser (2005), which provides evidence that people facing unfair economic exchange often substitute emotion expression for relatively more costly material punishment. Notably, this is true even when the emotion expression cannot affect final allocations. Taken together, the data reported here and in Xiao and Houser (2005) suggest that providing opportunities in markets for *ex post* emotion expression can promote efficient exchange by both reducing costly punishment activity and reducing selfish economic decisions. In addition, our data are compelling evidence that these efficiency gains do not require repeated interactions (see also Ellingsen and Johannesson, 2007, for a closely related study that provides convergent evidence on this point).

Our paper is organized as follows. Section II describes the design of the experiment. Theory predictions are presented in Section III. We report results in Section IV, and Section V concludes.

II. Experiment

II.A. Ultimatum Game with Emotion Expression

The current paper reports data from Xiao and Houser (2005), and we begin this section with a brief review of that paper. Xiao and Houser (2005) study links between individuals' desires for emotion expression and costly punishment decisions. They hypothesize that responders in an ultimatum game are less likely to use costly

punishment (reject offers) when their feelings about unfair offers can be conveyed to their respective proposers in an alternative and less costly way. To test this they conducted two treatments with the ultimatum game—no emotion expression (NEE) and emotion expression (EE). NEE is the standard ultimatum game (see, Güth, et al, 1982) where the proposer and the responder are given $20 to split. The proposer decides how many cents out of each dollar to keep, and the responder decides whether to accept the offer (divide $20), or to reject the offer (divide $0). In this treatment, rejecting or accepting is the only way for a responder to display a reaction to her proposer.

The EE treatment is identical, except that after a responder observes her proposer's decision she is given an opportunity, not a requirement, to write a message to her proposer at no pecuniary cost. Any message is delivered to her proposer concurrently with her accept or reject decision. Note that messages cannot have strategic implications; rather they provide an opportunity for a responder to display voluntarily her feelings regarding her proposer's decision. The hypothesis is supported if responders in EE use written messages to express emotions, and also reject unfair offers less frequently than in the NEE treatment.

Xiao and Houser (2005) find support for their hypothesis. First, 87% of all responders wrote a message. The emotional content of these messages was evaluated in a new experiment with saliently rewarded participants who were blind to the research hypotheses. The results were that 79% (15 of 19) of responders who received allocations of 20% or less wrote a message expressing negative emotions. When responders were offered at least half of the total amount, 81% (29 out of 36) displayed positive emotions.

Furthermore, rejection rates of unfair offers (20% of the surplus or less) were significantly lower in the EE than NEE treatment (32% vs. 60% , respectively, p=0.04).[4] Most of the data are in cases where the responder is offered 20% ($4). This occurs 14 times in NEE, with seven responders (50%) choosing to reject. In contrast, only 3 of 15 responders (20%) do so in EE, and this difference is statistically significant (p=0.05, see Fig. 1). Thus, people are more willing to accept pecuniary inequality when they can express emotions to their counterpart.

[4] The p-values in this paragraph derive from Mann-Whitney tests of the null hypothesis that the frequency of rejections is the same between treatments, against the alternative that it is lower in the EE treatment.

Xiao and Houser (2005) find no significant difference in offer distributions between the EE and NEE treatments. However, this does not rule out the possibility that opportunities for *ex post* emotion expression might affect fair exchange. The reason is that proposers in both the NEE and EE treatments faced threats of monetary punishment (rejections), and such threats might mask an underlying informal sanction effect.

II.B. Dictator Games with Emotion Expression

We designed dictator game experiments with and without receiver emotion expression. Our experiment consists of two treatments: a standard dictator game without emotion expression (DNEE) and a dictator game with emotion expression (DEE). In the DNEE treatment, two subjects are randomly paired, one as dictator (divider in the instructions) and the other as receiver (counterpart in the instructions). The dictator decides how much of $20 s/he wants to send to the receiver and the receiver earns that amount. The amount sent can be interpreted as a measure of fairness, because there are no other consequences associated with dictators' decisions.

The DEE treatment is identical to DNEE except that, after dictators make their decisions, receivers have an opportunity to write messages to their respective dictators. Our hypothesis is that opportunities for *ex post* emotion expression lead to relatively more generous offers in this case than in the DNEE treatment. Note that this hypothesis relates entirely to dictators' decisions. In particular, unlike Xiao and Houser (2005), the emotional nature of any message does not directly bear on our hypothesis.

It is important to note that, in order to make our results comparable to Xiao and Houser (2005), we adopt the same action space used in the ultimatum game reported there. In particular, dictators can send 2, 4, 8, 10, 12, 16 or 18 (out of 20) dollars to their respective receivers. In addition, just as in the emotion expression treatment in Xiao and Houser (2005), dictators are not required to read the messages sent by receivers and foul language is not allowed. As we discuss further in section V, these design features work against our hypothesis that ex post opportunities for emotion expression promote fairness.

II.C. Procedures

Experiments included undergraduate students recruited from the general student population at George Mason University, using standard procedures in place at the Interdisciplinary Center for Economic Science. We ran nine sessions. Subjects were randomly and separately assigned to two rooms: one for dictators and the other for receivers. Each subject was randomly assigned a letter as his or her ID for the duration of the experiment. A receiver and a dictator were paired if they held the same letter. All subjects received an instruction sheet explaining the rules of the game. After reading the instructions each subject was required to complete a quiz to verify comprehension. The game started after every subject successfully finished the quiz.

The games proceeded as follows. First, dictators indicated the split on a decision sheet. After all dictators had finished, the experimenter took all the decision cards to the receivers' room and gave each receiver his or her dictator's decision card. Subjects were given pen and paper in both treatments. After observing the dictator's decision, the receiver returned the decision card to the experimenter. In the DEE treatment, each receiver was given a card for writing a message to his/her dictator. This card was distributed immediately prior to distributing the dictator's decision card. Receivers were asked to avoid indecent language, but were otherwise given no guidance regarding what, or whether, to write. When receivers had finished, the message and decision cards were returned to the experimenter. The experimenter then delivered the decision cards (and message cards in the DEE treatment) to the dictators.

Each subject played the game exactly once. In both treatments subjects were given as much time as they liked to make their decisions. Subjects were paid privately with cash at the end of the experiment. Each subject received a $5 show up bonus in addition to money earned in the game ($10 on average, of course) [5]. Subjects were in the lab about 45 minutes.

We conducted a message evaluation session after all of the dictator game sessions had been completed. We recruited ten message evaluators from the general undergraduate population at George Mason University. Potential evaluators were excluded if they had

[5] Severn sessions were run in 2004 and we ran another two sessions (one DEE treatment and one DNEE treatment) in 2007. ICES show-up bonuses for all laboratory experiments increased in 2007 to $7, and we used that amount for our 2007 experiments as well.

previously participated in any ultimatum game, or the message evaluation experiment in the Xiao and Houser (2005), or any dictator game experiment. Evaluators were given a receiver's instructions because some messages were not comprehensible absent this context. After reading the instructions evaluators were given a randomly ordered list of messages. Evaluators classified each message as "positive", "negative" or "neutral" in emotional content. Evaluators were paid $10 if they classified every message and an additional $5 if their message classification agreed with the most popular classification for each of two randomly chosen messages[6]. Evaluators were in the laboratory for about an hour, and median earnings were $15. We classified messages according to the most popular evaluator classification. There was a single most popular classification in 33 of 35 cases. The two ties were broken by the investigators' own evaluations.

III. Theory

Standard economic theory assuming self-interested earnings maximization predicts dictators in the DNEE treatment will give the minimum amount, as receivers have no bargaining power. The same is predicted in the DEE treatment, as *ex post* messages cannot affect earnings. Substantial evidence of non-selfish behavior has been observed over decades of experiments, and one way to explain this is to build social preferences into theory. This section points to recent contributions in this spirit, and their predictions regarding dictator decisions in our experiment. Appendix 1 includes additional detail.

III. A. Rabin (1993), Fehr and Schmidt (1999) and Bolton and Ockenfels (2000)

Using the "psychological game" framework first introduced by Geanakoplos, Pearce and Stacchetti (1989), in which utility depends on players' beliefs, Rabin (1993) develops a game-theoretic model that incorporates preferences for fairness. In Rabin's model, an individual makes her decision based on both her own material payoff and her beliefs about her counterpart's intentions. Rabin's model predicts dictators will behave the same way in both the DNEE and DEE treatments. The reason is that receivers have no

[6] The 26 messages in 2004 experiment and 9 messages in 2007 experiment were evaluated separately with the same procedure except the evaluators in 2007 were paid $5 for finishing all the classifications and earned a $7 show-up bonus.

bargaining power in either treatment, and can neither signal intentions nor change dictators' beliefs prior to dictators' decisions.

The models of Fehr and Schmidt (1999) and Bolton and Ockenfels (2000) assume an individual's utility depends only on their own and others' earnings (in particular, there are no intention effects in these models). Because *ex post* message opportunities cannot affect earnings, these models predict that dictators will behave the same way in both the DNEE and DEE treatments.

III. B. Konow (2000)

Konow develops a model of cognitive dissonance (see also Rabin, 1994; Akerlof and Dickens 1982). As noted in the introduction, individuals suffer from cognitive dissonance when they have selfish preferences but believe in fairness. If a dictator could choose any belief, then she could choose to believe it is fair for her to behave selfishly. However, beliefs are not absolutely pliable, and Konow assumes there are costs to holding beliefs that differ from a reasonable view of what is fair (e.g., the cost of searching for justifying arguments.) Hence, Konow's model predicts that higher costs of self-deception reduce selfishness.

In the standard dictator game it is easy for dictators to choose beliefs that support selfishness (e.g., the belief that they are doing to their counterpart what their counterpart would have done to them.). In the emotion expression treatment the possibility of receiving messages of disapproval makes it difficult to self-deceive. Thus, Konow's model predicts relatively more generous offers to receivers in the DEE treatment.[7]

IV. Results

We obtained observations on 140 undergraduates: 34 pairs of subjects in the DNEE treatment and 36 pairs in the DEE treatment. Table 1 gives summary statistics for decisions in these games, as well as our earlier ultimatum games that use the same action

[7] Charness and Dufwenberg (2006) develop a model of guilt aversion (see also Huang and Wu (1994) and Dufwenberg (2000)). The key assumption in Charness and Dufwenberg (2006) is that people experience guilt, so disutility, when they believe they have failed to meet their counterparts' expectations. They consider cases where counterparts' expectations are known prior to decisions, while in our experiment expectations are made clear at best *ex post*. Hence, it is not obvious how to take their interesting model to our experiment's data.

space. Visual inspection reveals the following general patterns. Mean offers increase with emotion expression opportunities, and are larger in ultimatum than dictator games[8]. Frequencies of equal-split offers are not very different among treatments (and there are no statistically significantly differences), although frequencies of unfair 90/10 offers are much higher in the baseline dictator game than in any of the three other treatments.

Our analysis below focuses on changes in 90/10 decisions. We begin by comparing dictators' decisions in games with and without emotion expression, providing clean evidence on the impact of emotion expression on fairness. Next, we compare dictators' decisions in the DEE treatment to proposers' decisions in Xiao and Houser (2005)'s NEE treatment. This offers evidence on the relative efficacies of both threats of emotion expression and threats of rejection in promoting fairness. Finally, we discuss receivers' messages.

IV.A. Emotion Expression and Fair Divisions

Figure 2 describes the distribution of dictators' offers in each treatment. In both treatments, about half of the dictators offer 40% or more to the receiver and the other half offer 20% or less. We define offers of 40% or more as fair and 20% or less as unfair. The distribution of fair offers is similar in the DNEE and DEE treatments. In both treatments, about 30% of participants offer half or more, and 20% of participants offer 40%. However, the distribution of unfair offers differs between the two treatments. In the DNEE treatment, significantly more dictators choose 10%, the minimum amount, than 20% (47% of participants vs. 9% of participants, $p<0.01$, two-tailed Mann-Whitney test). In contrast, in the DEE treatment the fractions of dictators who offer 10% and 20% are about the same (28% and 25% of participants, respectively). Consistent with our (one-sided) hypothesis, and compared with the DNEE treatment, the reduced frequency of

[8] Differences in means between DNEE and DEE, and EE and NEE, are in the expected direction but are not statistically significant. However, differences in means between otherwise identical dictator and ultimatum games, DNEE and NEE, and DEE and EE, are statistically significant (in both cases $p < 0.01$, one-tailed Mann-Whitney tests.)

offers at the 10% level in the DEE treatment is statistically significant (p=0.028, one-tail Mann-Whitney test)[9].

In sum, our data suggest that *ex post* opportunities for emotion expression can reduce profit-maximizing decisions. This is consistent with our hypothesis, and supports the self-deception model in Konow (2000).

IV.B. Comparing Emotion Expression to Monetary Sanction Effects

Previous research reveals that dictators are less generous than ultimatum games' proposers who face threats of rejection (see Camerer (2003) for a survey). As is clear from Figure 3, comparing our baseline dictator game data with the ultimatum game data reported in Xiao and Houser (2005) replicates this finding. In particular: (i) more first movers offer 40% or more in the standard ultimatum game (NEE) than the standard dictator game (DNEE) (68% and 44%, p=0.01, one-tail Mann-Whitney test); and (ii) significantly fewer minimum offers occur in NEE than DNEE (10% vs. 47%, p<0.001, one-tail Mann-Whitney test). Moreover, the proportion of minimum offers in NEE is significantly lower than occurs in the dictator game with emotion expression (10% vs. 25%, p=0.04, two-tail Mann-Whitney test). Therefore, our results suggest that threats of both disapproval and monetary punishment can discourage selfish decisions. In our environment, however, monetary punishment is more effective than the threats of disapproval.

Combining the data from all four treatments suggests a reason that Xiao and Houser (2005) found no positive effect of emotion expression opportunities on fairness in ultimatum games. Under rejection threats in ultimatum games, the percent of subjects choosing to maximize their monetary payoff decreased from 47% to 10%. As noted, emotion expression opportunities also discourage subjects from sending minimum

[9] It is appropriate in our case to report results of one-sided hypothesis tests, because we developed *ex ante* the one-tail hypothesis that that emotion expression promotes fairness. Moreover, we noted above that our design is biased against this hypothesis in at least three separate ways: (i) restrictions against foul language and threats; (ii) dictators need not read messages; and (iii) dictators must send positive amounts in all treatments.

amounts[10]. Thus, the effect of emotion expression opportunities on fairness was masked by the fact that few subjects offer minimum amounts in standard ultimatum games.

IV.C. Messages

All receivers except one (35/36) in the emotion expression treatment wrote messages to their respective dictators. The emotional content of those messages, as classified by our evaluators, is listed in Table 2. Of 18 total messages written in response to unfair offers, more (44.4%) were classified as expressing negative emotions than either positive (22.2%) or neutral (33.3%). We obtained some evidence that many receivers would have chosen an unfair distribution had they been the dictator, so that they empathized with dictators' selfish choices. It seems not all dictators anticipated this reaction, and some even expressed surprise. One selfish dictator reported[11]:

> *Surprisingly, my counterpart said they would have made the same decision, and to enjoy myself. How funny. I don't feel as bad now about my decision. I guess everyone is a little greedy.*

Such a reaction makes clear the importance of investigating repeated games in this environment, a pursuit we leave for future research.

V. Conclusion

Economists increasingly recognize the importance of emotion in human economic behavior (see, Elster, 1998; Frank, 2002; Loewenstein, 2000; Thaler, 2000). However, our understanding regarding how emotion, especially emotion expression, affects decisions is still in its early stages[12]. In this paper, we reported evidence that *ex post*

[10] A Kruskal-Wallis *k*-sample procedure rejects the hypothesis that there are no differences in median offers among the four (DNEE, DEE, NEE and EE) treatments ($p<0.01$). Differences can be traced to unfair offers. The null hypothesis that there are no differences in median unfair offers (when receivers are allocated 20% of the total amount or less) among the four treatments is rejected ($p<0.01$). However, we cannot reject the hypothesis that the medians among fair offers are the same across the four treatments.

[11] Some subjects voluntarily completed a questionnaire at the conclusion of the experiment.

[12] Scharlemann et al. (2001) study how facial expression can be used as a signal of an intention to cooperate. They find evidence that smiles can increase cooperation among strangers in a one-shot interaction.

opportunities for emotion expression affects economic decisions of both expressers and the targets of the expression.

Data reported by Xiao and Houser (2005) suggest people are less likely to use costly punishment, and correspondingly more likely to accept monetary inequality, when they can reveal to their counterparts their feelings regarding the exchange. This paper extends those findings by showing that threats of emotion expression, even absent opportunities for material punishment, can promote fair economic outcomes. In particular, people are significantly less likely to make maximally self-interested decisions when such *ex post* reaction is possible. Importantly, this is true even when expressed emotions can have no effects on monetary payoffs.

Our results complement previous studies on nonmonetary informal sanctions (e.g., Masclet et. al., 2003; Noussair and Hucker, 2005; Andreoni and Petrie, 2004; Subhasish, 2006), and are novel in that they provide direct evidence that disapproval avoidance can be an important reason why informal sanctions promote fair exchange. Also, our findings are consistent with psychological game theory that incorporates factors such as cognitive dissonance and guilt aversion (see, e.g. Konow, 2000; Rabin, 1994; Akerlof and Dickens 1982)[13].

Our data suggest that monetary punishment is more effective than informal sanctions in promoting fairness. Nevertheless, monetary punishment can be costly to enforce, and is not credible if enforcement costs are sufficiently high. Moreover, in many situations it can be difficult to stipulate complete contracts that enforce punishment and, even when doing so is feasible, sanction threats can be counter-productive (see, e.g., Frey and Oberholzer-Gee, 1997; Gneezy and Rustichini, 2000; Fehr and Falk, 2002, Houser et. al., forthcoming). Our findings reveal that, because individuals often make efforts to avoid disapproval, there are contexts where allowing *ex post* emotional reactions is an efficient alternative means to enforce fair economic exchange.

[13] Our results also provide an explanation for the widely replicated finding that reduced "social distance" can promote fairness (see, e.g., Cherry, et. al, 2002). Perhaps people are more concerned about receiving disapproval as social distance is reduced. At the same time, the opportunity to express disapproval might itself reduce social distance, say by increasing "identifiability" with one's counterpart (e.g., Small and Lowenstein, 2005). This might increase the expected disutility of future disapproval from others and thus promote fairness.

It is important to emphasize that our design is biased against our hypothesis that emotion expression opportunity promotes fairness in several ways. An important example of this is that our receivers were asked to avoid using foul or threatening language in their responses to dictators. Our interest is in studying mild forms of disapproval, the sorts we believe are relevant to the vast majority of naturally occurring exchange. However, more extreme forms of disapproval, such as threats of violence or foul and degrading insults might be expected to lead to stronger fairness responses from dictators.

In a paper closely related to our dictator treatments, Ellingson and Johannesson (2007) allow extreme forms of disapproval and indeed find stronger effects on dictators. Moreover, in their study dictators can choose to send nothing to receivers, and do so significantly less often when *ex post* messaging is allowed. Our and their results provide convergent evidence that *ex post* opportunities for emotion expression can significantly mitigate the frequency of the most selfish choice available to the agent.

Our findings have important implications for policy makers. In contrast to emotions such as anger or sadness, opportunities for emotion expression are relatively more easily controlled within an institutional framework. Thus, mechanism design theorists could exploit connections between *ex post* complaint processes and *ex-ante* economic outcomes. For example, a system which facilitates expressions of dissatisfaction might reduce costly consumer boycotts, especially ones stemming from perceptions of unfair pricing (see, e.g., Friedman, 1991; or Tyran and Engelmann, 2005). In addition, many have pointed out that *ex post* messaging in online exchange enables efficiency enhancing reputation formation (e.g., Houser and Wooders, 2006). Our results provide an alternative perspective, in that the possibility of receiving negative messages might alone discourage fraud even in one-shot anonymous exchange.

Research on emotion expression and economic behavior is in its very early stages. Current results are intriguing, and reveal its importance in many aspects of economic decision-making. Future research might profitably highlight connections between emotion expression and cooperation, trust, reciprocity and forgiveness.

Appendix 1. Theory Predictions

A. Rabin (1993)

Rabin (1993) develops a game-theoretic model that incorporates preferences for fairness. He adopts the "psychological game" framework of Geanakoplos, Pearce and Stacchetti (1989) in which utility can depend directly on players' beliefs. The theory is sophisticated, and will not be detailed here. We provide only enough detail to make clear the predictions of the theory with respect to our emotion expression environment.

In normal-form games with two players *i* and *j*, Rabin (1993) assumes the payoff of player i depends not only on *i*'s actions, but also on player *i*'s beliefs regarding player j's kindness. Rabin posits a kindness function $f_i(a_i, b_j)$, which is a metric for how kind player i is to player j, where a_i is player i's action and b_j is player i's belief about player j's action. From player i's point of view, given she has the belief b_j of what player j will do, her choice is to decide the payoff pair $(\pi_i(a_i, b_j), \pi_j(b_j, a_i))$ from the set $\prod(b_j)$ of feasible payoffs that can arise if player j chooses action b_j:

$$\prod(b_j) \equiv \{(\pi_i(a, b_j), \pi_j(b_j, a)) \mid a \in S_i\}.$$

Then player i's kindness to player j is given by

$$f_i(a_i, b_j) \equiv \frac{\pi_j(b_j, a_i) - \pi_j^e(b_j)}{\pi_j^h(b_j) - \pi_j^{\min}(b_j)} \tag{1}$$

If $\pi_j^h(b_j) - \pi_j^{\min}(b_j) = 0$, then $f_i(a_i, b_j) = 0$. Here $\pi_j^h(b_j)$ and $\pi_j^{\min}(b_j)$ is player j's highest and worst payoff in $\prod(b_j)$, respectively. $\pi_j^e(b_j)$ is the equitable (or fair) payoff, given by $\pi_j^e(b_j) = [\pi_j^h(b_j) + \pi_j^l(b_j)]/2$, where $\pi_j^l(b_j)$ is play j's lowest payoff among points that are Pareto-efficient in $\prod(b_j)$. Thus, kindness is a fraction of the degree above or below the equitable point scaled by the range of payoff player i could have obtained. A critical feature of the kindness function is that whether player i is kind (i.e. $f_i(a_i, b_j) > 0$) or mean (i.e. $f_i(a_i, b_j) < 0$) to player j is decided by whether player i chose an action so that player j got a payoff higher or less than the fair one $\pi_j^e(b_j)$.

Rabin assumes that player i also has a conjecture about how kind player j is to her. If c_i is player i's belief about what player j believes her strategy, then player i perceives player j's kindness as given by:

$$\tilde{f}_j(b_j, c_i) \equiv \frac{\pi_i(c_i, b_j) - \pi_i^e(c_j)}{\pi_i^h(c_i) - \pi_j^{\min}(c_i)} \tag{2}$$

If $\pi_i^h(c_i) - \pi_j^{\min}(c_i) = 0$, then $\tilde{f}_j(b_j, c_i) = 0$. Here, to form this conjecture, player i must guess what player j thinks player i will do. Thus, player i's second order belief plays a role.

These kindness functions can now be used to define player i's utility function:

$$U_i(a_i, b_j, c_i) = \pi_i(a_i, b_j) + \tilde{f}_j(b_j, c_i) \cdot [1 + f_i(a_i, b_j)]. \quad (3)$$

This framework implies that player i prefers to treat player j kindly (i.e. $f_i > 0$) if she believes that player j will treat her kindly($\tilde{f}_j > 0$) , and analogously for player *j*. An important advantage of this preference specification is that it makes clear the trade off between material payoffs and social preferences. The kindness term becomes less and less important the higher the material payoffs are.

A "fairness equilibrium" in Rabin's model is an equilibrium in which players maximize their utilities and their beliefs are rational expectation of what actually happens (i.e. $a_i = b_i = c_i$).

Although the model is quite sophisticated, it is quite easy to derive the predictions of Rabin's model in our environment. In the DNEE treatment, the dictator entirely determines the payoff distribution: the receiver has no bargaining power to change either payoff and cannot signal any intentions to change the dictator's belief. In the DEE treatment, the receiver can write a message to the dictator. However, this message is written after the dictator's decision, and this message cannot affect either payoff. As, in Rabin's model, the belief of intentions is decided by the (belief of) decisions on the allocation of payoffs, the messages therefore can't change any belief of intentions. Consequently, Rabin's model predicts dictators will behave the same way in both the DNEE and DEE treatments.

B. Fehr and Schmidt (1999)

Fehr and Schmidt (1999) develop an elegant model in which people have preferences over the distribution of monetary payoffs. In contrast with Rabin (1993), their model does not explicitly incorporate intentions. Rather, they assume individuals are averse to both disadvantageous and advantageous inequality, but the aversion to the former is stronger than the latter. Formally, in an *n*-player game, if *x* denotes the pecuniary payoff, then the utility function of player $i \in \{1,...,n\}$ is given by:

$$U_i(x) = x_i - \alpha_i \frac{1}{n-1} \sum_{j \neq i} \max\{x_j - x_i, 0\} - \beta_i \frac{1}{n-1} \sum_{j \neq i} \max\{x_i - x_j, 0\} \quad (4)$$

where $\beta_i \leq \alpha_i$ and $0 \leq \beta_i < 1$. In the two-player case, the utility function simplifies to

$$U_i(x) = x_i - \alpha_i \max\{x_j - x_i, 0\} - \beta_i \max\{x_i - x_j, 0\}, \; i \neq j \; . \quad (5)$$

Here player i's utility is increasing in x_j if and only if $x_i \geq x_j$. Under the assumption that $\beta_i \leq \alpha_i$, the disutility for player i from inequality is larger if player j's payoff is higher than her own than if player j's payoff is lower than her own.

This model rationalizes altruistic action towards others. Assuming that in addition to purely selfish people, there is also a fraction of people motivated by fairness, Fehr and Schmidt show that their model can explain why, in some situations, equal outcomes obtain (e.g., the ultimatum game) while in others fairness concerns do not seem to have a substantial effect (e.g., the ultimatum game with proposer competition).

With respect to our experiment's environment, the only difference between DNEE and DEE treatment is that, in the latter, the receiver can send a message to the dictator after the dictator's decision. Although this can be an effective channel for receiver emotion expression, the message cannot change payoffs. Consequently, the Fehr-Schmidt model predicts that dictators will behave the same way in both the DNEE and DEE treatments.

C. Bolton and Ockenfels (2000)

Bolton and Ockenfels (2000) build a model of equity, reciprocity and competition (ERC) in an incomplete-information context. In their model, each player i maximizes the expected value of her "motivation function":

$$v_i = v_i(x_i, \sigma_i) \tag{6}$$

where x_i is player i 's payoff and σ_i is i's relative share of the total pecuniary payoff. Specifically:

$$\sigma_i = \begin{cases} x_i \Big/ \sum_{j=1}^{n} x_j & if \sum_{j=1}^{n} x_j \neq 0 \\ 1/n & if \sum_{j=1}^{n} x_j = 0 \end{cases} \tag{7}$$

Given σ_i, v_i is assumed to be weakly increasing and concave in x_i, player i's own payoff (they call this "narrow self interest"). Furthermore, for given x_i, v_i is strictly concave in σ_i with a maximum at the allocation at which one's own share is equal to the average share (they call this a "comparative effect"). Individuals are distinguished by how they solve the trade-off between comparative effect and narrow self-interest.

An implication of this model is that, in the dictator game, the dictator will offer a positive amount which is less than half of the total amount available. The model also implies that responders in the ultimatum game will never reject a 50% offer and the probability of rejection, p, depends on the total payoff size and the responder's share of the total payoff[14]. On average, the model implies that offers in the dictator game are lower than in the ultimatum game. This is consistent with many laboratory results.

Applied to our experiment, the ERC model makes the same behavioral predictions as the Fehr and Schmidt model. To see this, note simply that a message to the dictator cannot change either x_i or σ_i, and therefore the dictator's motivation function v_i cannot be affected by *ex-post* messages. It follows that ERC predicts the same dictator behavior in both the emotion expression and baseline treatments.

D. Konow (2000)

Konow built a model of cognitive dissonance based on social psychology theory (also see Rabin, 1994). When individuals have desire for both self-interest and fairness, they suffer from cognitive dissonance. In the dictator game, if the dictator allocates an amount $y \in [0, \bar{y}]$ different from what she believes is fair $\phi \in [0, \bar{y}]$, she might experience displeasure (e.g., guilt).

[14] This prediction is inconsistent with data in Xiao and Houser (2005). We found differences in rejection probabilities between the NEE and EE treatments, even when the pie size and offered split were the same.

In his model, this cognitive dissonance is represented by: $f(w,\alpha)$, where $w = y - \phi$ and $\alpha \in [0,1]$ is a parameter of dictator's sensitivity to the dissonance. α may vary across dictators as well as according to context (e.g., an experiment's procedures.) It is assumed that $f(\cdot)$ is continuously differential in α ($\alpha \neq 1$), is twice continuously differential in w, and that $f(0,\alpha) = 0, \forall \alpha$. When $\alpha = 0$, there is no cognitive dissonance i.e. $f(w,0) = 0, \forall w$. When $\alpha = 1$, it is prohibitively unpleasant to take any amount believed to be unfair i.e. $f(w,1) = \infty$, $w \neq 0$. When $\alpha \in (0,1)$, $f_1(w,\alpha) \cdot w > 0, w \neq 0$, and $f_{11}(w,\alpha) > 0$. This means that dissonance increase at an increasing rate as the amount kept deviates from what is believed to be fair. It is also assumed that for $w \neq 0$, $f_2(w,\alpha) > 0$, $f_{12}(w,\alpha) > 0$ and $\lim_{\alpha \to 1} f(w,\alpha) = \infty$.

If the dictator could choose any belief, then she could always choose to believe it is fair for her to behave selfishly ($\phi = \bar{y}$) and therefore not feel any displeasure by keeping all. However, beliefs are not absolutely pliable, and are typically based on and reconciled with some knowledge or experience. Konow assumes that there are costs to choosing beliefs that differ from a reasonable view of what is fair, which might include the cost of searching for justifying arguments. The self-deception cost is formalized as $c(z,\beta), z \equiv \phi - \eta$, where $\beta \in [0,1]$ is a parameter of the cost of self-deception, and the fair amount is denoted by η. Also, $c(\cdot)$ is functionally equivalent to $f(\cdot)$.

The utility function is assumed to consist of three terms: the monetary utility less the cognitive dissonance and self-deception cost. The dictator chooses how much to keep (y) and how much to believe it is fair to keep (ϕ) to maximize utility:

$$\underset{y,\phi}{Max} \;\; u(y,\phi,\eta,\alpha,\beta) \equiv v(y) - f(y-\phi,\alpha) - c(\phi-\eta,\beta), \text{ subject to } y \leq \bar{y},\ \phi \leq \bar{y} \qquad (8)$$

Denote optimal y as y^* and optimal ϕ as ϕ^*. Konow demonstrated that for the standard dictator $\eta \leq \phi^* \leq y^* < \bar{y}$, $\partial y^* / \partial \beta \leq 0$ and $\partial \phi^* / \partial \beta \leq 0$, with strict inequalities for $y^* < \bar{y}$ and $\phi^* < \bar{y}$, respectively. That is, higher self-deception costs reduce self-deception and therefore selfishness (excepting corner solutions.)

It is straightforward to apply this model to our experiment. In the DNEE treatment, the dictator does not receive any feedback from the receiver, so it is plausible to assume that the dictator will choose to hold the belief that supports selfish behavior. However, in the DEE treatment receivers have an opportunity to write a message to the dictator that responds to the dictator's decision. The possibility of receiving negative messages from receivers makes it more difficult for unfair dictators to choose to believe that a low offer is fair. That is, β is higher in the DEE treatment than in the DNEE treatment. Hence, Konow (2000) predicts that dictators will offer more in the DEE than in the DNEE treatment.

Appendix 2. Instructions

A. Dictator's instruction in DEE treatment.

Instructions

Thank you for coming! You've earned $5 for showing up on time. Whatever you earn in the rest of the session will be in addition to this $5. The instructions explain how you can make decisions. Please read these instructions carefully! There is no talking at any time during this experiment. If you have a question please raise your hand, and an experimenter will assist you.

You are in Room A. You will be randomly and anonymously paired with someone in Room B. You will never be informed of the identity of this person, either during or after the experiment. Similarly, your matched participant will never be informed about your identity. You are in the role of **Divider** and your matched participant will be referred to as your **Counterpart**. You and your Counterpart will participate only once in this decision problem.

This is how the experiment works.

Your task is to divide $20 between the two of you. How much money you end up with at the end of the experiment depends on the decisions you make.

Divider (You)

You will choose a Dividing Rule (described in detail below). A dividing Rule determines how much of $20 will go to the Divider (you) and how much will go to your Counterpart.

Dividing Rule

The possible divisions must be chosen from the table below. You must choose only one of them.

Possible Dividing Rules	**The rule is**
A	Divider gets **$18** and Counterpart gets **$2**
B	Divider gets **$16** and Counterpart gets **$4**
C	Divider gets **$12** and Counterpart gets **$8**
D	Divider gets **$10** and Counterpart gets **$10**
E	Divider gets **$8** and Counterpart gets **$12**
F	Divider gets **$4** and Counterpart gets **$16**
G	Divider gets **$2** and Counterpart gets **$18**

Your Counterpart

After receiving the dividing rule that you chose, your Counterpart can write a short message to you. The message can be anything your Counterpart wants to say to you. **Please note:** Foul language and threatening messages are not allowed.

Experiment Procedures:

Step 1: Randomly and anonymously assign counterparts

There are several envelopes in Room A and Room B. In each envelope in Room A and Room B there is a tag marked with a unique letter. Each envelope looks the same. Everyone in Room A and Room B will randomly pick an envelope. Persons in Room A and Room B who choose the tag with the same letter will be paired.

Step 2: Divider chooses the rule

The Divider will be given a card where he/she can write down his/her decision. A sample of the decision card is as below:

Divider: (Dividing rule)
I choose dividing rule_____. That is,

Divider gets $_____ Counterpart gets $____

After finishing the decision, the Divider will also write down the tag letter on the back of the decision cards and put it into his/her envelope. After every Divider has finished, the experimenter will take the envelopes to Room B.

Step 3: The Counterpart receives the Divider's decision.

The experimenter will give each Divider's envelope to his/her Counterpart according to the tag letter on the card. The Counterpart will see the decision made by the divider. The Counterpart will also be given a blank card where he/she can write a short message to the Divider, and will put both the decision card and the message card into the envelope.

Step 4: **Return cards to the Dividers**

After everyone in Room B has finished, the experimenter will take all of the envelopes to Room A and return the envelopes to their Dividers, according to their tag letters. When the Divider gets his/her envelope, he/she will see the message his/her Counterpart wrote, if any.

Step 5: **Receive cash payment privately**

Each Divider will be called one by one to the experimenter. When called, the Divider will take his/her decision card, and the experimenter will pay him/her privately. Then the Divider will exit the lab and drop all the other supplies into the box near the monitor room. Everyone in Room B will be paid after all of the Dividers have been paid and have left the lab. When called, the counterpart in Room B will show the experimenter the tag letter and will be paid according to the corresponding decision card.

Throughout this experiment, you won't meet anyone in Room B.

End of Instructions

Please raise your hand to indicate that you are finished reading these instructions. When you do, an experimenter will give you a few questions to ensure that you understand how you make decisions.

B. Receiver's instruction in DEE treatment

Instructions

Thank you for coming! You've earned $5 for showing up on time. Whatever you earn in the rest of the session will be in addition to this $5. The instructions explain how you can make decisions. Please read these instructions carefully! There is no talking at any time during this experiment. If you have a question please raise your hand, and an experimenter will assist you.

You are in Room B. You will be randomly and anonymously paired with someone in Room A. You will never be informed of the identity of this person, either during or after the experiment. Similarly, your matched participant will never be informed about your identity. Your matched participant is in the role of **Divider** and you will be referred to as Divider's **Counterpart**. You and your Divider will participate only once in this decision problem.

This is how the experiment works.

The task is to divide $20 between the two of you. How much money you end up with at the end of the experiment depends on the decision your Divider makes.

Divider

The Divider will choose a Dividing Rule (described in detail below). A dividing Rule determines how much of $20 will go to the Divider and how much will go to you.

Dividing Rule

The possible divisions must be chosen from the table below. The Divider must choose only one of them.

Possible Dividing Rules	**The rule is**
A	Divider gets **$18** and Counterpart gets **$2**
B	Divider gets **$16** and Counterpart gets **$4**
C	Divider gets **$12** and Counterpart gets **$8**
D	Divider gets **$10** and Counterpart gets **$10**
E	Divider gets **$8** and Counterpart gets **$12**
F	Divider gets **$4** and Counterpart gets **$16**
G	Divider gets **$2** and Counterpart gets **$18**

Counterpart (You)

After receiving the dividing rule that Divider chose, you can write a short message to your Divider. The message can be anything you want to say to the Divider. **Please note:** Foul language and threatening messages are not allowed.

Experiment Procedures:

Step 1: Randomly and anonymously assign counterparts

There are several envelopes in Room A and Room B. In each envelope in Room A and Room B there is a tag marked with a unique letter. Each envelope looks the same. Everyone in Room A and Room B will

randomly pick an envelope. Persons in Room A and Room B who choose the tag with the same letter will be paired.

Step 2: Divider chooses the rule

The Divider will be given a card where he/she can write down his/her decision. A sample of the decision card is as below:

Divider: (Dividing rule)
I choose dividing rule_____. That is,

Divider gets $_____ Counterpart gets $____

After finishing the decision, the Divider will also write down the tag letter on the back of the decision cards and put it into his/her envelope. After every Divider has finished, the experimenter will take the envelopes to Room B.

Step 3: The Counterpart (You) receives the Divider's decision.

The experimenter will give each Divider's envelope to his/her Counterpart according to the tag letter on the card. The Counterpart will see the decision made by the divider. The Counterpart will also be given a blank card where he/she can write a short message to the Divider, and will put both the decision card and the message card into the envelope.

Step 4: **Return cards to the Dividers**

After everyone in Room B has finished, the experimenter will take all of the envelopes to Room A and return the envelopes to their Dividers, according to their tag letters. When the Divider gets his/her envelope, he/she will see the message his/her Counterpart wrote, if any.

Step 5: **Receive cash payment privately**

Each Divider will be called one by one to the experimenter. When called, the Divider will take his/her decision card, and the experimenter will pay him/her privately. Then the Divider will exit the lab and drop all the other supplies into the box near the monitor room. Everyone in Room B will be paid after all of the Dividers have been paid and have left the lab. When called, the counterpart in Room B will show the experimenter the tag letter and will be paid according to the corresponding decision card.

Throughout this experiment, you won't meet any Divider in Room A.

End of Instructions

Please raise your hand to indicate that you are finished reading these instructions. When you do, an experimenter will give you a few questions to ensure that you understand how you make decisions**.**

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Table 1. Descriptive Statistics

Treatment	# of obs.	Mean Offer (% of $20)	Percentage of 50/50 Offers	Percentage of 90/10 Offers
Dictator Game (**DNEE**)	34	26.8 (3.1)	26.5 (7.7)	47.1 (8.7)
Dictator Game with Emotion Expression (**DEE**)	36	30.3 (2.8)	27.8 (7.6)	25.0 (7.3)
Ultimatum Game (**NEE**)	62	36.9 (2.0)	33.9 (6.1)	9.7 (3.8)
Ultimatum Game with Emotion Expression (**EE**)	86	39.8 (1.4)	37.2 (5.3)	4.7 (2.3)

Note: Numbers in the parenthesis are standard errors.

Table 2. Percentages of Receivers and Responders Who Send Messages in DEE and EE Treatments

Offer (%)	**DEE**				**EE**			
	Positive	Negative	Neutral	Total	Positive	Negative	Neutral	Total
>=50	72.7	9.1	18.2	100.0	80.6	0.0	11.1	91.7
40	16.7	33.3	50.0	100.0	22.6	32.3	25.8	80.7
20	10.0	40.0	50.0	100.0	0.0	80.0	6.7	86.7
10	33.3	44.4	11.1	88.9	0.0	75.0	25.0	100.0
Total				100.0				87.2

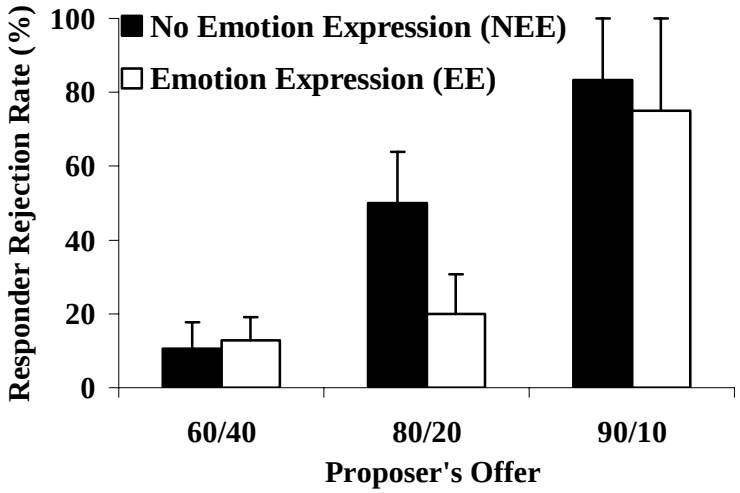
Table 3. Messages Written When Receiver's Offer is 20% or 10%

Offer (%)	Messages	Emotion
20	Even though a little more would have been appreciated, thanks for not giving me $2. Enjoy the $	Positive
20	Should split it 10 and 10. both leave w/ same amount	Neutral
20	Fair enough	Neutral
20	I probably would have done the same	Neutral
20	Pumpkin pie cartwheels edgewise with a side of pancake batter.	Neutral
20	Thanks for your boundless generosity.	Negative
20	How $4. Since there was no reason for you to split the money evenly, I suppose I should be surprised. I wonder though, if you found someone's wallet, would you only return part of it? If you decide them like you did today, it must mean that you are only somewhat hard up for cash. If that's the case, I feel badly for you. Have a great day.	Negative
20	Thanks for $2 more than the minimum	Negative
20	Although I would have enjoyed a little bit more than $4, I understand why you chose "B." Thanks for not choosing "A"… I would have been mad a that, but I'm not as angry now. ☺	Neutral
20	I suppose I don't have to eat again this week. I understand w/e it was you need must be more important than my sustenance.	Negative
10	Thank you for choosing this dividing role.	Positive
10	Thanks for your decision. I would have chosen the same dividing rule you did. Enjoy your cash	Positive
10	Thanks, you lucky duck! I would have done the same.	Positive
10	I'd have done it. Why choose anything else?	Neutral
10	I'm wondering what I will get. Yes, I know that's what I will exactly get. Why do they do this kind of experiment anyways! (They are getting cheaper and cheaper… I can barely make anything here.. I'm going to starve)	Negative

(continue)

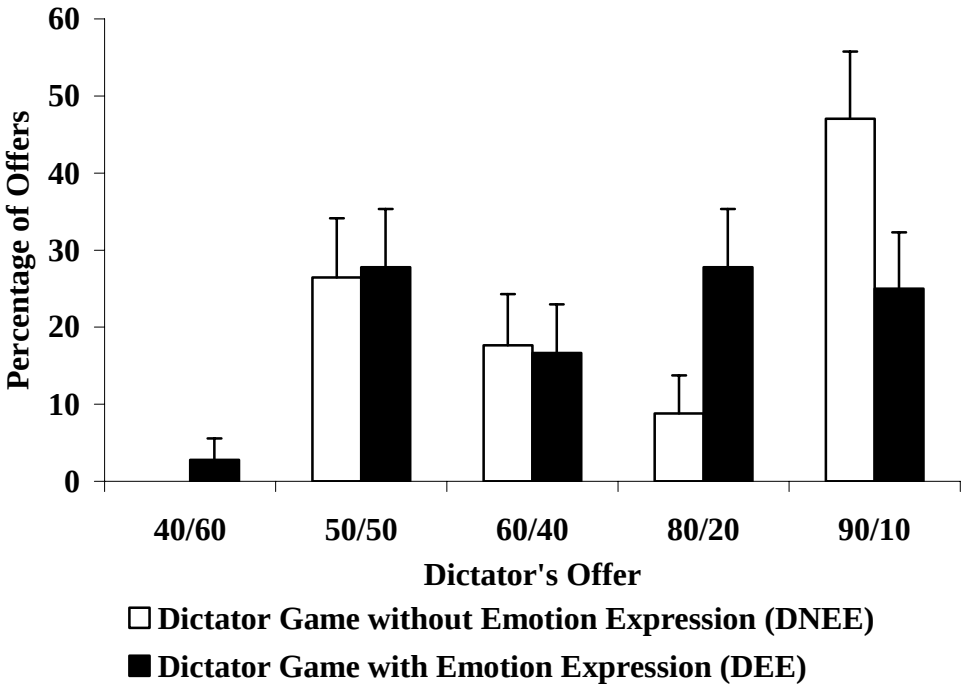
Offer (%)	Messages	Emotion
10	Dear Divider: What was your first thought when you learned of your position in this experiment? Do you feel lucky? Are you someone who needed a break and this was it? Do you feel like this is hilarious and it sucks to be on the receiving end? Did you feel guilty? Or did you feel reluctant and hoped I'd understand? Either way just think about it. You might have made the right decision because I might have deserved. Or it was just tough luck being me? Yours truly, Counterpart "A" P.S. I will never forget you. P.P.S. No hard feelings.	Negative
10	I know you're saying "I don't know and I don't care about the other person," but we all like money, so to know you cut me short is messed up. I'm not asking for the majority. I'm asking for $10/$10. If you can change it, please do. If you can't, …you need to check your priorities…it's not about the money, it's about sharing what you have and realizing you're not the center of the world. - Counterpart C	Negative
10	Man, what is that? $2…when you get $18? You should have split it $10/$10 man…	Negative

Figure 1. Rejection Rates When Responders Offer Less Than 50%



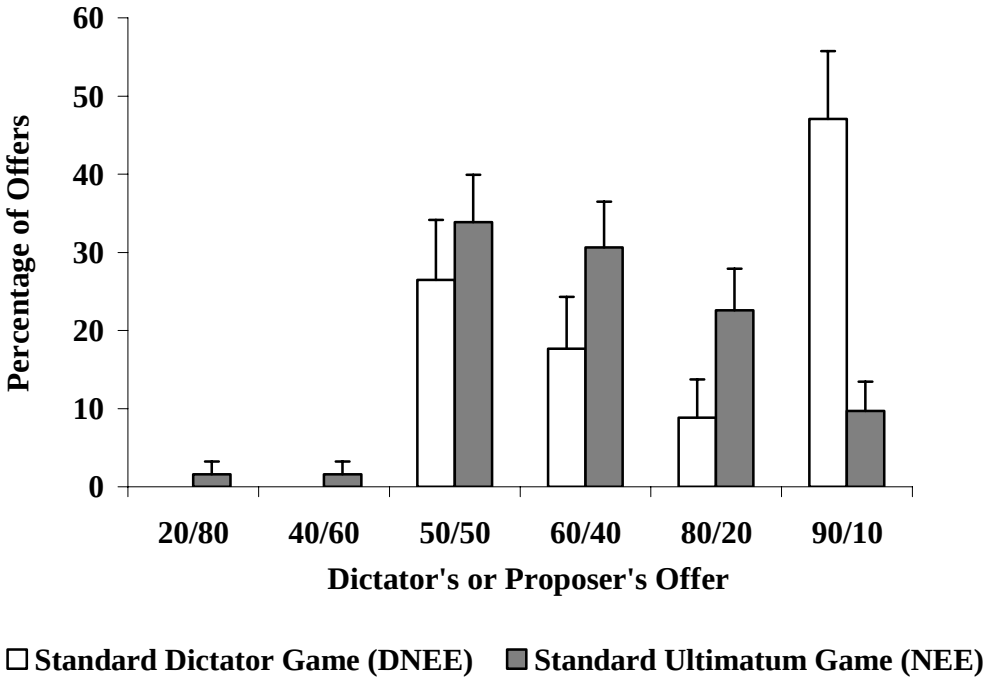
(From Xiao & Houser, 2005, *Proceedings of the National Academy of Sciences* , 102(20))

Figure 2. Distribution of Dictators' Offers



Note: Offers are denoted X/Y, where X is the proposer's (Fig. 1) or dictator's (Fig. 2) percentage share, and Y is the responder's (Fig. 1) or receiver's (Fig. 2) share.

Figure 3. Distribution of Offers in Standard Dictator and Ultimatum Games



Note: Offers are denoted X/Y, where X is the proposer's or dictator's percentage share, and Y is the responder's or receiver's share.