

Experiments on parochial altruism in humans: procedures and instructions

Helen Bernhard

University of Zurich

Urs Fischbacher

University of Zurich

Ernst Fehr

University of Zurich and Collegium Helveticum

Method Article

Keywords: parochial altruism, dictator game, third party punishment, ingroup favouritism, fairness

Posted Date: August 24th, 2006

DOI: <https://doi.org/10.1038/nprot.2006.214>

License:  This work is licensed under a Creative Commons Attribution 4.0 International License.

[Read Full License](#)

Abstract

Introduction

In the experiment there are three players A, B, and C. Player A gets an initial endowment of 10, player B gets 0 and player C gets 5 points. First, player A decides how many of his 10 points to transfer to B. Then, player C observes the decisions of A and gets the possibility to leave the payoffs unaffected or to punish A by deducting 3 (or 6) points from A at a cost of 1 point (or 2 points) for C. If an egalitarian fairness norm applies, player A should transfer a fair amount of 5 points to B; and C should punish A if A violates the norm by transferring less than 5 points. We conducted the third party punishment game with members of two small, distinct, cohesive, and non-hostile indigenous tribes in the Western Highlands of Papua New Guinea (PNG). As we wanted to examine the parochial behavioral patterns, we allocated each subject in our study to one of the following four treatment conditions. (i) All three players in the game are from the same tribe (treatment ABC). (ii) Only player A and B are from the same tribe while C is an outgroup member (AB). (iii) Only player B and C are from the same tribe (BC). (iv) Only Player A and C are from the same tribe (AC). Treatment (iii) and (iv) are novel as previous studies with university students had only considered the ABC and the AB condition. The decision-makers in all four treatments were informed about the other two players' group affiliation. A total of 195 members – aged 17 to 60 – of two small scale societies in the Western Highlands of Papua New Guinea – the Wolimbka and the Ngenika – participated in the third party punishment game, permitting us to conduct 65 games with three players each. We recruited 216 subjects but later had to dismiss 21 subjects because they did not understand the payoff consequences of different action combinations. We, therefore, conducted 17 games in the AB treatment and 16 in each of the other treatments. The clans live in areas roughly 30 kilometers from one another. The members of the clans do not live in big villages, but are grouped in hamlets averaging two to six huts. Located in the Wahgi Valley, the Wolimbka dwellings are scattered among gardens over rough and bushy terrain, whilst the Ngenikas, living in the Mondomil Valley, are spread around dense rainforest. Both clans speak “Wahgi”, with dialectal differences between the two areas. The members of both clans are also conversant in Neo-Melanesian (Pidgin). Each of these societies consists of 400-600 people. Their subsistence is based on horticulture and pig husbandry, supplemented by hunting and gathering. Gardening is the main subsistence activity, but hunting provides a welcome addition to their diet. Sweet potatoes are the main food in both tribal societies. Most families raise a few pigs, which are an integral part of the gifts presented in the exchanges and ceremonies recurrent in village life (e.g. bride price, compensation fee). Some of the surplus from the subsistence sector is sold on markets. Small outdoor markets are found everywhere along the roads, where women and children sell their garden produce, and other commodities such as string bags, betel nuts, and limes. As is the case in most Highland communities, coffee is one of the main agriculture products and is a prime income earner for the villagers. It is one of the few commercial crops which the villagers can grow and sell without the need for processing. Tribal warfare is a frequent event in PNG. Both clans have had many recent wars with their neighbouring tribes. One important reason for choosing the Ngenikas and the Wolimbkas as subjects in our experiment is that these two clans have never conducted tribal warfare with

each other within the memorized history of the elders of the two clans. They are neutral towards each other and do not exchange any gifts or goods, except in the rare case of inter-clan marriage. Thus, due to the absence of any hostilities between the two clans, finding parochialism across these two tribes makes our results even stronger.

Procedure

****1. Overview**** In each experimental session, 18 participants first received some preliminary verbal instructions as a group, where we informed them about the general experimental procedures. Moreover, the basic structure of the game was explained to the group, but the experimenter did not mention the different treatment conditions. Thus, subjects at this stage did not yet know that they would face players from different clan. This has the advantage that all participants received the same view of the game. We ensured that the participants did not communicate about the game before they participated in the experiment. Each participant received a show-up fee of K3 and drew a number at the beginning of the game. One at a time, in the order of the numbers drawn, the subjects then came into a separate room to participate in the experiment. The game was then explained again to them individually in much detail after they entered the experiment room; this time the instruction include the information about their own role in the game and the group affiliation of the other two players. Since many of the participants had little or no education, the experimenter (H. Bernhard, who speaks Neo-Melanesian [Pidgin]) explained the experiment with coins and cups, representing the three players A, B, and C, before asking test questions. Participants who failed to understand the instructions were dismissed from the experiment but could keep their show-up fee. The subjects who answered the test questions correctly were then asked to make their decision. Subjects in the role of player A decided how much of their endowment of K10 they want to transfer to player B. Subjects in the role of player C decided whether to spend K0, K1 or K2 on the punishment of player A. Each K spent on punishment reduced A's earnings by K3. We elicited player C's punishment decision with the strategy method. This means that player C indicated how much he is willing to spend on punishment for each of player A's feasible transfers. Player C made this decision before he knew the dictator's actual transfer level. The strategy method has the great advantage that we also collect information about punishment at transfer levels that player A did not actually choose, which considerably increases the statistical power of our results. Since we collected 11 punishment decisions from each player C – one punishment decision for each feasible transfer level – we always controlled for repeated measurement in the statistical analysis of punishment decisions. The strategy method has been widely and successfully applied in experimental games. In principle, it is possible that this method generates different results than the specific response method where individuals only respond to the specific actions the other players take. However, many studies indicate that the two methods generate qualitatively similar behaviours [1-4]. The strategy method might somewhat reduce the strength of punishment relative to the specific response method [2, 4] but several investigations also indicate that it has no effect [1, 3]. However, as we implemented the strategy method in all treatment conditions, the behavioral impact of this method, if there is any, would be kept constant across treatments. Immediately after they had made their decisions, we elicited every player A's and every player C's expectation about

punishment for transfers of K0, K5 and K10 (e.g. for K0: _If Person A gives K0 to Person B and keeps K10 for himself, do you think most people in the position of Person C would pay money in order to punish Person A?_ When the subject answered with "yes" we asked: _How much?_). The games were first conducted with the Ngenikas, then with the Wolimbkas. The Wolimbka participants were paid after everyone in the session had made their decision. After having played with the Wolimbkas, we returned to the Ngenikas and paid them their money according to the Wolimbkas' decisions. Thus the time lag between the game play and the payment was about ten days for the Ngenikas. They entered the classroom one by one for payment. We briefly explained which decisions had been made and paid the players their money (handed over in envelopes). Moreover, each Ngenika received K2 as a thank you for coming a second time.

****2. Game Instructions**** The introductory instructions and the game instructions are based on the written experimental protocols developed by Henrich et al. (in press) for the specific purpose of conducting experiments in small scale societies. We are very grateful to these authors for allowing us to base our experiments on their pioneering work [5]. The participants of a session first received some preliminary verbal instructions as a group, before the subjects came into a separate room one by one to play the experiment. Here we present the introductory instructions and game instructions to the group, followed by the individual game instructions.

****2.1. THIRD PARTY PUNISHMENT GAME: INTRODUCTORY INSTRUCTIONS**** Thank you all for taking the time to come today. Today's experiment may take up to 4 hours, so if you think you will not be able to stay that long let me know now. Before we begin I want to make some general comments about what we are doing here today and explain the rules that we must follow. We will be making some experiments in which you can get some money. Whatever money you will get in the experiments will be yours to keep and take home. [Ngenika: you should all come again next week (date and time) to check if you got some money and collect the money.] Maybe you won't get any money from the experiment, but today Assistant 1 will pass out K3 to each of you to thank you for coming today. This money is not part of the experiment, it is yours to keep. Assistant 1 and I will be supplying the money. But you should understand that this is not our own money. It is money given to us by a University in Switzerland to use for research. Before we proceed any further, let me stress something that is very important. You were invited here without understanding very much about what we are planning to do today. If at any time you find that this is something that you do not wish to participate in for any reason, you are of course free to leave whether we have started the experiment or not. I will now explain the experiment to you in the group and afterwards one after the other will come into the classroom with me and carry out the experiment. It is important that you listen as carefully as possible, because only people who understand the experiment will actually be able to participate. We will run through some examples here while we are all together. You cannot ask questions or talk while here in the group. This is very important. Please be sure that you obey this rule, because it is possible for one person to spoil the experiment for everyone. If one person talks about the experiment while sitting in the group, we will not be able to carry out the experiment today. Do not worry if you do not completely understand the experiment as we go through the examples here in the group. Each of you will have a chance to ask questions in private to be sure that you understand what you have to do.

****2.2. THIRD PARTY PUNISHMENT GAME SCRIPT FOR THE GROUP**** There are three persons in this experiment - Person A, Person B, and Person C. The three persons come from two different clans, the Wolimbkas and the

Ngenikas. None of you will know exactly with whom you are interacting, you will only know, if the other persons are Wolimbkas or Ngenikas. Only I know who will interact with whom and I will never tell anyone else. Here are K10. Person A must decide how much of these K10 he wants to give to Person B and how much he wants to keep for himself. Person B takes home whatever Person A gives to him, but Person A has to wait until Person C has made a decision before finding out what he is going to take home. Person C is given K5. Person C can make three things with his K5. 1) He can punish Person A by paying K1 and with that K3 of Person A's money, which Person A wanted to keep for himself, will be taken away. 2) He can punish Person A even harder by paying more. If he pays K2, K6 of Person A's money, which he wanted to keep for himself, will be taken away. 3) He can pay nothing, keep the K5 for himself and leave the money Person A wanted to keep for himself untouched. Before hearing how much Person A has given Person B, Person C has to decide what he wants to do for each of the possible amounts that Person A could have allocated to Person B. Here are some examples (All examples are shown with cups and coins):

1.1. Suppose Person A gives K5 to Person B, and keeps K5 for himself. Now Person C states that he would "do nothing" if Person A does this. In this case, Person A goes home with K5 (From the K10 he had given K5 to Person B and had kept K5 for himself). Person B goes home with the K5 from Person A. And Person C goes home with K5.

1.2. Here is another example. Suppose Person A gives K0 to Person B and keeps K10 for himself. Person C states that he would "do nothing" if Person A does this. In this case, Person A goes home with K10. Person B doesn't have anything and Person C goes home with K5.

1.3. Here is another example. Suppose Person A gives K10 to Person B and keeps K0 for himself. Person C states that he would "do nothing" if Person A does this. In this case, Person A goes home with K0. Person B goes home with the K10 from Person A, and Person C goes home with K5.

1.4. Here is another example. This time suppose Person A allocates K3 to Person B and keeps K7 for himself. Person C states that he would "do nothing" if Person A does this. In this case, Person A goes home with K7 (He had kept K7 for himself and Person C didn't punish him). Person B goes home with the K3 from Person A. And Person C goes home with K5.

1.5. Here is another example. As before, Person A allocates K3 to Person B and keeps K7 for himself. But now, Person C states that he would pay K1 to subtract K3 from Person A. In this case, Person A goes home with K4 (He had kept K7 for himself minus the K3 equals K4). Person B goes home with the K3 from Person A. And Person C goes home with K4.

1.6. Here is another example. Again, suppose Person A allocates K3 to Person B and keeps K7 for himself, but this time Person C states that he would pay K2 to subtract K6 from Person A. In this case, Person A goes home with K1 (He had kept K7 for himself minus the K6 equals K1). Person B goes home with the K3 from Person A. And Person C goes home with K3. (K5 minus K2 equals K3).

1.7. And a last example: Suppose Person A gives K6 to Person B and keeps K4 for himself. Person C states that he would punish Person A for his decision and pay K1 to subtract K3 from Person A's money. In this case, Person A goes home with K1 (He had kept K4 for himself minus the K3 equals K1). Person B goes home with the K6 from Person A. And Person C goes home with K4 (K5 minus K1 equals K4).

We have here a box of papers with numbers from 1 to 18. Now Assistant 3 will come to each one of you and you can pick a piece of paper. Assistant 1 will give you K3 as a thank you for coming today. We will then call each of you in turn to make the experiment, starting with the person who picked number 1. While you are waiting for your turn, Assistant 2 will help you fill out a form. When it's your turn to make the experiment you can come inside the classroom. I will tell you

whether you are Person A, Person B, or Person C and from which clan the other two persons are \ (Wolimbka or Ngenika). Then I will explain the experiment again and ask you to work through a couple of examples to be sure that you understand. After you have completed the experiment, you can go to the table to Assistant 4 and take a snack. Then you can go to Assistant 1 and Assistant 3 who will help you fill out the another form. \[**Ngenika**]: When you have finished there, you can go home. Remember that you are not allowed to come and talk to the people still waiting to carry out the experiment. Next week on \ (date and time) you should come to this classroom again. Please don't come on another day, because I won't be here anymore and nobody else can give out any money to you. If you come on that day, you will get K2 as a thank you for coming and we will tell you, whether you have won something. If yes, you will be paid that amount as well. Please make sure, you also bring along your slip of paper with the number on it. **Wolimbka**: When you have finished there, you have to wait until everybody has made the experiment. Remember that you are not allowed to come and talk to the people still waiting to carry out the experiment. When everyone has finished the experiment, I will call you in one by one again and pay you your money, in case you get any.] **2.3. Game Instructions for the Individual Player** Below we present the script of the individual game instructions for Player A \ (Wolimbka) in the ABC treatment. Apart from the different clan-belonging of the other players and the changes pointed out in brackets, the scripts for the other treatments are the same for all Players A. **2.3.1 THIRD PARTY PUNISHMENT GAME SCRIPT FOR PERSON A** As I have told you, there are three persons in this experiment - Person A, Person B, and Person C. All three persons are Wolimbkas. None of you will know exactly with whom you are interacting. Only I know who is to interact with whom and I will never tell anyone else. Now you yourself are Person A. Here are K10. You must decide how much of this money you want to give to Person B from Wolimbka and how much you want to keep for yourself. Person B takes home whatever you give to him, but you will have to wait until Person C, also a Wolimbka, has decided what he wants to do before finding out how much money you can take home. Person C will be given K5. Person C from Wolimbka can make three things with his K5. 1) He can punish your decision by paying K1 and with that K3 of your money will be subtracted. 2) He can punish you even harder by paying K2. Then K6 of your money will be subtracted. 3) He can pay nothing, keep the K5 for himself and leave you all your money. Here are three examples \ (_the examples will be presented with cups and coins_): 2.1 Suppose you give K1 to Person B, a Wolimbka and keep K9 for yourself. Person C, also a Wolimbka states that he would punish you and pay K1 to subtract K3 from your money if you do this. Person C also states what he will do. In this case, you would go home with K6 \ (K9 minus the K3 subtract by Person C equals K6). Person B from Wolimbka goes home with the K1 you gave him, and Person C from Wolimbka goes home with K4 \ (K5 minus K1 equals K4). 2.2 Here is another example. Suppose you give K4 to Person B from Wolimbka and keep K6 for yourself. Person C from Wolimbka states that he would pay K2 to punish you and subtract K6 from your money. In this case, you go home with K0 \ (You had kept K6 for yourself minus the K6 subtracted by Person C equals K0). Person B goes home with the K4 you gave him. And Person C goes home with K3 \ (K5 minus K2 equals K3). 2.3 Here is another example. As before, suppose you allocate K4 to Person B, a Wolimbka, but this time Person C from Wolimbka states that he would "do nothing" if you do this. In this case, you go home with K6 \ (You had kept that money for yourself and Person C didn't punish you). Person B goes home with the K4 you gave him. And Person C goes home with K5. Now can you answer

these questions? 3.1 Imagine that you allocate K4 to Person B from Wolimbka and that Person C from Wolimbka states that he would pay nothing and leave things unchanged if you do this. * How much will you go home with? $(K6)$ * How much does Person B from Wolimbka go home with? $(K4)$ * How much does Person C from Wolimbka go home with? $(K5)$ 3.2 But what if Person C from Wolimbka states that he would punish you for your decision and pay K2 to subtract K6 from you if you allocate K4 to Person B. * How much do you go home with? $(K0)$ * How much does Person B from Wolimbka go home with? $(K4)$ * How much does Person C from Wolimbka go home with? $(K3)$ 3.3 Imagine that you allocate K6 to Person B from Wolimbka and that Person C from Wolimbka states that he would punish you for your decision and pay K1 to subtract K3 from you. * How much will you go home with? $(K1)$ * How much does Person B from Wolimbka go home with? $(K6)$ * How much does Person C from Wolimbka go home with? $(K4)$ _Further Examples and Test Questions if needed_ 2.4 Here is another example. Suppose you allocate K1 to Person B from Wolimbka, but this time Person C from Wolimbka stated that he would "do nothing" if you do this. Person C also states what he will do if you allocate other possible amounts, but we won't worry about that now. In this case, you go home with K9 (From the K10 you had given K1 to Person B and you had kept K9 for yourself and Person C didn't punish you). Person B goes home with the K1 you had given him. And Person C goes home with K5. 2.5 Here is another example. Suppose you allocate K7 to Person B from Wolimbka. Person C from Wolimbka states that he would pay K1 to punish you and subtract K3 from your money. Person C also states what he will do if you allocate other possible amounts, but we won't worry about that now. In this case, you go home with K0 (From the K10 you had given K7 to Person B and kept K3 for yourself minus the K3 subtracted by Person C equals K0). Person B goes home with the K7 you gave him. And Person C goes home with K4 (K5 minus K1 equals K4). 3.4 If you give K0 to Player B from Wolimbka and Player C from Wolimbka states that he would pay nothing and leave things unchanged if you does this. * How much do you go home with? $(K10)$ * How much does Player B go home with? $(K0)$ * How much does Player C go home with? $(K5)$ 3.5 But what if Player C states that he would pay K1 to subtract K3 from you if you give K0 to Player B. * How much do you go home with? $(K7)$ * How much does Player B go home with? $(K0)$ * How much does Player C go home with? $(K4)$ 3.6 If you give K8 to Player B from Wolimbka and keep K2 for yourself and Player C from Wolimbka states that he would pay nothing and leave things unchanged if you does this. * How much do you go home with? $(K2)$ * How much does Player B go home with? $(K8)$ * How much does Player C go home with? $(K5)$ Now it is your turn to play. Here are K10. You can now decide how much of this money you want to give Person B from Wolimbka and how much money you want to keep for yourself. Please divide this money into two piles and push the amount that you wish to give to Person B from Wolimbka over the line. [_After they have made their offer:] Okay, we will give the amount of money you have pushed over the line to Person B. To see how much you can take home of the money you have kept for yourself, we first have to find out, what Person C decides to do. [_Belief-questions are now asked.]

****Belief of Person A/C**** If Person A gives K0 to Person B and keeps K10 for himself, do you think most people in the position of Person C would pay money in order to punish Person A? Yes No If yes, how much? If Person A gives K5 to Person B and keeps K5 for himself, do you think most people in the position of Person C would pay money in order to punish Person A? Yes No If yes, how much? If Person A gives K10 to Person B and keeps K0 for himself, do you think most people in the position of

Person C would pay money in order to punish Person A? Yes No If yes, how much? You can now go to the table to Assistant 4 and get a snack. Then please go to Assistant 1 and Assistant 3. They will help you fill out another form. \[**Wolimbka**]: After you have filled out the form you have to wait until everybody has made the experiment inside the classroom. Remember that you are not allowed to come and talk to the people still waiting to carry out the experiment. When everyone has finished the experiment, I will call you in one by one again and pay you your money, in case you have received any money from the experiment. **Ngenika**]: After you have filled out the form, you can go home. Remember to come back next week \[time and date]. You will get K2 in any case, just for coming. Please bring along your note with the number on it. I will then explain to you what Person C has decided to do and pay you your money, in case you have received any money from the experiment.] _Below we present the script of the individual game instructions for Player B. Apart from the group affiliation of the other players and the changes pointed out in brackets, the script for Player B is the same in all treatments._

****2.3.2 THIRD PARTY PUNISHMENT GAME SCRIPT FOR PERSON B**** As I have told you, there are three persons in this experiment - Person A, Person B, and Person C. Now you yourself are Person B. Person A and Person C come from Wolimbka \ (Ngenika). None of you will know exactly with whom you are interacting. Only I know who is to interact with whom and I will never tell anyone else. \[**Ngenika**]: This week I will go to Person A from Wolimbka and he will tell me how much of the K10 he wants to give to you and how much he wants to keep for himself. Remember to come back next week \ (time and date). Please bring along your note with the number on it. I will then tell you, how much Person A from Wolimbka gave to you and pay you the amount. You can now go to the table to Assistant 4 and get a snack. Then please go to Assistant 1 and Assistant 3. They will help you fill out another form. After you have filled out the form, you can go home. **Wolimbka**]: Here are K10. Person A from Ngenika has decided how much he wants to give to you and how much he wants to keep for himself. After everyone has finished the experiment I will call you in again and tell you, how much Person A has given to you and pay you that amount. You can now go to the table to Assistant 4 and get a snack. Then please go to Assistant 1 and Assistant 3. They will help you fill out another form. After you have filled out the form you have to wait until everybody has made the experiment.] _Below we present the script of the individual game instructions for Player C \ (Wolimbka) in the ABC treatment. Apart from the different clan-belonging of the other players and the changes pointed out in brackets, the scripts for the other treatments are the same for all Players C._

****2.3.3 THIRD PARTY PUNISHMENT GAME SCRIPT FOR PERSON C FROM WOLIMBKA \ (BC TREATMENT)**** As I have told you, there are three persons in this experiment - Person A, Person B, and Person C. Now you yourself are Person C. Person A is a Ngenika, B is a Wolimbka. None of you will know exactly with whom you are interacting. Only I know who is to interact with whom and I will never tell anyone else. Here are K10. Person A told me, how much of those K10 he wants to give to Person B, a Wolimbka and how much he wants to keep for himself to take home. Now my school gives you K5. With these K5 you can make three things: 1) You can punish Person A from Ngenika for his decision by paying K1 and with that K3 of Person A's will be subtracted. 2) You can punish Person A from Ngenika even harder by paying K2. Then K6 of Person A's money will be subtracted. 3) You can pay nothing, keep the K5 for yourself and leave Person A from Ngenika all his money. You will have to decide what you want to do for each of the possible allocations Person A from Ngenika could have made to Person B from

Wolimbka. [At this stage the same examples were shown and the same test-questions were asked like Person A, however specifically reworded for Person C, of course. Following we present one example and one test-question as exemplification of the adaptation:]

2.1 Suppose Person A from Ngekina gives K1 to Person B from Wolimbka and keeps K9 for himself. Suppose you now state that you would like to punish Person A from Ngenika and pay K1 to subtract K3 from Person A's money if he does this. You also have to state what you will do (pay K1 to subtract K3, pay K2 to subtract K6 or pay nothing) if Person A allocates other possible amounts, but we won't worry about that now. In this case, Person A from Ngenika would go home with K6 (K9 minus the K3 subtract by you equals K6). Person B from Wolimbka goes home with the K1 Person A had given him, and you would go home with K4 (K5 minus K1 equals K4).

3.1 Imagine that Person A from Ngenika allocated K4 to Person B from Wolimbka. If you decide that you would pay nothing and leave things unchanged if Person A does this, * How much does Person A from Ngenika go home with? (K6) * How much does Person B from Wolimbka go home with? (K4) * How much do you go home with? (K5) * How much money is here for Person A to divide in the beginning? (K10) * How much money is here for you in the beginning? (K5)

Subjects who failed to understand the experiment, were dismissed at this point. If the subject gave correct answers to the test questions, we went on as follows:

The allocation that Person A from Ngenika has made to Person B from Ngenika is written on the slip of paper in front of me. Before I tell you, how much Person A from Ngenika gave Person B from Ngenika, you have to decide for each of the possible allocations Person A could have made to Person B what you want to do. These decisions will determine what Person A from Ngenika and you actually receive once we see what Person A has done. Please note that you will not get a chance to change your mind after you know, what Person A has allocated to Person B.

1. If Person A from Ngenika gave K0 to Person B from Ngenika and kept K10 for himself would you pay K1 to punish Player A from Ngenika and subtract K3 from his money or would you pay K2 to subtract K6 from Person A's money or would you pay nothing and leave things as they are?
2. If Person A from Ngenika gave K1 to Person B from Ngenika and kept K9 for himself would you pay K1 to punish Player A from Ngenika and subtract K3 from his money or would you pay K2 to subtract K6 from Person A's money or would you pay nothing and leave things as they are?
3. If Person A from Ngenika gave K2 to Person B from Ngenika and kept K8 for himself would you pay K1 to punish Player A from Ngenika and subtract K3 from his money or would you pay K2 to subtract K6 from Person A's money or would you pay nothing and leave things as they are?
4. If Person A from Ngenika gave K3 to Person B from Ngenika and kept K7 for himself would you pay K1 to punish Player A from Ngenika and subtract K3 from his money or would you pay K2 to subtract K6 from Person A's money or would you pay nothing and leave things as they are?
5. If Person A from Ngenika gave K4 to Person B from Ngenika and kept K6 for himself would you pay K1 to punish Player A from Ngenika and subtract K3 from his money or would you pay K2 to subtract K6 from Person A's money or would you pay nothing and leave things as they are?

[Occasionally or when it seems necessary the following reminder will be given:] Remember that Person A's offer is already made. Nothing you decide now can change what Person A has given to Person B.

6. If Person A from Ngenika gave K5 to Person B from Ngenika and kept K5 for himself would you pay K1 to punish Player A from Ngenika and subtract K3 from his money or would you pay K2 to subtract K6 from Person A's money or would you pay nothing and leave things as they are?
7. If Person A from Ngenika gave K6 to Person B

from Ngenika and kept K4 for himself would you pay K1 to punish Player A from Wolimbka and subtract K3 from his money or would you pay K2 to subtract K6 from Person A's money or would you pay nothing and leave things as they are? 8. If Person A from Ngenika gave K7 to Person B from Ngenika and kept K3 for himself would you pay K1 to punish Player A from Ngenika and subtract K3 from his money or would you pay K2 to subtract K6 from Person A's money or would you pay nothing and leave things as they are? 9. If Person A from Ngenika gave K8 to Person B from Ngenika and kept K2 for himself would you pay K1 to punish Player A from Ngenika and subtract K3 from his money or would you pay K2 to subtract K6 from Person A's money or would you pay nothing and leave things as they are? 10. If Person A from Ngenika gave K9 to Person B from Ngenika and kept K1 for himself would you pay K1 to punish Player A from Ngenika and subtract K3 from his money or would you pay K2 to subtract K6 from Person A's money or would you pay nothing and leave things as they are? 11. If Person A from Ngenika gave K10 to Person B from Ngenika and kept K0 for himself would you pay K1 to punish Player A from Ngenika and subtract K3 from his money or would you pay K2 to subtract K6 from Person A's money or would you pay nothing and leave things as they are? After everyone has finished the experiment I will call you in again and tell you, how much Person A from Ngenika has given to Person B from Ngenika and we will then see, how much money Person A and you can take home. _\[Belief-questions are now asked.]_ ****Belief of Person A/C**** If Person A gives K0 to Person B and keeps K10 for himself, do you think most people in the position of Person C would pay money in order to punish Person A? Yes No If yes, how much? If Person A gives K5 to Person B and keeps K5 for himself, do you think most people in the position of Person C would pay money in order to punish Person A? Yes No If yes, how much? If Person A gives K10 to Person B and keeps K0 for himself, do you think most people in the position of Person C would pay money in order to punish Person A? Yes No If yes, how much? You can now go to the table to Assistant 4 and get a snack. Then please go to Assistant 1 and Assistant 3. They will help you fill out another form. After you have filled out the form you have to wait until everybody has made the experiment here with me. ****3. Statistical methods**** The punishment decisions were examined with ordered probit regressions. This is the appropriate statistical tool because punishment is a discrete variable that can only take on three values: K0, K1 and K2. We control for repeated individual measurements and for individuals' transfer levels in all regressions. Treatment effects were measured by dummy variables that take on a value of one if the observation comes from the treatment of interest. The dummy variable is otherwise zero. The impact of the different treatments on expected punishment at transfer levels of K0 was also examined with the help of dummy variables in ordered probit regressions. Although p-values are a widely used method for reporting the statistical significance of variables, we also applied an alternative statistical approach to validate our inferences \ (as one of the referees suggested). We compared the Akaike information criterion \ (AIC) of different empirical models \ (probit regressions) to see which model fits our data best \ [6]. This approach has the advantage that it does not critically depend on the number of observations. When using p-values, even very small differences between treatments become significant if the number of observations is sufficiently large. This is not the case for AIC, which is defined as $AIC = -2 \ln(\text{log-likelihood}) + 2K$, where K is the number of estimated parameters included in the model \ (i.e. number of variables). The AIC validates the increased predictive power of included treatment dummies after adjusting for the number of parameters and makes it possible to select

the model that best replicates the data. The model with the smallest AIC tends to make the best out-of-sample predictions. The dictators' transfer decisions were analyzed with tobit regressions (censored at zero) that take the fact that the transfer level is a function of the expected punishment and the treatment dummies of interest into account. These regressions also enable us to disentangle the voluntary component in average transfers from the forced component that is merely due to the threat of punishment. If we draw the regression line of the transfer level as a function of expected punishment, the intercept of the regression line with the vertical axis informs us about the average transfer level obtained if expected punishment is zero, which we term the voluntary transfer level. Deducting this voluntary transfer level from the average transfer level in a treatment yields the part of the total average transfer that is due to expected punishment. The estimated average transfer levels in the absence of a punishment threat can then be interpreted as a measure of voluntary norm compliance. It turned out that 57% of the average transfer can be attributed to voluntary norm compliance if A and B belong to the same group whereas only 20% of the average transfer was made voluntarily if A and B belong to different groups. This result confirms the prediction that there is a much stronger obligation to share if A and B belong to the same group.

Anticipated Results

In this section, we present the results from the analysis of the Akaike information criterion (AIC). We compared the AIC values of the following ordered probit models shown in Figure 1. In each of the models third party punishment is the dependent variable. If M0 has the smallest AIC value, then we can conclude that group affiliation has no additional explanatory power for punishment. If, instead, M1 is the best model (i.e., has the smallest AIC value), it then supports the prediction derived from selection extinction theories ($ABC > AB = AC = BC$). The p-values reported in the paper suggest, however, that M2 best fits our data ($BC > ABC > AC = AB$). If M3 has the smallest AIC value, the ABC and BC treatment would not differ from each other, while a best-fitting M4 would indicate that all treatments vary from each other. Finally, the last model is based on the idea that the AC ingroup dummy alone (where A and C are from the same group) explains punishment best. As the Table 1 shows, M2 indeed has the smallest AIC value which supports the hypothesis that $BC > ABC > AC = AB$ because a model based on this hypothesis makes the best out-of-sample predictions. Based on the AIC values, it is also possible to compute the Akaike weight which is the probability that a given model is the best in the set of considered models. The Akaike weights indicate that M2 has by far the highest probability of being the best model. Moreover, the evidence ratio tells us that M2 is 2.74 times more likely to be the best model than the second place model M4. Thus, we conclude that the qualitative results are the same with reported p-values and AIC model fit statistics. The dictators' transfer decisions were analyzed with tobit regressions (censored at zero) that take the fact that the transfer level is a function of the expected punishment and the treatment dummies of interest into account. These regressions also enable us to disentangle the voluntary component in average transfers from the forced component that is merely due to the threat of punishment. If we draw the regression line of the transfer level as a function of expected punishment, the intercept of the regression line with the vertical axis informs us about the average transfer level obtained if expected

punishment is zero, which we term the voluntary transfer level. Deducting this voluntary transfer level from the average transfer level in a treatment yields the part of the total average transfer that is due to expected punishment. The estimated average transfer levels in the absence of a punishment threat can then be interpreted as a measure of voluntary norm compliance. It turns out that 57% of the average transfer can be attributed to voluntary norm compliance if A and B belong to the same group whereas only 20% of the average transfer is made voluntarily if A and B belong to different groups. This result confirms the prediction that there is a much stronger obligation to share if A and B belong to the same group.

References

1. Brandts, J. & Charness, G. Hot versus Cold - Sequential Responses and Preference Stability in Experimental Games. *Experimental Economics* **22**, 227-238 (2000).
2. Brosig, J., Weimann, J. & Yang, C.-L. The Hot versus Cold Effect in a Simple Bargaining Experiment. *Experimental Economics* **6**, 75-90 (2003).
3. Oxoby, R. J. & McLeish, K. N. Sequential Decision and Strategy Vector Methods in Ultimatum Bargaining: Evidence on the Strength of Other-Regarding Behavior. *Economics Letters* **84**, 399-405 (2004).
4. Falk, A., Fehr, E. & Fischbacher, U. Driving Forces behind Informal Sanctions. *Econometrica* **73**, 2017-30 (2005).
5. Henrich, J. et al. Costly punishment across human societies. *Science* **312**, 1767-1770 (2006).
6. Burnham, K. P. & Anderson, D. R. Model selection and inference: a practical information-theoretic approach (Springer Verlag, New York, 1988).

Figures

Model	Log-likelihood	Number of parameters	AIC	Delta AIC	Akaike weight	Evidence ratio
M0	- 410.397	1	822.79	67.37	0	0
M1	- 406.989	2	817.98	62.56	0	0
M2	- 374.709	3	755.42	0	0.63	2.74
M3	- 377.240	2	758.48	3.06	0.14	0.22
M4	- 374.700	4	757.40	1.98	0.23	0.37
M5	- 409.383	2	822.77	67.35	0	0

Figure 1

Table 1 Model Comparison based on Akaike's Information Criterion Remark: To derive the evidence ratio, we divide the Akaike weight of each model by the Akaike weight of the best model M2. M2 itself is compared with the second best model.

M0: $\alpha \cdot \text{transfer}$

M1: $\alpha \cdot \text{transfer} + \beta \cdot \text{ABC}$

M2: $\alpha \cdot \text{transfer} + \beta \cdot \text{ABC} + \gamma \cdot \text{BC}$

M3: $\alpha \cdot \text{transfer} + \delta \cdot (\text{ABC} \& \text{BC})$

M4: $\alpha \cdot \text{transfer} + \beta \cdot \text{ABC} + \gamma \cdot \text{BC} + \varepsilon \cdot \text{AC}$

M5: $\alpha \cdot \text{transfer} + \varphi \cdot (\text{ABC} \& \text{AC})$

Figure 2

Figure 1 Models used in the model comparison