On The Demand for Expressing Emotions

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People communicate in economic interactions either aiming to alter material outcomes or because they derive direct satisfaction from expressing. We focus on the latter noninstrumental motivation and find that this less researched aspect of expression has important economic implications. In particular, we experimentally study ex–post verbal expression in a modified Power–to–Take game and document people's willingness to pay for this kind of expression possibilities. Our experiment contributes to previous studies discussing the role of mood–emotional states. We find that purely expressive as well as reciprocal motives are both non–trivial components of the valuation for noninstrumental expression. We demonstrate that expression possibilities have important impacts on welfare beyond what our standard view predicts. (JEL D03, D83, C91, C78)

There is a simple but important puzzle regarding the communication that occurs in many face-to-face economic interactions: the amount of communication we see in real life far exceeds the amount of content flow our standard

theories predict. If you pay attention to, say, a negotiation process between two strangers in a flea market, you would probably observe a lot of back and forth—sometimes even of seemingly unrelated topics—while our models predict mostly no communication in such environments.

This gap in our understanding mainly emerges because the purposes of communication in reality are a lot richer than in economics' current views. Our standard approach sees communication as fundamentally instrumental in the sense that it is capable of altering material outcomes. In particular, the most standard models predict that communication will transmit effective content only when parties' interests are at least partially aligned (Crawford and Sobel (1982); Farrell and Rabin (1996) and Farrell and Rabin (1996)). In conflict situations (such as bargaining) there will be no meaningful content flow. However, this view clearly contrasts with our human intuition that commonly utilizes communication with broader strategic purposes than those contemplated in this orthodox view and that often perceives communication as being a good or a bad in and of itself.

Previous experimental literature has already presented evidence of broader strategic uses of communication in bargaining environments. Galinsky and Mussweiler (2001), Galinsky and Mussweiler (2001) and Andreoni and Rao (2011) all document instances in which communication in these encounters commonly favors the speaker in the material allocation. These studies further imply that people are somewhat aware of some behavioral reactions to communication and are able to exploit those biases to achieve better material positions. Persuadability, over-reaction to information, and empathy sensitivity are some of the mechanisms in play.

Economic studies of the type of communication that has no further material implications (for example, because it takes place after the allocation is determined) has been minimal. Existing studies document that this kind of expression in bargaining environments is a likely behavior and its anticipation does in fact change material outcomes. However, there is no systematic look into its full economic value: how much is this type of expression possibility worth? To the best of our knowledge ours is the first study to answer this

question. In particular, we study a type of expression and environment that have been linked to mood and emotional states in previous literature: unidirectional, ex-post verbal expression in bargaining-like settings. Brain scans, self–reports as well as physiological measures of emotional arousal, support the idea that bargaining environments are indeed charged with emotional states.[1] Xiao and Houser (2005, 2007) document that verbal expression in ultimatum and dictator games is likely to emerge as an expression of emotions. Importantly, while the existing research relates emotion and mood to communication observed in bargaining interactions, it has not yet been established what motives drive such expressions or how exactly they affect traditional measures of welfare as well as subjective well–being. Our research tries to address these questions as well.

We implement in the laboratory a modified version of the Power–to–Take game. This is an asymmetric bargaining environment where previous research has identified strong emotional–mood changes experienced by the vulnerable side (e.g., Bosman and Van Winden (2002)). In our experiment, each subject first earns money in a real effort task. Then, subjects are randomly matched to one another and assigned roles, T and R. Role T (the *taker*) is given the authority to withdraw a percentage of the counterpart's labor income, while role R (the *responder*) is only asked to guess what percentage that will be. All treatments share this interaction, but differ in what comes afterwards. To study the broad value of expression, we elicit in our main treatment R's valuation of sending an ex–post verbal message to the taker. To isolate the purely expressive motives from the reciprocal ones, we implement a treatment where a third party – not the taker – is the recipient of the message. We also implement some additional treatments to check the robustness of our findings.

Our evidence confirms that people value the ability to express and are willing to pay significant amounts of money for it. Purely expressive and re-

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[1]E.g. Pillutla and Murnighan (1996); Bosman and Van Winden (2002); Sanfey et al. (2003); De Quervain et al. (2004); Reuben and Van Winden (2005); Ben-Shakhar et al. (2007). Note that we often use 'emotional state' to refer what psychologists more accurately call 'feeling state'. That is, the situation where a subject experiences a 'feeling of' a certain emotion.

ciprocal motives are both nontrivial components of this valuation. We show that when expression is allowed the vulnerable side experiences a smaller decrease in subjective well–being. This suggests that beyond the instrumental purposes expression can have a real impact on well–being in economic interactions. This can be useful for further theoretical modeling, in particular, the design of institutions.

The paper is organized as follows: Section two discusses the related literature on the topic as well as some theoretical considerations. Section three details the experimental design and section four presents and discusses our results. We conclude with some final remarks.

1   Conceptual Framework and Literature

This section presents the predominant conceptual framework of communication and expression in economics. It summarizes the literature that studies the presence of mood and emotional elements in economic interactions and discusses the previous studies of expression in bargaining setups.

1.1   Communication and Expression in Economics

Communication in economic interactions has been long studied for its instrumental purposes, that is, for how it can alter play and therefore impact material outcomes. Within this approach, the most standard view states that agents in strategic interactions with material interests will use communication in an attempt to coordinate actions or to shape the opponent's beliefs about his/her own private information. For communication that is costless and occurs before and during play, i.e. *cheap talk*, it has been shown that the more incentives are aligned and the bigger the coordination surplus, the more informative and welfare improving communication becomes. Although these theories predict a multiplicity of equilibria, reasonable refinements predict informative equilibria to be among the most likely (e.g. Crawford and Sobel (1982); Farrell and Rabin (1996); Charness (2000)).

This view, however, predicts that in environments where agents' interests are perfectly opposed to oneanother – such as in fixed–pie bargaining situations – communication will convey virtually no information and will not have an impact on material allocations. Experimental evidence shows otherwise and suggests that communication can have instrumental purposes even in such situations. Allowing expression can sway opponents' motivations through different channels often bringing benefits to the "speaking" side. For example, in an experimental bargaining setup, Croson et al. (2003) find that under imperfect information, lies and threats do have an impact on the material surplus distribution. In a similar setup, Galinsky and Mussweiler (2001) find that, by stating a high initial price, a party at a negotiation might *anchor* the range of counter offers at a higher level than otherwise possible. They refer to the same type of anchoring effect first discussed by Tversky and Kahneman (1974). Another relevant instance is provided by Andreoni and Rao (2011) who document that even in a Dictator Game, the party that is able to issue a pre–play message gets a higher material payoff. The authors point out that from the perspective of the receivers, communication is a social cue capable of activating altruistic behavior by heightening empathy.

Less research exists within economics regarding types of communication that have direct welfare implications without necessarily affecting the distribution of resources. We use the term noninstrumental for this type of communication and the verbal expression we study in this paper mostly lies in this category.[2] Two potentially relevant sources of noninstrumental communication are mood and emotion. Although these are in effect partially incorporated in any utility–based theory, some essential features of their functioning inform further extensions of our more standard models. In particular, they could explain part of the observed noninstrumental communication and give reasons why noninstrumental communication can be important for welfare outcomes. In fact, as we shall see later in this section, the evidence for the presence

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[2]Although it is a broader term that encompasses many ways in which internal and subjective states are reflected in behavior, we use *expression* mainly as interchangeable with *noninstrumental communication.*

of mood and emotions (and their expression) in bargaining environments is growing. Therefore, a more precise look into how they affect welfare is needed. The rest of this section briefly discusses the approaches and evidence related to mood, emotion and noninstrumental expression in economics.

1.2   Emotions and Mood

Although there is still debate on the definition and approaches to emotions, most psychologists would agree that emotions are mechanisms that involve reactions in brain, mind and body. The degree to which cognition (the subjective appraisal of the situation), other neurological activity or bodily changes are regarded as the essential part of these processes, is the main difference between different theories of emotion. In most approaches, however, we find the following main features or components: emotions have *aboutness* (or *intentionality*) and *valence. Aboutness* means that an emotion occurs in reference to an event or some stimulus, and *valence* that emotions are not typically experienced as neutral; instead, they take a position on a pleasure–pain scale. They also present *action tendencies* in that they make certain behaviors more likely to occur during the emotional episode. This highlights another important feature: emotions are temporary processes where the mechanism involved is active for a finite, often short span of time.[3] Mood, on the other hand, is intimately linked to the feeling of emotions for it is a signed mental state. However, it has received less detailed study because it is less traceable to specific mechanisms, stimuli, and behavior. Mood, in general, involves more awareness and lower arousal levels than a typical emotional episode. As a mostly conscious state, moods are active for longer spans of time. Similar to emotion, moods have *valence* and *tendencies*: they have a sign as they are most commonly

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[3]For a discussion on definitions and essential features of emotions see Frijda (1986); Ekman (1994); Oatley et al. (2006). Another important dimension that has long received attention in the definition and characterization of emotions is the degree to which they are more innate and less cognition-based mechanisms. What the literature has termed as *basic emotions* (e.g., Plutchik (1980); Ekman (1992)) commonly refers to these more automatic mechanisms that emerged earlier in human evolution.

perceived nonneutral, and they make certain behavior more likely while they last. Finally, they operate more as a background state where past or anticipated stimuli or thoughts are all combined or synthesized (Dingman (2008)).

In the economics literature, progress has been made in extending the standard model to incorporate emotions and mood. Elster (1998); Loewenstein (2000); Rick and Loewenstein (2007); Manzini and Mariotti (2011) are examples of this advance. Given that the incorporation of these elements in our modeling implies abandoning the idea that motives are invariant, a big challenge this literature faces is separating the actual influence of mood and emotion on decision–making from other sources of indeed inconsistent behavior. Rick and Loewenstein (2007), for example, categorize emotions according to how they operate on decision making. Their first category, *expected emotions*, refers to the expected collateral psychic value of each alternative, the emotional states that an outcome provides along with those benefits directly caused by the realization (consumption) of the outcome. This is already assumed in the standard model. A second category, and new to the standard model, comprises of emotions experienced at the moment of the decision–making and occurring only in relation to it. These are called *integral immediate emotions*. Finally, there are emotional states whose origin is unrelated to the choice but happen to occur at the same moment of decision–making and affect it. Rick and Loewenstein (2007) call these *incidental immediate emotions*. Manzini and Mariotti (2011) incorporate this last category into their model of *moody choice*. They propose a formal extension of the revealed preference approach to incorporate mood–influenced decision making into the standard model. Their main contribution is giving content to the broad idea that, unlike indecisiveness or plain randomness, mood must have a signature pattern when it shapes decisions, and choice data should reflect that. They narrow down the type of data and tests that help identify this influence.

1.3 Previous Research on Emotions and Bargaining

This subsection presents in more detail the previous experimental research on emotions and expression in bargaining environments. A series of studies have documented mood and emotion reactions in such environments, specially among the disadvantaged party. Pillutla and Murnighan (1996) document that feelings of anger and spite are common among responders in ultimatum games. Sanfey et al. (2003), using fMRI scans, find that responders who reject unfair offers presented higher activity in the anterior insula, a brain area associated with disgust. De Quervain et al. (2004) observe that effective punishment in the ultimatum game activates a brain area implicated in processing rewards, indicating that punishment gives actual satisfaction.

Bosman and Van Winden (2002) study behavior and emotions in a two–player Power–to–Take game (PTT). In their design players earn income in an individual effort task preceding the game. Then, one player can claim any proportion of the other's income. The second player can respond by destroying a percentage of his/her own income in order to reduce the amount actually transferred. They find that a higher *take rate* by the first player increases (decreases) the intensity of negative (positive) emotions experienced by the second player, and that negative emotions drive destruction. At high emotional intensities, responders have the tendency to destroy everything. In the same environment, Reuben and Van Winden (2005) report feelings of shame and guilt among takers. The authors also find an important asymmetry: responders that punished others who treated them badly do not always treat others nicely when they switch positions in later rounds. Pure social preference motives are inconsistent with this, since such motives would predict a certain symmetry in the behavior of the same subject across roles. Their evidence is not compatible with self–serving biases as the cause of this asymmetry. Therefore, this behavior might be induced by immediate emotions that are specific to the type of choice that proposers and responders make.

Ben-Shakhar et al. (2007) use physiological as well as self–reported measures of emotional states in the PTT game. To measure physiological changes they apply skin conductance response (SCR) measures, widely used in scientific

research of emotional arousal. They find a strong relation between the responder's resource–destruction behavior and both measures of emotional arousal, with more negative states predicting higher chances of destroying all resources. It is important to notice that the observed strong correlation between physiological measures of (actual) arousal and the self–reported ones supports the use of self–reports to measure emotional changes, as we do in our experiment.

In relation to ex–post verbal expression, previous research has studied bargaining setups where the disadvantaged party can send free written messages to counterparts. It is found that messages are likely being driven by emotional states. Xiao and Houser (2005), in particular, conduct an experiment in which an ultimatum game (UG) is augmented to allow responders to send an ex–post free written message to the proposer. They find that rejections of small offers (i.e., 20 percent of the pie) went down from 60 percent to 32 percent compared to the ordinary UG. The authors leave open the question of the underlying cause of this behavior, that is, whether expression gives relief or whether it is seen as an alternative punishment. Xiao and Houser (2007) observe that very unfair donations (i.e., 10 percent percent of the pie in the dictator game DG) decrease from about half to one fourth when the receiver can send an ex–post free written message to the dictator. Finally, Ellingsen and Johannesson (2008) find that when verbal feedback is allowed, the fraction of zero donations decreases from about 40 percent to about 20 percent, and there is a corresponding increase in the incidence of equal splits from about 30 percent to about 50 percent. Recipients who receive no money almost always express disapproval of the dictator, sometimes very strongly. Following an equal split, almost all recipients praise the dictator. In all cases, low donations or offers are associated with messages entailing negative emotions. Fairer donations from dictators facing possible verbal responses are interpreted by Xiao and Houser (2007) as being cognitively dissonant (Festinger (1962)). In a no expression environment, dictators take advantage of the ambiguity (the self–serving biased thought that it is fair to be selfish, Babcock and Loewenstein (1997)) but under expression possibilities they cannot avoid recognizing the conflict between their convenient beliefs and reality. This implies dictators or proposers

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would prefer a no expression environment, but this has not been established yet. It could also be the case that dictators might want to buy and feel positive expressions.

2 The Experiment

Our experiment is designed to measure valuations for expression in an economic setup where, as discussed previously, it has been shown that the motivation for expression is substantially emotional. We use a modified versions of the Power–to–Take game PTT. This game is a somewhat extreme bargaining environment where only one side's resources are vulnerable. It is also seen as a tax–authority/citizen relationship or a very asymmetric negotiation.

In order to restrict our analysis to expressions that are largely originated in mood and feelings of emotions or aim to induce emotional states in others (i.e., to eliminate instrumental cheap talk type of motives) we focus on a type of expression that has no material consequence; this expression occurs after material resources of the interaction are settled. To properly elicit valuations, our design innovates with respect to previous experiments in two aspects. First, we separate the *size of the stimulus* from the *opportunity cost of responses*. This is in contrast to the usual UG or PTT, where the *size of the stimulus* (money offered and taken, respectively) is deterministically related to the cost of responding (one gives up what is offered or destroys the money left, respectively) and where in consequence valuations cannot be studied independently from the size of the stimulus. Second, we implement a BDM mechanism to induce sincere revelation of the corresponding material value of expression (Becker et al. (1964)).[4]

The second main question of the research is regarding the purpose of the emotion expression. As discussed previously, the purpose can be either *intrinsic,* stopping the negative feeling of anger for example, or *extrinsic*, such as harming the opponent. As Xiao and Houser (2005) point out, lower re-

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[4]We argue this elicitation method does not seem to be taxing cognition excessively in our environment.

jections when expression is possible can be interpreted as a relief effect, but such behavior is also consistent with an attempt to harm. Their research did not disentangle the two. In the case of physical health, for example, emotional expression seems to follow the *venting hypothesis* that is associated with taking–it–out/relief motivations. However for the type of feelings occurring during bargaining and with a clearer defined intentional object, the opponent, it seems very plausible for us that the main motive might be actually harming. In order to disentangle emotion expression goals we run different treatments that differ in the recipient of the message. While under the *venting/relief emotions hypothesis* some valuation will be assigned even if the message is not directed at the source of the stimulus, but at a third party; under the *extrinsic purpose hypothesis*, most value will be assigned to messages that are directed at the origin of the stimulus.

2.1 Experimental Design

Our design modifies the Power–to–Take Game (Bosman and Van Winden (2002)) as follows. Each player receives \$3.00 as an endowment and earns additional income by completing a number of search tasks.[5] These search tasks are real effort tasks where each individual has to search for the top of a mountain in a two–dimensional grid using the mouse of the computer. The search tasks are calibrated so that all participants roughly earn the same amount of money (about \$10) in order not to introduce any differences in initial income. After the search tasks are over, participants are randomly matched in pairs and roles are assigned. Each pair consists of a T player and a R player. A T player then decides what percentage of R's task income (excluding the \$3 of initial endowment) to transfer into his/her own account. T's strategic move is referred to as *the stimulus* since this move is the cause of R's emotional arousal. Likewise, T is referred to as the *source of the stimulus* and the amount subtracted is referred to as the *size of the stimulus* as it is reasonably conjectured that higher transfers from R's account will trigger a

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[5]The small size and symmetry of this initial endowment are expected not to change the perception of fairness by either player.

stronger arousal. Another simple way to think of the stimulus is by defining it as the difference between the expected take rate and the actual, often referred to as the *surprise*.

Then, R is informed about T's action and asked about his/her maximum willingness to pay to send a written message. As explained previously, the willingness to pay is elicited in an incentive compatible way using a *BDM* mechanism (Becker et al. (1964)). This is an important feature of our design. In previous research, the cost of an action, for example rejecting in the Ultimatum Game, was perfectly tied to the *size of the stimulus* (i.e., the amount offered). An offer of \$1 implied an opportunity cost of rejection of \$1 too. This makes proper assessment of the valuation for rejection/destruction impossible as we can only observe one price of the action for each size of stimulus. In our design, the cost of an action (the price of sending a message) will be independent of the size of the stimulus (the amount taken by T). After each R has stated his/her value, he/she is informed about the actual price which is randomly drawn from a uniform distribution between \$0 to \$3. If the stated willingness to pay is higher than the random price, the participant pays the actual price and can take the action. If the stated willingness to pay is lower than the random price, the participant will not be able to take any action and will not have to pay anything. Some expression desires might be left unfulfilled as the random price turns out higher than the stated willingness to pay.[6]

The initial endowment of \$3 is given to ensure that even somebody whose entire task income has been taken by T can respond if she/he really wants to. Table 1 summarizes the main four treatments that differ with respect to who will be the recipient of the message. *OFU* – Only for You – allows for messages to be sent to the source of the stimulus, i.e. the T player with whom the R player is paired. *SLTM* – Somebody Listen to Me – allows for messages to be sent to a third party that is not involved in the decision making and whose payoff is unaffected by the decision. We recruited one

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[6]The BDM mechanism was explained in detail at the beginning of the experiment, before subjects knew their roles or any emotional arousal occurred.

Table 1: Summary of the Experimental Design: Main Treatments

	Recipient/Cost of the message
OFU	Costly message read by T player
SLTM	Costly message read by a third party
FM	Free message to T player
NM	No message

extra participant for every 5 pairs and assigned him/her the sole purpose of reading messages that are sent. All participants know at the very beginning of the experiment what kind of expression can potentially be used. Senders of messages receive acknowledgement of when the designated party has read the message. We also study behavior in two polar control treatments. One in which no message can be sent, *NM* (no message) and one in which a free message can be sent to *T*, *FM* (free message) (see Table 1).

Besides eliciting the willingness to pay for writing a message (and following Charness and Grosskopf (2001); Bosman and Van Winden (2002); Konow and Earley (2008)), we also collect self–reports of subjective well–being, emotions currently experienced and mood states at the very beginning of the experiment. We repeat the corresponding questionnaires at the end of the experiment. The self–report of a variety of emotions experienced at that moment will also help us to control for some incidental background feelings/states of participants. An important issue with the self–report is the discrepancy between what is actually felt in the emotional episode and the beliefs people form about it. This gap is exacerbated by the quick fading out of the episodic memory; so it can bias the self–report (Robinson and Clore (2002)). Some of these considerations are taken into account for our design. For example, we embedded the application of the questionnaires into the same computer interface as the game, so we keep them *hot*, minimizing the perception that the interaction had finished.

2.2 Hypotheses

Our design allows us to properly elicit the valuation for a certain type of response conditional on the size of the stimulus and other covariates. This allows us to formulate our first hypotheses.

Hypothesis 1: Takers are responsive to the possibility of expression by their counterparts (instrumental effect of expression).

Hypothesis 2: People are willing to pay for expressing, i.e., there is a demand for expressing emotions.

Hypothesis 3: The stimulus size does affect the valuation, i.e., the stimulus does shift the demand: the more money is taken the higher is the valuation.

Hypothesis 4: The valuation (the demand) is higher when the expression is directed at the *source* of the stimulus.

Hypothesis 5: Material outcomes as well as expression possibilities affect mood emotional states and self–reported well–being (noninstrumental effect of expression).

2.3 Sessions

Experimental sessions were conducted at the Economic Research Laboratory at Texas A&M University and at the Experimental Economics Lab at University of Maryland. Our participants were undergraduate students with a non-economics major. All sessions were computerized, using a computer interface programmed in zTree (Fischbacher (2007)). Instructions were read aloud and questions answered in private. After reading the instructions and having questions answered, all participants had to answer a set of questions that were meant to test whether the instructions had been understood. All answers were checked and corrected by the experimenters and remaining questions answered. Throughout the sessions the subjects were not allowed to

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communicate with one another and dividers separated the individual computer terminals.

3   Results and Discussion

In this section we present the results of the experimental study. We implemented our four main treatments in 34 sessions recruiting a total of 472 subjects (236 pairs).[7] It is important to highlight that we obtained a different number of observations in each treatment across the two campuses, and although the main behavioral patterns were equivalent, some measures present nonnegligible differences between the two universities. To correctly account for this fact, we regard the data of each treatment as coming from a stratified sample, where each campus represents a stratum. We then assumed that both campuses have same–size populations. Also, as we needed more data to do some measures that focus only on the OFU treatment, we collected more pairs (71) for this treatment compared to the rest of treatments. Table 2 shows the distribution across treatments of the most relevant variables in the experiment, summarized by their means, as well as the number of pairs studied in each treatment.[8]

Notice that, as our design dictated, the task income is virtually the same ($10.3) for all treatments and both types of participants with negligible dispersion (a coefficient of variation of approximately 1 percent). All tests either across treatments and participant roles within treatments do not reject the null hypothesis that task incomes come from the same distributions and have the same central tendency measures.[9] The discussion of the take rate, the willingness to pay and the self–reported measures of emotions require further analysis presented in separate subsections.

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[7]Additionally, the $SLTM$ treatment combined had seven third–party receivers/readers of the messages, which were not studied for obvious reasons.

[8]Reports in Table 2 broken down by university can be found in the Appendix.

[9]Reports are omitted but available form the authors upon request.

Table 2: Summary Statistics

	FM	OFU	SLTM	NM
Number of pairs	57	71	44	64
Task Income T ($)	10.34	10.32	10.32	10.34
Task Income R ($)	10.34	10.34	10.35	10.33
Take ratio (percent)	47.91	63.83	64.86	67.88
Expected take ratio (percent)	53.55	56.28	55.66	54.94
WTP>0 (percent)	82.6*	68.3	48.0	N/A
WTP for msg. ($)		0.78	0.33	
Final Earnings T ($)	18.3	19.92	20.03	20.36
Final Earnings R ($)	8.38	6.58	6.54	6.32

All statisticss are sample means, except for the number of pairs.
* This refers to the percentage of people who write a message when writing is free.

3.1 The Take Rate Behavior

The take rate is the percentage of the responder's labor income that is appropriated by the taker. Each taker decides how much to take from his/her counterpart after learning how much both players have made in task income. We find that the take rate is statistically equivalent across all treatments except in the free message treatment where the take rate is lower. While the mean take rate was 67.8 percent in *NM*, 63.8 percent in *OFU* and 64.8 percent in *SLTM*; this rate was only 47.8 percent in *FM* (see Table 1 and Figure 1). We run a regression, reported in the Appendix, of the take rates over treatment dummies, considering the stratified structure of the data. We tested if the mean take rates differ across treatments; and only the tests of *FM* against *OFU*, *SLTM* and *NM*, were significant. The null hypotheses of same mean are rejected in all cases in favor of typical *FM* take rates being lower (one–sided p–values = 0.007, 0.007 and 0.001, respectively for *OFU*, *SLTM* and *NM*). We also implemented Hodges–Lehmann tests for median differences (Hodges and Lehman, 1963). This nonparametric test gave the same results: all comparisons against *FM* resulted in positive median differences at 95 percent level of
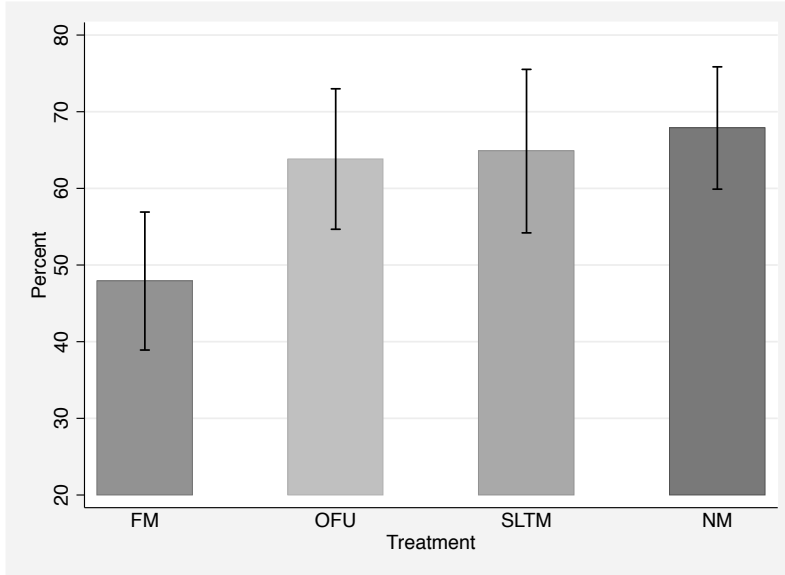
Figure 1: Take Rate and 95 percent C.I.

confidence; and no other contrast rejects the null of zero difference.

Confirming Hypothesis 1, the contrast between *FM* and *NM* establishes that takers do care about the message they might receive as a response when deciding how much to take. The 16 percent lower take rate under *FM* compared to *NM* (which amounts to about \$1.60) is an approximate measure of how much takers value modifying their counterparts' behavior regarding sending a message. This can be either because the taker believes that a lower take rate will reduce the probability of receiving a negative message or increase the probability of receiving a positive one. The similarity of takers' behavior between *NM* and the rest of treatments (*OFU* and *SLTM*) is less immediate. Intuitively, these result suggests that takers possibly perceive *FM* as the only environment where they could get a response with high chances. This might be because *FM* is the only treatment where responders are able to express freely and costlessly. Also, takers might underestimate responders' valuations for writing messages in the same way individuals tend to mispredict reactions driven by emotions in themselves and in others. Therefore their extraction behavior is qualitatively distinct only in the *FM* environment.

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While takers are asked about their take rate decision, responders are asked to guess how much that take rate will be. We find responders believe that takers' behavior is roughly independent of the message features of the environment and expect the take rate to be around 55 percent in all treatments (see Table 1 and Figure 2). That is, expected take rates do not vary significantly across treatments. We tested two measures: means, via a regression as for the actual take rate, and median difference, via a Hodges–Lehmann test. We do not find the self–reported beliefs about the take rate to be statistically different between treatments. Every test based on the regression that compares the expected take rates of any two treatments fails to reject the null of equal conditional mean and every median difference test did not reject the null of a zero median difference.
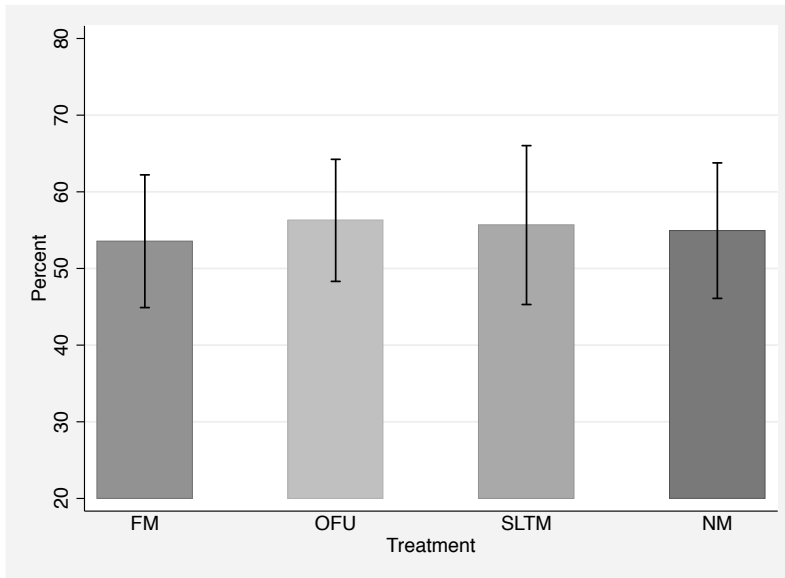

Figure 2: Expected Take Ratio and 95 percent C.I.

This result is consistent with the idea that a typical responder cannot predict the impact of expression possibilities on the taker's behavior; therefore, they see the situations the taker faces as equivalent across treatments. There could be several reasons why this happens. For example, responders failing to anticipate takers' feelings regarding different chances of getting a message, or

responders, when guessing counterparts' behavior, mostly focusing on the material dimension of the environments. Though these are interesting question, adressing them lies outside the scope of the current paper.

3.2   Message Valuation

As explained in the design section, in the message–enabled treatments, responders are asked about their valuation to write a message after they learn the take rate (OFU and $SLTM$) or whether or not they want to write a message (FM). A first basic question is then whether or not responders value using messages at all in this context. The relevant environment to answer this question is our free message setting (FM) where we found that 82.6 percent of responders did send messages. Given that there is a small yet positive cost of doing so, it is reasonable to conclude that responders value the possibility of writing messages to the takers. The second basic question is whether or not this tendency to write a message depends on the take ratio that responders faced. It could be that higher take rates would cause a bigger tendency to respond verbally. We found, however, that the propensity to send a message does not have the take rate as a significant explanatory variable.[10] So, we know that writing a messages in this environment is valued in that most people do it when the material cost is zero. Our main focus here, however, is finding out what part of this valuation can be materialized (i.e. can be substituted with money). While the FM data suggested that, broadly speaking, most people found sending messages worthwhile, the OFU data informs us about the monetary equivalent of this valuation. Our evidence suggests, first, that the majority of people do translate this valuation into the monetary dimension, as we find that 68.3 percent of responders in OFU have a strictly positive willingness to pay and second, that the probability of having a strictly positive

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[10]We run probit regressions with the FM data testing if the probability of sending a message is affected by the take rate (with and without its squared term, to allow for simple nonlinearity). We do not reject the null hypothesis of the whole model having no explanatory power over deciding to write a message. We repeat this exercise with the *surprise* term (actual take rate minus expected take rate), finding that the probability of sending a message is not explained by *surprise* either.

material valuation (WTP>0) does indeed depend on the size of the stimulus: the take rate. In our probability regressions with the *OFU* data, the take rate did in fact explain the probability of having a strictly positive valuation for sending a message in the *OFU* treatment.[11] But not only did people have a strictly positive valuation for expressing, confirming Hypothesis 2, we also find that this material valuation is sizable relative to the resources the responder has available after the material interaction. This means that the possibilities of expression in this type of economic setting are important determinants of the final well–being. In particular, we find that, on average, a responder in the *OFU* treatment is willing to pay \$0.78 to write a message to the taker, which corresponds to 11.6 percent of his/her disposable income that amounted to \$6.73 after the taker withdraws money from his/her account.
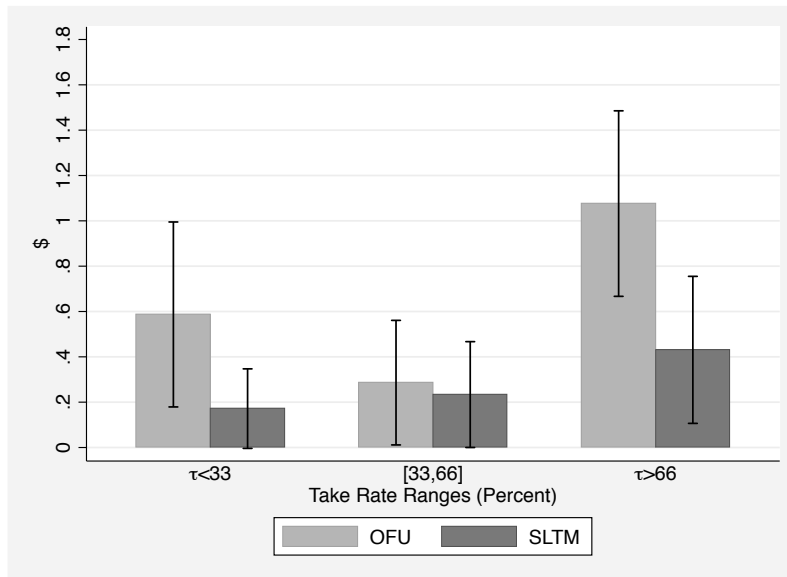

Figure 3: Mean Willingness to Pay with 95 percent C.I.

Now that we have established that the typical WTP represents an important amount in relation to the resources available, we might ask whether or

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[11]We also found that the index underlying this relation is nonlinear in the take rate. The surprise, on the other hand, is not explanatory for having a strictly positive WTP. The regressions are reported in the Appendix.

not this valuation varies with different take rates. As detailed in a previous section, one of the contributions of our design is that, unlike the original PTT game and other bargaining games used in experiments, we can study this valuation conditional on different sizes of *stimuli*. Put simply, we can see how the WTP varies with different take rates.

We find that the take rate influences the monetary valuation of ex–post verbal expression and, in fact, there exists a nonlinear relationship between the take rate (the stimulus) and the WTP. This means that responders' valuation for being able to reply is stronger when facing very low (pro–social/nice) take rates or very high (self–interested/harming) ones. In particular, in *OFU*, for take rates up to 33 percent the average willingness to pay is $0.59, for take rates above 33 percent and below 66 percent the average WTP is only $0.29, and for high take rates (above 66 percent) the average WTP is $1.07 (see Figure 3). The comparison of the take rates over these three groups is not very precise as the number of observations in the categories is not very large (only the upper category gets 37 observations, 52 percent of all cases). However, it gives enough information to show: (i) that the WTP is positive over all take rate ranges (one–side test for zero mean WTP had p—values of 0.002, 0.021 and < 0.000 for the bottom, middle and upper ranges of the take rate, respectively) and (ii) that there is a nonlinear u–shaped relationship between the WTP and the take rate. This confirms Hypothesis 3 as very high take rates induce higher valuations. However, this hypothesis did not consider the nonlinear nature of this relation.

Table 3: Regression WTP in *OFU*

	(Model 1)	(Model 2)	(Model 3)	(Model 4)	(Model 5)
Take Rate	-0.030**				-0.032**
	(0.012)				(0.015)
Take Rate (Squared / 100)	0.034**				0.033**
	(0.011)				(0.012)
Surprise		0.006**			0.003
		(0.003)			(0.004)
Surprise (Squared / 100)		0.002			-0.000
		(0.006)			(0.006)
Surprise (Abs Value)			0.003		
			(0.018)		
Surprise (Abs Val. Sqrd / 100)			0.000		
			(0.000)		
Good Surprise (tk≤Etk)				0.004	
				(0.004)	
Bad Surprise (tk>Etk)				0.008	
				(0.007)	
Constant	0.846**	0.684**	0.677**	0.661**	1.013**
	(0.319)	(0.169)	(0.325)	(0.226)	(0.488)
Observations	71	71	71	71	71
R2	0.18	0.09	0.01	0.09	0.20

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentesis.

We test this nonlinearity by running a regression of the WTP against the different polynomial expressions of the take rate. We find that a quadratic equation is appropriate to describe this u–shaped relationship.[12] One alternative conjecture about the relationship between WTP and the take rate is that responders react to the difference between the expected and the actual take rate, the *surprise*, as opposed to the take rate itself. It is intuitive to think that highly positive or highly negative surprises will result in a stronger desire to submit a message. If surprise is the actual (or just a better proxy of the perceived) stimulus, we should observe that this variable explains the WTP behavior better than the raw take rate. However, we found that the surprise does not explain the observed WTP as well as the raw take rate. Table 3 report various specifications for regressions of the WTP against either the raw

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[12]We provide the Figures associated to these regressions in the Appendix. We also run a fractional polynomial regression. While it mildly improved the regression's explanatory power, its predicted WTP correlate near perfectly with those of the simpler regression with a quadratic term. We keep the quadratic specification for the rest of our analysis.

take rates and/or the surprise (allowing for nonlinearities via quadratic terms). We found that the raw take rate performs better than any specification that includes the surprise term. The evidence indicates then that the raw take rate is what causes variation in the material valuations for expressing.

3.2.1 Directed Expression Vs. Being Listened to

We have established that the majority of subjects in the responder position attaches a monetary value to being able to respond verbally, and also that this valuation comprises a nonnegligible percentage of the resources available to him/her. Further we have shown that the desire to reply is bigger if the taker's behavior is highly pro–social or highly egoistic. Now we need to unbundle further the value of the message to characterize better the motivations involved. Under OFU, the two main components of a message are *(i)* the expression possibility itself (being listened to by anyone) and *(ii)* the response/reciprocal possibility (taking an action directed to the source of the harm/good itself). The $SLTM$ treatment gives us precisely that measure. In this treatment the responder is able to write a message exactly as in OFU, but now the recipient of the messages is a third party, not the taker. Since the reader remains anonymous to takers, we claim that the willingness to pay to send a message in $SLTM$ fundamentally pins down the value of being–listened–to, what we had earlier called the *purely expressive motive*.

Our experimental findings confirm that typical responders do value positively this pure expression possibility (48 percent of participants presented a strictly positive WTP_{SLTM}, and we reject the null of zero mean WTP_{SLTM} in favor of the alternative of mean $WTP_{SLTM} > 0$, $p < 0.001$). On average, responders' value of being listened to is $0.33, which amounts for 42 percent of the $0.78 that was the total value of directing a message to the taker. Further, we found that this difference is statistically significant, and that the value of pure expression is lower than the value of directed expression ($WTP_{SLTM} < WTP_{OFU}$, one–sided $p = 0.002$).[13] This means that both the

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[13]The reason why we use a direct comparison of the WTP across treatments is because

value of pure expression as well as the value of taking it back and directing a message to the source of the harm (*the reciprocal motive*) are important components of the material valuation of expressing in this setting. This favors Hypothesis 4 that stated simply that $WTP_{SLTM} < WTP_{OFU}$.

Our evidence also indicates that the value associated with pure expression motives (WTP_{SLTM}) does not depend on the take rate as the total value of directed expression (WTP_{SLTM}) did.[14] In particular, in relation to the three categories of take rates we discussed previously, the mean WTP_{SLTM} is significantly greater than zero in all of them. Differences in WTP_{SLTM} across categories were insignificant. Finally, we need to point out that the importance of the purely expressive motive relative to the total value of the directed expression varies with the take rate. The stylized fact is that at very high and very low take rates, addressing the taker becomes more important and the purely expressive motive is less important. In fact, only for the bottom and the top categories do we reject the null that mean WTP_{SLTM} being equal to mean WTP_{OFU} in favor of being lower ($p = 0.031$ and $p = 0.006$, respectively). Intuitively, this is in line with the conjecture that an important part of these material valuations for expression is mediated via changes in the emotional or mood states of responders. Presumably, extreme take rates (low or high) trigger mood and emotional changes that relate more to reciprocal forces increasing the value of addressing the source of stimulus.

3.3   Robustness

We run some additional treatments as robustness checks. Although the comparison with these treatments is imperfect for they were run only at one of the two campuses were this study was conducted (University of Maryland), they are useful and confirm our findings. The first treatment is a modified OFU which reverses the order in which the willingness to pay and the mood–

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previously we have established that OFU and $SLTM$ have statistically equivalent take rates.

[14]Regressions of WTP_{SLTM} against the take rate with and without a quadratic term rejected the null of the take rate explaining the WTP in this environment.

emotional reports were elicited. In the main treatment we elicited the WTP right after the interaction as its measure is the main interest of this paper; in the robustness treatment instead, the subjective states were elicited before the valuation. If reporting emotions acts as a close substitute for expression or if the time passed after the interaction until being asked about the WTP is so long that subjects' desires to express get colder, we would expect the WTP to decrease significantly. However, we find the WTP is still strictly positive and although it is slightly lower than in OFU (mean=0.54, s.e.=0.17, n=24), this difference is not significant.

A second robustness treatment isolates alternative explanations for our finding of positive WTP for expression. We run a treatment where we elicit subjects' willingness to pay for just writing something on the computer even though it will go nowhere, not even the experimenter. This is an extreme version of studying purely expressive motives as there is no receiver of the expression. Although this should receive more attention in future research, our results suggest that this kind of expression has either very little or no material value at all. The valuation of this expression is not statistically different from zero (p=0.1) and statistically lower than WTP_{SLTM} or WTP_{OFU} (p=0.000 and p=0.038, respectively).

3.4   The Role and Change of Mood and Emotional States

We now study the relationship between the take rate (the stimulus), the mood–emotional states and the material valuation of expression. As indicated before, we collected responses to self–reported well–being, mood and emotional questions before and after the economic interaction. These measures have been previously used in Batson et al. (1988); Charness and Grosskopf (2001); Bosman and Van Winden (2002); Konow and Earley (2008) and contain information about general well–being, momentary well–being, feelings of the most basic emotions (intensity of feeling anger, fear, irritation, etc.), mood related states (opposite scales for: bad mood - good mood; sad - happy; gloomy - cheerful, etc.) and some other fillers (see Appendix for details).

Although the analysis for specific items is informative, different groups of emotions and mood dimensions are closely related and comove as different shocks and mental states occur. From the perspective of the modeler, this co-movement of feelings and states suggests that a substantial part of the activity boils down to a few main mechanisms (or factors) that the stimulus acts on. Therefore, it makes sense to focus on the few factors whose sign and/or intensity changed significantly over the course of the interaction. Along those lines, we identified one main group of eight mood and emotion items that behave exactly in this way: across different factor analyses we conducted, with ex–ante reports, with ex–post reports or with their difference, this set of variables behaves as if associated with an underlying factor. There were eight variables included 7–valued scales for feelings of happiness and joy, opposite 9–valued scales for bad mood – good mood, sad – happy, depressed – elated, gloomy – cheerful, displeased – pleased, and sorrowful – joyful. We study a normalized before–after difference of this index. To generate this measure we first built the ex–ante index with a factor analysis that includes these variables. We then used the same coefficients and the ex–post reports to compute the ex–post index. Finally we compute the change in this index normalized to the ex–ante standard deviation, σ. We study the ex–ante/ex–post change of this index.

As measured by this mood–emotion index, henceforth *MEI*, our results show that the environment generates very different experiences for the two roles. When we pool all treatments, responders' *MEI* changes are on average negative and dispersed ($mean = -1.05\sigma$, $sd = 1.4\sigma$). Takers, on the other hand, experience a positive and less volatile change ($mean = 67\sigma$, $sd = \sigma$; see Figure 4). Similar patterns are observed in all treatments: takers improve their state and responders deteriorate around twice as much (see Table 4). Interestingly, when expression is completely free, responders experience a sub-stantially milder shock compared to any other treatment where expression is either costly, impossible or directed at a third party. More precisely, compar-ing the two polar treatments *FM* and *NM* we find expression does not impact the takers' *MEI* (they show a mean change of 0.68 in *FM* and 0.58 in *NM*, which is statistically not significantly different from oneanother) but it does

Table 4: Ex–ante and Ex–post emotional–mood states by roles and treatment

| | Taker | | | Responder | | |
	Before	After	Diff	Before	After	Diff
FM	-0.09	0.60	0.68***	-0.11	-0.56	-0.44**
OFU	-0.15	0.51	0.66***	0.08	-1.26	-1.34***
SLTM	0.06	0.85	0.79***	0.29	-0.86	-1.15***
NM	0.08	0.66	0.58***	0.03	-1.26	-1.29***

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$, for null Diff $\neq 0$.

have a significant impact on responders as their mood-emotional state deterio-rates much less compared to the completely silent treatment (responders *MEI* change is -0.44 in *FM*, and -1.29 in *NM*; $p=0.00$. Table 4). This difference in our measure of subjective well–being for responders that amounts to 0.85σ and goes in favor of the expressive environment (*FM*) can be conjectured to have two sources. First, it can be related to the fact that responders under *FM* do receive on average higher final payoffs as the take rates are lower and, second, to the fact that under *FM* they fulfill their expression desires. Using data from *FM* and *NM*, we conduct the simple test whether or not expression possibil-ities have a positive impact on subjective well–being by regressing the ΔMEI against the total monetary payoff and the indicator of expression possibilities (a dummy that takes 1 for *FM* treatment and 0 for *NM* treatment). We find that expression possibilities account for aproximately 0.4σ after controlling for the effect of the material payoff ($p=0.03$).

Another central question to our research is how the emotional states are affected by the stimulus and how they relate to the material valuation of ex-pression. First, we find that the take rate has a strong negative effect on the mood–emotional states. The regression analysis shows that a ten percent increase in the take rate decreases the mood and emotional index by 0.25σ. This implies, as expected, that events in the material dimension cause strong mood emotional reactions. This impact of the stimulus on the self–reported emotional states is remarkably stable across treatments. We find that mood–emotional reactions are associated with higher valuation for expression. The
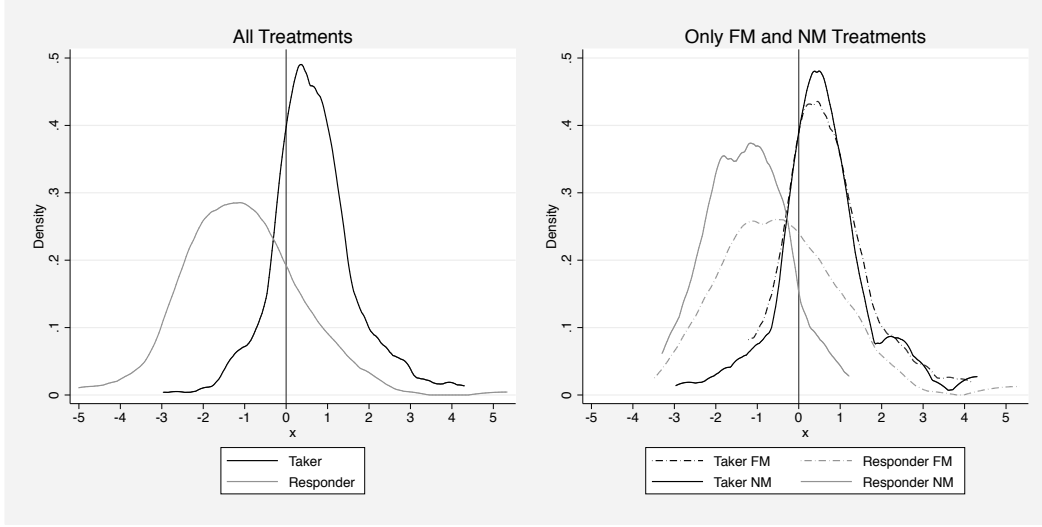
Figure 4: Change in Mood-Emotion Index

Source: Authors' calculations.

more negative or the more positive these reactions are, the higher the willingness to pay. Figure 2 in Appendix A illustrates these relationships. These results suggest, as conjectured, that the relationship between the WTP and the MEI mirrors the relationship between the WTP and the take rate.

The relationship between the take rate, the emotional states and the willingness to pay can be put in a shock–mediator–outcome framework if the material valuation is seen as the final outcome and the change in MEI as the mediator. By means of conducting a seemingly unrelated regression comprising of the following equations:

$$\Delta MEI = \alpha + \underset{-.024\,(.003)}{\beta}\tau + \epsilon_M \tag{1}$$

$$WTP = \delta + \underset{.293\,(.142)}{\delta_1}\Delta MEI + \underset{.138\,(.044)}{\delta_2}\Delta MEI^2 + \delta_3\tau + \delta_4\tau^2 + \epsilon_W \tag{2}$$

we implement a standard mediation analysis, except for a customized nonlinear relationship. The results indicate that the mediated impact of the take

rate on the expression valuation through ΔMEI:

$$\frac{d\Delta MEI}{d\tau} \times \frac{\partial WTP}{\partial \Delta MEI} = \beta(\delta_1 + 2\delta_2 \Delta MEI) \qquad (3)$$

is statistically different from zero when ΔMEI is below -2 or above 0.[15] These results suggests that emotional and mood states mediate the impact of the take rate only (or more strongly) when the reaction in such states is strong enough. Now, although the results are appealing, there are also reasons to be skeptical with respect to a mediation interpretation in this context. As it is pointed out in the recent literature, estimation biases might potentially emerge from the fact that our design did not randomize the mood emotional state (the mediator) with another shock (see Imai et al. (2010) and Bullock et al. (2010)). We acknowledge this shortcoming but believe that using the change in the emotional state – as opposed to the ex–post level – partially takes care of this problem; that is, the omitted unobservable factors that might simultaneously impact the levels of MEI and the WTP are less likely to show up in the ΔMEI equation. Again, these results favor Hypothesis 5: expression possibilities as well as material outcomes do affect peoples' mood–emotional states, pointing to the non–instrumental effect of expression.

4 Well–Being

Incorporating expression while not increasing the pie–size, does shift substantial gains toward the disadvantaged side of the bargaining. This can be seen by conducting a nonstandard well–being analysis based on the self–reports. We use two measures for this purposes, the change in *MEI*, discussed previously, and a simpler measure of current happiness, a 1–9 scaled question on how subjects describe how they feel at that very moment from *extremely unhappy* to *extremely happy*. With both measures we find the combined effect of the interaction on both roles to be negative for all treatments except the free message treatment (*FM*). This is because while in all treatments takers

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[15]Detailed results are available upon request.

increase their perceived well–being roughly the same, responders do experience the free message treatment differently. Responders decrease their well–being in all treatments approximately twice as much as taker increase theirs, except in *FM* where responders well–being falls only one third compared to the other treatments. In particular, combined ΔMEI is 0.12 (s.e. = 0.137) in *FM* and is -0.34 (s.e. = 0.13) in *NM*. For the change in the 1–9 scaled momentary well–being measure, the combined effect in *FM* is -0.17 (s.e.=0.19) and -1.02 (s.e.=0.25) for *NM*.

5 Conclusions

Departing from the traditional approach to communication in economics that emphasizes its instrumental purpose – i.e. how it affects play and outcomes in the material interaction – we focus on the noninstrumental aspect of communication. We study the value and purpose of ex–post (written) verbal expression in a modified Power–to–Take game, where previous research suggests expression is likely to be driven by mood–emotional episodes. We measure the value of directed verbal expression and isolate purely expressive motives from the reciprocal ones by varying the recipient of the messages across treatments. In order to conduct a welfare analysis of incorporating expression, we run polar treatments where expression is totally costless and where expression is not possible.

Our evidence confirms that this type of expression has a nonnegligible material value, and, moreover, that purely expressive and reciprocal motives are both nontrivial components of this valuation. We show that (self–reported) mood and emotional states are associated with a higher material desire to express. Our evidence suggests that, beyond the classical purposes (such as *cheap talk*), whether or not verbal expression is possible has a real well–being impact in usual economic interactions as, on average, the disadvantaged side experiences less of a reduction in self–reported well–being when expressions are allowed. We further document that the anticipation of expression possibilities alters the behavior of the taker in a pro–social direction.

Our findings are useful for the design of institutions. In fact, a recent change in the way court rulings are conducted in England and Wales seems to acknowledge the value of expressions. Victims of crime will get a chance to speak in court. The new Victim's Code will entitle victims to personally address offenders to explain how a crime has impacted them by reading a statement in court.[16] This new code is seen to give victims the choice to explain to a court and the offender(s) in their own words the personal and emotional impacts a crime has had on them and their families, a process that is known to help victims cope and recover from crime. This ruling acknowledges the intrinsic motivation behind the noninstrumental effect of emotion expression as currently, judges read such statements in private with only parts being read alloud by the prosecutors. This new ruling is not meant to change verdicts but is predicted to increase the subjective well–being of the disadvantaged side. Whether this change also has instrumental effects remains to be seen as a decrease in crime rates might take time to manifest itself.

Participatory democracies clearly go a step further in asking for expressions before decisions are made. Interestingly enough, citizens report to be happier in such circumstances (see Frey and Stutzer (2002)). Human beings seem to value the ability to express themselves, whether it being ex–ante or ex–post of any outcome allocation.

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A   Aditional Results and Figures

Table 5: Statistics by Pool

TAMU

	FM	OFU	SLTM	NM
Number of pairs	25	29	19	21
Labor Income Type 1 ($)	10.3	10.3	10.3	10.3
Labor Income Type 2 ($)	10.3	10.3	10.3	10.3
Take ratio (percent)	38.8	62.7	62.2	58.3
Expected take ratio (percent)	58.6	50.9	47.8	50.5
WTP for msg. ($)		0.87	0.37	
Final Earnings Type 1 ($)	17.3	19.8	19.7	19.4
Final Earnings Type 2 ($)	9.3	6.7	6.8	7.3

UMD

	FM	OFU	SLTM	NM
Number of pairs	32	42	25	43
Labor Income Type 1 ($)	10.4	10.3	10.4	10.4
Labor Income Type 2 ($)	10.4	10.4	10.4	10.4
Take ratio (percent)	57.1	65.0	67.6	77.4
Expected take ratio (percent)	48.5	61.7	63.5	59.4
WTP for msg. ($)		0.69	0.28	
Final Earnings Type 1 ($)	19.3	20.1	20.4	21.4
Final Earnings Type 2 ($)	7.5	6.5	6.3	5.4

Table 6: Take Rate and Expected Take Rate Regressions

	Take Rate b/se	Expected Take Ratio b/se
OFU	17.087***	1.730
	(6.542)	(6.024)
SLTM	18.031**	0.977
	(7.057)	(6.885)
NM	20.677***	0.449
	(6.280)	(6.317)
Constant	46.675***	54.242***
	(4.636)	(4.510)
Observations	236	236
R2	0.05	0.00

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentesis.

Table 7: Probit Regressions of Positive WTP in *OFU*

	Model 1 b/se	Model 2 b/se
Take Ratio	-0.068***	
	(0.022)	
Take Ratio (squared)	0.001***	
	(0.000)	
Surprise Take Rate		-0.003
		(0.004)
Surprise (squared)		0.000
		(0.000)
Constant	1.959***	0.501**
	(0.576)	(0.216)
Observations	71	71

Notes: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Standard errors in parentesis.
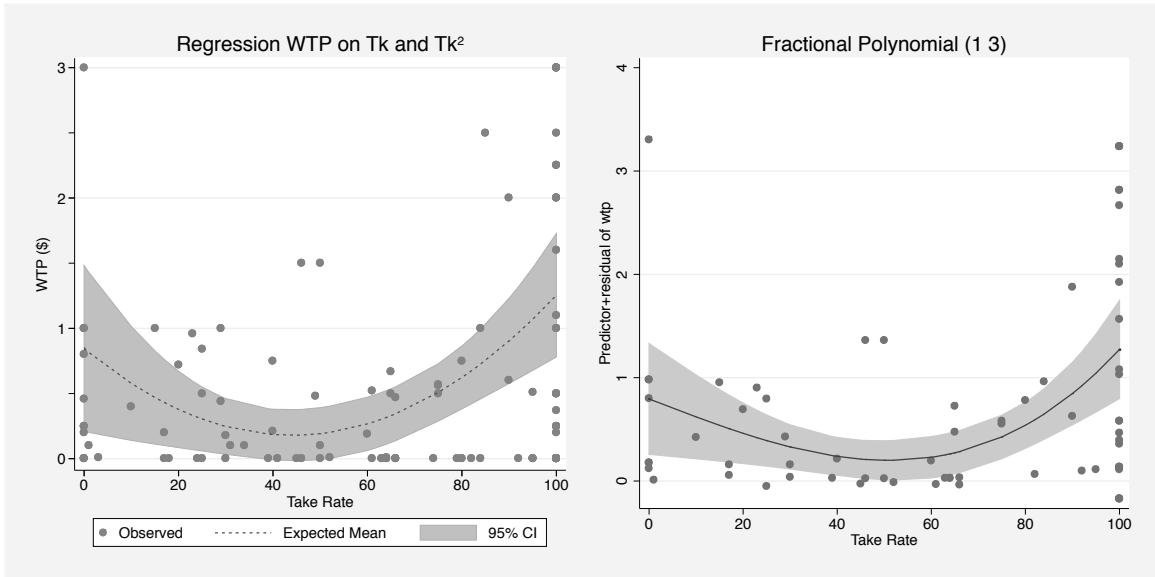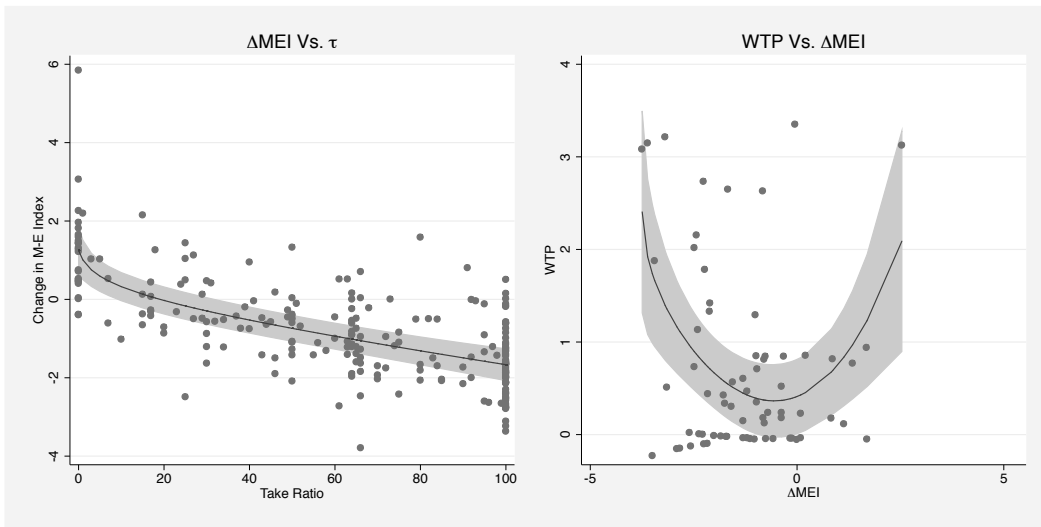
Figure 5: How WTP Relates to the Take Rate

Figure 6: Take Rate, MEI and WTP

Notes: One outlayer observation regarding the mood emotions reports was disregarded from this estimation.

B   Instructions

Welcome to the Economic Research Laboratory. This is an experiment in decision-making. The National Science Foundation has provided funds for this research. Just for showing up you have already earned 5 dollars. During the course of the experiment, you will be called upon to make a series of decisions. If you follow the instructions carefully and make good decisions, you can earn real money, which will be paid to you in cash at the end of the experiment. It is important that you remain silent and do not look at other people's work. If you have any questions, or need assistance of any kind, please raise your hand and an experimenter will come to you. If you talk, laugh, exclaim out loud, etc., you will be asked to leave and you will not be paid. We expect and appreciate your cooperation. We will first jointly go over the instructions. After we have read the instructions, you will have time to ask clarifying questions. Each of you will then need to answer a few brief questions to ensure everybody understands. Please do not touch the computer or its mouse until you are instructed to do so. Thank you.

Participants An even number people are participating in today's experiment. There are two possible roles for each participant, the role T and the role P. Each of you will be randomly assigned to have one of them. You will remain in the same role throughout the entire duration of the experiment. That is, you will either be T for the entire experiment or you will be P for the entire experiment. You will be informed about your role on your computer screen once the experiment starts. There will be an equal number of participants in role T and role P.

Today's experiment consists of four parts. Each of those is explained below.
Part 1 and Part 4: Questionnaires
For the first and the last part of the experiment you will not make any decisions. In these parts we ask you to answer a series of brief questions. Please, read each screen carefully and follow the instructions to answer those questions.

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Part 2: Earning Money

The second part of the experiment is where you will generate earnings. In this part, each participant receives an endowment of $3.00 and then can earn additional income by completing a sequence of search tasks. In each of the search tasks you are asked to find the top of a mountain. The current location is given by a maroon square, which you have to drag with the mouse onto new locations until you get to the top. You will be assisted by an altitude instrument, called the Points Indicator, that will tell you the direction you should follow to the only peak of the mountain (up/down-right/left) (see Figure 1). At each location you will know how many points you will earn if you stopped searching. For each of the search tasks you can try as many locations as you want within a time limit of 35 seconds. The point indicator and a message saying "Well Done!" will tell you when you have reached the top of the mountain. You are given two untimed practice tasks before the real tasks start.
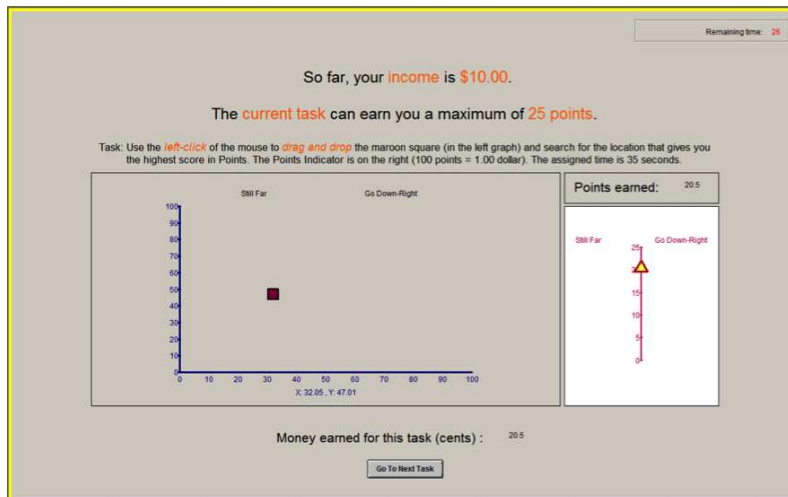

Figure B1: Search Task

All search tasks you will be given are exactly of the same type. Though, each of them has potentially different earnings possibilities. Do your best in each task, you will receive $1.00 for every 100 points you accumulate through-

out this part of the experiment. Your endowment ($3.00) plus the income you make in these search tasks will be the balance in your account at the beginning of Part 3.

Part 3: Interacting

For this part of the experiment each of you will be randomly paired with another participant through the computer. Each pair will consist of one participant of role T and one participant of role P. Roles will be assigned randomly. You will never be informed about the identity of the person you are paired with, neither during nor after the experiment. Similarly, the participant you are matched with will never be informed about your identity. At the beginning of this part you will be informed about your role (either T or P) and about the previous earnings of your counterpart. Decisions made in this part of the experiment will determine the final amount of money you will take home.

T's Task T is given the authority to transfer money from P's account to T's own account. The maximum amount of money T can collect is what P has earned as income in the search tasks of Part 2. The endowment of $3.00 cannot be transferred. In the corresponding screen, T will be asked what percentage of P's task income T wants to transfer into his/her own account. T will use a percentage slider, as shown in Figure 2, to make his/her decision. The screen will show the percentage selected as well as the corresponding dollar amount. Additionally, T's final earnings given the selection will be displayed. After T has made this choice, no other decision made by him/her or P will affect T's final earnings.

P's Task After being informed about T's decision, each P will be given the opportunity to write a message for T to read it. The content of the message depends entirely on what P wants to express. Sending a message, however, is costly. Each P, before knowing the actual price of sending a message, will be asked about the highest amount (in $) he/she is willing to pay for doing so. After P submits this amount, the actual price will be randomly determined by

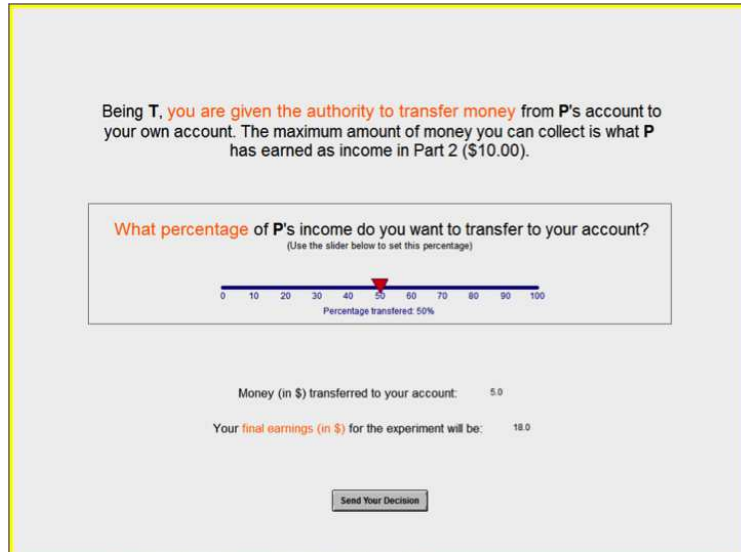the computer and revealed on a new screen.

Figure B2: T's Decision Screen

If P's willingness to pay is greater than or equal to the actual price, then P will be able to send a message and will pay the actual price generated by the computer. If P's willingness to pay is lower than the actual price, then P will not be able to send any message and will not be charged. Before being asked to state a willingness to pay, each P will be informed about his/her available earnings (see Figure 3). Available earnings are defined as the balance P obtained in Part 2 MINUS what T transferred to T's own account ($3.00+ Task Income - Transfer to T). These earnings represent all of the money that P can spend at that point, i.e. the stated willingness to pay cannot exceed that amount. The computer draws the actual price randomly from a uniform distribution ranging from $0 (zero dollars) to $3 (three dollars). This means that all prices in that range are equally likely to be drawn as the actual price. A new price is drawn for each P, with each draw being independent from the price drawn for any other P. Notice that even though the price is randomly generated, it will never exceed the amount of the endowment ($3.00), which is the minimum possible amount that P can have available after T takes a

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proportion of P's task income.

Figure B3: P's Information Screen and Willingness to Pay

Figure B4: P's Message Box

A screen with a message box like the one shown in Figure 4 will appear for P participants who are able to send a message. Those who get this screen must remember to press the ENTER key to record the written message. You will be able to verify if the message is in fact recorded by pressing the verify

button. Once you have verified the message was recorded, you can press the SEND button. The message will not be recorded unless P presses the ENTER key and sees the message on the upper part of the message box. P will be informed once T has read the message.

Determination of Earnings

Earnings of T depend only on the decisions he/she makes. While earnings of P depend on both, T's as well as P's own decisions. The following three rules summarize the earnings.

1. T's final earnings are calculated as follows: *Endowment + Task Income + Money Transferred from P's Account*

P's earnings depend on whether or not P actually sent a message. A different rule applies for each of these cases:

2. Earnings of those participants P who were able to send a message are calculated as follows: *Endowment + Task Income - Money Transferred to T's Account - Actual Price of Messaging*

3. Earnings of those participants P who were NOT able to send a message are calculated as follows: *Endowment + Task Income - Money Transferred to T's Account*

At the end of the experiment, your total earnings in dollars (plus the $5 show up fee) will be privately paid to you in cash.

C Mood - Emotions Variables Questionnaire

- Right now how would you describe yourself? 9-valued scale: Extremely Unhappy to Extremely Happy.

- Please, give the number that best describes the emotions you are experiencing at this moment: 7-valued scale: form "Emotion is not present at all" to "Emotion feels very intense"

    - Irritation, Anger, Contempt, Surprise, Envy, Jealousy, Sadness, Happiness, Fear, Joy, Shame.

- Below you are given pairs of opposite feelings. Use the following scale to indicate your current mood relative to these feelings (1: you are experiencing the feeling on the left side very strongly. 5: neutral. 9: you are experiencing the feeling on the right side very strongly.)

  – Bad mood/Good mood; Sad/Happy; Depressed/Elated; Gloomy/Cheerful; Displeased/Pleased; Sorrowful/Joyful

  – Nervous/Calm; Tense/Relaxed; Uncomfortable/Comfortable; Apathetic/Carinf; Lethargic/Energetic; Unconfident/Confident; Unresponsive/Emotional; Passive/Active.