# Teams Promise But Do Not Deliver*

Kirby Nielsen[+], Puja Bhattacharya[+], John H. Kagel[+], and Arjun Sengupta[*]

7/6/2017

Abstract

Individuals and teams participate in a hidden-action trust game with pre-play communication. Both make non-binding promises to cooperate at the same rate, but individuals live up to their promises while teams do not. Teams first decide on their action and use non-binding communication to support their chosen action. Teams and individuals receiving non-binding communication generally trust promises and choose to cooperate, at similar rates. The literature on pre-play communication argues that people fulfill promises because doing so avoids moral costs. Our results indicate this conclusion does not apply to teams, as teams provide their members with support for acting in a self-benefiting manner, limiting the implications one can draw based on studies with individuals.

Key words: trust game, hidden-action, non-binding communication, teams versus individuals

JEL classification: C72, C91, C92, D83

Ohio State University[+] and Nanyang Technological University*. Funding for this research was provided by the National Science Foundation, SES- 1630288. We have benefitted from discussions with Katherine Baldiga Coffman, Lucas Coffman, Paul J. Healy, and audience members at the 2016 North American ESA meeting. We thank Liam Bailey, Gus Bradley, Anish Ravipati, and Eric Spurlino for their research assistance. An earlier version of this paper was circulated under the title "Team vs. Individual Behavior with Non-Binding Commitments." Opinions, findings, conclusions or recommendations offered here are those of the authors and do not necessarily reflect the views of the National Science Foundation.

Economic transactions are often characterized by imperfectly observable actions. These unobservable actions, and the lack of trust surrounding them, can prevent potentially profitable partnerships from being formed in one-shot interactions (Bolton and Dewatripont, 2004). However, non-binding communication can lead to more efficient outcomes, even with unobservable actions, when individuals are motivated to fulfill their commitments. A large literature with individual decision makers has shown that non-binding communication increases cooperation in one-off transactions with hidden actions (e.g., Charness and Dufwenberg 2006, Vanberg 2008, Ederer and Stremitzer 2016, Ismayilov and Potters 2016, Young et al. 2014, Bhattacharya and Sengupta 2017).

The present paper explores whether this positive effect of non-binding communication extends to two-person teams with imperfectly observable actions. This is important since if decision making by individuals and teams differs substantially, false inferences may be drawn from experiments using individuals as decision makers. Second, employing two person teams as decision makers allows for recording within-team conversations which provides insight into decision makers' motivation for meeting (or failing to meet) their commitments, as well as insight into why non-binding commitments are believed and acted on.

As the title of the paper indicates, with communication teams make non-binding promises to cooperate at about the same rate as individuals (78% versus 73% for individuals). However, cooperation rates are much lower for teams (26% versus 45%, $p < 0.05$), with the marginal effect of promises on cooperation rates effectively zero for teams. In contrast, trust rates are high for both individuals (64%) and teams (53%), with this difference not statistically significant.

Evidence from within-team conversations shows that, in making commitments, teams first decide on whether they want to cooperate or not, and then choose a message to support this decision. When not living up to their commitments, promises are designed to induce first movers to trust them in order to earn the higher payoff from reneging. Teammates occasionally express guilt, or feeling bad, when not living up to these commitments. However, the moral cost does not rise to the point that they are any more trustworthy than absent the opportunity to make a commitment. There is evidence, both direct and indirect, that when teams live up to their promises, this is largely motivated by other regarding preferences and/or confusion. Other regarding preferences may provide the basis for expectation-based guilt aversion (Charness and Dufwenberg, 2006) or a preference for consistency (Festinger 1962, Falk and Zimmermann,

2011), hypotheses for why individuals live up to their commitments. However, these sentiments are rarely, if ever, expressed directly. More generally, results from hidden action trust games with individuals have been used to suggest a more limited need for formal contracts in one-shot transactions than previously thought (Charness and Dufwenberg 2006). The results reported here show that this conclusion does not extend beyond individuals.

Prior research on trust games, with and without communication, have all employed individual decision makers (Charness and Dufwenberg, 2006; Vanberg 2008, Ederer and Stremitzer 2016, Ismayilov and Potters 2016, Young et al. 2014, Bhattacharya and Sengupta 2017). Those few trust games comparing teams with individuals have all employed games with no hidden action and no communication. In these "standard" trust games, first movers have a fixed sum of money to distribute between a second mover and themselves. The amount of money sent to second movers is then doubled or tripled, after which second movers decide how much to send back to the first mover. In contrast to the present game, first movers can signal their trust by the amount of money sent. Song (2008) compares behavior between individuals and group-representatives for three-player teams in a standard trust game. She finds that group-representatives are less trusting and less trustworthy than individuals. Kugler et al. (2007) compare three person teams with individuals in a standard game. The main finding is that teams are less trusting than individuals, as they send less money than individuals do. However, teams are just as trustworthy, giving back, on average, the same fraction of the amount of money sent.

Closer to the present game, in terms of tapping into the same underlying strategic considerations, are simultaneous move, one-shot, prisoner dilemma games comparing teams with individuals with and without communication, reported in the psychology literature (Insko et al., 1993). These experiments typically employ two way communication, compared to the limited one-sided communication in the present experiment.[1] Using financial incentives, communication increases cooperation significantly for individuals but not for teams, quite similar to the results reported here. This will be discussed in more detail below.

The structure of the paper is as follows: Section I outlines the experimental design and procedures. Results comparing individuals and teams with and without communication are reported in Section II. Section III analyzes the team discussions to better understand the basis

[1] Cooper and Kühn (2014) show that unrestricted two-way communication leads to substantially higher cooperation rates than one-sided communication.

for the behavior reported in the team communication treatment. The paper ends with a brief summary of results reported and possible extensions of this line of research.

## I. Experimental Design and Procedures

There are two treatments using the same experimental design as Charness and Dufwenberg (2006; hereafter CD). The first treatment uses individuals, designed to calibrate and replicate behavior for our subject population. The second uses two person teams who must coordinate their actions. The game tree is shown in Figure 1, with the names of players and strategies the same as those used in the experimental instructions.[2] Also shown, in parentheses, are dollar payoffs, with As' payoffs listed first followed by Bs'. It is a sequential move game programmed using z-Tree (Fischbacher, 2007).

[Insert Fig 1 here]

A's move first, deciding between In or Out, with payoffs of $5 to both A and B for Out. A's payoff for In depends on B's choice, with expected earnings greater than $5 if B cooperates (Rolls), and $0 if not. Participants played 5 periods of the same game with perfect stranger matching, and no feedback regarding outcomes until the last period.[3] Roles were held constant throughout a session, with one period chosen randomly to determine earnings (along with a $5 show-up fee). At the end of a session participants learned the payoff they would have received in each of the 5 periods, along with which the randomly selected period determining their payoff. Subjects were told that they would not learn whether the chance move was a "Success" or a "Failure", so that As could not attribute a $0 payoff to B choosing Don't Roll.

Team treatments employed 2-person teams.[4] Teammates did not know each other's identity, sitting at separate computer terminals and communicating with each other through a continuously available chat box. Team composition remained the same for all 5 periods. Teams were required to reach agreement on all decisions, with the message protocol structured to allow input from both team members. Each team member received the payoff at the node of the game tree for the one, randomly selected, payoff period. There were no restrictions on the within-

[2] The experimental instructions, along with images from the experimental interface can be found at http://www.kirbyknielsen.com/teams-promise/instructions.pdf.

[3] The only difference between our design and that of CD is that their participants played only a single round while ours play 5 rounds. Given our perfect stranger matching protocol, predictions remain the same.

[4] In the experiment, teams were referred to as "group" A or B.

team discussions, except to refrain from using profanity and to not identify themselves in any way.[5]

Each treatment had several sessions with no communication and a similar number with communication – a between subject design with no overlap between subjects. In the no communication treatments, participants played the game exactly as shown in the game tree. All A's decided In or Out, followed by Bs deciding to Roll or Don't Roll, without seeing A's choice. The Chance move was computerized, with the computer simulating the roll of a 6-sided die. In the communication treatment, Bs' had the opportunity to send a single free-form typed message to the A they were paired with, *before* A decided In or Out. After that, decisions proceeded as in the no communication treatment.

In the communication treatment, Bs had 2 minutes to reach agreement on their message. Neither teams nor individuals were required to send a message and were explicitly told that they could leave the message blank or write "No Message". In order to give both teammates input into the message content either member could initially propose a message, with their teammate choosing to accept or reject it. If teammates agreed on the message it was sent after the 2 minutes expired. If they failed to agree, one member was randomly selected and given 30 seconds to write a message on behalf of the team (with the chat box turned off).[6] While the B teams decided on what message to send, A teams had 2 minutes to freely chat with each other.

After all B teams had written a message, they were delivered to their respective A team, with As having 1 minute to decide on In or Out. Teammates were required to agree on their decision, and if no agreement was reached, one teammate was randomly selected to make the decision on behalf of the team (with the chat box turned off).[7] While As decided between In or Out, Bs were able to continue their discussions. After all As made their decisions, Bs had 1 minute to reach agreement whether to Roll or Don't Roll (without knowing A's choice). If Bs could not reach agreement, one member of the team was randomly chosen to make that decision (with the chat box turned off).[8]

---

[5]Chat analysis indicates subjects generally followed these instructions, with the exception of a few subjects disclosing minor identifying characteristics; e.g., their major and class schedule.

[6] This option was only exercised in period 1 (20 out of 40 period 1 messages). Within-team conversations indicate that, in most of these cases, teammates had already agreed on the message but ran out of time typing it.

[7] This happened in 7 of the 375 decisions, with 5 of these occurring in Period 1.

[8] This happened in 3 out of the 375 decisions.

In the no communication treatment, the message stage was omitted but decision times and disagreement options were the same as in the communication treatment. Procedures were essentially the same for the individual sessions, except individuals were given only 1 minute to write messages.

No effort was made to solicit A's or B's beliefs, as this was done only after the fact in the original CD experiment. In place of this, we rely on the within team discussions to identify motives for cooperating or not, as well as what amounts to A's first order beliefs and B's second order beliefs regarding A's beliefs.

Subjects were primarily from the undergraduate student population at the Ohio State University, recruited through ORSEE (Greiner, 2004). Sessions lasted under 1 hour, with payments averaging $11.50 per subject in the team sessions and $13 in the individual sessions, including a $5 show-up fee.

There were 4 individual subject sessions without communication with a total of 38 sets of A and B players, and 4 sessions with communication for a total of 42 pairs of A and B players. The corresponding numbers for the team treatment were 7 sessions for a total of 37 pairs of A and B teams without communication, and 7 sessions with communication for a total of 40 pairs of A and B teams.[9] The statistical analysis is based on decisions at the individual- or team-level and, unless stated otherwise, taking averages of choices over the five periods.

## II Experimental Results

*Effects of Communication on Cooperation:* The left hand panel of Figure 2 reports the impact of communication on cooperation rates for individuals, with the corresponding statistical tests reported in the top row of Table 1. In rates increased from 50% to 64% for individuals with communication ($p = 0.06$ based on a two-tailed Wilcoxon rank-sum test statistic).[10] Roll rates increased by about the same amount, from 26% to 45% ($p < 0.05$). These changes are similar to those reported in CD, although the baseline (no communication) Roll rates are lower here.[11]

---

[9] With teams and perfect stranger rematching, team sessions required 20 subjects. In two team sessions without communication this required that a single experimenter sit in as a team partner. In these instances, the experimenter told her partner that she was the experimenter, and would go along with all of her partner's decisions. In both sessions, the experimenter was assigned to an A team. These two A teams are dropped from the analysis.

[10] Two tailed Wilcoxon sign tests will be used unless indicated otherwise.

[11] In CD, the increase in In and Roll rates with communication were 18% and 23% respectively. Baseline (no communication) In and Roll rates were 56% and 44% in CD.

The impact of communication on cooperation rates for teams is another matter (the second panel of Figure 2, and the second row of Table 1). While communication significantly increased teams' In rates from 30% to 53% ($p < 0.01$), it had only a minor impact on Roll rates, an increase from 21% to 26% ($p = 0.35$).

[Insert Table 1 and Figure 2 here]

*Conclusion 1:* Communication enhances cooperation rates on the part of first movers (A players) for both teams and individuals and, if anything, more so for teams compared to individuals. Communication increases cooperation rates on the part of second movers (B players) for individuals but has no effect on teams.

There is one subsidiary point to be made here regarding previously reported differences in trust between teams and individuals. In the standard (one-shot) trust game, comparing individuals with three person teams, Kugler et al. (2007) report that teams are less trusting than individuals, sending less money than individuals. But as second movers teams are as trustworthy as individuals, as they send back the same fraction of the amount sent. These results, without communication, are similar to those reported here without communication: Teams chose In less often than individuals (a 20% difference, $p < 0.05$) (are less trusting), but Roll rates were essentially the same (21% for teams and 26% for individuals, $p = 0.14$) (equally trustworthy). These similarities hold in spite of second movers observing first movers actions in the standard trust game, which allow first movers to send a trust signal by the share of their endowment they send.

In what follows the focus is on the effect of communication on the rate of As choosing In, and how B's messages correlate with their decision to Roll or not. In addition, the within team chats were coded with a view to better understanding decisions to choose In and Roll.

*Messages and Their Impact***:** Bs' free-form messages were placed in one of four categories: Strong Promise, Weak Promise, Empty Talk, and No Message.[12] To remove experimenter bias two undergraduate students, neither of whom participated in the experiment, coded the messages after receiving a brief description of each of the categories along with examples of same. A message was classified as a Strong Promise if the sender clearly promised to Roll. A Weak Promise consisted of a less direct statement of intent, or reference to, choosing Roll. Empty Talk

[12] These categories are based on Houser and Xiao (2010) who reanalyzed the CD data using these four categories.

were messages unrelated to the game, and No Message was reserved for blank messages or messages where the sender wrote "No Message". Examples of these categories, along with the frequency with which these messages were sent are reported in Table 2 below. The agreement rate between coders was 94%.[13]

[Insert Table 2 here]

Although subjects were free to send whatever message they wished, and the experimenters never mentioned promises, over 50% of the messages sent consisted of a Strong Promise to Roll for both teams and individuals. Combining Weak and Strong Promises 73% and 78% of all messages were classified as Promises for individuals and teams, respectively. In what follows, “Promise" refers to Strong and Weak promises together, with the modifier Strong or Weak when distinguishing between the two. (In subsequent analysis, these will typically be combined as the results are unchanged when distinguishing between the two.) For all four message categories, there are no significant differences in the frequency with which teams differed from individuals in the type of message sent ($p = 0.15$).[14]

[Insert Table 3 here]

Table 3 shows the impact of the different messages on first movers’ choosing In, along with frequency of choosing In under the No Communication (baseline) treatment at the bottom.[15] Individuals are more likely to choose In, compared to teams, following a Strong Promise. However, a better measure of differences in behavior conditional on the type of message received comes from the probits reported in Table 4.[16] The impact of the different message categories is measured relative to the no communication treatment. The dependent variable is equal to 1 when first movers chose In (0, otherwise), with separate dummy variables (=1, 0 otherwise) for each of the four message categories. Standard errors are clustered at the subject or

[13]Disagreements were confined to distinguishing between Strong and Weak Promises.

[14] Differences between categories are evaluated using a Fisher exact test on the message frequencies corrected for multiple tests.

[15]Frequencies are calculated conditional on the number of times In was chosen for each message category. For example, choosing In 2 out of 3 times after receiving a Strong Promise has an In rate of 66%.

[16]Table 3 calculations are based on averages across agents, which can give higher weight to some agents. For example, an agent who receives 1 Strong Promise and chooses to go In has a 100% In rate in Table 3. Another agent receiving 5 Strong Promises and choosing In 4 times has an 80% In rate, but is based on more observations. Similarly, not all As receive all message types, so some are represented in multiple categories while others are not. Probits with errors clustered at the individual or team level allows control for this.

team level. Separate probits are reported for teams and individuals, and then for the pooled data, with marginal effects reported.

There are relatively strong, positive marginal effects of choosing In following both Strong and Weak Promises, with no significant differences between the two, for both individuals and teams. After pooling Strong and Weak Promises, there are no differences in marginal effects between teams and individuals. Empty Talk and No Message do not significantly affect In rates for either teams or individuals (and will be combined into an Empty Message in discussions). The pooled data show a significant negative effect for the team dummy, consistent with the higher levels of In for individuals reported for the raw data in Table 3. There are no significant marginal effects from interacting the teams dummy with a pooled Promise dummy.

*Conclusion 2:* There is a strong positive marginal effect on In following both Strong and Weak Promises for both teams and individuals (relative to the no communication treatment).These marginal effects are of about the same size for teams and individuals and are not significantly different between the two. These results are consistent with the literature on expectation based guilt aversion, in that both teams and individuals are substantially more willing to choose In following a Promise than following Empty Talk or No Message (i.e., act as if they expect B's to roll following a promise).

The period dummies are negative and significant at better than the 5% level for both teams and individuals which, at first blush, seems quite odd. However, the team chats reported on below suggest this is a false "end game" effect, most likely resulting from subjects' experience in previous experiments, e.g. "haha maybe we can do in for the first two or three rounds. people tend to be more nice the first several rounds."[17] The same regressions have been run on different subsets of the data to check if the results are driven by early-round confusion or late-round deterioration of cooperation. Similar results to those reported in Table 4 are observed restricting the analysis to periods 2-5 or 1-4.

*Second Movers Actions in Relation to Messages Sent:* Table 5 reports the frequency with which B players chose Roll in relation to messages sent. The aggregate results show that compared to teams, individuals are far more likely to Roll following a Strong Promise ($p < 0.01$), and less so following No Message. Table 6 reports a probit, similar to the one reported in Table 4,

[17] Quotes from chats are always reported verbatim, hence the poor grammar and spelling at times.

confirming that Strong Promises have a large and statistically significant effect on Roll rates for individuals, but not for teams.[18] (Here too, the no communication treatment serves as the baseline against which these marginal effect are measured.) The marginal effect of Weak Promises is negligible, and not significant, for both individuals and teams. Once again the period variable is negative so that second movers are subject to this false "end game" effect as well.

*Conclusion 3:* The marginal effect of a Strong Promise on the likelihood of choosing Roll is positive and significant for individuals, but not for teams. Weak Promises along with the remaining message categories have small marginal effects on the likelihood of choosing Roll for both teams and individuals, none of which are statistically significant.

There is an important analogy between these results and results from simultaneous move, one-shot, prisoner dilemma games in the psychology literature. In that case too, communication increases joint cooperation by a substantial and significant amount for individuals, but not for teams (see Insko et al., 1993).[19] The difference in cooperation rates between teams and individuals in this, and related experiments, is attributed to the fact that "… groups provide their members with support for acting in a self-benefiting manner, whereas individuals have no such support. Social support is important because it helps to overcome pressure from three norms, equity, equality and reciprocity." (Insko et al., 1993, p. 115).

The within-team chat analysis reported on below focuses on the extent to which team member support for self-benefiting choices underlies decisions not to Roll following Promises to do so. It also examines the extent to which teams, when choosing to Roll, are motivated out of guilt and/or a desire for consistency, the preferred explanations for the increase in cooperation rates with communication from earlier experiments (CD and Ellingsen and Johannesson, 2004).

*Benefits (or the lack thereof) from Choosing In:* Cooperation rates are far from the subgame perfect Nash equilibrium (SPNE) prediction (Out, Don't Roll) both with and without communication. The question posed here is, were Roll rates high enough that it paid for As' to deviate from the SPNE? For individuals, with no communication, the (ex post) expected payoff

[18] Standard errors are clustered at the individual or team level.
[19] This experiment use financial payoffs and written communication. The standard PD matrix is modified to allow a "withdrawal" option – a perfectly safe payoff intermediate between the cooperative outcome and the "sucker" payoff (a maxi-min option).

for In was $2.60 for individuals and $2.10 for teams so that in both cases, it did not pay to choose In. With communication this increased to $5.50 for individuals following a Promise, making In an empirical best response to receiving a Promise, with the expected payoff from In following Empty Messages $4.30, less than for staying Out ($5). For teams, the expected return for In was $3.20 following a Promise to Roll, worse than staying Out, but slightly better than choosing In under either the no communication treatment ($2.10) or absent a Promise to Roll ($2.00).

## III Analysis of Team Chats

Within-team discussions were coded and analyzed to better understand teams' decision processes. Procedures were similar to those used for categorizing messages sent: Two undergraduate students read through and independently coded the team chats after first being instructed on the categories of interest.[20] The coding focuses on second movers' motivation for choosing Roll after having made a promise to cooperate, as well as the motivation for As choosing In.

Coding categories for As, along with the frequency with which they were coded and agreement rates between the two coders, are reported in Table 7. Examples for each category are provided in the Appendix. All categories were coded at the period-level. Coders were instructed to base their coding strictly on within team discussions for the period in question.[21] The percentage of teams satisfying a category is calculated in terms of whether either coder coded the category in question. Agreement rates were calculated as the number of periods where both coders coded a category, divided by the total number of times at least one of them coded the category. Disagreements were rarely about opposite interpretations of what teams were discussing (e.g., one coding A2, the other coding A3), instead typically resulting one coder's failure to code a given category while the other one did.[22]

---

[20] Coding instructions can be found in the Appendix.

[21] This was done for two reasons: First, while discussions are correlated across periods within a team, As' choice of In is heavily dependent on type of message received, which changes from one period to the next. Second, history-dependent coding would lead coders to make inferences based on discussions in a past periods, which would have resulted in even more subjective coding discussions.

[22] Coders had opposite interpretations only 2% of the time for A2 versus A3 and 7% for A4 versus A5.

*A Teams*: Codes for As focused on their interpretation of messages received. In the analysis Strong and Weak Promises are combined into a single "Promise" category, and Empty Talk and No Messages into a single "Empty Message" category for parsimony.[23]

[Table 7 goes here]

Figure 3 shows In rates conditional on whether teams discussed the message received in a given period or not. Teams often discussed the credibility of specific messages or made contingent plans to base their decisions on the message content. For example,

> 4: So, should we just go out every time unless they send us a message saying they swear or something?
> 20: yeah, lets just see based on context

Discussions showed that teams not only believed the messages to be meaningful in general, but also believed that specific messages were more informative than others. For example, after receiving a Weak Promise, one subject remarked “if they would have typed ‘we promise’ afterwards, i’d give it to em.” Though subjects recognize that messages need not be truthful, they believed that strongly worded statements of intent were more likely to be upheld.

Figure 3 shows that when explicitly discussing the content of the message received, As are substantially more likely to chose In following a Promise (65%) than following an Empty Message (65% vs 22%, $p < 0.01$). In rates were also higher after a Promise, even when not discussing the message (52% vs 44%), but fail to achieve statistical significance ($p = 0.14$). That Promises still have an effect bordering on statistical significance in these cases, likely reflects previous discussions regarding Promises.[24]

[Insert Fig 3 and 4 here]

Figure 4 shows that explicit statements about willingness to take a chance plays a small role in deciding between In and Out. Teams are much more likely to choose In when explicitly citing a willingness to take a chance following a Promise as well as an Empty Message. However, the frequency with which risk is explicitly discussed in relationship between choosing In or Out is quite small, being discussed less than 23% of the time.[25] [Insert Figure 4 here]

---

[23]Strong promises comprise the bulk of the promises made, while the previous analysis show minimal differences between the No Message and Empty Message categories.

[24] In rates are borderline significantly higher after a Promise when discussing the Promise compared to not discussing the Promise (65% vs 52%, $p=0.10$).

[25] See the numbers in parentheses in Figure 4 citing the frequency of these discussions.

*B Team Chats:* Coding for Bs focused on decisions to Roll or Don't Roll, and the corresponding decision to send a Promise or not. The literature on why individuals keep their promises focuses on expectation-based guilt aversion (CD) or a desire for consistency between their actions and the message sent (Ellingsen and Johannesson, 2004). We coded for "guilt" and "feeling bad" (B1 in Table 8) conditional on sending a Strong Promise. In addition we coded for justification for choosing Don't Roll (B2; e.g. it makes the most money) and for choosing Roll (B3; e.g., it makes everyone better off). There were no discussions related to consistency between teams' messages and their actions.

[Insert Table 8 here]

Teams never discussed what As' expected other than when discussing ways to get the higher payoff. For example:

> 5: lets tell them to go in, than we dont roll again.
> 7: Sounds good to me.
> **Message sent**: *Go in, and we'll roll. Id rather have 10 than 5 with you guys going out every time.*
> 7: Well done. I'd buy that.
> 5: i try.
> 7: How about the same thing next time?
> 5: sounds like a plan

This shows that Bs anticipate that As will attach value to their messages. That is, Bs have at least an implicit second-order expectation that a Promise will lead As to expect them to Roll. But for teams these second-order beliefs, if anything, occur more often when deciding not to Roll. This is not surprising given the small (4%) increase in Roll rates with communication, and accounts for the high Promise rates when choosing Don't Roll.

Figure 5 reports expressions of guilt and/or feeling bad (code B1) in relation to decisions to Roll or Don't Roll, and broken down by the type of message sent – a Promise or an Empty Message. In deciding *not* to Roll, expressions of guilt and/or feeling bad are slightly higher following a Promise (24% vs 16%, $p = 0.32$). When deciding *to* Roll, expressions of guilt or feeling bad are slightly lower following a Promise compared to an Empty Promise (16% vs 25%, $p = 0.56$). So for teams at least, expressions of guilt or feeling bad, which can be interpreted as expressing second order beliefs regarding the impact of Promises on As choices, were essentially the same whether making a Promise or sending an Empty Message. The fact that when deciding to Roll, expressions of guilt are, if anything, a little higher following an Empty Message versus a

Promise indicates that decisions to Roll, for teams at least, are *not* rooted in expectation-based guilt aversion or a desire for consistency between ones' actions and the message sent.[26]

The fact that teams discuss feeling bad or guilty when choosing Don't Roll following a Promise serves to confirm the existence of moral costs associated with decisions not to Roll. However, in deciding not to Roll, these moral costs are not high enough for teams to act unselfishly. For example:

2: i really hope we get groups who want to take risks haha
2: does that make me a bad person?
15: yeah but me too so whatever
2: im buying chipotle with whatever money i get
15: worth the guilt

Note the "social support" for acting selfishly and own payoff maximization, as discussed in the psychology literature.

We identified all those teams who choose to send a Promise and Rolled in any period. The literature for individuals suggests that a decision to Roll following a Promise is based on guilt aversion or a desire for consistency. With this in mind, we classified the reasons stated for choosing to Roll for each team: other-regarding preferences (41%), message-based (consistency) concerns (18%), confusion (29%), or no reason given (24%).[27] An example of other regarding preferences is given below:

16: Hey
13: What are your thoughts?
16: I think we'd better choose to cooperate
13: Yeah, I agree. We get money either way, but it's important to give back

An example of message-based concerns:

*(After choosing Don't Roll and sending a Promise)*
51: I feel bad being deceptive tho lol
68: Yeah same. Next time we could choose roll and tell them to choose in
51: Sounds good

[26] Also see Ismayilov and Potters (2016) who show that for individuals, not allowing messages that refer to the game being played does not result in lower Roll rates than unrestricted communication.
[27] This adds up to more than 100% as two teams were classified as both other regarding and message-based.

These results suggest that teams who decide to Roll typically do so out of other-regarding preferences and then send a Promise accordingly, rather than choosing to Roll out of raised expectations or consistency. Teams identified as acting out of other regarding preferences do not always chose to Roll following a Promise. However, note that the frequency of rolling following a Promise is essentially the same with and without communication, and expectations or consistency in behavior cannot, by definition, underlie decisions to Roll absent communication.[28]

Team discussions also reveal an interesting fact with respect to the timing of Bs' decisions in the communication treatment. Recall that Bs' send a message, then wait for As' (hidden) choices, and then decide to Roll or Don't Roll. While this is the formal structure for with respect to Bs' decisions, team discussions show that in almost all cases they first decide to Roll or Don't Roll, and then discuss what message to send. For example, take a team that decided not to Roll in period 1:

> 2: we should definitely not roll
> 3: Hello! I agree
> 2: should we write them a message?
> 3: however, we should tell the other group that (we will Roll) since we have an 80% shot at getting the 12/10 thats what we want (parentheses added)

Teams that decided to Roll did much the same the same:

> 13: What are your thoughts?
> 16: I think we'd better choose to cooperate
> 13: What should our message say?

These are not isolated instances. Only 3 out of 40 teams were identified as deciding on their message before deciding which action to take. This is consistent with the fact that decisions to Roll or Don't Roll are unrelated to whether a team sent a Promise or an Empty Message. It would be interesting to devise a way to determine if the timing of individual choices is the same.

*Conclusion 4*: Teams promise to Roll at essentially the same rate, regardless of whether they actually Roll or not (84% when Rolling, 75% when not Rolling). Expressions of "guilt" or

[28] An example of confusion: "Perhaps we can think about saying we will ROLL in round 5 but then not roll, since there will be no way for group A to retaliate then".

"feeling bad" occur at low rates, with essentially the same rate regardless of whether teams Roll or Don't Roll, and when sending a Promise to Roll or an Empty Message. When choosing Don't Roll, Promises are typically designed to induce As to choose In to achieve higher payoffs. When choosing to Roll, teams are primarily motivated by standard other-regarding preferences and confusion (70% total). To the extent that decisions to Roll are a result of other-regarding preferences, this would provide the foundation for elicited second order beliefs, or the desire for consistency, to be associated with cooperating in games of this sort.

## IV Summary and Conclusions

This experiment explores the differences between two-person teams and individuals in a one-shot, hidden action trust game with and without communication. The primary message from this experiment is that the increase in cooperation raters observed in (one-shot) hidden action trust games for individuals does not extend to two person teams. This adds to the literature showing that teams, in their role as second movers, are much more self-serving and own maximizing than individuals (Kugler, Kausel, and Kocher, 2012; Charness and Sutter, 2012). As for first movers, teams are as trusting of promises as individuals. The analysis of B teams' discussions supports the hypothesis from the psychology literature that this self-serving is rooted in the fact that "… groups provide their members with support for acting in a self-benefiting manner, whereas individuals have no such support. Social support is important because it helps to overcome pressure from three norms, equity, equality and reciprocity." (Insko et al., 1993, p. 115). It's been argued that the high degree of trust and cooperation exhibited in hidden action games suggests a more limited need for formal contracts than previously discussed in the economics literature (Charness and Dufwenberg, 2006). While this may well be true for individuals, the present data shows it is not true for teams. To the extent that most important economic transactions occur between teams (e.g., corporations) this distinction is important.

On a more detailed level, our results do replicate those reported in the literature in that communication in the hidden action trust game serves to increase cooperation rates substantially. Although expressions of guilt or feeling bad expressed on the part of teams when deciding not to Roll, occurring 24% of the time following a Promise, they do not rise to the level of promoting high levels of following through on those Promises. Finally, although the formal process calls for Bs' to send messages before choosing to Roll or not, the team chats show that these decisions are made first, after which the message sent is formulated. Just that teams tend to use the message to get As to choose In so that they can exploit their choices.

There is one final point worth making here. Although this experiment adds to the small and growing literature that teams are more selfish and closer to the predictions of standard economic theory than individuals, these results are largely limited to one-shot games. In repeated play games, teams may be a little more fearful to begin with, but with some experience, and a fresh start they may be as, if not more, cooperative than individuals (Kagel and McGee, 2016). The "shadow of the future" serves to promote cooperation between individuals as well as teams.[29]

[29] Also see Insko et al. (2001) which shows that anticipation of future interactions within a prisoner's dilemma game significantly reduces the differences between teams and individuals reported in one-shot games.

## References


Bhattacharya, Puja and Sengupta, Arjun. (2016). Promises and Guilt. *Ohio State University Working Paper.*

Bolton, Patrick and Dewatripont, Mathias. (2004). *Contract Theory*. MIT Press, Cambridge, MA. 02142.

Charness, Gary and Dufwenberg, Martin. (2006). Promises and Partnership. *Econometrica*, 74(6):1579-1601.

Charness, Gary and Sutter, Matthias. (2012). Groups Make Better Self-Interested Decisions. *Journal of Economic Perspectives*, 26(3): 157-76.

Cooper, David and Kai-Uwe Kühn. (2014). Communication, Renegotiation, and the Scope for Collusion. *American Economic Journal: Microeconomics*, 6(2): 247-278.

Ederer, Florian and Stremitzer, Alexander. (2014). Promises and Expectations. *Working Paper*.

Ellingsen, Tore, Magnus Johannesson, Sigve Tjøtta, and Gaute Torsvik. (2010). Testing Guilt Aversion. *Games and Economic Behavior*, 68:95-107.

Falk, Armin and Florian Zimmermann. (2011). Preferences for Consistency. *IZA Discussion Paper No. 5840.*

Festinger, Leon. (1962). Cognitive Dissonance. *Scientific American*, 207(4): 93-107.

Fischbacher, Urs. (2007). z-tree: Zurich Toolbox for Ready-Made Economic Experiments. *Experimental Economics,* 10(2).

Greiner, Ben. (2004). The Online Recruitment System ORSEE 2.0 – A Guide for the Organization of Experiments in Economics. *Working Paper Series in Economics.*

Houser, Daniel and Erte Xiao. (2010). Classification of Natural Language Messages Using a Coordination Game. *Experimental Economic*s, 14(1): 1-14.

Insko, Chester, John Schopler, Stephen M. Drigotas, Kenneth A. Graetz, James Kennedy, Chante Cox, and Garry Bornstein. (1993). The Role of Communication in Interindiviual-Intergroup Discontinuity. *The Journal of Conflict Resolution*, 37(1): 108-138.

Insko, Chester, John Schopler, Lowell Graertner and others (2001). Interndividual-Intergroup Discontinuity Reduction Through the Anticipation of Future Interaction. *Journal of Personality and Social Psychology*, 80 (1): 95-111.

Ismayilov, Huseyn and Jan Potters. (2016) Why Do Promises Affect Trustworthiness, or Do They? *Experimental Economics*, 19(2): 382-393.

Kagel, John and Peter McGee. (2016). Team versus Individual Play in Finitely Repeated Prisoner Dilemma Games. *American Economic Journal: Microeconomics*, 8(2): 253-276.

Kugler, Tamar, Gary Bornstein, Martin Kocher, and Matthias Sutter. (2007). Trust Between Individuals and Groups: Groups are Less Trusting than Individuals but Just as Trustworthy. *Journal of Economic Psychology*, 28(6): 646-57.

Kugler, Tamar, Edgar E. Kausel and Martin G. Kocher (2012). Are Groups More Rational than Individuals? A Review. *Wiley Interdisciplinary Reviews: Cognitive Science*, 3(4): 425-492.

Song, Fei. (2008). Trust and Reciprocity Behavior and Behavioral Forecasts: Individuals versus Group-Representatives. *Games and Economic Behavior*, 62(2): 675-696.

Vanberg, Christoph. (2008). Why do People Keep Their Promises? An Experimental Test of Two Explanations. *Econometrica,* 76(6):1467-1480.

Schwartz, Steven, Eric Edward Spires, and Richard A. Young. (2014). Why Do People Keep Their Promises? A Further Investigation. Ohio State University working paper.

Table 1

Tests for Effects of Communication on Promise Keeping

| | A's *In* Rate | | | B's *Roll* Rate | | |
|---|---|---|---|---|---|---|
| | Message | No Message | Diff M-NM | Message | No Message | Diff M-NM |
| Individuals | 64% | 50% | 14%* | 45% | 26% | 19%** |
| Teams | 53% | 30% | 23%*** | 26% | 21% | 5% |
| Diff Ind - Tm | 11% | 20%** | --- | 19%** | 5% | --- |

*** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level

Table 2

Message Frequencies: Teams Compared to Individuals

| | Individual | | Teams | | Example |
|---|---|---|---|---|---|
| | Number | Percentage | Number | Percentage | |
| Strong Promise | 120 | 57% | 105 | 53% | "We will choose ROLL" |
| Weak Promise | 34 | 16% | 50 | 25% | "It would be wise to choose In" |
| Empty Talk | 10 | 5% | 10 | 5% | "Hi!" |
| No Message | 46 | 22% | 35 | 18% | |

Table 3

Frequency As' Chose In Conditional on Message Received.

| | Individuals | Teams | p-value[a] |
|---|---|---|---|
| Strong Promise | 72% | 58% | (0.08) |
| Weak Promise | 72% | 63% | (0.37) |
| Empty Talk | 22% | 10% | (0.48) |
| No Message | 35% | 35% | (0.94) |
| No Communication | 50% | 30% | (0.02) |

[a] p-values for differences based on Wilcoxon rank-sum tests. Unit of observation based on average frequencies per each decision making unit (individuals or teams).

Table 4

Probits for In Rates Conditional on Message Received: Marginal values reported
(standard errors in parentheses)

| VARIABLES | Individuals | Teams | Combined |
|---|---|---|---|
| Strong Promise | 0.241***<br>(0.08) | 0.283***<br>(0.09) | 0.262***<br>(0.06) |
| Weak Promise | 0.266***<br>(0.10) | 0.292***<br>(0.10) | 0.278***<br>(0.07) |
| Empty Talk | -0.188<br>(0.19) | -0.209*<br>(0.11) | -0.204*<br>(0.11) |
| No Message | -0.135<br>(0.10) | 0.0450<br>(0.11) | -0.057<br>(0.07) |
| Period | -0.043***<br>(0.01) | -0.028**<br>(0.01) | -0.036***<br>(0.01) |
| Team | | | -0.163***<br>(0.05) |
| Observations | 400 | 375 | 775 |

*** Significant at the 1% level, ** Significant at the 5% level, * Significant at the 10% level

Table 5

Roll Rates Conditional on Message Sent

| | Individuals | Teams | p-value[a] |
|---|---|---|---|
| Strong Promise | 60% | 27% | (< 0.01) |
| Weak Promise | 43% | 36% | (0.63) |
| Empty Talk | 37% | 14% | (0.18) |
| No Message | 41% | 17% | (0.08) |
| No communication | 26% | 21% | (0.15) |

[a]p-values for differences based on Wilcoxon rank-sum tests. Unit of observation based on average frequencies per each decision making unit (individuals or teams).

Table 6

Probits for Roll Rates Conditional on Message Sent: Marginal values reported
(Standard errors in parentheses)

| VARIABLES | Individuals | Teams | Combined |
|---|---|---|---|
| Strong Promise | 0.269*** | 0.055 | 0.165** |
| | (0.10) | (0.09) | (0.07) |
| Weak Promise | 0.067 | 0.122 | 0.109 |
| | (0.13) | (0.11) | (0.09) |
| Empty Talk | 0.147 | -0.115 | 0.010 |
| | (0.16) | (0.11) | (0.10) |
| No Message | 0.078 | -0.025 | 0.027 |
| | (0.12) | (0.10) | (0.08) |
| Period | -0.052*** | -0.036*** | -0.044** |
| | (0.01) | (0.01) | (0.008) |
| Team | | | -0.128*** |
| | | | (0.05) |
| Observations | 400 | 385 | 785 |

***Significant at the 1% level, **Significant at the 5% level, *Significant at the 10% level

Table 7

Coding Categories for A Team Discussions
(agreement rates in parentheses)

| Coding Category | Description | Percentage of Teams[1] |
|---|---|---|
| A TEAMS | | |
| A1 | Discuss message and how it might influence their choice | 49% (0.68) |
| A2 | Reasons they should believe the message (e.g. people think it's important to keep their word). | 19% (0.25) |
| A3 | Reasons they should not believe the message (e.g. the other them could just lie) | 19% (0.45) |
| A4 | Recognize that In is risky, but willing to take a chance to get higher reward. | 65% (0.29) |
| A5 | Recognize that In is risky, but not willing to take a chance | 53% (0.33) |

[1] Frequencies and agreement rates for A1-A3 are conditional on receiving a Strong Promise

Table 8

Coding Categories for B Team Discussions
(agreement rates in parentheses)

| Coding Category | Description | Percentage of Teams |
|---|---|---|
| B TEAMS | | |
| B1 | Feeling bad about Don't Roll or having lied about promising to Roll | 21% (0.55)[1] |
| B2 | Give a justification for choosing "Don't Roll" (e.g. it will make them more money). | 68% (0.47) |
| B3 | Give a justification for choosing "Roll" (e.g. it is more fair to the other team). | 30% (0.14) |

[1] Frequency and agreement rate conditional on sending a Strong Promise.

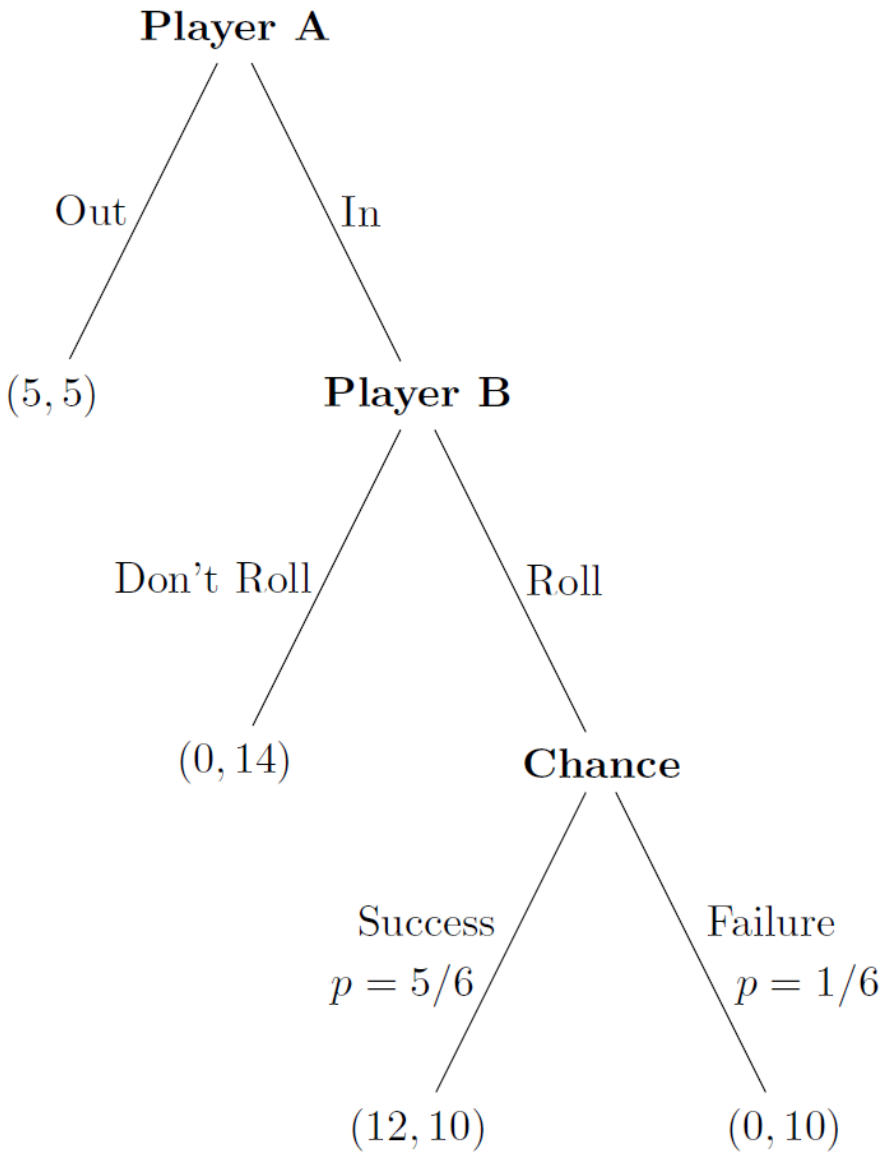


Figure 1: Game Tree: As' move first. Bs' choose second not knowing As' choices. Chance is probability a decision to Roll will actually occur (success) or will result in Don't Roll (failure). With communication, Bs' have an opportunity to send a short, non-binding, messages to As' before they choose In or Out.

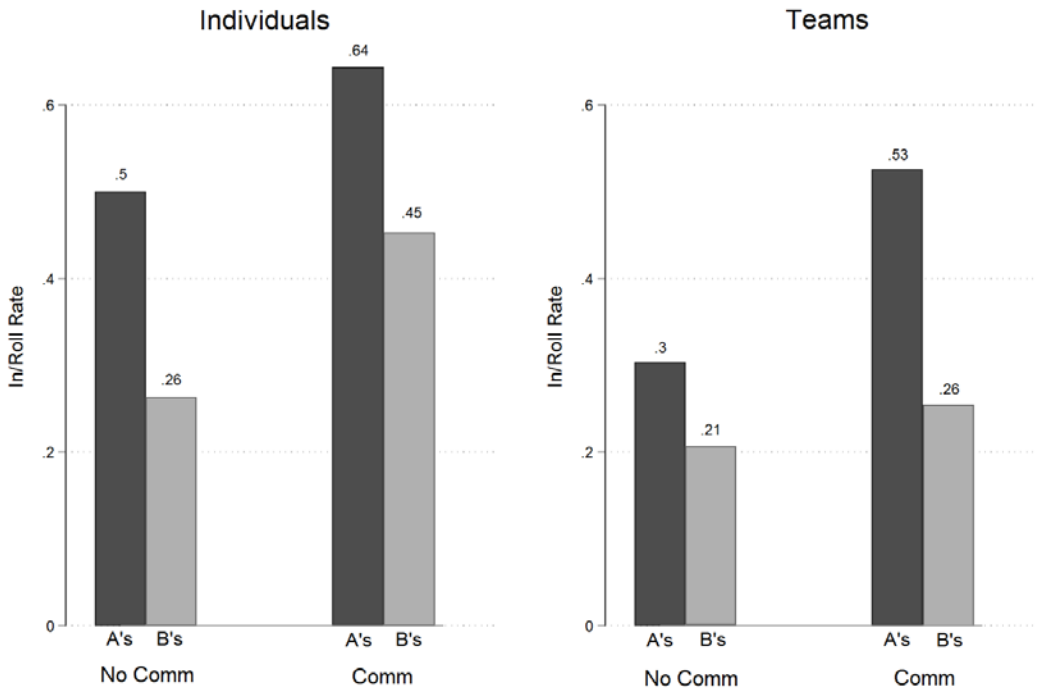


Figure 2: Communication versus No communication: Comparing Teams and Individuals for In and Roll Rates

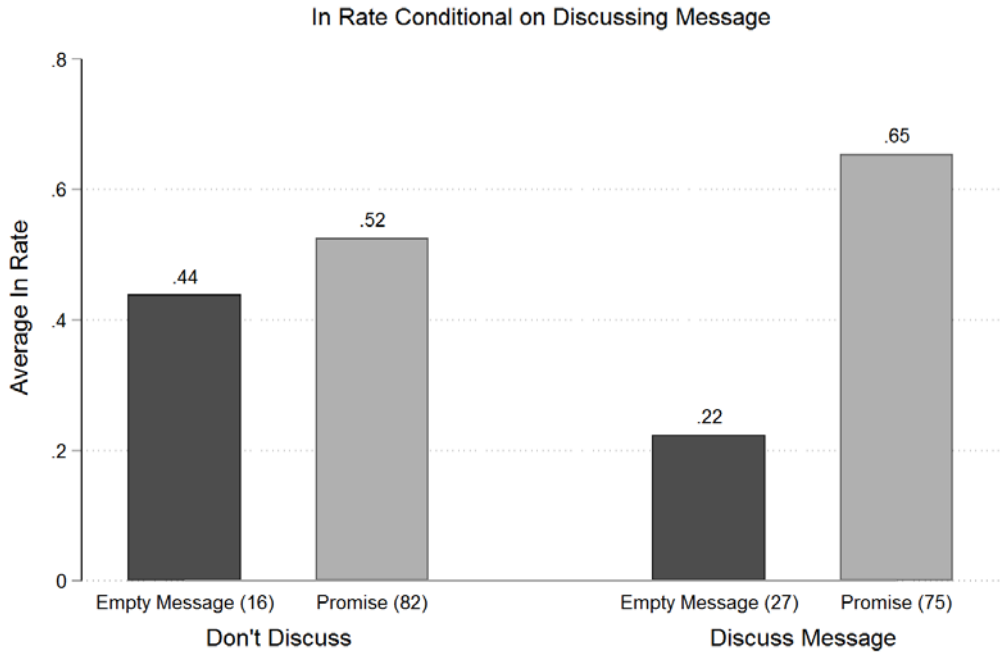


Figure 3: In Rates for Teams Conditional on Discussing Message or Not. Number of observations in each cell in parentheses. Exact frequencies at top of bars.

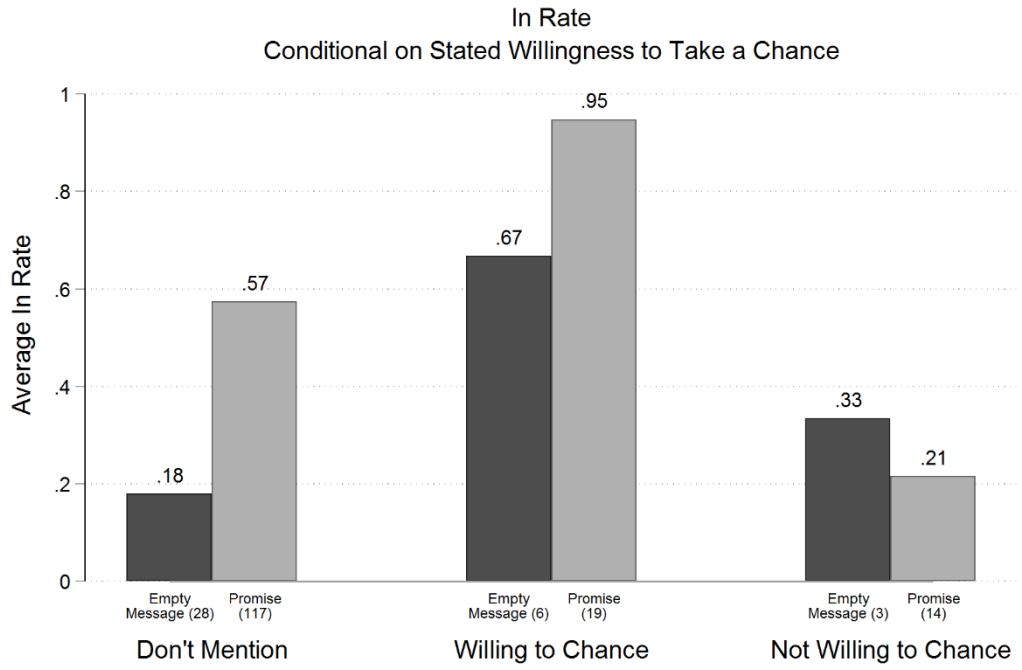


Figure 4: ln Rates Associated with Discussing Willingness to Take a Chance. Number of observations in each cell in parentheses. Exact frequencies at top of bars.

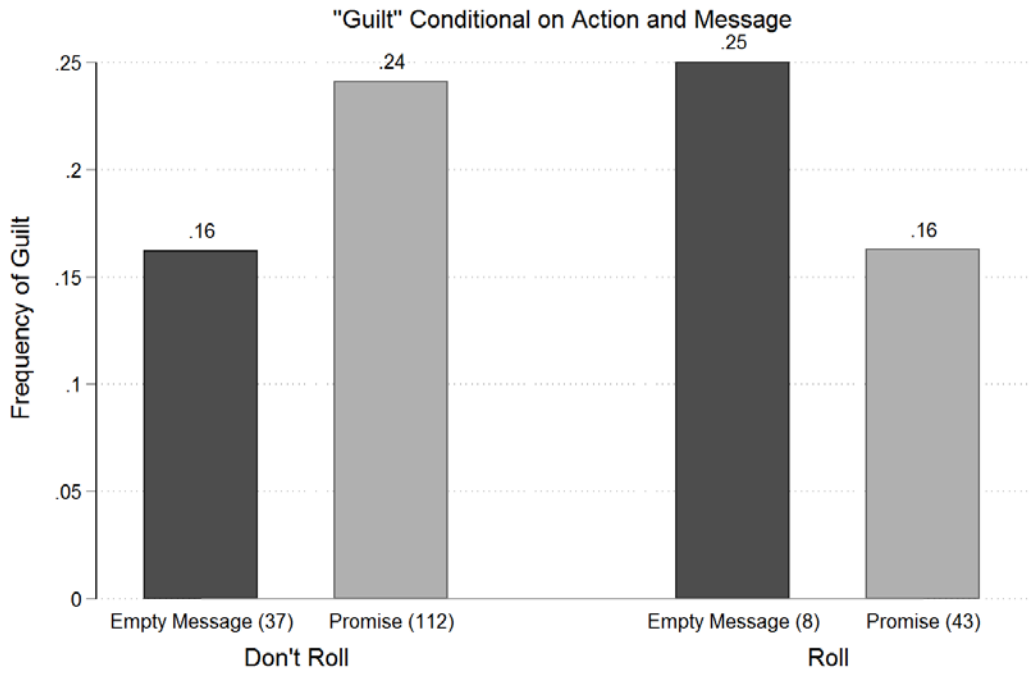


Figure 5: Teams Discussing Guilt and/or Feeling Bad Messages Sent and whether Rolled or not. Number of observations in each cell in parentheses. Exact frequencies at top of bars.

## APPENDIX

Examples of chat categories:

**A1: Discuss message and how it might influence their choice**

28: alright, so what's the plan?

10: But let's see what they say. If they say they're going to roll, we go in. if they don't say anything I think we go out. How dos that sound?

**A2: Reasons they should believe the message**

17: if they would have typed "we promise" afterwards, i'd give it to em

**A3: Reasons they should not believe the message**

25: they might just send a positive message and choose not to roll

16: you think they would do that?

25: yea

25: it makes them 14$

**A4: Recognize that In is risky, but willing to take a chance to get higher reward.**

18: one more in?

12: maybe two. you have to risk it for the biscuit sometimes haha

**A5: Recognize that In is risky, but not willing to take a chance**

20: They would be stupid to roll it. They get a guaranteed $14…

4: I would have to say play it safe than

**B1: Feeling bad about Don't Roll or having lied about promising to Roll**

7: haha we can be terrible peole and start telling groups were gonna pick roll and then pick don't roll. get that extra 4 bucks

**B2: Give a justification for choosing "Don't Roll"**

20: Do you want to just choose don't roll??

5: yes

5: Highest payoff no matter what

**B3: Give a justification for choosing "Roll"**

6: I feel like we should roll

6: I know if I was in A I would want the other team to roll