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To support trust and trustworthiness: punish, communicate, both, neither?

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Abstract
We examine the effects of punishment, communication, and their interaction on trust and trustworthiness. Our findings suggest that, when communication alone is available as an option for the trustor, using it roughly doubles the ability the trustor has to elicit trustworthiness, so communication is not cheap talk. When punishment alone is available, a punishment threat has no significant impact on the marginal ability of trust to elicit trustworthiness. If the two mechanisms are available and implemented together, the choice to punish completely cancels out the positive effect of the choice to communicate. For policy, these findings stress the importance of communication relative to contracts enforced with material penalties.

JEL Classification: C70; C71; C91

Keywords
trust — trustworthiness — punishment — communication — cooperation

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Introduction

When trust and trustworthiness more fully permeate society, there is more support for mutually beneficial economic exchanges (Breuer and McDermott, 2010), for the generation and of income and a more equitable distribution (Ermisch and Gambetta, 2016), and for tax compliance (Puaschunder, 2012). Breuer and McDermott argue trustworthiness is more important than trust for public policy success and sustainable long-term economic growth, in part because trustworthiness supports trust, so they emphasize the usefulness of establishing mechanisms to punish untrustworthy behavior.

Behaviorally, trust involves taking a risky action with the belief that the trustworthiness of the other is sufficient to protect from the exposure to harm. People often rely upon material penalty mechanisms when they trust, but the economic literature has focused upon more subtle behavioral supports. When material punishment mechanisms are absent, the literature indicates the levels of trust and trustworthiness displayed are a result of two fundamental motives: 1) risk preferences, and 2) social preferences of varying forms, including fairness, reciprocity, altruism, and positional concern (e.g., Rabin, 1993; Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000; Ortmann et al., 2000; Cox et al., 2001; Andreoni and Miller, 2002; Charness and Rabin, 2002; McCabe et al., 2003; Cox, 2004; Capenter et al., 2008).

The Investment Game developed by Berg et al. (1995) has been instrumental in developing an improved understanding of trust and trustworthiness. Variations of the original design have provided meaningful results in many lab and field experiments (e.g., Glaeser et al., 2000; Barr, 2003; Willinger et al., 2003; Cochard et al., 2004; Coricelli et al., 2006; Bacharach et al., 2007; Bellemare and Kroger, 2007; Bigoni et al., 2013)[1]. Here, we are especially interested in work showing punishment and communication can impact levels of trust and trustworthiness (e.g., Bichierri et al. 2010; Ben-Ner et al., 2011; Cason et al., 2012; Fehr and Rockenbach, 2003; Houser et al., 2008; Ismayilov and Potter, 2016; Kimbrough et al., 2008; Schotter and Sopher, 2006; Sheremeta and Zhang, 2013).

The works by Fehr and List (2004) and Charness and Dufwenberg (2006) are the most relevant. Fehr and List observe a higher degree of trustworthiness when the trustor voluntarily refrains from using an available punishment threat. This is behaviorally interesting because material self-interest predicts more trustworthiness should be exhibited when the punishment is implemented. Charness and Dufwenberg find a non-binding message enhances cooperative behavior. This is behaviorally interesting because material self-interest indicates such a message should be cheap talk and have no impact.

While punishment and communication have been examined separately in some detail[2], this study fills a gap by sys-

[1] Also see Camerer (2003), Cooper and Kagel (2009), Eckel and Grossman (2008), Johnson and Mislin (2011), Sapienza et al. (2007), and Wilson and Eckel (2010) for reviews of experimental results in the trust game. See also Naef and Schupp (2009) for survey results.

[2] For example, there are studies that have shown the effectiveness of punishment or communication depends upon the cost of punishment (Rigdon, 2009), the number of participants (Bohnet et al., 2001; Charness et al., 2008), and the form and channel of communication (Issac and Walker, 1998; Duffy

tematically comparing the two and by examining how they interact. We use a 2 x 2 experimental design, where the trustor (1) has no opportunity to punish nor communicate, or (2) has the ability punish but not communicate, or (3) has the opportunity to communicate but not punish, or (4) has both the opportunity to punish and the opportunity to communicate.

Experimental design and procedures

We implement a 2 x 2 experimental design with 4 treatments as summarized in Table 1.

Table 1. Experimental treatments

	No Ability to Communicate	*Ability to Communicate*
No Ability to Punish	NPNC	NPWC
Ability to Punish	WPNC	WPWC

The NPNC treatment replicates the standard trust game of Berg et al. (1995), with one modification. Actor 1 neither has the ability to punish nor the ability to communicate. Actor 1 and Actor 2 are paired anonymously, and their identity is never revealed to the other. Both receive an endowment of 10 shanks (experimental currency units). Actor 1 chooses a transfer amount $x \in \{0,1,2,...,10\}$ shanks to send to Actor 2. The single modification of the standard trust game, implemented to provide consistency across our four treatments, is Actor 1 also presents Actor 2 with a desired "back transfer" $\hat{y} \in \{0,1,2,...,3x\}$, where the desired back transfer is the number of shanks Actor 2 wants Actor 1 to send back. As in the standard game, trust is productive, which is implemented by having Actor 2 receive 3 shanks for each shank transferred by Actor 1. Then, Actor 2 chooses the actual back-transfer level $y \in \{0,1,2,...,3x\}$, yielding final payoffs of $\pi_1 = 10 - x + y$ for Actor 1 and $\pi_2 = 10 + 3x - y$ for Actor 2. The NPNC treatment provides baseline measures of trust and trustworthiness.

The WPNC treatment replicates the experiment of Fehr and List (2004). It is identical to the NPNC treatment, except Actor 1 can implement a conditional payoff cut — the fixed penalty of 4 shanks $(f = 4)$ — on Actor 2 whenever the actual back transfer paid by Actor 2 is less than the desired back transfer of Actor 1 (i.e., $y < \hat{y}$). Punishment in this experiment, as in the Fehr and List experiment is this conditional payoff cut. Actor 1's payoff is $\pi_1 = 10 - x + y$. Actor 2's payoff is $\pi_2 = 10 + 3x - y - 4$ if Actor 1 imposes the conditional payoff cut and Actor 2 provides $y < \hat{y}$. Alternatively, Actor 2's payoff is $\pi_2 = 10 + 3x - y$ if either Actor 1 does not impose the conditional payoff cut or Actor 1 imposes the conditional payoff cut but Actor 2 provides $y \geq \hat{y}$.

The NPWC is identical to the NPNC treatment, except Actor 1 can provide a written message to Actor 2 prior to submitting the transfer choice. This message is the definition of communication in this experiment. Actor 2 cannot provide a message back to Actor 1, so the communication is one-way. If Actor 1 chooses to communicate, the message is typed into a computer and sent through a computer network to the computer in front of Actor 2 in the other room. Actor 2 then reviews the message and chooses y. Regardless of whether a message is sent, Actor 1's payoff is $\pi_1 = 10 - x + y$ and Actor 2's payoff is $\pi_2 = 10 + 3x - y$.

The treatment WPWC combines the WPNC and NPWC treatments. Actor 1 has both the ability to punish and the ability to communicate a massage. Actor 1's payoff is $\pi_1 = 10 - x + y$. Actor 2's payoff is determined exclusively by whether or not the condition payoff cut is imposed: $\pi_2 = 10 + 3x - y - 4$ if Actor1 imposes the conditional payoff cut and Actor 2 provide $y < \hat{y}$, while $\pi_2 = 10 + 3x - y$ if Actor 1 chooses not to impose the conditional payoff cut or if Actor 1 imposes the punishment but Actor 2 provides $y \geq \hat{y}$.

The experimental data was collected in a series of 10 sessions. Following Fehr and Lists (2004) experimental procedure, each subject participated in only one session, but within a session the participant played the game twice in the same role in two different treatments. Importantly, subjects were not informed in advance about the second game, and the treatment ordering was reversed in different sessions to allow us to test for treatment effects[3].

A total of 65 subjects participated in the experiment, including undergraduate students, graduate students, and employees at University of Nevada, Reno. These generated a total of 130 pairs (observations): 25 in treatment NPNC, 39 in treatment WPNC, 26 in treatment NPWC, and 40 in treatment WPWC[4]. Each participant was paid two U.S. dollars for each shank earned. Upon agreeing to participate in the experiment, subjects also completed a demographic questionnaire[5].

Results

Table 2A compares the average behavior of subjects between the NPNC and WPWC treatments. Using the two-sample t-test, there is no significant difference in the mean transfer of Actor 1 (7.00 vs. 6.69), but the mean back transfer of Actor 2 in the NPNC treatment (11.95) is significantly higher ($p<0.05$) than the mean back transfer in the WPWC treatment (7.89). This suggests the ability to punish and the ability to communicate hamper the ability to elicit trustworthiness.

Considering previous trust game results, we find evidence that the ability to communicate a desired back transfer may

and Feltovich, 2002).

3 Three statistical tests (the paired t-test of mean difference, Wald Chi-square test of equality, multiple regression with a game-specific dummy variable) indicate the first game decision does not significantly impact the second game decision, suggesting the absence of learning or treatment effects in our experiment.

4 During the experiment, there are two subjects in the role of Actor 2 that did not receive any transfer from Actor 1, but sent back all the 10 shanks endowment. These two pairs (4 observations) were excluded from our analysis. Subsequently, the total number of observations reduces to 126.

5 In unreported results, we find demographic factors (e.g., age, gender, religious, education, religious, income, and managerial status) have no significant impact on subject behaviors.

make Actor 1 subjects more trusting. Our NPNC treatment is unique in that no previous standard trust game without a punishment option has required Actor 1 to provide a requested back transfer. In our NPNC treatment, Actor 1 transfers averaged 70% of the endowment. In the seminal trust game, Berg et al. (1995) found that Actor 1 transferred 52% of the endowment on average. Cox (2004) reported a 60% average, while Bohnet and Baytelman (2007) reported a 55% average. Interestingly, the average desired back transfer $\hat{y}$ of Actor 1 is roughly twice the transfer x. This implies Actor 1 is effectively communicating a proposal to divide the total surplus so the payoffs of the two players are roughly equal. Thus, even though communicating a written message is not possible, Actor 1 can communicate a desire for fairness to Actor 2 in the NPNC treatment. This may explain why more trustworthiness is elicited in our experiment than in the standard trust game.

The average behavior in the WPNC and NPWC treatments are summarized in Table 2B. The results are consistent with the previous findings in the WPWC treatment. The mean transfers in the WPNC (6.16) and NPWC (6.77) treatments are not significantly different from the mean of the NPNC treatment, but the mean back transfers (7.11 in WPNC and 9.07 in NPWC) are significantly lower ($p<0.05$) than the mean of the NPNC treatment.

Most Actor 1 subjects used punishment and communication when the opportunities were available, as shown in Table 2A and Table 2B. Adding the opportunity to communicate with a written message (moving from WPNC to WPWC) increased the use of punishment (from 62% to 77%). Conversely, adding the opportunity to punish (moving from NPWC to WPWC) increased the use of communication (from 70% to 85%). That is, subjects on average perceived punishment and communication opportunities to be complementary. However, the mean back transfers were not higher in the WPWC treatment, so the perception did not bear fruit.

Table 3A and Table 3B separate the data according to whether Actor 1 adopts the ability to punish or the ability to communicate, and compares subject behavior using three main variables: i) the transfer sent by Actor 1; ii) the back transfer chosen by Actor 2; and iii) the return to trust, or the ratio of the back transfer to the transfer.

One finding is that using the available communication option can have a positive impact on both trust and trustworthiness. As shown in Table 3A, in the WPWC treatment, Actor 1 subjects who choose to use the communication option but not the punishment option trust more on average (8.6). The difference is statistically significant ($p<0.01$). The average back transfer is significantly greater ($p<0.10$) when Actor 2 receives a message but does not face punishment (11.4) than when Actor 1 subjects do not send the message but impose the punishment threat (7.0).

We also find evidence that using the available punishment option can substantially crowd out the positive impact of communication on trustworthiness. In the WPWC treatment, moving from using only communication to choosing

Table 2A. Subjects actual behavior on average in the NPNC and WPWC treatments

	NPNC	WPWC
Transfer x (shanks)	7.00	6.69
Punishment (% imposed)	N/A	77 %
Desired back transfer $\hat{y}$ (shanks)	14.91	13.79
Message (%sent)	N/A	85%
Actual back transfer y (shanks)	11.95	7.89
Number of observations (N)	24	39

Table 2B. Subjects actual behavior on average in the WPNC and NPWC treatments

	WPNC	NPWC
Transfer x (shanks)	6.16	6.77
Punishment (% imposed)	62%	N/A
Desired back transfer $\hat{y}$ (shanks)	12.67	13.80
Message (%sent)	N/A	70%
Actual back transfer y (shanks)	7.11	9.07
Number of Observation (N)	37	26

to use communication with the punishment option lowers the average back transfer from 11.4 to 6.7 shanks ($p<0.01$).

As shown in Table 3B, in the NPWC treatment, the average transfer and the average back transfer are significantly higher ($p<0.01$) when Actor 1 chooses to communicate than when Actor 1 chooses not to use the communication option.

Alternatively, in the WPNC treatment, the average back transfer of Actor 2 is lower when Actor 1 chooses to impose the punishment (7.3 vs. 7.0). This result is consistent with Fehr and List (2004), but is not statistically significant.

Table 4 presents a series of regressions designed to identify marginal impacts of individual factors and examine interactions.

Model specifications (A) and (B) are benchmark regressions, examining the treatment effects on trustworthiness. Model (A) includes all treatment dummies but suppresses the constant, so each estimated coefficient represents the average back transfer in each treatment (11.96 in NPNC, 7.11 in WPNC, 9.08 in NPWC, and 7.90 in WPWC). Model (B) includes the constant term but drops the NPNC treatment dummy, so each estimated coefficient represents the difference in the average back transfer between the NPNC treatment and the other three treatments. The mean for the NPNC treatment is significantly greater than the means of the WPNC and NPWC treatments but not significantly different from NPWC mean.

Model (C) indicates the estimated coefficients on NPNC, WPNC, NPWC, and WPWC are indistinguishable from zero, while the coefficients on the interaction terms are all signif-

Table 3A. Participant behavior in NPNC and WPWC by use of punishment or communication

Variables	NPNC	WPWC				
	All subjects	All subjects	Use punishment not communication	Use communication not punishment	Use both	Use neither
Transfer (x)						
Mean	7.0	6.7	5.0	8.6	6.4	7.5
S.D.	3.5	3.0	3.7	2.4	2.9	3.5
C.V.	0.5	0.5	0.7	0.3	0.5	0.5
Back transfer (y)						
Mean	12.0	7.9	7.0	11.4	6.7	12.5
S.D.	7.6	6.3	8.9	6.3	5.8	3.5
C.V.	0.6	0.8	1.3	0.5	0.9	0.3
Return to trust (y/x)						
Mean	1.7	1.2	1.5	1.3	1.1	2.0
S.D.	0.6	0.9	1.3	0.7	0.8	1.4
C.V.	0.3	0.7	0.9	0.5	0.8	0.7
Number of observations (N)	24	39	4	7	26	2

Notes: Amounts shown are in shanks. S.D. stands for standard deviation. C.V. stands for coefficient of variation (S.D./Mean).

Table 3B. Participant behavior in WPNC and NPWC by use of punishment or communication

Variables	WPNC			NPWC		
	All subjects	Not use punishment	Use punishment	All subjects	Not use communication	Use communication
Transfer (x)						
Mean	6.2	6.8	5.8	6.8	5.6	7.3
S.D.	3.3	3.6	3.1	3.6	4.7	3.1
C.V.	0.5	0.5	0.5	0.5	0.8	0.4
Back transfer (y)						
Mean	7.1	7.3	7.0	9.1	4.8	11.0
S.D.	5.6	6.3	5.3	8.3	7.9	8.0
C.V.	0.8	0.9	0.8	0.9	1.7	0.7
Return to trust (y/x)						
Mean	1.4	1.1	1.5	1.3	0.8	1.5
S.D.	0.9	0.6	1.0	0.8	0.9	0.7
C.V.	0.7	0.6	0.7	0.6	1.1	0.5
Number of observations (N)	37	14	23	26	8	18

Notes: Amounts shown are in shanks. S.D. stands for standard deviation. C.V. stands for coefficient of variation (S.D./Mean).

icantly positive. This implies the different treatments have impact by affecting the marginal impact trust has on trustworthiness. Model (D) excludes the insignificant treatment dummies in Model (C), but preserves the interaction terms. The positive coefficients on the interaction terms indicate trust is reciprocated with trustworthiness in all the treatments. The marginal effects of trust on trustworthiness in the NPNC, WPNC, NPWC, and WPWC treatments are 1.70, 1.05, 1.38 and 1.18, respectively.

Model (E) re-estimates the regression after replacing the $NPNC*x$ variable with the transfer x. The results indicate the marginal effect of trust on trustworthiness is significantly greater in the NPNC treatment. The marginal effect of trust on trustworthiness in the NPWC treatment is not significantly greater than the WPNC (p = 0.44) or WPWC (p = 0.36).

Model specifications (F), (G), and (H) add the interactions needed to examine how Actor 2s trustworthiness is affected by the use of either punishment or communication options. In Table 4, the dummy Y_p equals 1 if Actor 1 chooses to punish when the option is possible (i.e., in WPNC and NPWC), 0 otherwise. The dummy Y_c equals 1 if Actor 1 chooses to communicate when the option is possible (i.e., in NPWC and WPWC), 0 otherwise. Thus, $Y_p * Y_c$ equals 1 if the two mechanisms are implemented simultaneously in the WPWC treatment. The estimate coefficients represent the marginal effect of trust on trustworthiness when Actor 1 uses punishment, communication, or both.

In Model (F), the significant positive coefficient (0.69) on the $NPWC * Y_c * x$ variable indicates a written message from Actor 1 to Actor 2 is not cheap talk, but rather is a mechanism that reinforces the ability trust has to elicit trustworthiness. The other insignificant coefficients indicate implementing the punishment threat does not crowd out the ability of trust to elicit trustworthiness, or enhance it.

Models (G) and (H) exclude the usage interaction variables that are not statistically significant in Model (F). Model (G) confirms that communication should be used when it is available. Yet, Model (H) suggests that the positive effect of communication disappears if the punishment threat is implemented together.

Conclusion

A primary result of our study is counter intuitive: The ability of a trustor to punish untrustworthiness and the ability of a trustor to communicate each hamper the degree to which trust can elicit trustworthiness on average. The average, however, is misleading. If the communication option is used, then a trustor with the opportunity to communicate can elicit trust just as effectively as a trustor without the opportunity to communicate. What is problematic is not using the communication option when it is available. Normally, people have the opportunity to communicate when they trust another. For policy formation and for daily living, our results indicate it is better to communicate than not. Communication is not just cheap talk.

Consistent with Fehr and List (2004), we find using the punishment option is not helpful on average. When the punishment option alone was available in our experiment, those choosing to use it did not elicit more trustworthiness. When punishment and communication options were available, choosing to add the punishment option to the communication option entirely cancelled out the positive effect communication had for eliciting trustworthiness. For policy formulation, this suggests good will, which communication may provide, will tend to be damaged when accompanied by a punishment threat.

For policy makers, our study also highlights the importance of communication for eliciting trustworthiness, especially as an alternative to a penalty threat. Previous experiments have either examined one-way communication in the opposite direction, from trustee to trustor (e.g., Bracht and Feltovich, 2009; Ismayilov and Potter, 2016), or they have examined two-way communication (e.g., Ben- Ner et al., 2011; Charness and Dufwenberg, 2006; Duffy and Feltovich, 2002). We examined one way communication from trustor to trustee primarily to be able to compare it to the use of a punishment threat by the trustor. In our NPWC treatment, where no punishment option was available, sending a written message doubles the marginal ability trust has to elicit trustworthiness, a substantial effect. Roughly three-fourths of messages sent expressed the desire of the trustor to be generous in some way. We could not find evidence that a particular type of message content was especially effective (e.g., emphasizing mutual benefit, fairness, equality, or productivity).

Most of our human subject trustors tended to use options when they were available. When both punishment and communication were available, those who refrained from using punishment elicited more trustworthiness on average. However, most did not refrain, meaning most did not understand how a threat to punish would dampen the positive impact of communication. An experiment allowing repetition could examine whether people could learn to refrain from threatening punishment.

The fundamental economic idea that people respond to incentives suggests communicating generosity or good will in some form is just cheap talk and suggests credible penalty threats will be more effective. However, trusting without a credible penalty sends a positive message. It says, I am relying upon you, not on the penalty, and this message can be reinforced with communication. Further research is needed to identify how context matters. For example, it is reasonable to think that foregoing a penalty option will be more effective in personal relationships, small groups, and closely held business than in impersonal relationships, large groups, very large businesses, or across society as a whole. Nonetheless, our results suggest policy makers should not underestimate the power of communication for eliciting trustworthiness and not overestimate the power of credible penalty threats.

Lastly, we return to the work of Breuer and McDermott (2010), which emphasizes the importance of trustworthiness for economic growth and thus the importance of promoting trustworthy behavior among all citizens. Complementing much previous work, our work indicates contracts enforced with penalties for non-compliance are not all important. In particular, communicating good intentions, while it provides no material incentive, nonetheless seems to elicit the trustworthiness which supports economic growth.

Table 4. Regression estimates for Actor 2's back transfer

Dependent variable: Actor 2's actual back transfer								
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
Treatment effects								
NPNC	11.96***		0.48					
	(1.40)		(2.57)					
WPNC	7.11***	-4.85***	3.09					
	(1.12)	(1.79)	(1.96)					
NPWC	9.08***	-2.88	-1.13					
	(1.34)	(1.94)	(2.31)					
WPWC	7.90***	-4.06***	0.06					
	(1.10)	(1.78)	(2.17)					
Treatment interaction effects								
x					1.70***			
					(0.14)			
NPNC * x			1.64***	1.70***		1.70***	1.70***	1.70***
			(0.33)	(0.14)		(0.14)	(0.14)	(0.14)
WPNC * x			0.65**	1.05***	-0.65***	1.05***	1.05***	1.05***
			(0.28)	(0.13)	(0.19)	(0.19)	(0.13)	(0.13)
NPWC * x			1.51***	1.38***	-0.32*	0.88***	0.88***	0.88***
			(0.30)	(0.14)	(0.18)	(0.27)	(0.27)	(0.26)
WPWC * x			1.17**	1.18***	-0.52***	1.41***	1.18***	1.41***
			(0.30)	(0.12)	(0.19)	(0.19)	(0.12)	(0.19)
Usage effects								
WPNC * Yp * x						-0.01		
						(0.26)		
NPWC * Yc * x						0.69**	0.69**	0.69**
						(0.31)	(0.31)	(0.31)
WPWC * Yp * Yc * x						-0.38		-0.38
						(0.24)		(0.24)
Constant		11.96***						
		(1.40)						
R2	0.63	0.06	0.77	0.77	0.40	0.79	0.77	0.78
F-statistic	52.73	2.70	49.64	99.60	20.39	60.01	83.17	70.60
Observations	126	126	126	126	126	126	126	126

(1) Notes: Absolute values of standard errors are in parentheses.

(2) *** Significant at 0.01 level.

(3) ** Significant at 0.05 level.

(4) * Significant at 0.10 level.

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