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Listen: I am angry!
An experiment comparing ways of revealing emotions*

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Abstract

We report on an experiment designed to explore whether allowing individuals to voice their anger prevents costly punishment. For this sake, we use an ultimatum minigame and distinguish two treatments: one in which responders can only accept or reject the offer, and the other in which they can also scold the proposer. By an unannounced successive two-person public goods game, with either the same partner or a different one, we additionally explore how “having a voice” affects later behavior. The evidence supports the conclusion that voicing one’s outrage crowds out the need to harm oneself and the other. Yet, this emotional reaction does not lead to increased future cooperation.

JEL Classification: C72, C78, C92, H41

Keywords: Ultimatum bargaining; Public goods game; Outrage; Punishment

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1 Introduction

People become angry when they are cheated or when their partners do not live up to what can be reasonably expected. With or without consciousness, anger may induce humans to make choices that are inconsistent with narrow definitions of pure self-interest, based on material well-being.¹ We report here on an experiment designed to explore institutional opportunities that can help individuals cope with their anger, thereby avoiding inefficient punishment. Specifically, we want to study the behavioral validity of the *need for a voice-hypothesis*, as opposed to the *need to harm-hypothesis*. The “need for a voice-hypothesis” asserts that allowing individuals to voice their anger suffices to prevent behavior that is costly for all involved parties. In contrast, “the need to harm-hypothesis” states that only harming materially those who have deluded one’s expectations alleviates one’s anger, even though this implies pecuniary costs for oneself.

The context within which we test the need for a voice-hypothesis is the two-person ultimatum minigame or UMG (Bolton and Zwick, 1995; Gale et al., 1995), a game that has been extensively used to investigate costly punishment. In the UMG, the first mover (the “proposer”) offers one of two possible payoff vectors – a “fair” and an “unfair” one – and the second mover (the “responder”) either accepts the offer, which then becomes the actual payoff vector, or vetoes it, yielding zero-payoffs for both parties. Standard game theory, based on material self-interest, implies that the responder will never choose a zero payoff when she can obtain a positive payoff (e.g., the responder will never choose to *punish*).

However, previous experimental research has shown that many responders are unwilling to accept the “unfair” offer, even though rejection rates depend systematically on alternative offers not chosen by the proposers (Güth et al., 2001; Falk et al., 2003; Cox et al., 2007). The finding that the unfair offer

¹In the last few decades, economists such as Loewenstein (2000) or Romer (2000) have enlarged their models of human behavior so as to include emotions. For a survey see Elster (1998).

(possessing positive values) is often turned down justifies the assumption that the responders feel outraged when receiving the meager offer (Huang, 2000). Brain imaging studies, conducted on participants in the responder role, indicate that the likelihood of rejection is correlated with brain activity involving negative emotions (Sanfey et al., 2003).

The UMG is framed with an obvious fairness norm: the proposer should offer the fair allocation because she did not “earn” her position, but rather gained it without entitlement. Hence, the responder reasonably expects the proposer to act fairly. Unfulfilled expectations provoke anger that leads the responder to reject the positive, but meager, offer in order to inflict a much more dramatic loss on the proposer.² The need to harm-hypothesis claims that the responder can cope with her anger only punishing the proposer, although this entails auto-punishment.³ Our aim is to investigate whether allowing the responder to scold the proposer via symbolic gestures can help the responder handle her anger and avoid the inefficient pecuniary retaliation. To test the need for a voice-hypothesis, our design distinguishes two treatments that differ according to whether the opportunity to scold the proposer is present or not. The need for a voice-hypothesis will be supported if the availability of such symbolic gestures increases the acceptance rate of the meager offer.

Having grudgingly accepted a meager offer may, however, not suffice to eliminate one’s anger, and one may desire further retribution. By the same token, having been able to express one’s own anger via symbolic gestures may help the responder to get over it. We try to detect the prevailing feeling via an initially unannounced second phase where proposers and responders interact in

²The conjecture that the meager offer is commonly rejected due to frustrated expectations of “fair” offers is confirmed by the observation that rejection rates decrease if the fairness norm vanishes because the proposer earns her position, e.g., through an auction (as in Güth and Tietz, 1986) or by scoring high on a general knowledge quiz (as in Hoffman et al., 1994). Less rejection behavior is observed also when the experimental procedures are perceived as fair (see, e.g., Bolton et al., 2005, Karni et al., in press, and references therein).

³Although similar to Bolton and Zwick (1995)’s punishment hypothesis, the need to harm-hypothesis has a different non-materially consequentialist interpretation: responders do not punish the proposer in order to move play towards fair outcomes, but only as a means to express their anger.

a two-person public goods game. Each pair is composed by one proposer and one responder, who, depending on the treatment, have or have not interacted with each other in the prior game. By means of this experimental design, we want to investigate how being able to scold the proposer affects future behavior, and whether contribution decisions depend on the specific rematching procedures. The question is important because it may shed light on issues like whether allowing workers to openly protest enhances the future relationship with their employer or whether giving citizens freedom of speech and press turns out to be a good strategy in dictatorial states.

To the best of our knowledge, this is the first economics experiment designed to provide insights into the influence of “having a voice” on future behavior. In contrast, there is some experimental literature that aims at identifying the extent to which non-monetary punishment alters behavior. Relying on the voluntary contribution mechanism, Masclet et al. (2003) study the impact of informal sanctions on contribution levels and find that the possibility to express disapproval of others’ behavior in itself increases the average level of contributions and earnings. In a similar game, Noussair and Tucker (2005) demonstrate that a sanctioning system combining formal and informal penalties is more effective than a system where only one type of sanction is available.

Xiao and Houser’s (2005) study is probably the one most closely related to ours. They examine a standard ultimatum game in which the responder is given the opportunity to write a message to the proposer at no pecuniary cost. There are, however, some major differences between their design and ours. First, they use free-form messages requiring evaluations of their emotional content. Instead, we ask responders to indicate on a bipolar scale of -3 to $+3$ how they consider the proposer’s offer (-3 , “very outrageous”; $+3$, “very generous”); thus, we can easily quantify the responder’s feelings.⁴ Second, in Xiao and Houser’s experiment, responders have to decide whether to accept or reject

⁴Xiao and Houser (2005, p. 7401) acknowledge that they cannot know the true emotion behind any of the messages they collected.

a known offer. On the contrary, we employ the strategy method, i.e., responders in our experiment have to react to each possible proposal. Moreover, the question of how the opportunity to scold the proposer affects later behavior is not addressed by Xiao and Houser.

The rest of the paper is organized as follows. In Section 2, we introduce the two games on which our experimental design is based. Details about the experimental procedures are provided in Section 3. Section 4 reports the main results of our experiment. Section 5 sums up and offers concluding remarks.

2 The experimental games

2.1 The ultimatum minigame

The basic game that we use to explore the need for a voice-hypothesis is the UMG depicted in Figure 1. The first mover P is restricted to two offers: unfair offer x , which gives €18 to P and €2 to R , or “fair” offer y , which slightly favors the responder as it assigns €9 to P and €11 to R . The second mover R either accepts the offer (a and a'), which then becomes the actual payoff vector, or else refuses it (r and r'), in which case the payoff is zero for both players.

Insert Figure 1 about here

If players are only guided by monetary incentives, the solution of the game is the unique subgame perfect equilibrium $s^* = (x, (a, a'))$, according to which R should accept all offers. Nevertheless, former experimental data clearly contradict this solution play: rejection rates of the unfair offer are found to be quite high, especially when the “fair” offer slightly favors R (Güth et al., 2001).

We consider two treatments that differ according to whether R can send a message to P or not. In one treatment, we confront participants with the UMG in Figure 1. In the other treatment, we consider an “augmented” version in which R , besides choosing between rejection and acceptance, can transmit

a message to P , communicating a level of approval or disapproval of her offer. We do not permit free-form messages, but instead allow R to rate the offer on a bipolar scale of -3 to $+3$, where each rating has attached a given word (from “very outrageous” to “very generous”). Based on the need for a voice-hypothesis, we expect that the possibility of scolding or praising the proposer will affect responder behavior and lead to higher acceptance rates of the meager offer as compared to the situation where rejection is the only viable option.

2.2 The linear public goods game

We investigate whether and to what extent the possibility of communicating (dis)approval of P 's offer affects later behavior by means of an initially unannounced second phase where pairs confront a two-person linear public goods game. Each pair consists of one proposer and one responder who, depending on the treatment, either have or have not interacted in the prior (standard or augmented) UMG.

In the public goods game, each player i receives an endowment of €10 and has to decide how much she wants to contribute to a public good. Denoting by c_i player i 's contribution to the public good, with $c_i = \{0, 1, 2, \dots, 10\}$ for $i = 1, 2$, the monetary payoff of each i is given by

$$u_i(c_1, c_2) = 10 - c_i + 0.75(c_1 + c_2).$$

Maximization of own monetary payoffs requires a player to contribute zero. However, numerous experimental studies, even with single-shot settings, have shown that individuals contribute positive amounts (for reviews see Ledyard, 1995, or Holt and Laury, forthcoming). Our aim is to explore whether these positive contributions differ depending on whether or not R had the possibility to express (dis)approval of P 's decision in the prior game. Because both theory and empirical evidence on the issue are lacking, rather than formulating a specific hypothesis, we prefer to be guided by data. In this sense, this aspect

of our study is explorative.

3 Experimental protocol

The experiment is based on the games introduced in the previous section. Participants first interact either in a standard UMG or in an “augmented” UMG (phase 1). Then they play the linear public goods game either with the same person or with a different one (phase 2). This yields a 2×2 factorial between-subjects design with the two versions of the UMG and the different rematching procedures in the subsequent public goods game as treatment factors, i.e., treatments depend on the game being in force in phase 1 and the rematching procedure in effect in phase 2.

The standard UMG displayed in Figure 1, where rejection is the only “punishment” option available to responders, represents our control (henceforth *C*-treatment). When the responder, in addition to accepting and rejecting offers, can send a message to the proposer, we speak of the *message*-treatment (henceforth *M*-treatment). Depending on whether participants play the subsequent two-person public goods game being matched with the same person as in the first phase or with a different person, we have the Partner- or the Stranger-treatment. Table 1 summarizes our four treatments and their characteristics.

Insert Table 1 about here

The computerized experiment was conducted at the laboratory of the Max Planck Institute in Jena (Germany). The experiment was programmed using the z-Tree software (Fischbacher, 2007). Participants were undergraduate students from different disciplines at the University of Jena. Some of the subjects had previously participated in economic experiments, but all were inexperienced with the ultimatum game and the voluntary contributions mechanism. After being seated at a computer terminal, participants received written in-

structions,⁵ which explained only the rules of the game effective in phase 1.

At the beginning, participants were randomly assigned the P or the R role. To collect sufficient data, the UMG under both the C - and the M -treatment was played in normal form, meaning that each responder R had to specify a strategy $s_R \in \{(a, a'), (a, r'), (r, a'), (r, r')\}$. In the M -treatment, subjects were also informed that each R had the option to send a message to P . More specifically, R could (if she wanted to) rate each of the two offers on a bipolar scale of -3 to $+3$. A specific word was attached to each number: the most disapproval (i.e., -3) was denoted by “very outrageous”; the best approval (i.e., $+3$) by “very generous”.⁶ Being able to approve fairness and/or to scold P for unfairness should eliminate possible “demand effects” of the message possibility, in the sense that subjects identify moral outrage as the experiment’s motivation. The proposer P got to know at the end of the session if and how R had rated her actual offer.

After having interacted in the UMG, subjects in both the C - and the M -treatments were unexpectedly told that they would have to play the public goods game. Since the payoffs attained in phase 1 might affect behavior in the succeeding game, subjects received no feedback after the UMG. By this means, each player could be sure only of her own choice, allowing us to elicit contribution decisions conditional on the opponent’s behavior in the first phase. Specifically, each player i had to decide how much to contribute to the public good for each choice that her opponent could have made in the previous phase: P had to choose her contribution both in case of R ’s acceptance and in case of R ’s rejection; similarly, R had to choose her contribution both in case P proposed allocation x and in case P proposed allocation y . In C -Partner and M -Partner, participants were informed that they would be paired with the same person as in the previous experiment. In C -Stranger and M -Stranger, participants knew that they would interact with a different person.

⁵See the Appendix for an English translation.

⁶For details about all the used words, see the instructions in the Appendix.

In total we ran 4 sessions, each involving 32 participants and implementing one of the four treatments. Because phase 2 was unannounced, the decisions of proposers and responders in phase 1 are unaffected by the subsequent rematching procedure. Hence, we can pool the data from *C*-Partner and *C*-Stranger and from *M*-Partner and *M*-Stranger, and obtain 32 independent observations for each of the two parties in both the *C*- and the *M*-treatments. As to contribution decisions, for each of the four treatments, we can rely on 16 independent observations for proposers and 16 independent observations for responders.

Each experimental session took about 1 hour. Averaging over all four treatments, mean earnings were €19.88 for proposers and €20.38 for responders.

4 Results

4.1 Responder behavior

The main result for the UMG, presented in Figure 2, concerns the proportion of responders vetoing unfair offer $x = (18, 2)$ in the *C*- and the *M*-treatments. Of the 32 responders, twenty-four (75%) rejected x when rejection was their only “punishment” option (this frequency is in line with previous evidence; see, e.g., Camerer, 2003). In contrast, only fifteen responders (47%) did so when they “had a voice”.⁷

Insert Figure 2 about here

An exact binomial test rejects the null hypothesis of equality in rejection rates of the x -offer between treatments, in favor of the alternative that the rate of rejections is significantly lower in the *M*-treatment than in the *C*-treatment ($p < 0.001$). The robustness of this result is corroborated by a Pearson χ^2 -test ($p = 0.002$, $\chi^2 = 9.70$). These statistical results indicate support for the need for a voice-hypothesis: displaying emotional outrage seems to crowd out the need to use pecuniary retaliation.

⁷The alternative fair offer $y = (9, 11)$ was universally accepted under both treatments.

To confidently assert that the possibility of scolding the proposer affects responder behavior, we turn to investigate whether and to what extent responders used the additional option in the M -treatment. Twenty-six of the 32 responders (81.25%) sent a message to P , thereby rating each of the two offers. Eighteen of them (69%) expressed the strongest disapproval of the x -offer by assigning -3 (“very outrageous”) to it. The remaining eight responders rated x either -2 (“outrageous”) or -1 (“slightly outrageous”) (15% per rating). The unfair offer was, on average, rated -2.25 , which conveys strong resentment. As to the y -offer, twenty-five of the twenty-six responders who sent the message expressed positive feelings towards it: seventeen of them (65%) said that y was worth $+3$ (“very generous”) or $+2$ (“generous”), and eight granted it $+1$ (“slightly generous”). Only one responder assigned 0 to y , meaning that she was “neutral” with respect to it. The average rate of the fair offer amounted to 1.96 .

We investigate if the transmission of a message has a significant impact on the acceptance of the unfair offer with the help of both a Probit model and a correlation analysis. The dependent variable of the Probit regression is the decision of a responder about the x -offer, which is coded 1 in case of acceptance. The independent variable is a dummy taking value of 1 when the message was sent. The analysis reveals a strong influence of the explanatory variable on the likelihood of acceptance (the coefficient of the dummy is significantly positive: $\beta = 1.261$, $p = 0.05$). The Pearson’s product-moment correlation coefficient confirms this finding ($r = 0.651$, $p = 0.048$).

We sum up our observations on responder behavior under the C - and M -treatment in two behavioral regularities.

Regularity 1 *Responders reject the unfair offer less often when they can express disapproval of the offer than when rejection is their only viable option.*

Regularity 2 *Under the M -treatment, the likelihood that responders accept the unfair offer increases significantly if they send the message.*

Our next step is to look at responder behavior in the subsequent public goods game. Table 2 summarizes our results on responders' contribution decisions in each of the four treatments.

Insert Table 2 about here

Whatever the treatment, responders contributed, on average, significantly more in case of offer y than in case of offer x ($p \leq 0.04$ for each of the four comparisons; two-sided Wilcoxon signed-rank test with continuity correction). For the y -offer, average contributions range from 3.19 in M -Stranger to 4.56 in C -Partner. A series of two-sided Wilcoxon rank-sum tests indicate that contributions conditional on y do not vary significantly across treatments ($p > 0.174$ for all possible pairwise comparisons).

As regards average contributions that are conditional on offer x , they are the lowest in M -Stranger (1.38) and the highest in M -Partner (2.94): the difference in contributions between these treatments is significant at a p -value of 0.047 only using a one-sided test (Wilcoxon rank-sum). No statistically significant difference is detected between C -Partner and C -Stranger ($p = 0.633$). Turning to the investigation of whether the possibility to scold the proposer offering x affects behavior in the public goods game, we note that responders contributed, on average, more when they had this possibility than when they did not have it under Partner, but not under Stranger, rematching (see Table 2). The difference in contribution behavior between C -Partner and M -Partner is, however, only (weakly) significant applying a one-sided test ($p = 0.10$, one-sided Wilcoxon rank-sum test). The difference between C -Stranger and M -Stranger is clearly not significant ($p = 0.812$). These observations lead us to our next regularities.

Regularity 3 *In all four treatments, responders contribute, on average, significantly more in case of offer y than in case of offer x .*

Regularity 4 *The M - and the C -treatment do not prompt different contributions by responders in case of offer y , whatever the rematching procedure.*

The M-treatment yields weakly significantly higher contributions than the C-treatment in case of offer x under Partner, but not under Stranger, rematching.

Does the responder's prior decision about x affect her later contribution decisions? And if so, does this depend on the treatment? We address these questions via a generalized linear model (based on a Poisson distribution) regressing individual i 's contribution decisions on i 's prior choice about x (*Choice UMG*) and treatment dummies.⁸ *Message* takes value 0 for the *C*-treatment and 1 for the *M*-treatment. *Matching* equals 0 for Partner and 1 for Stranger. Table 3 lists the estimates for the coefficients, standard errors and z -statistics.

Insert Table 3 about here

The coefficient of *Choice UMG* is positive and significant, implying that average contributions tend to increase if responders accepted the meager offer in the *C*-treatment. The contrary holds for the *M*-treatment: the significantly negative coefficient of the interaction effect between *Choice UMG* and *Message* exceeds (in absolute value) the positive coefficient of *Choice UMG*, indicating that responders who "had a voice" contribute less if they accepted x .⁹ The coefficient of *Choice UMG* \times *Matching* is significantly negative, implying that contributions are lower if subjects accepted the meager offer and the Stranger rematching was in effect in phase 2. Responders tend to contribute higher amounts if they faced the *M*-treatment, but (as suggested by Regularity 4) this behavior is less pronounced under Stranger rematching. This is suggested by the significantly positive coefficient of the dummy *Message* and the significantly negative coefficient of *Message* \times *Matching*: the total effect is still positive, but its size is (in absolute terms) smaller than the effect under Partner rematching. Finally, the coefficient of *Matching* is not significant, meaning that the different

⁸Since offer y was universally accepted, running a regression on contributions conditional on y appears to be meaningless.

⁹A simple correlation analysis confirms that acceptance of the meager offer and contribution levels are positively related under the *C*-treatment (Pearson's $r = 0.178$) and negatively related under the *M*-treatment (Pearson's $r = -0.192$).

rematching procedures have no effect per se.

The regression analysis confirms the results of the non-parametric tests, and suggests that substituting inefficient pecuniary punishment with symbolic retaliation does not suffice to eliminate one's anger: responders who accepted the low offer by expressing their anger in a symbolic manner are less willing to cooperate with proposers compared to responders who accepted an unfair treatment without possibility to react emotionally.

4.2 Proposer behavior

The results on proposer behavior in the UMG and the public goods game are summarized in Tables 4 and 5, respectively.

Insert Tables 4 and 5 about here

Nine of the 32 proposers (28%) offered x in the C -treatment, and eleven (34%) did so in the M -treatment. The proportion of proposers choosing the meager offer does not significantly differ across treatments (exact binomial test, $p = 0.435$; Pearson $\chi^2 = 0.348$, $p = 0.555$). Thus, allowing the responders to voice their anger did not affect proposers' decisions. The latter result is in line with previous empirical evidence (Xiao and Houser, 2005).

Given the different rejection rates of the meager offer, the expected return from x also varies across treatments. Table 4 shows that proposers did not make the payoff-maximizing choice in the M -treatment, where they would have profited more from offering x rather than y . This behavior may be explained by the assumption that most proposers care for fairness, but also by the assumption that proposers in the M -treatment did not anticipate the responder's acceptance of the meager offer. Because the majority of proposers in both treatments offered the fair allocation, which all responders accepted, the different rejection rates of the unfair offer do not affect the earnings of either party: a two-sided Wilcoxon rank-sum test comparing proposers' (responders') earn-

ings in the two treatments yields $p = 0.384$ (0.73). The evidence on proposer behavior can be summarized by:

Regularity 5 *The responders' possibility to voice their anger does not affect proposer behavior: the rates of the meager offer do not significantly differ across treatments.*

Finally, we consider the proposers' contribution decisions in the following public goods game. Table 5 indicates that, regardless of the treatment, proposers react differently depending on whether the responder accepted the offer or vetoed it. The difference between contributions conditional on R 's acceptance and contributions conditional on R 's rejection is significant at the 5%-level for C -Partner, M -Partner and M -Stranger, but only at the 10%-level for C -Stranger (two-sided Wilcoxon signed-rank test with continuity correction).

There is no statistically significant difference, at any conventional level, between contributed amounts across treatments for contributions conditional on R 's acceptance. The same applies to contributions conditional on R 's rejection. The results on proposers' contribution decisions are summarized in our last regularity.

Regularity 6 *Proposers tend to contribute, on average, significantly more in case of responder's acceptance. Yet, both conditional contributions are not affected by the game being in force in phase 1 nor by the rematching procedure in effect in phase 2.*

To investigate whether the proposer's decision in the UMG influences her following contribution behavior, we performed two generalized linear regressions, similar to the one reported in Table 3, separately for each conditional contribution (the variable *Choice UMG* stands now for the proposer's decision in the UMG). The regression analysis corroborates the results emerging from the previous statistical tests (the coefficients of the treatment dummies are always not significant), and indicates that the offer made in the UMG has no

effect on amounts contributed in the public goods game (for both regressions, the coefficient of *Choice UMG* is very small and not significant).

5 Concluding remarks

In many circumstances, negative emotions such as anger or disappointment drive human behavior. There is ample theoretical and experimental evidence showing that individuals act against their own self-interest in order to punish those who trigger their anger (Huang, 2000; Bosman and van Winden, 2002; Fehr and Gächter, 2002; Sanfey et al., 2003). The task for the social scientist is, thus, to identify alternative factors that may help individuals *sate* their desire for inefficient pecuniary retaliation. Here, we have provided support for the so-called “need for a voice-hypothesis” in the context of an ultimatum minigame. The results of our experiment clearly show that responders who can voice their anger are less prone to inflict monetary harm on oneself and on the proposer (namely, to reject the meager offer) compared to responders whose only option is costly punishment.

Symbolic gestures, such as scolding openly the proposer, may help the responder sustain her own morale without having to turn down positive, though low, offers (Khalil, 2007). Or, as Xiao and House (2005) observe, the responder may think that acceptance of the meager offer would signal the proposer that she is willing to accept an inferior position. By expressing disapproval of the proposer’s decision, the responder can deny this interpretation. Or simply being aware that she has multiple options from which she can freely pick one may help the responder soothe her anger. As soon as she begins to think about her options and their consequences, and makes appropriate plans, the responder may start feel more in control. She gets out of the automatic stimulus-response (here, anger-retribution) mode and realizes that she has choices. There is a quote that goes like this: “*Between stimulus and response, there is a space. In*

that space lies our freedom and power to choose our response. In our response lies our growth and freedom” (Viktor Frankl, 2000). Simply put, when various ways of conveying outrage are possible, some people are more willing to accept the circumstances requiring them to be the “losers”.

The following interaction in the public goods game reveals, however, that non-pecuniary expressions of anger do not suffice to get rid of the latter. Our results indicate that responders who accepted an unfair treatment by replacing the pecuniary retaliation with the symbolic one exhibit less future cooperation levels than responders who vetoed the unfair offer. In contrast, willingly accepting an “inferior” position, without being able to symbolically punishing the proposer, is more likely to boost future cooperation.

At a more general level, this finding has far-reaching consequences because it means that in situations where the two parties have different roles, the person in the “top dog” position can more easily enforce her preferred outcome against opposition of the “underdog” by allowing the latter to express her feelings. Yet, this holds as long as the “top dog-underdog state” persists: if the underdog ameliorates her condition, having had a voice lowers her incentives to behave in the group interest. Therefore, when, e.g., a firm manager must decide whether or not enabling workers to voice disapproval, she has to take into account two opposing effects. Until the workers keep their status, letting them freely convey their disapproval may be beneficial. However, if a worker climbs the social ladder, it becomes more difficult to convince her to voluntarily cooperate. Thus, while our study confirms previous findings about the importance people attach to expressing negative emotions, it casts some doubts on the long-run efficiency of “voicing one’s anger”.

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Appendix. Translated instructions

Instructions for the ultimatum minigame (distributed at the beginning of the experiment)

Welcome and thanks for participating in this experiment. Please read the instructions – which are identical for all participants – carefully. During the experiment you are not allowed to talk to other participants. If you do not follow this rule, you will be excluded from the experiment and you will not receive any payment. Whenever you have a question, please raise your hand. An experimenter will come to you and answer your questions individually. Your earnings in this experiment will depend partly on your decisions and partly on the decisions of another participant. All your decisions will be treated anonymously and cannot be traced to your name.

DETAILED INFORMATION ON THE EXPERIMENT

In this experiment, participants are matched in groups of two. You will therefore be paired with another participant. Each of the two members of a pair will be randomly assigned one of two roles: *A* or *B*. You will read your role on your screen at the beginning of the experiment. Each pair can share €20.

- The *A*-member of the pair must propose the distribution of the €20. In particular, *A* can propose one of the following two distributions:

Distribution 1: *A* keeps €9 for him/herself and gives the remaining €11 to *B*;

Distribution 2: *A* keeps €18 for him/herself and gives the remaining €2 to *B*.

- The *B*-member of the pair must decide, for each of the two possible distributions of the €20, if (s)he accepts or rejects it. Thus, *B* will face the following table:

	Distribution 1 <i>A</i> keeps €9 and <i>B</i> gets €11	Distribution 2 <i>A</i> keeps €18 and <i>B</i> gets €2
Accept	○	○
Reject	○	○

For each of the two distributions, *B* must specify if (s)he accepts or rejects it by clicking on the corresponding circle.

[Participants in the M-treatment read the following two paragraphs:]

Moreover, *B* has the opportunity to send a message to *A*, registering his/her approval or disapproval of each distribution *A* may propose. If *B* decides to use this opportunity, (s)he will see on his/her screen the following tables:

Distribution 1 A keeps €9 and B gets €11						
-3 very offensive ○	-2 offensive ○	-1 slightly offensive ○	0 neutral ○	1 slightly generous ○	2 generous ○	3 very generous ○

Distribution 2 A keeps €18 and B gets €2						
-3 very offensive ○	-2 offensive ○	-1 slightly offensive ○	0 neutral ○	1 slightly generous ○	2 generous ○	3 very generous ○

For each distribution *A* can propose, *B* can rate it on a scale of “-3” to “3” by clicking on the corresponding circle (a rating of “-3” means that *B* considers that specific proposal “very offensive”; a rating of “3” means that *B* considers it “very generous”). In case *B* decides to rate the two distributions, *A* will learn about *B*’s rating of his/her actual proposal at the end of today’s session.]

After *A* and *B* have made their choices, their payoff is determined as follows:

- if *B* has accepted the actual proposal by *A*, then both get what *A* has proposed, i.e., *A* earns either €9 or €18 and *B* earns, respectively, either €11 or €2.
- if *B* has rejected the actual proposal by *A*, then both earn nothing, i.e., the €20 are lost.

The earnings that *A* and *B* will receive are summarized in the chart below:

	A earns	B earns
A proposes distribution 1 and B accepts	€9	€11
A proposes distribution 1 and B rejects	€0	€0
A proposes distribution 2 and B accepts	€18	€2
A proposes distribution 2 and B rejects	€0	€0

Before the experiment starts, you will have to answer some control questions to demonstrate your understanding of the experiment.

Please remain quiet until the experiment starts and switch off your mobile phone. If you have any questions, please raise your hand now.

Instructions for the public goods game (distributed after all subjects had interacted in the ultimatum minigame)

Before getting to know the decision of the other member of your pair (and thus your earnings) in the previous experiment, we kindly ask you to take part in another experi-

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ment. The money you will earn in this second experiment will be added up to what you have earned in the first experiment and paid out to you in cash at the end of today's session. Please take your time to read the instructions for the second experiment at your own pace. If you have any questions while reading them, please raise your hand and one of the experimenters will come to your place.

DETAILED INFORMATION ON EXPERIMENT II

[*Participants under Partner rematching read:* In this second experiment, you will be paired with the same participant as in the previous experiment.]

[*Participants under Stranger rematching read:* In this second experiment, you will be paired with a participant who had a role different from yours in the previous experiment, but (s)he is not the one you interacted with.]

At the beginning of the experiment you, as well as the other member of your pair, will receive an endowment of €10, and must decide ONLY ONCE how to use your endowment. In particular, you have to decide how much of your endowment you want to contribute to a project. Your contribution must be not smaller than €0 and not greater than €10. Furthermore, it must be an integer number. Whatever you do not contribute, you keep for yourself ("euros you keep").

Your earnings are the sum of:

- (1) the "euros you keep": €10 – your contribution;
- (2) the "income from the project".

$$\text{Your earnings} = (\text{€10} - \text{your contribution}) + \text{Income from the project}$$

The "income from the project" is determined by adding up the contributions of the two members of a pair and multiplying the resulting sum by 0.75. That is, the income from the project is given by

$$(\text{Your contribution} + \text{Your pair member's contribution}) \times 0.75.$$

The income from the project is determined in the same way for the two members of a pair; this means that both receive the same income from project, regardless of the size of their individual contributions.

FOR EXAMPLE, if the sum of your contribution and your pair member's contribution is €6, then both you and your pair member receive an income from the project of $6 \times 0.75 = \text{€4.5}$. If you and your pair member together contribute €15, then both receive an income from the project of $15 \times 0.75 = \text{€11.25}$.

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You have to decide about your contribution for each of the possible decisions that the other member of your pair could have made in the previous experiment.

- For instance, if you were the *A*-member of your pair in the previous experiment, you must decide how much you want to contribute to the project

[*Participants under Partner rematching read: both in case B has accepted your proposal and in case B has rejected it.*]

[*Participants under Stranger rematching read: both in case the B-participant you are paired with has accepted the proposal of the A-member of his/her pair in the previous experiment and in case (s)he has rejected it.*]

- Similarly, if you were the *B*-member of your pair in the previous experiment, you must decide how much you want to contribute to the project

[*Participants under Partner rematching read: both in case A has proposed you distribution 1 and in case A has proposed you distribution 2.*]

[*Participants under Stranger rematching read: both in case the A-participant you are paired with has proposed distribution 1 to the B-member of his/her pair in the previous experiment and in case (s)he has proposed distribution 2.*]

After all participants have made their contribution choices, you will be informed about

- the decision of your pair member and your corresponding earnings in the first experiment;
- the decision of your pair member and your corresponding earnings in the second experiment.

[*Participants in the M-treatment read: If you were the A-member of your pair in the first experiment, you will also learn about B's rating of your proposal.*]

Your earnings in both experiments will be added up and paid out to you in cash.

Before the second experiment starts, you will have to answer some control questions to demonstrate your understanding of the experiment.

Please remain seated quietly until the experiment starts. If you have any questions please raise your hand.

Table 1: Summary of experimental treatments

Treatment	Possibility to scold P in the ultimatum minigame	Pairs composition in the public goods game
<i>C</i> -Partner	No	Same as in UMG
<i>C</i> -Stranger	No	Different from UMG
<i>M</i> -Partner	Yes	Same as in UMG
<i>M</i> -Stranger	Yes	Different from UMG

Table 2: Responders' average contributions across treatments

Treatment	If P proposed x	If P proposed y
C -Partner	1.69 (2.73)	4.56 (3.12)
C -Stranger	1.50 (2.50)	3.81 (3.75)
M -Partner	2.94 (2.89)	4.13 (3.05)
M -Stranger	1.38 (2.70)	3.19 (4.09)

Note: Standard deviation in parentheses.

Table 3: Generalized linear regression on contribution decisions

	Coefficient	Std. Error	z	$Pr(z)$
Intercept	0.128	0.257	0.50	0.618
<i>Choice UMG</i>	1.078**	0.345	3.12	0.001
<i>Message</i>	1.077***	0.313	3.44	0.001
<i>Matching</i>	0.297	0.326	0.91	0.362
<i>Choice UMG</i> \times <i>Message</i>	-1.317**	0.401	-3.28	0.001
<i>Choice UMG</i> \times <i>Matching</i>	-1.159**	0.433	-2.67	0.007
<i>Message</i> \times <i>Matching</i>	-0.711*	0.398	-1.79	0.07

Significance level: *** = 0.001, ** = 0.01, * = 0.1

Table 4: Proposers' behavior and expected payoffs across treatments

	Percentage of offer x	Expected payoff of offer x	Expected payoff of offer y
C -treatment	28%	4.50	9
M -treatment	34%	9.54	9

Table 5: Proposers' average contributions across treatments

Treatment	If R accepted	If R rejected
C -Partner	5.31 (3.82)	3.31 (3.82)
C -Stranger	3.69 (2.89)	2.69 (3.00)
M -Partner	4.38 (3.67)	2.25 (3.49)
M -Stranger	4.81 (3.47)	3.19 (3.33)

Note: Standard deviation in parentheses.

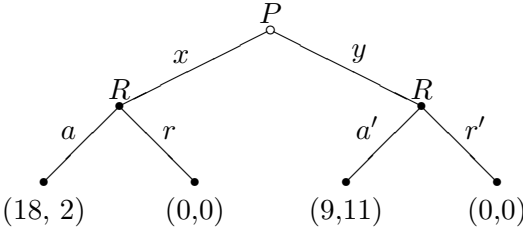


Figure 1: The ultimatum minigame

Figure 2: Rejection rates of offer $x = (18, 2)$ across treatments

