Emotion Expression in Human Punishment Behavior

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Abstract: Evolutionary theory reveals that punishment is effective in promoting cooperation and maintaining social norms. Although it is accepted that emotions are connected to punishment decisions, there remains substantial debate over why humans use costly punishment. Here we show experimentally that constraints on emotion expression can increase the use of costly punishment. We report data from Ultimatum Games, where a proposer offers a division of a sum of money and a responder decides whether to accept the split, or reject and leave both players with nothing. Compared to the treatment where expressing emotions directly to proposers is prohibited, rejection of unfair offers is significantly less frequent when responders can convey their feelings to the proposer concurrently with their decisions. These data support the view that costly punishment might itself be used to express negative emotions, and suggest that future studies will benefit by recognizing that human demand for emotion expression can have significant behavioral consequences in social environments including families, courts, companies and markets.

Emotion is related to many aspects of social life, from physical survival to social relationships and reproduction (1, 2). With or without self-awareness, humans often display their feelings in different ways when aroused (3-5). However, in many naturally occurring social situations individuals might believe that it is improper, or impossible, to reveal their inner feelings directly to, for example, a perceived antagonist. For instance, a sales clerk might find it improper to confront her customer (6). Because individuals often have a desire to express their emotions, the presence of constraints on expression can have important consequences for human behaviors (7, 8). This research uses ultimatum games to investigate links between constraints on emotion expression and punishment decisions.

The ultimatum game (9) is widely used to study costly punishment. In this game one subject (the proposer) starts with, say, $20, and the other subject (the responder) begins with nothing. The proposer suggests a division of the $20 between them, and the responder decides whether to accept the proposed split. If accepted, then the money is split as proposed, and if not then both subjects earn nothing. Consequently, an income maximizing responder should accept any positive offer, and an income maximizing proposer would offer the responder the smallest possible positive amount.

In fact, decades of data from ultimatum games show that responders who are offered 20% or so of the total amount choose to reject about half the time (10), and rejection rates increase as responder shares become smaller. Reasons for rejections have been a source of much debate. Recently however, brain imaging data has been

collected while responders make their decisions, and the findings suggest that emotions are tightly connected to rejections (11).[§]

Evolution has likely programmed human responders to prefer to make their negative emotions about unfair offers known to proposers (2, 3). However, standard ultimatum game protocols ensure that responders are constrained from conveying their feelings to proposers in any way except perhaps through choosing costly punishment. It follows that this constraint on emotion expression could increase the likelihood that responders choose to punish proposers who make unfair offers. Our hypothesis is that responders are less likely to choose costly punishment, and correspondingly more likely to accept unfair outcomes, when their feelings about unfair offers can be conveyed to the proposer in an alternative and less expensive way.

Ultimatum Games with Emotion Expression

To test our hypothesis we conduct two treatments with the ultimatum game—no emotion expression (NEE) and emotion expression (EE). NEE is the standard ultimatum game 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 the offer is the only way for the responder to display a reaction to her proposer about the offer.

The EE treatment is exactly the same as NEE except that the responder is given an opportunity, not a requirement, to write a message to the proposer at no pecuniary cost. Any message is delivered to the proposer concurrently with the responder's decision. Messages cannot have any strategic implications, because the

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[§] For more general research on the link between emotions and costly punishment, and debate on the reasons for costly punishment, see, e.g., (11-17).

proposers have made their decisions before they see responders' messages, all experiments take place anonymously, and each pair of subjects plays the game only once. Rather, a message provides an opportunity for a responder to display voluntarily her feelings regarding her proposer's division decision. Our 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.

Experimental Design and Procedures

EE and NEE Treatments. We obtained observations on 296 undergraduates: 62 pairs of subjects in the NEE treatment and 86 pairs in the EE treatment. 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 (ICES). We ran sixteen sessions, and the amount to be split in all cases was $20. Subjects were randomly and separately assigned to two rooms: one for proposers and the other for responders. (In the instructions, which closely follow a format used by others (18), we called the proposer "Divider" and responder "Designator."). Each subject was randomly assigned a letter as his or her ID in the experiment. The proposer and responder who received the same letter became a pair. In each room, subjects received an instruction sheet that explained the rules of the game. After reading the instructions, each subject was required to successfully complete a quiz to verify comprehension. The game started after every subject finished the quiz.

First, the proposer indicated his or her proposed split (how many cents out of each dollar would go to the proposer, and how many to the responder) on a decision sheet. After all proposers had finished, the experimenter took all the decision cards to

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the responders' room and gave each responder his or her proposer's decision card. The responders decided whether to divide $20 (accept the offer) or $0 (reject the offer). Subjects were given pen and paper in both treatments. In the EE treatment, the responder also received a card for writing a message to her proposer. This card was distributed immediately prior to the distribution of the proposer's decisions, and messages could have been written before, after or during their accept/reject decision process. Responders were asked to avoid indecent language, but were otherwise given no guidance regarding what, or whether, to write. After responders had finished, the experimenter collected the decision cards (and any message cards in the EE treatment) and returned them to the proposers.

Each pair of subjects played the game once. In both treatments subjects were given as much time as they liked to make their decisions, and the average length of the two treatments was the same. Subjects were paid privately with cash at the end of the experiment. Each subject received $5 show up bonus in addition to money earned in the game. Subjects were in the lab about 45 minutes and earned about $12 total on average.

Message Evaluation. To test our hypothesis requires evaluating the emotional content of our responders' messages. To do this, we used standard ICES procedures to recruit ten message evaluators from the general undergraduate population at George Mason University. Potential evaluators were excluded if they had previously participated in any ultimatum game experiment. After being seated in the laboratory, each evaluator was given the EE treatment's responder's instructions. We provided evaluators with instructions because some messages were not necessarily comprehensible without this context. After completing the instructions, they were

given a randomly ordered listing of all 75 anonymous messages written by the responders in the EE treatment. Subjects were asked to classify the messages as showing positive or negative emotion, or as being "neutral" (not positive and not negative). Evaluators were not given any information regarding the situation of the responder who wrote the message: they did not know the proposed split or the responder's decision. Subjects were paid $5 for attending and an additional $5 for completing the entire evaluation. To increase subjects' attentiveness, they were told that after all evaluations were complete three messages would be randomly chosen as payoff messages. If the subject's evaluation matched the most popular evaluation for a message, then they earned an additional $5. Subjects were in the laboratory for about an hour, and median earnings were $25.

Messages are classified according to the most popular classification chosen by the evaluators. There was a single most popular classification in 71 of 75 cases. The four ties were broken by the investigators' own evaluations.

Results

Emotion expression and punishment. Table 1 describes the distribution of proposers' offers. In both treatments, nearly 2/3 of proposers offer at least 40% of the total amount to the responders and about 1/3 offer 20% or less. EE proposers were aware that responders could send messages along with their accept/reject decisions, but this did not change proposers' decisions in relation to the baseline NEE case: the two treatments' distributions are not statistically significantly different (Kolmogorov-Smirnov two sample test, $p=0.80$).

In support of our hypothesis, Table 1 also reports that subjects do send messages in EE, and that these messages do express emotion (see also Table 2,

discussed below). About 87% of all responders wrote a message to their proposer, most of which express emotion. 79% (15 of 19) responders who received allocations of 20% or less wrote a message expressing a negative emotion, and none expressed a positive emotion. When the responder was offered at least half of the total amount, 81% (29 out of 36) displayed positive emotions and none expressed negative emotions. This latter is not surprising, in that all responders in both treatments accept all offers that allocate at least $10 of the $20 to them.

Rejection rates differ between the two treatments when the proposer offers the responder $4 (20%) or less. In the baseline NEE case, 60% (12 of 20) of such offers are rejected, a frequency that lines up well with previously reported results (10). However, in the EE treatment only 32% (6 of 19) reject the unfair offer, and this difference is statistically significant (Mann-Whitney test, $z=1.757$, one-tailed, $p=0.04$). Inspection of Table 1 reveals that 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 out of 15 responders (20%) do so in EE, and this difference is statistically significant (Mann-Whitney test, $z=1.669$, one-tailed, $p=0.05$). Because the (90,10) choice is made very infrequently by proposers, it is not possible to draw inferences based on responder decisions in that cell alone. Finally, note that rejection rates in the (60,40) cell are about 10% in each treatment. Figure 1 summarizes these results.

Responders' messages. Table 2 details the messages written by all responders who faced offers of 20% or less, whether the message was classified as expressing a positive or negative emotion, or neutral (expressing neither a positive nor negative emotion) and each responder's decision. (All messages are provided in supplementary

information.) When the offer is exactly 20%, 10 of 12 responders who accepted the offer wrote a message, and nine of these ten messages were classified by the reviewers as expressing negative emotions. In addition, note that some responders accepted unfair offers even while indicating that they should not. This might indicate that the egalitarian or retaliation motivation (16, 17) for punishment can be diminished by providing subjects an opportunity to express their feelings. Overall, these data provide convergent support for the possibility that costly punishment is used by responders as emotion expression, and that responders are less likely to use costly punishment, and instead accept unfair outcomes, if they have a less expensive alternative mechanism to express negative emotions toward the proposers.

Discussion

Negative emotions like anger or disapproval can be triggered when individuals are treated unfairly (11-15), and evolutionary theory argues there can be benefits to expressing negative emotions in some contexts (2, 3, 19, 20).[**] In our emotion expression treatment, for example, responders might feel better after explicitly displaying their emotions to proposers (4, 21). Or perhaps sending messages of disapproval directly to one's proposer might be a satisfying alternative form of punishment (13, 22). Or, a responder might believe that accepting a low offer would be interpreted by the proposer as indicating that the responder accepts an inferior position. By expressing anger or disapproval regarding the low offer, responders can deny this interpretation.

When direct channels for emotion expression are either impossible or undesirable, our results suggest that humans might instead resort to indirect or even

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[**] More general discussion of the evolutionary importance of punishment is here (23-25).

costly methods to convey negative feelings, particularly costly punishment. This highlights the importance humans attach to negative emotion expression.

Constraints on emotion expression might be a contributing factor for decisions typically observed in many naturally occurring and experimental environments, including highly studied trust, public goods and bargaining games (18, 26-33). For example, subjects in public goods games are generally found to decrease their contribution to the public goods when others contribute little (28-32). If these decisions are partially motivated by a desire to express unhappiness to free riders, then such reductions in contributions might be less common if subjects were provided an alternative way to express their feelings.

In addition to negative emotion expression, it is important to emphasize that about 80% of responders in our experiments displayed positive emotions toward proposers when they received fair offers. Presumably, a demand to express positive emotions can also affect decisions. For example, in a typical "trust" game (26, 27), where the investor transfers part of her endowment to a trustee, the only way for the trustee to say "thank you" is to reciprocate and return some amount to the investor. If this reciprocity is in fact motivated by human demand to express positive emotions (such as happiness or appreciation) then measured trustworthiness (amounts returned to investors by trustees) might decrease if trustees are given an alternative, less-costly channel to express appreciation to investors. Further exploration in this area, particularly efforts at eliciting the "demand curve" for both positive and negative emotion expression, would be useful.

Our results rely, in part, on classification of the emotional content of responders' messages. The classification approach we adopted is standard in its use of independent, objective and hypothesis-blind human evaluators. Nevertheless, we

cannot know the "true" emotion behind any of the messages we collected. Having said this, it should be reiterated that there was substantial agreement among our independent evaluators with respect to the emotional content of the vast majority (95%) of responders' messages.

The desire to express emotions, and constraints on that demand, are a ubiquitous feature human social interaction. The results of our study are a step towards an improved understanding of human behavior in environments that involve emotions (6, 34, 35). Our research, of course, provides only one perspective on how emotion is connected to human behavior. Emotions might have different effects in different contexts. More work and specific models are needed to advance our understanding of how emotions are involved in human decision-making processes.

Table 1 Distribution of proposers' offers and responders' messages

| Offer	NEE		EE		% of responders who send message			
	Number	%	Number	%	Positive Emotion	Negative Emotion	Neutral	Total
Responder offered ≥ 50%					80.56	0	11.11	91.67
20/80	1	1.61	0	0.00				
40/60	1	1.61	4	4.65				
50/50	21	33.87	32	37.21				
Responder offered 40%					22.58	32.26	25.81	80.65
60/40	19	30.65	31	36.05				
Responder offered < 40%					0	78.95	10.53	89.48
80/20	14	22.58	15	17.44				
90/10	6	9.68	4	4.65				
Total	62		86					87.21

For the offer, the first number is the proposer's percentage share and the second

number is the responder's percentage share. Messages are classified according to the

evaluations of ten objective and hypothesis-blind evaluators.

Table 2. Messages written when the offer is 80/20 or 90/10

Offer	Subject	Accept	Message	Emotion
80/20	1	No	Sorry, I'm a person too. When the cards are all in my hand, you should try to appease me instead of offend me. There was a 50/50 split. It couldn't have been easier. So, since you decided you are obviously better than I am. You get nothing. Enjoy it, I know I will.	Negative
	2	No	If you would have been less greedy than maybe we would have gotten some money. Treat everyone as you want them to treat you.	Negative
	3	No	Should not have been greedy. Oh well, you make nothing.	Negative
	4	Yes		
	5	Yes	Thanks For Nothing.	Negative
	6	Yes	It would have been better if you had chosen D. I was going to split $0, so you would no gain. But $4 is better than nothing. So I decide to go with it. Have I been the divider, I would have chosen D.	Negative
	7	Yes	I guess I'll do $20. You are getting way more than me. But if I screw you over I get no Money either :-)	Negative
	8	Yes	Tuesday is election day! Vote for Kerry Read the platform johnkerry.com :-)	Neutral
	9	Yes	Not fair, I wish I am the divider! But I get $4 is better than none.	Negative
	10	Yes	Too selfish. I would rather get nothing and let you get a penny.	Negative
	11	Yes	Dude, that's kina greedy and I'm seriously contemplating designating $0… I was hoping you'd choose D so we'd both be happy but whatever, Grrrr…	Negative
	12	Yes	You suck, you are lucky I'm broke! If you did the A I would have put 0.	Negative
	13	Yes	You are lucky I'm broke!	Negative
	14	Yes		
	15	Yes	I should have chosen to divide by $0 but I'll take the $9 since I don't like wasting my time. Enjoy your $16.	Negative
90/10	1	No	Hey, we could both benefited equally, but no –sorry.	Negative
	2	No	I don't think so buddy!	Negative
	3	No	Well, we all want to make a little bit. I have the money here. Since you are my divider, I think it would better for the both of us to go for rule D. either that or we won't get nothing at all...	Neutral
	4	Yes	We should have divided the money equally. Don't be so greedy. People are always out for themselves	Negative

In the "Offer" column, the first number is the proposer's percentage share and the second number is the responder's percentage share. As described in the experiment's instructions, "D" stands for an equal-split offer and "A" stands for an offer of 10% to the responder (so 90% to the proposer). The last column shows whether the message is classified as expressing positive emotion, negative emotion or neutral (i.e. neither positive nor negative).

Figure 1. Rejection rates when Responders offered less than 50%.
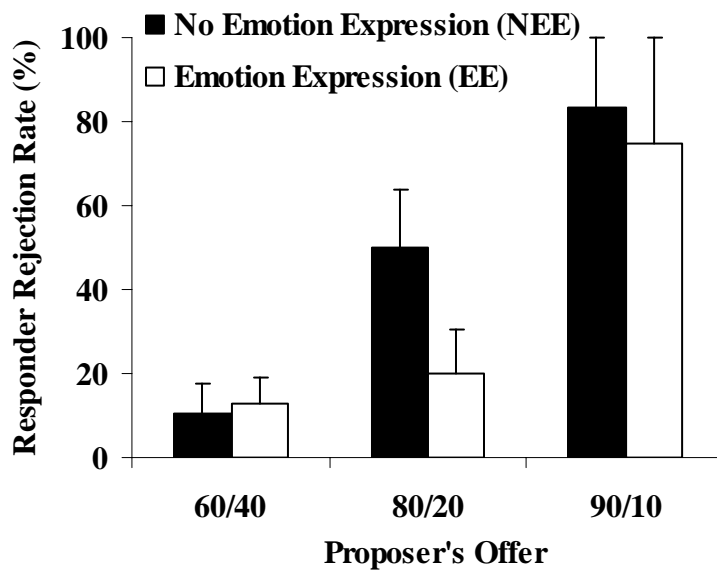
Columns show mean +/- s.e.m. The first number is the proposer's percentage share and second number is the responder's percentage share. When proposers offer 60/40, EE responders reject the offer at nearly the same rate as NEE. When the offer is either 80/20 or 90/10 the EE rejection rate is lower. The difference is significant in the 80/20 cell, as well as when the 80/20 and 90/10 data are pooled ($p<0.05$). A responder is more likely to accept an unfair division if she can express her emotions about the offer concurrently with her decision.

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Supplementary Data

Offer	Accept	Message	Emotion
(40, 60)	Yes	WoW! Much less selfish than I expected! Nice decision, because I really was going to write 0 if it were less than 50. I'm very happy with your decision. Thank you, and have a wonderful evening with your $13 :) love! D"	Positive
	Yes	Let's be fair to one another Let's get the money	Neutral
	Yes	Thanks! Since you weren't self-seeking, I chose $20. Even if you'd gone 60-40 or 50-50, I'd have done it too. Anything more in your favor, I'd have gone with $0. Be Blessed!	Positive
	Yes	Thanks	Positive
(50, 50)	Yes	Good decision.	Positive
	Yes	Thanks for making it even!	Positive
	Yes	Good choice	Positive
	Yes	Hi, I hope we get $-Happy Halloween! Good choice on the 50/50 things	Positive
	Yes	Thank you for sharing	Positive
	Yes	Good Job!	Positive
	Yes	Hello, there: You've made a right choice, haha. Thanks.	Positive
	Yes	A noble economic decision….	Positive
	Yes	Thanks for choosing to divide equally!	Positive
	Yes	Fair enough	Positive
	Yes	Thanks, I hoped that you would pick that.	Positive
	Yes	Hey, keep choosing rule D and I'll keep choosing to divide $20 (unless you want to choose rule E through G, then that would be better). If you choose any rule before rule D, I'll choose to divider $0. It's your choose	Neutral
	Yes	Thanks.	Positive
	Yes	We think alike! 50/50 is the way to go :) Enjoy!	Positive
	Yes	That's how I like it .Straight down the middle--no funny business. If it would have been on even, we would have still been broke. You're the coolest, I love you!--Love your secret admirer/Designator	Positive
	Yes	That was a good decision; otherwise I wouldn't have divided $20.	Positive
	Yes	Excellent choice My comrade!	Positive
	Yes	Good choice!	Positive
	Yes	The dog barks at night	Neutral

Offer	Accept	Message	Emotion
(50, 50)	Yes	Nice Choice! Anything else, and we both would have walked away with nothing.	Positive
	Yes	Good move! (although you could have given me more!):-)	Positive
	Yes	Fair deal	Positive
	Yes	Thank you :-)	Positive
	Yes	Since you choose rule D we both leave with same amount of money. I will divide 20 so we get the equal amount of money.	Positive
	Yes	Hey, buddy, I always agree that we should split the money 50/50 because that's what we are here for. Trying to get some $. Ay, Good choice :)	Positive
	Yes	I would have designated $20 for any rule up to B by the way, because money is money. Rule A I would have designated $0 as punishment for greed.	Neutral
	Yes	Hey, I liked your choice! However, you could have gotten away with role C. But thanks a lot. Have a good one.	Positive
	Yes	Good choice!	Positive
	Yes	Good choice! We both come out with the same cash! :)	Positive
(60, 40)	No	Don't get greedy now.	Negative
	No	Why should you get more $ than me? Only generosity or fairness would payoff.	Negative
	No	Sorry. Be a little more fair next time. Eh? P.s. I decided before I got your rule that if it wasn't 50/50. No one was getting money.	Negative
	No	I understand your gamble, but you should have gone 50/50	Neutral
	Yes	Why do you have to be greedy?	Negative
	Yes	Exactly what I had expected. You have a good business mind, because that is the maximum I can agree to pay a divider. Thanks.	Positive
	Yes	You're a little greedy here!! But it's better than nothing, so I'll choose to split $20 instead of $0	Negative
	Yes	Hi	Neutral
	Yes	I would have chosen D, much safer. But, hey, you win, enjoy the $4, buy a cookie or something	Negative
	Yes	:) What ever	Neutral
	Yes	Thanks for not picking A!	Positive

Offer	Accept	Message	Emotion
(60, 40)	Yes	A little greedy~would 've been fair if you would've chosen rule D~But I wouldn't really expect fairness. Everyone is here for the money. Thanks for not choosing A or B~Then we both would've left w/ $0	Neutral
	Yes	I almost gave us both 0, but you have no idea how much debt I'm in and these few dollars will help. But why? Why not make it 50/50? I decided I would accept 60/40 early on, as the lowest I would go. But I can only assume you need this more than I do why else would you not make it equal? Thanks.	Negative
	Yes	50-50 or nothing at all	Negative
	Yes	Smart choice. We both get paid relatively fairly. Not 50/50 but close enough. :-)	Positive
	Yes	So that we both maximize. Chose option D and I'll share $20. Many thanks.	Positive
	Yes	Thank you for not being completely greedy and giving me a portion of the money…I was hoping for 50/50 but hey…I'm making out alright :) Thanks	Positive
	Yes	You should have split it 50/50 Common now! Oh well better than A	Negative
	Yes	Exactly what I would have chosen	Neutral
	Yes	Spend it well	Neutral
	Yes	C'est la vie	Neutral
	Yes	Thanks for not choosing rule A. Because then I would have only ended up with $7 for this whole experiment and the only reason I did this experiment was for beer money tonight $13 should at least get me a case.	Positive
	Yes	I dunno about that. You do realize that you only made $2 more than what you would have made choosing C.	Negative
	Yes	It takes a tough man to make a tender chicken"--Short circuit. All your buses are belonging to us" name the game.	Neutral
	Yes	I'm fine with your decision. Need that money.	Positive
(80, 20)	No	Sorry, I'm a person too. When the cards are all in my hand, you should try to appease me instead of offend me. There was a 50/50 split. It couldn't have been easier. SO, since you decided you are obviously better than I am. You get nothing. Enjoy it, I know I will.	Negative
	No	If you would have been less greedy than maybe we would have gotten some money. Treat everyone as you want them to treat you.	Negative
	No	Should not have been greedy. Oh well, you make nothing.	Negative

Offer	Accept	Message	Emotion
(80, 20)	Yes	Thanks For Nothing.	Negative
	Yes	It would have been better if you had chosen D. I was going to split $0, so you would no gain. But $4 is better than nothing. So I decide to go with it. Have I been the divider, I would have chosen D.	Negative
	Yes	I guess I'll do $20.You are getting way more than me--But if I screw you over I get no Money either---:-)	Negative
	Yes	Tuesday is election day! Vote for Kerry Read the platform johnkerry.com :-)	Neutral
	Yes	Not fair, I wish I am the divider! But I get $4 is better than none	Negative
	Yes	too selfish. I would rather get nothing and let you get a penny.	Negative
	Yes	Dude, that's kina greedy and I'm seriously contemplating designating $0… I was hoping you'd choose D so we'd both be happy but whatever, Grrrr…	Negative
	Yes	you suck, you are lucky I'm broke! If you did the A I would have put 0	Negative
	Yes	you are lucky I'm broke!	Negative
	Yes	I should have chose to divide by $0 by I'll take the $9 since I don't like wasting my time. Enjoy your $16.	Negative
(90, 10)	No	Hey, we could both benefited equally, but no --sorry	Negative
	No	I don't think so buddy!	Negative
	No	Well, we all want to make a little bit. I have the money here. Since you are my divider, I think it would but for the both of us to go for rule D. either that or we won't get nothing at all...	Neutral
	Yes	We should have divided the money equally. Don't be so greedy. People are always out for themselves	Negative

In the "Offer" column, the first number in parentheses is proposer's share and the second number is responder's share. As described in the experiment's instructions, "A" stands for (90, 10) offer, "B" stands for (80, 20) offer, "C" stands for (60, 40) offer and " D" stands for (50, 50) offer. The last column shows whether the message is classified as expressing positive emotion, negative emotion or neutral (neither positive nor negative emotion).

Supplementary Methods

I. Instruction for the proposer in NEE 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 is in the role of **Designator**. You and the Designator will participate only once in this decision problem.

This is how the experiment works.

The task of each pair is to divide either $0 or $20 between the two of you. How much money you end up with at the end of the experiment depends on the decisions both people in the pair make.

Divider (You)

You will first choose a Dividing Rule (described in detail below). A dividing Rule determines how much of each dollar will go to the Divider (you) and how much will go to the Designator (your counterpart).

Dividing Rule

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

Possible Dividing Rules	Of each Dollar to divide, the rule is
A	Divider gets **90¢** and Designator gets **10¢**
B	Divider gets **80¢** and Designator gets **20¢**
C	Divider gets **60¢** and Designator gets **40¢**
D	Divider gets **50¢** and Designator gets **50¢**
E	Divider gets **40¢** and Designator gets **60¢**
F	Divider gets **20¢** and Designator gets **80¢**
G	Divider gets **10¢** and Designator gets **90¢**

Designator (Your counterpart)

Given the dividing rule that you chose, the Designator decide how many dollars, either $0 or $20, will be divided.

If the Designator chooses to divide $0, then both you and your Designator will get $0 no matter which rule is chosen by you. If the Designator chooses to divide $20, the earnings of you and your Designator are listed in the table below, and depend on which dividing rule you chose.

	Of each Dollar to divide, the rule chosen by the Divider(You) is	If Designator chose to divide $20
A	Divider gets **90¢** and Designator gets **10¢**	Divider gets **$18** and Designator gets **$2**
B	Divider gets **80¢** and Designator gets **20¢**	Divider gets **$16** and Designator gets **$4**
C	Divider gets **60¢** and Designator gets **40¢**	Divider gets **$12** and Designator gets **$8**
D	Divider gets **50¢** and Designator gets **50¢**	Divider gets **$10** and Designator gets **$10**
E	Divider gets **40¢** and Designator gets **60¢**	Divider gets **$8** and Designator gets **$12**
F	Divider gets **20¢** and Designator gets **80¢**	Divider gets **$4** and Designator gets **$16**
G	Divider gets **10¢** and Designator gets **90¢**	Divider gets **$2** and Designator gets **$18**

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, for each dollar to divide:
>
>   Divider gets_____¢   Designator gets____¢
>
>
> **Designator: (How many dollars to divide? $0 or $20)**
>   I choose to divide $_____. Therefore,
>
>   Divider gets $_____   Designator 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: Designator makes a decision.
The experimenter will give each Divider's envelope to his/her Designator according to the tag letter on the card. The designator will then decide how many dollars to divide ($0 or $20), write that decision on the decision card and put the decision card into the envelope.

Step 4: Return cards to the Dividers
After all of the Designators have 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 his/her Designator's decision.

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 calculate his/her final earnings and pay him/her privately. Then the Divider will exit the lab and drop all the other supplies into the box near the monitor room. The Designators will be paid after all of the Dividers have been paid and have left the lab. When called, the Designator 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 Designator in Room B.
<div align="center">

End of Instructions
</div>

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.

II. Instruction for the responder in NEE 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 <u>randomly</u> and <u>anonymously</u> 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. You are in the role of **Designator** and your matched participant is in the role of **Divider**. You and the Divider will participate only once in this decision problem.

This is how the experiment works.

The task of each pair is to divide either $0 or $20 between the two of you. How much money you end up with at the end of the experiment depends on the decisions both people in the pair make.

Divider (Your counterpart)
The Divider will first choose a Dividing Rule (described in detail below). A dividing Rule determines how much of each dollar will go to the Divider and how much will go to the Designator (you).

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

Possible Dividing Rules	Of each Dollar to divide, the rule is
A	Divider gets **90¢** and Designator gets **10¢**
B	Divider gets **80¢** and Designator gets **20¢**
C	Divider gets **60¢** and Designator gets **40¢**
D	Divider gets **50¢** and Designator gets **50¢**
E	Divider gets **40¢** and Designator gets **60¢**
F	Divider gets **20¢** and Designator gets **80¢**
G	Divider gets **10¢** and Designator gets **90¢**

Designator (You)
Given the dividing rule that the Designator chose, you decide how many dollars, either $0 or $20, will be divided.

If you choose to divide $0, then both you and your divider will get $0 no matter which rule is chosen by the Divider. If you choose to divide $20, the earnings of your Divider and you are listed in the table below, and depend on which dividing rule the Divider chose.

	Of each Dollar to divide, the rule chosen by the Divider is	If Designator (You) chose to divide $20
A	Divider gets **90¢** and Designator gets **10¢**	Divider gets **$18** and Designator gets **$2**
B	Divider gets **80¢** and Designator gets **20¢**	Divider gets **$16** and Designator gets **$4**
C	Divider gets **60¢** and Designator gets **40¢**	Divider gets **$12** and Designator gets **$8**
D	Divider gets **50¢** and Designator gets **50¢**	Divider gets **$10** and Designator gets **$10**
E	Divider gets **40¢** and Designator gets **60¢**	Divider gets **$8** and Designator gets **$12**
F	Divider gets **20¢** and Designator gets **80¢**	Divider gets **$4** and Designator gets **$16**
G	Divider gets **10¢** and Designator gets **90¢**	Divider gets **$2** and Designator gets **$18**

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, for each dollar to divide:
>
> Divider gets_____¢   Designator gets____¢
>
>
> **Designator: (How many dollars to divide? $0 or $20)**
> I choose to divide **$_____**. Therefore,
>
> Divider gets **$_____**   Designator gets **$_____**

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: Designator makes a decision.
The experimenter will give each Divider's envelope to his/her Designator according to the tag letter on the card. The designator will then decide how many dollars to divide ($0 or $20), write that decision on the decision card and put the decision card into the envelope.

Step 4: Return cards to the Dividers
After all of the Designators have 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 his/her Designator's decision.

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 calculate his/her final earnings and pay him/her privately. Then the Divider will exit the lab and drop all the other supplies into the box near the monitor room. The Designators will be paid after all of the Dividers have been paid and have left the lab. When called, the Designator 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.

III. Instruction for the proposer in EE 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 <u>randomly</u> and <u>anonymously</u> 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 is in the role of **Designator**. You and the Designator will participate only once in this decision problem.

This is how the experiment works.

The task of each pair is to divide either $0 or $20 between the two of you. How much money you end up with at the end of the experiment depends on the decisions both people in the pair make.

Divider (You)

You will first choose a Dividing Rule (described in detail below). A dividing Rule determines how much of each dollar will go to the Divider (you) and how much will go to the Designator (your counterpart).

Dividing Rule

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

Possible Dividing Rules	Of each Dollar to divide, the rule is
A	Divider gets **90¢** and Designator gets **10¢**
B	Divider gets **80¢** and Designator gets **20¢**
C	Divider gets **60¢** and Designator gets **40¢**
D	Divider gets **50¢** and Designator gets **50¢**
E	Divider gets **40¢** and Designator gets **60¢**
F	Divider gets **20¢** and Designator gets **80¢**
G	Divider gets **10¢** and Designator gets **90¢**

Designator (Your counterpart)

Given the dividing rule that you chose, the Designator decide how many dollars, either $0 or $20, will be divided. He/she can also write a short message to you. The message can be anything the Designator wants to say to you. **Please note:** Foul language and threatening messages are not allowed.

If the Designator chooses to divide $0, then both you and your Designator will get $0 no matter which rule is chosen by you. If the Designator chooses to divide $20, the earnings of you and your Designator are listed in the table below, and depend on which dividing rule you chose.

Of each Dollar to divide, the rule chosen by the Divider(You) is	If Designator chose to divide $20
A Divider gets **90¢** and Designator gets **10¢**	Divider gets **$18** and Designator gets **$2**
B Divider gets **80¢** and Designator gets **20¢**	Divider gets **$16** and Designator gets **$4**
C Divider gets **60¢** and Designator gets **40¢**	Divider gets **$12** and Designator gets **$8**
D Divider gets **50¢** and Designator gets **50¢**	Divider gets **$10** and Designator gets **$10**
E Divider gets **40¢** and Designator gets **60¢**	Divider gets **$8** and Designator gets **$12**
F Divider gets **20¢** and Designator gets **80¢**	Divider gets **$4** and Designator gets **$16**
G Divider gets **10¢** and Designator gets **90¢**	Divider gets **$2** and Designator gets **$18**

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, for each dollar to divide: │
│                                                              │
│           Divider gets_____¢   Designator gets____¢          │
│                                                              │
│                                                              │
│  Designator: (How many dollars to divide?  $0 or $20)        │
│    I choose to divide $_____.  Therefore,                   │
│                                                              │
│           Divider gets $_____     Designator 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: Designator makes a decision.
The experimenter will give each Divider's envelope to his/her Designator according to the tag letter on the card. The designator will then decide how many dollars to divide ($0 or $20) and write that decision on the decision card. The designator will also be given a blank card where he/she can write a short message to the Divider and put both the decision card and the message card into the envelope.

Step 4: Return cards to the Dividers
After all of the Designators have 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 his/her Designator's decision and the message the Designator wrote.

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 calculate his/her final earnings and pay him/her privately. Then the Divider will exit the lab and drop all the other supplies into the box near the monitor room. The Designators will be paid after all of the Dividers have been paid and have left the lab. When called, the Designator 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 Designator in Room B.
<div align="center">**End of Instructions**</div>
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.

IV. Instruction for the responder in EE 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 <u>randomly</u> and <u>anonymously</u> 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. You are in the role of **Designator** and your matched participant is in the role of **Divider**. You and the Divider will participate only once in this decision problem.

This is how the experiment works.

The task of each pair is to divide either $0 or $20 between the two of you. How much money you end up with at the end of the experiment depends on the decisions both people in the pair make.

Divider (Your counterpart)
The Divider will first choose a Dividing Rule (described in detail below). A dividing Rule determines how much of each dollar will go to the Divider and how much will go to the Designator (you).

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

Possible Dividing Rules	Of each Dollar to divide, the rule is
A	Divider gets **90¢** and Designator gets **10¢**
B	Divider gets **80¢** and Designator gets **20¢**
C	Divider gets **60¢** and Designator gets **40¢**
D	Divider gets **50¢** and Designator gets **50¢**
E	Divider gets **40¢** and Designator gets **60¢**
F	Divider gets **20¢** and Designator gets **80¢**
G	Divider gets **10¢** and Designator gets **90¢**

Designator (You)
Given the dividing rule that the Designator chose, you decide how many dollars, either $0 or $20, will be divided. You can also 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.

If you choose to divide $0, then both you and your divider will get $0 no matter which rule is chosen by the Divider. If you choose to divide $20, the earnings of your Divider and you are listed in the table below, and depend on which dividing rule the Divider chose.

	Of each Dollar to divide, the rule chosen by the Divider is	If Designator (You) chose to divide $20
A	Divider gets **90¢** and Designator gets **10¢**	Divider gets **$18** and Designator gets **$2**
B	Divider gets **80¢** and Designator gets **20¢**	Divider gets **$16** and Designator gets **$4**
C	Divider gets **60¢** and Designator gets **40¢**	Divider gets **$12** and Designator gets **$8**
D	Divider gets **50¢** and Designator gets **50¢**	Divider gets **$10** and Designator gets **$10**
E	Divider gets **40¢** and Designator gets **60¢**	Divider gets **$8** and Designator gets **$12**
F	Divider gets **20¢** and Designator gets **80¢**	Divider gets **$4** and Designator gets **$16**
G	Divider gets **10¢** and Designator gets **90¢**	Divider gets **$2** and Designator gets **$18**

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, for each dollar to divide:
>
>   Divider gets_____ **¢**   Designator gets_____ **¢**
>
> **Designator: (How many dollars to divide? $0 or $20)**
>   I choose to divide $_____. Therefore,
>
>   Divider gets $_____   Designator 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: Designator makes a decision.

The experimenter will give each Divider's envelope to his/her Designator according to the tag letter on the card. The designator will then decide how many dollars to divide ($0 or $20) and write that decision on the decision card. The designator will also be given a blank card where he/she can write a short message to the Divider and put both the decision card and the message card into the envelope.

Step 4: Return cards to the Dividers

After all of the Designators have 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 his/her Designator's decision and the message the Designator wrote.

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 calculate his/her final earnings and pay him/her privately. Then the Divider will exit the lab and drop all the other supplies into the box near the monitor room. The Designators will be paid after all of the Dividers have been paid and have left the lab. When called, the Designator 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.

<div style="text-align:center">**End of Instructions**</div>

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.