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Cooperation due to cultural norms, not individual reputation

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ABSTRACT

Increased cooperation in groups that are allowed to communicate (engage in "cheap talk") has been attributed to reputation-building and to cultural norms or culturally normal behavior. We tested these two theories by exposing groups of undergraduates to a public-goods social dilemma. Five groups were permitted to communicate via anonymous written messages that were read aloud. The groups with messaging contributed substantially more to the common good than the groups without messaging. Because the messages were anonymous, their efficacy cannot be explained by effects on reputation. Instead, the results point to the participants' histories of giving and receiving exhortations to cooperate – i.e., to culturally normal behavior (cultural norms).

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1. Introduction

Why do people cooperate? Should not natural selection produce firmly selfish individuals? These questions have sparked much research and thought, beginning with Darwin himself. Arguments have been made for a genetic component and for a cultural component. One line of research has studied people's behavior with respect to common goods using a public-goods game in which participants may make contributions to a public good, sacrificing their own short-term interest for the longer-term interest of the group. In the present experiment we sought to elucidate one culturally based mechanism that promotes cooperation in a public-goods game: the efficacy of exhortation.

The public-goods game has been studied extensively (Fehr and Gächter, 2002; Ostrom et al., 1994; Herrmann et al., 2008). One finding is that players allowed to talk among themselves beforehand often behave more cooperatively in the game subsequently. Some researchers have attributed this finding of the efficacy of "cheap talk" to so-called reputation effects (Ostrom et al., 1994). That is, when people make promises, they are inclined to keep them afterwards because to fail to do so would damage their reputation. If one's reputation is poor, one might receive less cooperation and fewer benefits from the group. Most prior experiments studying the effects of communication were conducted this way – allowing face-to-face contact beforehand (Dawes et al., 1977; Orbell et al., 1988; Kerr and Kaufman-Gilliland, 1994; Sally, 1995). However, this method confounds at least three potentially separable factors: (a) exhortation to cooperate; (b) promises to cooperate; and (c) face-to-face contact, which might enhance the effectiveness of either exhortation or promises. Few experiments have allowed communication within the game, and, as far as we can tell, no published research exists in which communication was anonymous, even though such procedures might allow separating these three factors. If we eliminate face-to-face contact, in particular, we eliminate the possibility of reputation-building and test the theory that reputation is responsible for enhanced cooperation.

Two meta-analyses of communication effects on cooperation have been published (Sally, 1995; Balliet, 2010). Although both reviews reported that face-to-face communication before or during a group social-dilemma game increases cooperation, neither reported any study in which group members were given the opportunity to communicate open-ended messages anonymously. Many of the studies reported on prisoners' dilemma games involving only a pair of players, in which, even if each player is a stranger to the other, no ambiguity can occur about who that one other player might be. Some studies allowed written messages, but these were always limited to a few possibilities, such as promises to contribute, and were not composed by the participants themselves. Thus, our finding of a strong reliable effect seems newsworthy.

In this experiment, we show that, under some circumstances, the efficacy of cheap talk may have nothing to do with reputation. We allowed anonymous, open-ended communication in our experimental groups and found it to increase contributions substantially, even though no effects on reputation were possible. We cannot, of course, eliminate the possibility that cheap talk may trigger a

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cognitive "reputation module" (Hagen and Hammerstein, 2006) or some other predisposition. Indeed, in some sense this must be true for anonymous cheap talk to affect cooperation in a game where no real reputations can be gained; talk must generate trust by some psychological mechanism or another. We are concerned here with the behavioral level of analysis where fitness-relevant rewards occur (contra Symons, 1989). If anonymous talk raises the rewards to participants in experiments in which no true reputation exists, we may conclude that speech is important in human cooperation irrespective of any hidden cognitive mechanisms that talk may stimulate. That is, if humans are highly prone to behave as if reputations matter when in fact they do not, actual reputations may have played little or no role in the evolution of such a behavioral tendency, and calling it a cognitive "error" would be misleading.

2. Method

A public-goods game models a social dilemma: whether to cooperate with other group members in contributing to a common good or whether to benefit selfishly from the common good and not to contribute. Participants are asked, in each round of the game, to contribute as much or as little money as they wish, up to a maximum, to a public fund. Contributions are anonymous, and usually no communication is permitted. The sum of the contributions is multiplied by a number greater than one (e.g., doubled) and then distributed equally among participants. If a participant free-rides by withholding money while the others contribute, that participant benefits more than the others. However, if someone free-rides, others may stop contributing. A common result is that in a game of 10 rounds contributions start out at about half the maximum and then decrease, often to zero (Fehr and Gächter, 2002). Occasionally, at least in our protocol, the contributions increase instead, until they reach or approach the maximum. Thus, the beginning often represents a cusp, and positive feedback may drive the contributions either up or down. The reason that we often observed increased cooperation may be that our procedure was unusual in two ways.

First, although experimenters usually keep track of gains and losses with points exchangeable for money, our participants used actual money. Each participant started with a pool of US$5.00 in nickels (US$0.05 each, 100 nickels). The participants took nickels from their pools of nickels to make their contributions to the public fund and placed them in specially designed transaction boxes, which were collected each round. Their payoffs came back in the same boxes, for them to collect and put into their pools of nickels (private accounts). Second, the group sat around a table, facing one another. They conducted their transactions in the privacy of cardboard boxes in front of them, but they could see each other over the tops of the boxes.

We doubt that either of these features was crucial, however, because subsequent replications, in which participants used pen and paper to keep track of their earnings instead of actual money, produced similar results, and Sally's (1995) meta-analysis showed no reliable effect of eye contact.

2.1. Subjects and procedure

Apart from these two features, the public-goods game was typical. All 60 participants were undergraduate students. They participated in groups of five. Each participant was given printed instructions, which were read out at the beginning (see Appendix A). The game lasted for ten rounds. On each round, a player could contribute anywhere from zero to ten nickels to the public fund. The contributions were summed, the sum was doubled, and the resulting amount was divided equally among the five participants. The total contributed, the doubled amount, and the share were written on a blackboard while the transaction boxes were being adjusted. Seven groups were exposed to these baseline conditions without messaging.

In the 5 sessions with messaging, the participants were invited to write in a folder, hidden in their private box, following the announcing and posting of results on the blackboard. The folder contained a space for each round. The folders were collected and shuffled to retain anonymity, and the messages were read aloud to the group. Participants never gave any indication that the authors of messages could be identified. In all sessions, as soon as the transaction boxes were returned, a new round began.

The messages were coded by content according to the following categories: (1) exhortation to full cooperation; (2) exhortation to partial or ambiguous cooperation; (3) praise; (4) threat; and (5) chat – i.e., messages irrelevant to the game. A single message could count in more than one category, if the participant, for example, both praised and exhorted the others. Coding with these categories was easy, because the messages were rarely ambiguous. One experimenter coded every session, because inter-coder reliability would have been near 100%.

3. Results

3.1. Contributions

Fig. 1 shows the basic result, the difference between the groups with messaging and without messaging. Contributions were substantially higher with messaging. A *t*-test on the mean contributions across the independent sessions reached statistical significance ($t = 2.6$; df = 10; $p = 0.013$).

Researchers familiar with public-goods experiments may be surprised that the curves in Fig. 1 do not decrease. On average, contributions remained approximately stable, but few of the groups actually produced such stability; most groups either increased or decreased their average contributions across rounds (see Figs. 2 and 3). On balance, the mean across these disparate performances produced the apparent stability.

3.2. Messages

Many of the messages were exhortations to the group to contribute the "maximum" or "ten nickels" to the public fund. An average of 1.58 (SD = 0.43) such exhortations occurred each round in Rounds 1–9. Other messages urged contributing "more" or an

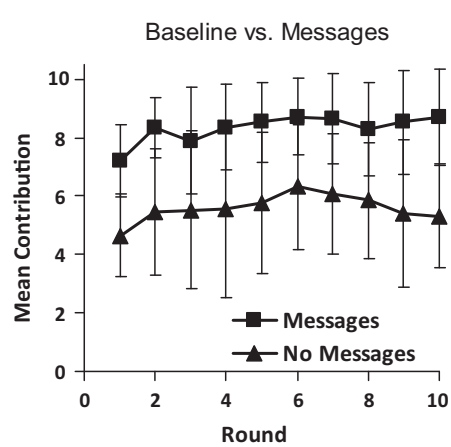

Fig. 1. Anonymous messages increase contributions. Seven groups played the public-goods game with no messages, and five groups played the game with messages. Each point represents a mean across groups of each group's mean contribution on that round. Error bars show standard deviations of the groups' mean contributions.

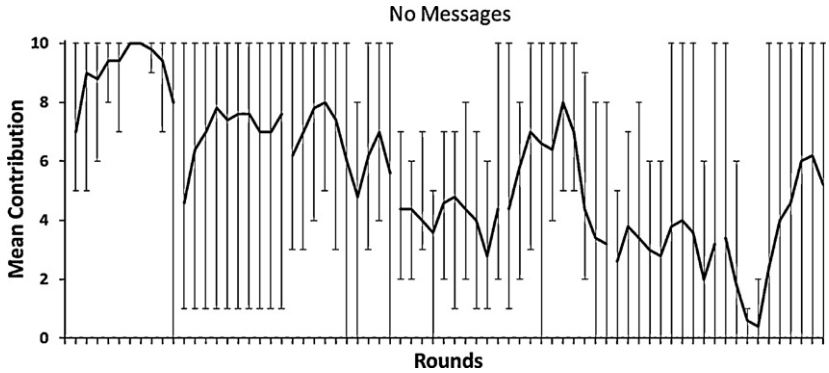

Fig. 2. Individual sessions with no messaging (baseline). These sessions were averaged to produce the triangles in Fig. 1. Error bars show the range of contributions on each round. Contributions increased in some sessions and decreased in others.

amount less than ten. Exhortations of either sort constituted the great majority of messages (74%), and exhortations to cooperate fully were the most common (59%). The remaining messages consisted mainly of praise (e.g., "Good job!") or chat about irrelevant matters. Participants in this situation almost never made promises to cooperate, although they did, rarely, threaten to stop contributing if everyone did not contribute. The rarity of such occurrences and the frequency of exhortation allow us to rule out promises as an explanation of our results.

3.3. Messages and contributions affect each other

These results suggest that the participants were responding directly to the exhortations on the basis of their everyday experience prior to the experiment (i.e., on the basis of culturally normal behavior or cultural norms). To test this line of reasoning, we analyzed the relations between exhortations to full cooperation and contributions. We asked two questions: (a) are exhortations conditional upon the contributions just made? And (b) did contributions increase following exhortation? Fig. 4 shows the answer to the first question. For each of the 45 mean contributions from Rounds 1–9 in the 5 groups, the number of exhortations that followed the announcement of results on that round is plotted. As contribution increased, exhortation increased, until cooperation was near-perfect, at which point it fell off, presumably from lack of any further need. Exhortations were at their height when cooperation was high (8 nickels) but not perfect.

Fig. 5 shows the answer to the second question. The increase in mean contribution from Round i to $i+1$ is plotted against the number of exhortations on Round i. Exhortations were moderately efficacious; when one or more occurred, the increase tended to be positive. One, two, or three exhortations, however, were all about equally efficacious. One exhortation sufficed to increase mean contribution by about 0.4 nickels.

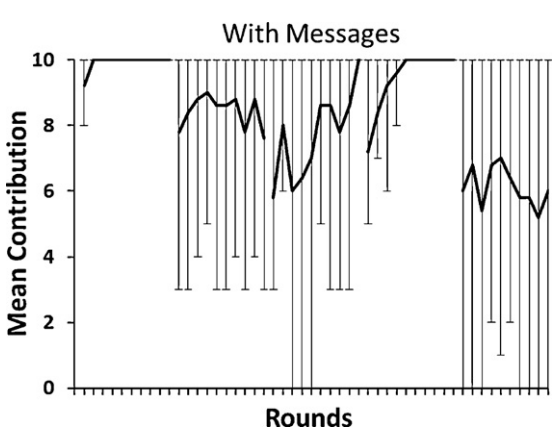

Fig. 3. Individual sessions with messaging. These sessions were averaged to produce the squares in Fig. 1. Error bars show the range of contributions on each round. Contributions increased in some sessions and decreased in others.

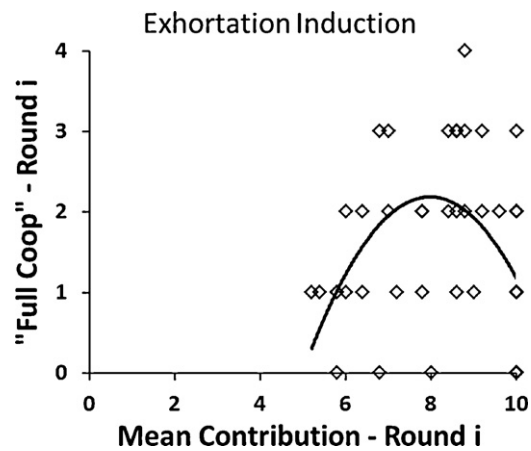

Fig. 4. Contribution means induce exhortations to full cooperation ("contribute ten" or "contribute the maximum"). The data were fitted by Excel® to a second-order polynomial, in which the linear portion was negligible. Exhortations increased as contribution mean increased, up to about 8 nickels, and then fell off as cooperation became near-perfect.

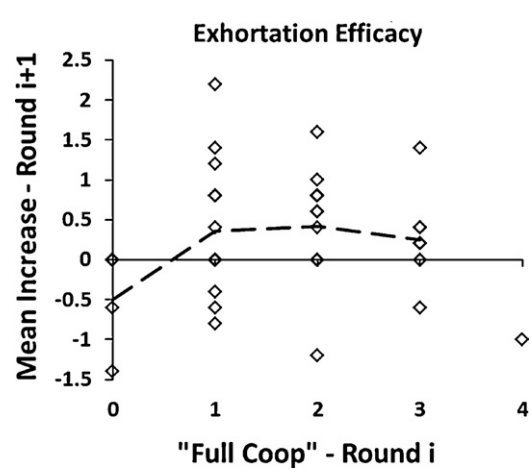

Fig. 5. Anonymous exhortations increase contributions. The increase in contribution from round i to $i+1$ is plotted against the number of exhortations to full cooperation on round i. The broken line connects the means for zero, one, two, and three exhortations. With zero exhortations, the contribution decreased on average, but with one or more exhortations, it tended to increase.

We may conclude from Figs. 4 and 5 that the reason messages increased contributions (Fig. 1) was that members of the group exhorted the others to contribute when contributions were not hopelessly far from maximal.

4. Discussion

These results indicate that anonymous exhortations suffice to increase cooperation substantially. They go against the common speculation that the effects of "cheap talk" can be explained by participants' attempts to build or preserve reputation. Anonymity insures that no such reputations can be built in our procedure, although we cannot eliminate the possibility that the use of language triggers some tendency to compare oneself to the rest of the group and, perhaps, imitate the majority. Although one might argue that the students tended to behave as if effects on reputation were possible, even when they were not possible, such a theory would be indistinguishable in practice from the simpler idea that they arrived with a general tendency toward cooperation.

Instead, the efficacy of the messages is consistent with the participants' long history of exposure to pro-social exhortations before they enter the experiment (Baum, 2005). College students have probably been told to "share" and "think of others" since they were in preschool. Exhortations were effective, not because of reputation effects, but because of the participants' history of obeying and giving such exhortations in their everyday lives. Pro-social behavior, as judged from the results of experimental games, varies across cultures, suggesting a large role for such experiences (Henrich et al., 2006). Linguists also emphasize that language itself is only possible if listeners trust speakers to have the listeners' interests in mind; the existence of language itself implies a predisposition to cooperate (Grice, 1975). Most likely, human language and cooperation coevolved over the course of human evolution, leading to some innate tendency to cooperate with those that speak the same language or dialect as oneself (Tomasello, 2008; Richerson and Boyd, 2005; Labov, 1973). Developmental studies in several cultures would help to elucidate the division of labor between genetic and cultural factors in human cooperation and the role of language in that division.

Finally, the results point to practical applications, because work groups that are allowed to exhort one another to cooperate and work as a team, even if the exhortations are anonymous, should exhibit more cooperation than those not exhorting one another. To the extent that cooperation translates into quality and productivity, allowing and encouraging exhortations should improve those performance factors too.

Appendix A.

The instructions to participants when messages were allowed were as follows (when no messages were allowed, the references to "communication folders" were omitted).

"No talking with other participants is permitted. You may raise your hand to ask the researcher questions.

This is a decision-making experiment that *does not involve any deception*. It is funded by research grants. At the beginning of the experiment, you are being given an endowment of $5.00 dollars in nickels. This is your money, and it is being held in the trays labeled "Private Account." Depending on the decisions made by you and others in the course of the experiment, this account could either grow or diminish. Whatever amount of money you end up with will become your personal property at the end of the experiment. *The money is yours to keep*.

The experiment runs for 10 rounds, and each will proceed in the same way. At the beginning of each round you must make a decision and you may communicate a written message to the other participants.

A.1. Procedures

Other participants will not be able know your personal decisions in this experiment. Because each person conducts decisions in the privacy of the cardboard box, and hands in the "transaction box" and "communication folder" every round, your anonymity will be preserved.

(1) Take out between 0 and 10 *nickels* from a tray in your "Private Account" and put them in the slots labeled "Contribution to Public Account." At the end of each round, the researcher will sum all of the public account contributions, *double* this amount, and then distribute it equally to among participants.
(2) When finished, please do not snap the transaction box closed. The researchers will gather all the boxes and make the appropriate calculations using the computer.
(3) If you wish, use the "Communication Folder" to write a brief message to the other participants concerning how decisions should be made in this experiment. Write your message in the space allocated for each round. When complete, the researchers will gather the folders and read aloud word-for-word all of the messages. Remember, other participants will not be able to match your identity with your message.
(4) Before the next round, please put any returns in your "Private Account." Public account returns will be given to you in the box labeled "Public Account Returns."
(5) Please make careful decisions, but try to finish the steps in each round as quickly as possible so that we can complete all ten rounds in a timely manner.
(6) At the end of 10 rounds, we will ask you to write advice to the next group of participants and to complete a short questionnaire, after which you will be paid the sum of your earnings over the entire 10 rounds."

References

Balliet, D., 2010. Communication and cooperation in social dilemmas: a meta-analytic review. J. Conflict Resol. 54, 39–57.
Baum, W.M., 2005. Understanding Behaviorism: Behavior, Culture and Evolution. Blackwell, Malden, MA.
Dawes, R.M., McTavish, J., Shaklee, H., 1977. Behavior, communication, and assumptions about other people's behavior in a commons dilemma situation. J. Pers. Soc. Psychol. 35, 1–11.
Fehr, E., Gächter, S., 2002. Altruistic punishment in humans. Nature 415, 137–140.
Grice, H.P., 1975. Logic and conversation. In: Cole, P., Morgan, J.L. (Eds.), Syntax and Semantics, vol. 3: Speech Acts. Academic Press, New York, pp. 41–58.
Hagen, E.H., Hammerstein, P., 2006. Game theory and human evolution: a critique of some interpretations of experimental games. Theoret. Pop. Biol. 69, 339–348.
Henrich, J., McElreath, R., Barr, A., Ensminger, J., Barrett, C., Bolyanatz, A., Cardenas, J.C., Gurven, M., Gwako, E., Henrich, N., Lesorogol, C., Marlowe, F., Ziker, J., 2006. Costly punishment across human societies. Science 312, 1767–1770.
Herrmann, B., Thöni, C., Gächter, S., 2008. Antisocial punishment across societies. Science 319, 1362–1367.
Kerr, N.L., Kaufman-Gilliland, C.M., 1994. Communication, commitment, and cooperation in social dilemmas. J. Pers. Soc. Psychol. 66, 513–529.
Labov, W., 1973. Sociolinguistic Patterns. University of Pennsylvania Press, Philadelphia.
Orbell, J.M., Vandekragt, A.J.C., Dawes, R.M., 1988. Explaining discussion-induced cooperation. J. Pers. Soc. Psychol. 54, 811–819.
Ostrom, E., Gardner, R., Walker, J., 1994. Rules, Games, and Common-Pool Resources. University of Michigan Press, Ann Arbor, MI.
Richerson, P.J., Boyd, R., 2005. Not by Genes Alone: How Culture Transformed Human Evolution. University of Chicago Press, Chicago.
Sally, D., 1995. Conversation and cooperation in social dilemmas: a meta-analysis of experiments from 1958 to 1992. Rational. Soc. 7, 58–92.
Symons, D., 1989. A critique of Darwinian anthropology. Ethol. Sociobiol. 10, 131–144.
Tomasello, M., 2008. The Origins of Human Communication. MIT Press, Cambridge, MA.