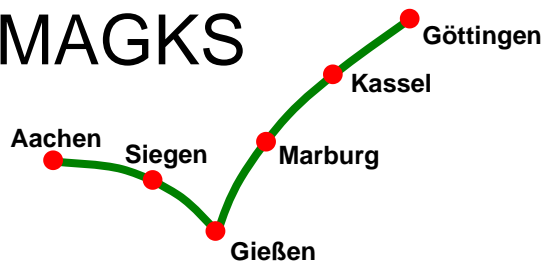


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with third party punishment**

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# Kinship and friendship in a trust game with third party punishment

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## Abstract

This paper reports on a set of trust games with third party punishment (TPP) where participants are either family members or friends or unrelated villagers. The experimental sessions were carried out in southern Namibia (Karas) and the bordering northern South Africa (Namaqualand). The aim was to test several hypotheses derived from kin selection theory as well as to assess the importance of third party punishment for encounters among family members and friends. Building on Hamilton, (1964) it was proposed by e.g. Madsen et al., (2007) that kinship is the baseline behaviour among humans. Thus, I use kinship as basis for comparison of how we treat friends and unrelated people and when there is the possibility to punish free-riding behaviour. It turns out that kinship is the baseline behaviour when no other features are available to humans. However, a personal exchange among friends that has a third party observer performs better than a personal exchange among family members without third party punishment. Contributions to family members can substantially be increased by third party punishment. Thus, human ability to sustain a norm by punishing free-riders at personal costs could also have played an important role in sustaining co-operation among kin.

**Keywords:** Trust, field experiment, third party punishment, kinship, friendship

# 1. Introduction

There is strong uncontested evidence that the possibility to punish free-riders sustains norms of co-operation or fairness among humans even when the punisher has only personal costs from doing so (Fehr and Fischbacher, 2003; Fehr and Gächter, 2002). But, is the possibility to sustain a norm still necessary when the involved persons are family members or friends? Will an unrelated third party still enforce a norm deviating behaviour when the personal exchange is between two related family members? Undoubtedly, humans behave more altruistic towards members of their own kin (Daly and Wilson, 1988; literature cited in Lieberman et al., 2008 or Madsen et al. 2007). Altruism<sup>1</sup> among kinship is explained by assuming selfish genes that aim at increasing the relative fitness within their own population through means of cooperation (Hamilton 1964; Dawkins, 1976). Strict Darwinian thinking does not allow altruistic genes to survive in a larger society with encounters of non-kin. However, everyday experience or anthropological research on food sharing tells us that humans also behave altruist with non-kin. The strongest rejection of the kin selection theory is the strong reciprocity hypotheses which builds on economic experiments that show that a large portion of individuals behave altruist even in one-shot encounters with unrelated anonymous people in large groups of people they will never meet again and thus where reputation is very limited (Fehr and Henrich, 2003). Strong reciprocity is “*a combination of altruistic rewarding, which is a predisposition to reward others for cooperative, norm-abiding behaviours, and altruistic punishment, which is a propensity to impose sanctions on others for norm violations*” (Fehr and Fischbacher 2003:785). The norm enforcing effect of third party punishment is unquestioned there is still a debate on the evolutionary origins of co-operation.

Since altruism is costly to individuals and the benefits from altruism are shared among unrelated group members it is an evolutionary puzzle why humans co-operate even with unrelated strangers (Boyd et al., 2003). One possible explanation from evolutionary biology or evolutionary psychology is that genetic relatedness regulates pattern of altruistic behaviour and that kin selection produce the evolution of pro-social behaviour since individuals that help a genetic relative are favoured by natural selection and benefit from a higher reproduction rate of their genes. Thus, co-operation can have emerged from kin networks in the first human societies and stepwise included non relatives (Gardner and West, 2004) or might have led to “the big mistake hypothesis” that claims that the psychological mechanisms

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<sup>1</sup> According to Fehr and Fischbacher (2003) altruism is performing costly acts that confer benefits on others.

underlying pro-social behaviours are not adjusted enough to differentiate the experimental context to past situations where these mechanisms are adapted for (Johnson et al., 2002) or humans have an evolved system of detecting relatedness also found with primates and other species (Lieberman, 2007). Proponents of non-kin driven theories of the evolution of pro-social behaviour question these transmission channels of altruistic behaviour into groups with unrelated strangers and instead believe that reciprocal altruism, reputation and especially strong reciprocity also called pro-social punishment or altruistic punishment have lead to the evolution of pro-social behaviour among humans. Strong reciprocity is an evolved feature that enables humans to enforce norms<sup>2</sup> that tell people what ought to be done in a certain situation when no explicit agreement exist e.g. in the family at the workplace in formal or informal associations in the use of common-pool resources, in the provision of public goods or for solving problems of collective action. In one-shot experiments with large groups of genetically unrelated and anonymous individuals a large proportion of individuals behaves as altruistic punishers or altruistic rewarder thereby sustaining a group beneficial norm of co-operation although punishing is monetary costly for them and yields no future monetary gain<sup>3</sup> (Bowles and Gintis, 2004; Fehr and Fischbacher, 2003; Fehr and Fischbacher, 2004; Gintis et al., 2003). However, recent research on neuroeconomics has found that co-operating and punishing norm deviators stimulates reward related brain areas which might further explain the evolutionary origin of punishment (De Quervain et al., 2004; McCabe et al., 2001; Rilling et al., 2002). So far the hypotheses from both theories have only been tested isolated. In a recent article, Madsen et al. (2007) experimentally test altruism among kin and proposes that “kinship represents a baseline against which humans make judgements that may subsequently be coloured by issues of reciprocity, obligation prosociality and other ethical considerations” (ibid p.355). Madsen et al. (2007) criticise the microeconomic experiments in small scale societies or in the laboratory for the deliberate omission of kinship as well as psychological surveys that mainly use hypothetical experiments without real incentives. The presented experiment addresses the main critique of Madsen et al. (2007) and uses microeconomic experiments that account for kinship as explanatory variable and participants to the experiment are not asked to allocate hypothetical amounts to family members. A next step in

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<sup>2</sup> According to Ostrom, (2000), norms are shared understandings about actions that are obligatory, permitted, or forbidden. Fehr and Gächter, (2000) define a norm as a behavioural regularity that is based on a socially shared belief how one ought to behave; which triggers the enforcement of the prescribed behaviour by informal social sanctions.

<sup>3</sup> In principle, the sanctions in the finitely repeated public goods game with a stable group composition could be driven by self-interest because punished group members typically increase their contributions in future periods thus yielding a higher gain for the punishers as well.

dealing with these two conflicting evolutionary views on co-operation could be to design experiments that account both for kinship and for third party punishment. The presented experiment is the first experiment that tests for the relative strength of kinship compared to third party punishment in personal exchange. It tests the kinship and TPP effect for trust/altruism and a distribution norm. I use a simple dyadic trust game with a third party punishment opportunity and analyse trust/altruism (Player 1), fair distribution (Player 2) and punishing behaviour of a third party (Player 3) when the violation of a norm occurs between two family members, two friends or two unrelated villagers. Although, trust is to a large degree calculative and influenced by the expectation of trustworthiness (Barr, 2003) it was found, that the trust exhibited by the first player in a trust games to a large degree refers to altruism as mainly amount sent in a trust game are not very different from contributions in a dictator game that measures altruism (Cox, 2003). Also, on average first players do not win from trusting their counterpart which cast doubt on the rationality of players or the calculative self-interest explanation of trust (Camerer, 2003). Hence, first player's choice does to some degree also include altruism. Second player in the trust game is also in a dictator game like situation where he can decide on the distribution of the money. However, second player's choice does not necessary measure altruism as it was found that the intention of player one whether he sends or not clearly influences behaviour of player two (McCabe et al., 2003). Therefore, I test for Hamilton's rule of altruism by building an aggregate measure of relatedness ( $r$ ) for all family members. The higher the aggregate value of  $r$  the more altruistic the person should behave towards player two. Besides replicating the results obtained by Madsen et al. (2007) in a different setting I further analyse the relationship between TPP, friendship and kinship as well as the relative strengths of their effects.

## **2. Related Literature**

### ***2.1. Kinship and friendship***

Trust games played in the field have by now been carried out extensively and the variance of the obtained results is rather low<sup>4</sup>. However none of the studies were framed to investigate friendship or family ties. A field experiment carried out in resettled communities in Zimbabwe indirectly analysed the effect of kinship on behaviour in a trust game experiment (Barr, 2004). Barr (2004) found that in resettled communities with fewer kinship relations

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<sup>4</sup> Amount sent by Player 1 range between 40 and 60 per cent of the initial endowment. Player 2 usually returns the same amount Player 1 sent initially.

trust was lower but that there was no difference in the trustworthiness. Participants in her trust did not know whether they were paired with a kin or a friend or an unrelated villager. However, participants might have realized the higher likelihood of being paired with someone of their own family in a traditional village as compared to a resettled community. Peters et al., (2004) first published an experiment using groups of family members. They found in a laboratory experiment on voluntary contribution mechanism that parents and children contributed more to a public good when in groups with family members than when in groups with strangers. Their sample consisted of a mix of parents and children, often with only one parent present in groups of three or four and they played three subsequent sessions either family-stranger-family or stranger-family-stranger. However, since the recruitment required parents and children to register beforehand the family had to discuss amongst them whether they would like to participate or not. Thus, there might have been some pre-experimental arrangement as family members had a chance to talk to each other before the game, an induced behaviour that participants had to think about family and knew they were tested as a family, or that the family in reality formed a group solidarity often reported in experiments with known group identity<sup>5</sup>. Also, a self-selection bias of families and family members who have good relations with each other might arise. Many of these shortcomings have been dealt with in the study of Haan et al., (2006) who investigate friendship in a similar public good setting as Peters et al. (2004). Haan et al. (2006) use a non computerized classroom experiment in a high school where the researchers deliberately formed groups of friends and normal classmates based on their prior knowledge and observation of friendship in the classes. They find that friendship dramatically affects individuals' contributions to public goods and even increases in the last rounds where one would expect much lower contributions. Participants to Madsen et al. (2007) experiments had to perform a painful task where the individual pain was increasing with time invested in the task and the more time was spent in the experiment the more money was transferred to either a close or more distant relative of the participant. Thus, altruist had to bear severe costs and people behaved more altruistic towards a close relative than a distant relative. Madsen et al. (2007) claim to provide the first experimental evidence for altruism based on Hamilton's rule and where all other possible influencing factors such as reciprocity could be excluded from the design. Over and above their experiment was carried out in England as well as in a Zulu community in South Africa where kinship relations are very different.

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<sup>5</sup> See for example Güth et al., (2006).

But how does altruism based on kinship work in large groups of unrelated strangers? According to Sánchez and Cuesta, (2005), Lieberman et al. (2007) or Park and Schaller (2007) humans have an evolved system of detecting relatedness also found with primates or other species<sup>6</sup>. Park and Schaller (2007) found evidence that attitude similarity can serve as heuristic for signalling kinship. Sherman et al., (1997) argue that phenotype matching a form of facial self-resemblance serves as a mean to determine a certain action. Based on their theory DeBruine, (2002) found that facial self-resemblance increases trust in a trust experiment and Krupp et al., (2008) found that contributions in a public good game increased as a function of facial self-resemblance. The critique of evolutionary economists and anthropologists concerning the kin selection theory is twofold. Fehr and Fischbacher (2003) write on the evolutionary origins of the nature of human altruism that the role of kinship (universalistic altruism) or friendship (particularistic altruism) in human altruism is not discussed because it is well-known that humans share kin-driven altruism. However, they question the evolutionary significance of kinship (as well as of reputation and reciprocity) since altruism is exhibited in large groups of unrelated strangers in anonymous one-shot situations. Henrich, (2004) argues that in prehistoric societies as well as in small-scale societies today people behave altruist with plenty of unrelated and distant relatives although everywhere in the world people can and do distinguish between kin and non-kin behaviourally. The alternative approach by evolutionary economists is strong reciprocity which is based on the evidence obtained from third party punishment experiments.

## ***2.2. Third party punishment***

In public goods experiments participants usually stop co-operating and get angry when other participants contribute less than oneself to the public good since lowering one's own contribution is the only possibility to retaliate against free-riders. When participants have the possibility to punish non-contributors, they do so at a cost to themselves (see cf. Dawes et al., 1986; Ostrom et al., 1992; Yamagishi, 1992). Divergent to an involved player who has an own personal incentive to punish norm deviators the article by Fehr and Fischbacher (2004) studies how an uninvolved third party punishes norm deviating behaviour at own personal cost. Fehr and Fischbacher (2004) compare co-operation levels between third party punishment to second party punishment in two different experiments as well as the pattern

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<sup>6</sup> Lieberman et al. (2007) use survey instruments to first construct the kinship index based on maternal perinatal association (MPA) and coresidence and then ask four different instruments related to sexual aversion to kin as well as kin altruism. They find evidence that humans direct altruism and sexual aversion to kin according to their kinship estimator.

and strength of third party punishment. The first experiment analysed by Fehr and Fischbacher (2004) is the dictator game which tests violations of a distribution norm and the second experiment used a prisoner's dilemma game to test violations of the cooperation norm. In both cases up to 60 % of third parties punished norm deviators and thus contributed to the formation and sustenance of social norms in the groups. Bernhard et al., (2006) is the only field experiment that used a third party punishment mechanism. They studied the punishing behaviour combined with a dictator game among two different tribes in Papua New Guinea and related punishments to in-group altruism or to out-group altruism. They found that third parties are more willing to punish dictators who violate the norms for sharing when the recipient is an in-group member (irrespective of the whether the dictator is an in- or out-group member). Also, transfers were higher when dictator and recipient were members of the same tribe but they also find altruism among different groups. An experiment with a similar aim and result has been carried out by Lieberman (2007) who finds that third parties punish someone who targets their own kin more severe than strangers and that in-group members are punished less severe. See also Goette et al., (2006) for a natural field experiment in the Swiss Army where fellow platoon members were more willing to enforce a norm of cooperation amongst them but without being hostile to out-group members. Lastly, to my knowledge only Charness et al., (2006) used a trust game in combination with a third party punishment mechanism. With third party punishment trust increases by 60% and also trustworthiness is significant but modestly increased by third party punishment.

### **3. Experimental Design**

In contrast to psychological experiments, economists adhere to an experimental method that uses repeated play, no deception, and most importantly monetary incentives<sup>7</sup> and anonymous interactions. That players need to be anonymous to each other in economic experiments has been one of the reasons for not yet using experimental methods to study behaviour among kin and friends. When both players have full information with whom they are paired with in an experimental session the results might rather relate to expected post-game punishments from the other person than experimental design<sup>8</sup>. It seems not very instructive to ask undergraduate

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<sup>7</sup> Another point criticized by Madsen et al. 2007 is that participants in the third party punishment and other games do not pay a personal cost since the player leaves the experiment with more money as when he arrived.

<sup>8</sup> Glaeser et al., (1999) conducted a trust game and prior to playing, they introduced the pairs of players and then asked how well and by what means they knew each other. They found that the level of investment by trusters increased with the degree of social connection between the players and argued that this was because of greater opportunities for post-play punishment.



students to bring along some of their family members to the next experimental session. So far, behaviour among kin has mainly been studied with field observation by anthropologists. However, in small scale societies or in rural villages like in southern Namibia and the Namaqualand of South Africa kinship ties are very prominent and the likelihood of having members of one's own kin in a pool of 30 randomly picked people is quite high. To explore the effect of kinship I ran nine sessions of a trust game with and without third party punishment in nine different villages and let participants prior to the game write on a form more than one and up to five members of their family and more than one and up to five friends that were also taking part in the same experimental session. When participants were making their decisions they were asked to state how they play the game for each possible category (family, friendship, unrelated). Since the matching of players was drawn randomly participants were informed that they could be paired with either one of their family member, friends or an unrelated villager. However, they could not know for sure with whom they were paired as people had to name at least two people for each category. Thus, the decision regarding kinship was not hypothetical but involved real money and the experiment was still anonymous as no one knew the composition of his pair.

I use the strategy method without immediate cash involved and a simple dyadic trust game. According to Solnick, (2007) the influence of different methods in a trust game was negligible. In the strategy method, subjects state contingent choices for every decision node they may face; then subjects are matched randomly; and, finally, the appropriate choices are carried out for the nodes that are reached, and the other contingent choices are ignored. Sequential games are those in which players make moves at different times or in turn. In this sequential-move trust game (Figure xx) the first player can decide to take a certain outcome [10,10] for both players by choosing "R" or he can choose "D" and let the second player determine the actual outcome. The second player can choose between "d" the symmetric joint maximum outcome [20,20] or "r" the defection outcome [5,30] where player two gets 30 ZAR and player one only 5 ZAR. In the non-strategy method players who move later in the game have full information about the actions of other players. Thus, Player 2 knows whether Player 1 played "D" or "R". In the experiment I applied the strategy method asking Player 2 what he would do if Player 1 decided to play "D". Thus while the first player has to look ahead to act now the second player is confronted with the question given that the first player played "D" what will I do? He has a moral decision whether to repay trust or not. In Figure xx

playing “D” by the first player is commonly referred to trust but also altruism or risk, while “d” measures second player’s trustworthiness or fairness.

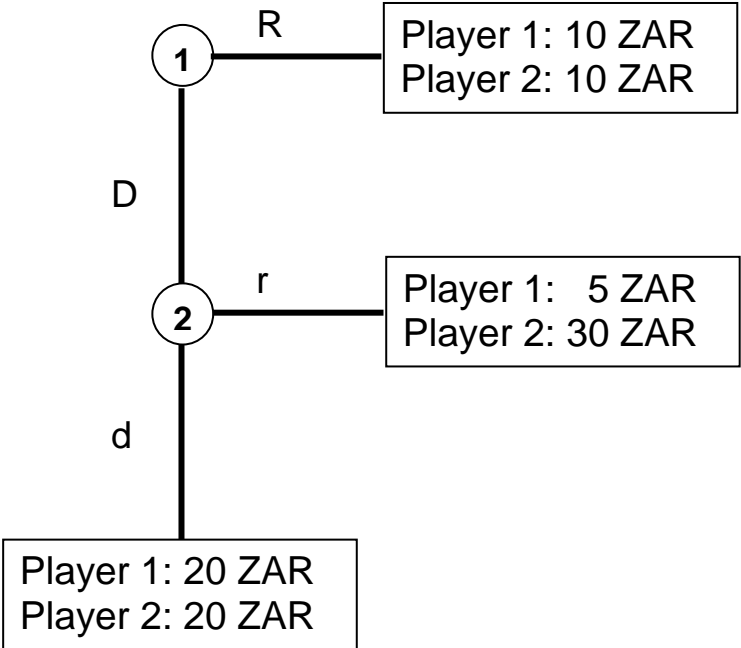


Figure 1 Decision tree used in the experiment.

In the scenario with third party punishment Player 3 receives 20 ZAR. Player 3 can keep his endowment or use his money to subtract money from Player 1 if she is playing “R” or from Player 2 if she is playing “r”. For every ZAR invested 5 ZAR are subtracted from the other player. Thus, if Player 3 wishes to punish Player 2 with 4 ZAR Player 2 receives 10 ZAR at the end of the game and Player 3 receives 16 ZAR. However, dissimilar to other studies I did not test whether a family member would punish his own family more or less severe but whether an uninvolved person would punish a norm deviating behaviour between two family members (not necessarily his own family), two friends (not necessarily his own friends) or two unrelated villagers as in small rural villages most encounters take place among family members and friends.

**3.1. Predictions**

The above mentioned theories lead to the following nine predictions that I can experimentally test to see which of the theories best organizes the data. The predictions in the baseline scenario follow from the individual profit maximizing strategy

- (i) Dominance or Backward induction: Since the defection outcome strictly dominates the co-operative outcome Player 1 knows that Player 2 will defect and

therefore he will choose also to defect. Thus, by applying backward reasoning one finds the subgame perfect equilibrium of the game as [10,10]. This is the outside option of Player 1.

- (ii) Nash equilibrium in mixed strategies: Besides the Nash equilibrium in pure strategies there exists a second Nash equilibrium in mixed strategy. A mixed strategy is a probability distribution over the pure strategies that might be played. With a probability of 1 Player 1 will play R and Player 2 will play r with a probability of 2/3 and d with a probability of 1/3. The second Nash equilibrium is not a subgame perfect equilibrium. This is because it violates the rules of backward induction, which hold that Player 1 would never choose D.

Thus, Player 1 should not cooperate according to the theoretical predictions. However, since Player 1 does not know with whom in the population she is paired and assuming there are different types of players it can be rational for Player 1 to play “D”. For example if Player 1 expects a high number of co-operators in the experiment he could expect player 2 to play “d” and thus also play “D”. Although the mixed strategy Nash equilibrium is not subgame perfect it makes sense in a situation where people are not fully anonymous but come from the same little village and share the same experiences and maybe have same expectations about the likelihood of co-operation. Introducing a third party punishment opportunity adds another uncertainty to players’ strategies. Not only do they build beliefs about their anonymous partners likelihood of co-operation but also how this is influenced by a third party that could punish at own costs.

- (iii) If player 1 and player 2 assume player 3 to be payoff maximizing both player 1 and player 2 should not change their behaviour and continue to play the dominant strategy R,r.

The following hypotheses are derived from kin selection theory:

- (iv) For trust and fairness among family members to be the baseline behaviour, family members should be treated with more trust and fairness than unrelated villagers.
- (v) Friends should be treated as unrelated villagers according to both kin selection theory and game theory. However, social capital literature argues that with

increasing network size and network strength co-operation will increase. Also the psychological literature suggests that close friendship activates processes similar to kinship and this might be especially true for women.

- (vi) It follows from prediction (iii) and (v) that if TPP and friendship have no effect on trust and fairness the combined effect of friendship and TPP or villager and TPP should also be insignificant to the baseline family treatment.
- (vii) For trust and fairness among family members to be the baseline behaviour, third party punishment should have (if at all) the smallest effect between family members. Since family members already behave more altruist than friends or villagers the expected change in behaviour should be smallest between family members.
- (viii) According to kin selection theory by Hamilton (1964) a gene for altruism can evolve if

$$rB > C$$

where B is benefit of the recipient and C the cost of the altruist and r the coefficient of relationship ( $r = 0.5$  for sibling or parent;  $r = 0.25$  for grandparent, aunt, uncle, niece or nephew and  $r = 0.125$  for cousins). Thus, participants with higher r should be more altruistic when playing with their family. This hypotheses is tested both for Player one and two since both actions have elements of altruism.

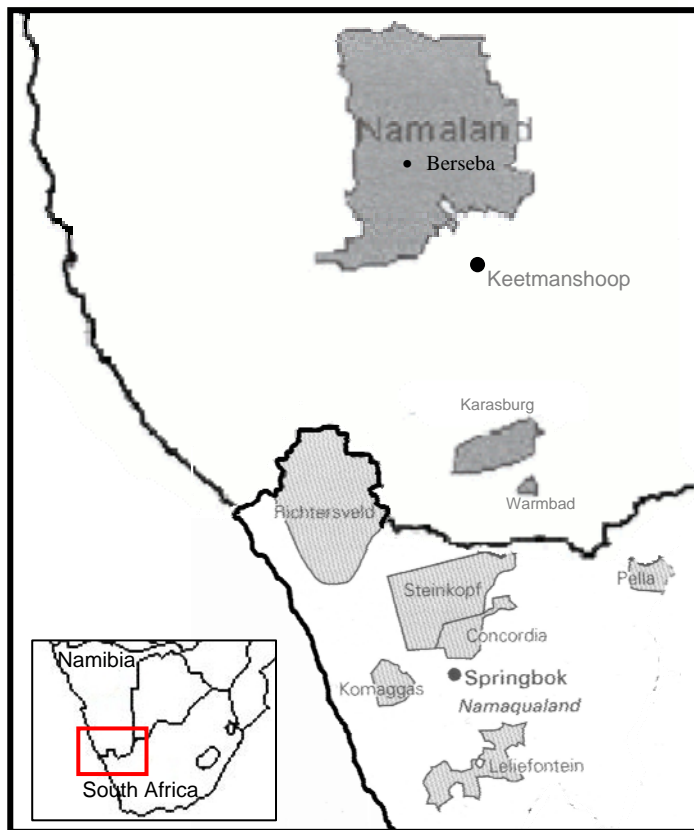
- (ix) Reciprocity is less important among kin than among nonkin. Playing cooperatively as player one although expecting player two to behave selfish should be higher for family than for friends and unrelated villagers. Similarly, the correlation between first player playing D and expectation that player 2 will play d should be higher for friends and villagers.

### **3.2. Experimental Implementation**

The experiments were carried out in two different regions that were during apartheid regime either a former homelands or so called “coloured reserves” where the non-white population lived: The Namaland in the Karas Region of southern Namibia where altogether 1235 households or roughly 5800 people live (Republic of Namibia, 2001). The Namaqualand in

South Africa at the border to the Namibian Karas region consisting of approximately 30000 people living in six former “rural reserves” or “coloured reserves” of Richtersveld, Steinkopf, Concordia, Komaggas, Pella, and Leliefontein (Figure 1). The trust games were played in 4 villages of the former Leliefontein reserve of the Kamiesberg municipality and in two villages of the Steinkopf area. A detailed statistics of the villages is presented in table xx. Especially in Namibia the experiment was mainly played with a younger population that have lower income but higher education.

Living in rural communities implies a high interdependence and the need of working together with other villagers. People therefore depend on others in various ways to accomplish their personal and organizational goals. In many similar societies, rights to use natural resources like fishing, grazing or forestry are held by communities, kinship groups, or individuals under a multiplicity of property-rights regimes. Where control and rules are not easily enforceable this interdependence and the resulting need for cooperation is solved (or not) through trust and evolved norms. But Nooteboom, (2002:195) notes that “*Often, trust based on friendship or kinship will not suffice as a basis for cooperation. It may not be sufficiently robust under extremes of temptation.*” Rohde et al., (2003) analyse the kinship ties in a small community of the research area in the Namaqualand. According to them relations of exchange are based on spatial patterns which are dominated by kinship and bonds between neighbours. The livelihood of the poorest depends strongly on the benevolence they get from these social networks. Altruism directed to members of the same kin thus is a widely practiced behaviour in the study region “through which individuals and families are able to withstand shocks and help each other expand limited livelihood opportunities” (ibid 38).



**Figure 2 Communal areas in Namibia and South Africa. communal area of Berseba and Tses lies within the Karas district of Namibia. The communal area of Leliefontein is part of the Kamiesberg municipality within the Northern Cape Province.**

The difficulty of the design was to determine people's kinship ties and friends. Asking people to identify their family and friends has two shortcomings according to Haan (2004): People think about family and friendship before the experiment which might already affect their behaviour in the experiment. Also, such questions are likely to yield socially acceptable answers, for example by inducing them to identify many more friends than they actually have. Regarding the first difficulty the participants were not confronted with family and friendship prior to the experiment only within the experiment, which is also exactly what people, should do when making their decisions<sup>9</sup>. The more severe second difficulty was handled by limiting the available friends with whom they might be paired to five friends. On average people reported to have 4,52 friends in the session and 2,51 family members. However, I use the total amount of friends people reported to have in the session as a control variable.

<sup>9</sup> Only a short welcome note (without saying, that they could earn some money) was read out before people had to fill in the form to identify their friends and family members.

The procedure of the experiment was the following. Participants were invited and recruited through various channels. Participants needed to be above 18 years of age. The invitation to participate was spread both through written notices at the local shops as well as through mouth to mouth propaganda. The experiments were played in community buildings of the municipality or at a similar place. The experiments were all pretested and run in Afrikaans. Upon arrival participants received a sheet to identify their friends and family members. When handing the finished form in players drew their player number (consisting of a number between 1 and 100 and a letter A, B, C) out of an opaque bag. Then the experimental instructions were read aloud to all participants and visualized on a (white) board by the same native speaker in all villages. Participants also received written instructions and had to answer a set of questions on the experiment. Thereafter, the participants were sent in a separate room one-by-one to. In the room the researcher first checked the answers to the quiz and made sure the participant understood all possible outcomes in the game. Then the participant was asked to make his decision according to his role and assuming he would be paired with either one of his family members [friends, other villager not identified on his sheet] that also did take part in the experiment and also what he expected the other persons to do. Participants were paid after the final round of the experiment according to a random matching of players and whether they were paired with one of their friends, family or not.

| Village        | Size        | Country | Treatment | N         | Earnings     | Quiz %    | Education   | Age         | Male (%)  | People knowing (%) | Friends (%) | Reported friends | Family      | Relatedness  |
|----------------|-------------|---------|-----------|-----------|--------------|-----------|-------------|-------------|-----------|--------------------|-------------|------------------|-------------|--------------|
| Kharkams       | 1291        | RSA     | TPP       | 26        | 15,88        | 75        | 7,31        | 38,5        | 50        | 80                 | 50          | 4,92             | 1,46        | ,245         |
| Tweerivier     | 207         | RSA     | TPP       | 28        | 14,04        | 82        | 9,62        | 29,2        | 61        | 98                 | 60          | 4,93             | 4,00        | ,235         |
| Soebatsfontein | 246         | RSA     | TPP       | 24        | 17,21        | 89        | 8,32        | 36,4        | 67        | 83                 | 37          | 4,38             | 3,17        | ,242         |
| Spoegrivier    | 460         | RSA     | TPP       | 27        | 19,07        | 96        | 7,96        | 39,4        | 70        | 90                 | 52          | 4,37             | 2,33        | ,225         |
| Bulletrap      | 357         | RSA     | No        | 22        | 13,41        | 79        | 8,33        | 33,3        | 36        | 97                 | 56          | 4,91             | 2,45        | ,256         |
| Steinkopf      | 7256        | RSA     | No        | 19        | 10,00        | 90        | 9,78        | 40,5        | 53        | 62                 | 34          | 4,84             | 1,32        | ,146         |
| Tses           | 904         | Namibia | TPP       | 27        | 14,56        | 91        | 9,63        | 30,2        | 41        | 65                 | 20          | 4,04             | 2,11        | ,279         |
| Keetmanshoop   | 15000       | Namibia | TPP       | 22        | 17,27        | 96        | 10,7        | 23,5        | 55        | 30                 | 13          | 3,36             | 1,59        | ,130         |
| Berseba        | 535         | Namibia | TPP       | 21        | 15,67        | 98        | 10,5        | 27,7        | 90        | 55                 | 26          | 4,95             | 3,95        | ,202         |
| <b>Average</b> | <b>2917</b> |         |           | <b>24</b> | <b>15,37</b> | <b>89</b> | <b>9,13</b> | <b>33,3</b> | <b>58</b> | <b>75</b>          | <b>40</b>   | <b>4,52</b>      | <b>2,51</b> | <b>0,227</b> |

Table 1 Descriptive Statistics from the experimental sample

|                 | Role | Villager           | Family             | Friends            |
|-----------------|------|--------------------|--------------------|--------------------|
| <b>Baseline</b> | A    | 2 sessions (n= 21) | 2 sessions (n= 14) | 2 sessions (n= 21) |
| <b>Baseline</b> | B    | 2 sessions (n= 19) | 2 sessions (n= 13) | 2 sessions (n= 19) |
| <b>TPP</b>      | A    | 7 sessions (n= 57) | 7 sessions (n= 41) | 7 sessions (n= 51) |
| <b>TPP</b>      | B    | 7 sessions (n= 55) | 7 sessions (n= 38) | 7 sessions (n= 54) |
| <b>TPP</b>      | C    | 7 sessions (n= 60) | 7 sessions (n= 60) | 7 sessions (n= 60) |

Table 2 Design for within and between subject study. All participants played either TPP or baseline without TPP treatment with a villager and according to availability also with family and/or friends.



## 4. Results

This experiment is also a follow-up experiment to a trust game using the money method played in the Namaqualand of South Africa and southern Namibia where participants exhibited unexpected low levels of trust sending only 27% of their endowment, 40% of people sending nothing at all and 25% sending half or more of their endowment of their 8 ZAR. Also, the return ratio with 0,71 was quite low in the initial experiment. Of those who obtained a positive amount from player one only 55% returned at least something 45% returned the same amount they received and 14% had a return ratio equal or greater than 1.5 meaning that they evenly distributed the money among themselves. I argue elsewhere (Vollan, forthcoming) that the reason for this unusual behaviour has to do with weak local institutions undermining trust, past external interventions, as well as heuristics that activate cultural norms among the Nama. The new experiment using the strategy method replicates the first trust game results quite well. In the baseline treatment without third party punishment and no family and friendship connection only 29% of people choose the trusting option “D” and 27% of all possible second players choose the trustworthy option “d” to split the money equally among them<sup>10</sup>.

### 4.1. Kinship and third party punishment

Concerning predictions (i) and (ii) the results are quite common indicating that people do not adhere to game theoretical predictions but a substantial portion of players applies norms of equal sharing or has an inequity aversion (Figure 3 left). Also, game theoretical prediction (iii) does not hold. Introducing TPP option increases trust and fairness to the baseline scenario. A test of between subjects study including all choices regardless whether it was among family friends or villagers reveals a significant effect of the TPP-treatment for trust ( $n=226$ ;  $Z = -3.4$ ;  $p<.01$ ) and fairness ( $n=198$ ;  $Z = -2.1$ ;  $p<.05$ ). However, an isolated view between subjects who played in TPP with a villager and subjects who played in baseline with a villager reveals that the increase in fairness due to TPP is not significant ( $Z = -.79$ ;  $p=.5$ ) only the change in trust ( $Z = -1.9$ ;  $p<.1$ ) is weak significant (Figure 3; right). Between subjects who played TPP with their friends and subjects who played baseline with their friends there is a significant change in trust ( $Z = -1.8$ ;  $p<.1$ ) and fairness ( $Z = -1.8$ ;  $p<.1$ ).

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<sup>10</sup> By only allowing a binary choice in the strategy method the frequency of “D” correlates strongly with the average amount sent and those players who sent or returned 50% of their money. By only offering a binary choice the option “d” is used less often than people would send at the same amount back but more often than equal sharing in the money method.

However, between subjects who played TPP with their family member and subjects who played baseline with their family member there is no significant increase in trust ( $Z = -1.0$ ;  $p=.31$ ) or fairness ( $Z = -1.1$ ;  $p=.28$ ) due to the TPP treatment. At least the reported significances between subjects for family should be treated carefully due to few people assigned in the baseline scenario ( $n=13$  respectively  $n=14$ )<sup>11</sup>. However, one can say that the effect of TPP is higher for trust than fairness and highest among friends.

Prediction (iv) and (v) can be analysed with a within subject design testing whether individuals discriminating for family or friendship increases trust and fairness significant (Figure 4). A within subject comparison shows that people exhibit significantly more trust with their family members (or friends) ( $Z = -2.9$ ;  $p<.01$ ) ( $Z = -3.9$ ;  $p<.01$ ) and more fairness with their family members (or friends) ( $Z = -2.2$ ;  $p<.05$ ) ( $Z = -3.7$ ;  $p<.01$ ) than with another villager. Thus, prediction (iv) is satisfied for the total sample. Differentiating between the TPP and baseline treatment in the within subject design one obtains the frequencies displayed in figure 4 and 5 as well as its statistical significance reported in table xx. First players exhibit statistically more trust when playing with a family member than with a unrelated villager both in the baseline as well as in the TPP treatment. Second players' fairness towards family members is only significantly higher in the baseline scenario. Prediction (iv) holds for the first player in both treatments.

Prediction (v) tests the differences between family members and friendship. By looking at the frequencies in figure 4 and 5 one can see that more people treat their family members with trust and fairness than people treat their friends with trust and fairness. In the baseline treatment both trust ( $64\% > 52\%$ ) and fairness ( $46\% > 37\%$ ) are played more often among family members than among friends and in the TPP treatment trust ( $78\% > 75\%$ ) and fairness ( $63\% > 61\%$ ) are both played more often with family members than with friends. Thus, also the difference of family to friends is narrowing due to the TPP prediction (v) seems satisfied. However, none of the differences between family friends are significant. Participants do not treat family members different to their friends in terms of trust and fairness both in the baseline and in the TPP scenario (see table xx). There are also no differences between family

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<sup>11</sup> For interpretation of significance one should bear in mind that: Since the results match the first experiment quite well and recruiting was very difficult, there was fewer sessions played with the baseline treatment than the TPP. There were also less people who reported to have family members than friends in each session. The lower cases for family and no TPP however, aggravate the requirements for statistical significance for between subjects testing. Thus, although absolute numbers might be higher than with friendship they are not statistical significant.

and friendship for trust ( $Z = -.57$ ;  $p=.5$ ) and fairness ( $Z = -.24$ ;  $p=.8$ ) in the total sample. Thus, one cannot reject the hypothesis that people treat their friends different than their family members. There are also no gender specific effects for first players ( $Z = -.54$ ;  $p=.6$ ) and second players ( $Z = -.76$ ;  $p=.5$ ) that female participants treat their friends more like family members than men.

Prediction (vi) looks whether family members are treated with more trust and fairness in the baseline scenario than villagers or friends with TPP. The frequency of playing trustful with a villager in the TPP treatment is lower (53%) than playing with a family member in the baseline treatment (64%). Similarly, the frequency of playing fair with a villager in the TPP treatment is lower (36%) than playing with a family member in the baseline treatment (46%). However, in the between subject design kinship effects are not statistically higher than the combined effects of villager and TPP for the first player ( $Z = -.78$ ;  $p=.4$ ) and the second player ( $Z = -.64$ ;  $p=.5$ ). Unlike, the villagers TPP treatment, the combined effects of friendship and TPP is higher for the first player (75% > 64%) and the second player (61% > 46%). These effects are however for the first player ( $Z = -.75$ ;  $p=.5$ ) and the second player ( $Z = -.97$ ;  $p=.3$ ) not statistical significant.

Prediction (vii) asks whether the effect of third party punishments is lowest for family members. For the second player the increase in percentages is highest among friends (39%) followed by villagers (27%) and indeed family members (26%). This difference becomes much greater by looking at the change of player one. Here, villagers increase their contribution due to TPP by 45 %, friends by 31 % and family members by only 18 %. Thus prediction (vii) holds. Furthermore, it is interesting to see that the increase in trust by villagers due to TPP is not accompanied by equally high increases in trustworthiness. It might be that due to the low expectations and unusual custom of being punished in the rural communities of Namibia and South Africa no stable expectations concerning punishment could be build.

Prediction (viii) is a direct test of Hamilton's rule. Since I use a within-subject design that automatically controls for individual socio-demographic differences in the treatments I simply uses the correlation coefficient of Pearson and find that player A is significantly playing more trustful when his family members have a higher average relatedness factor  $r$  (Pearson= .227;  $p<.1$ ) or a higher total relatedness factor of Hamilton's  $r$  (Pearson = .271;  $p<.05$ ). Similar as prediction (iv) and (vii) prediction (viii) also only holds for the first player. The effect for the

second player who applies the fairness norm is not related to Hamilton's relatedness coefficient. Average  $r$  is (Pearson = .062;  $p=.6$ ) and total  $r$  (Pearson = .046;  $p=.7$ ). Hamilton's rule is defined for altruism and a trust game is said to measure trust with the first player and fairness for the second player. However, in the past, researchers have argued that the amount sent by the first player in a trust game to a large degree includes altruistic motives. When asked after the experiment very few first players expected to increase their stake by sending an amount to player two<sup>12</sup>. In the first trust game played in the same study area only by 19 % of the first players who sent a positive amount to player two did that for calculative reason of trust (Vollan, forthcoming). Also, (Johansson-Stenman et al., 2006) find that religious believes and altruistic motives helping seem to activate trust much more than do calculative aspects. Usually, experiments that aim at measuring altruism use the dictator game where the first player receives 100 monetary token and can keep them or send any amount to the second player who has no choice but accepting the offer. Thus, in contrast to the first player in the trust game the first player in the dictator game will not get anything returned and thus does not expect anything in return. Cox (2003), for example, finds that dictators sent between 61 and 97 percent of the amounts transferred by equally endowed trust-game players. If the design does not grant perfect anonymity and subjects know that their counterparts are drawn from the same village it could be that altruist motives play a much larger role in a trust game than do reciprocal motives. Also, Barr (2003) finds that the first player increases his contribution in traditional villages with higher family concentration whereas the trustee does not send more money back in these villages. Thus, it seems not too surprising to see that only the first mover choice in the family treatment follows Hamilton's rule for altruism. The reason is that field experiments on trust do measure altruism instead of calculative trust. The motives of the second player do at least in the two trust games played in the study area not refer to altruism.

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<sup>12</sup> Brülhart and Usunier, (2004) Not only do people not expect any returns, they are also right in not expecting any returns. Camerer (2003, p. 87) summarizes his review on trust games that: "The fact that the return to trust is around zero seems fairly robust."

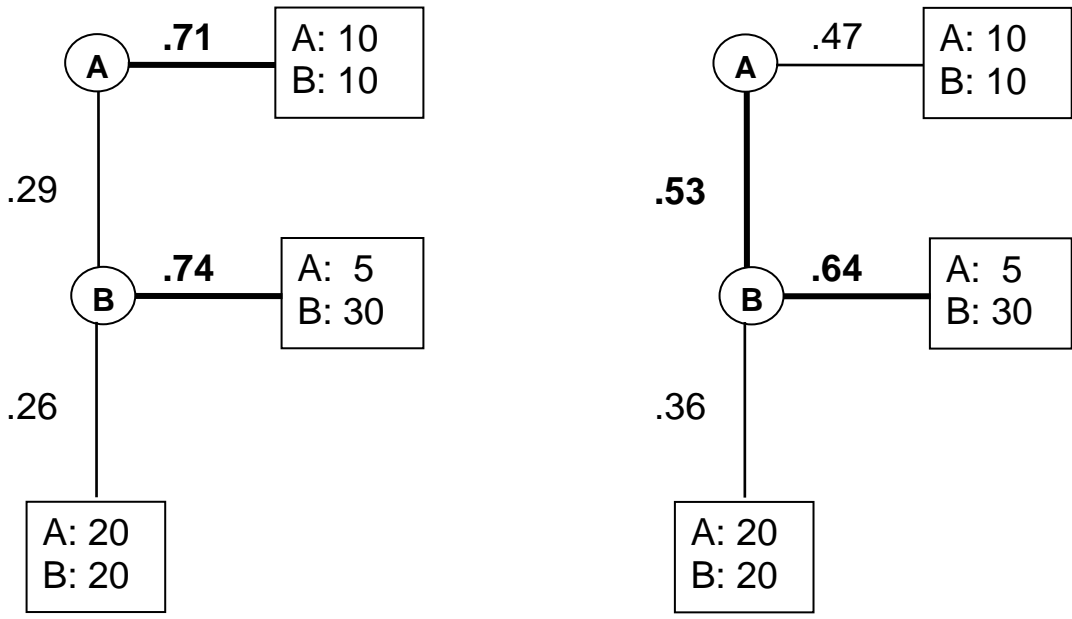


Figure 3 Frequencies of strategies played the trust game with a villager without (left) and with (right) third party punishment option.

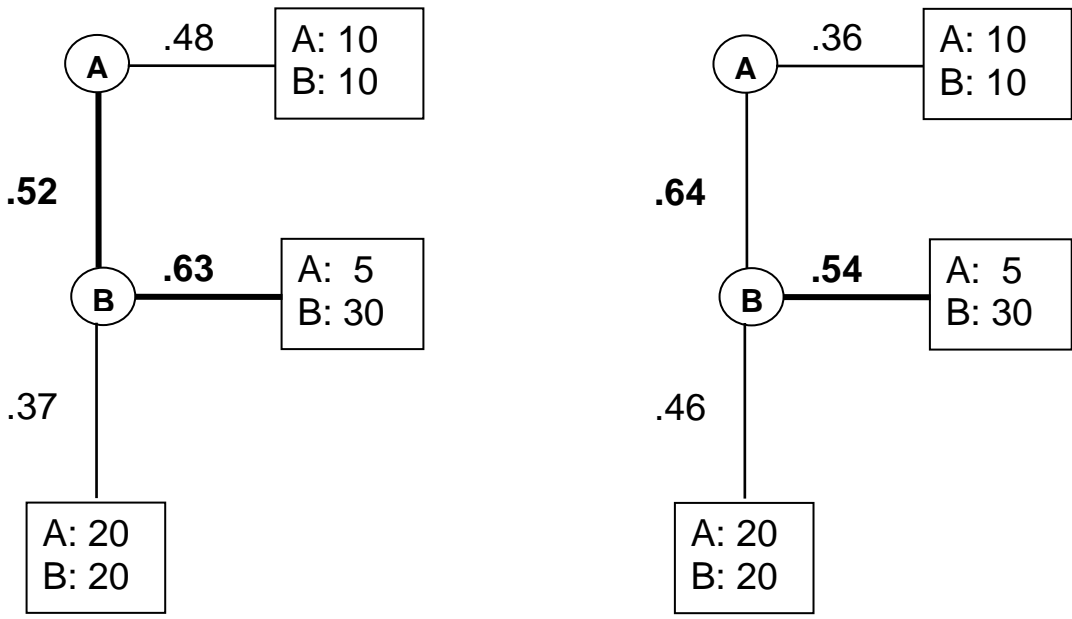


Figure 4 Frequencies of strategies played the trust game with a friend (left) or a family member (right) but without punishment option.

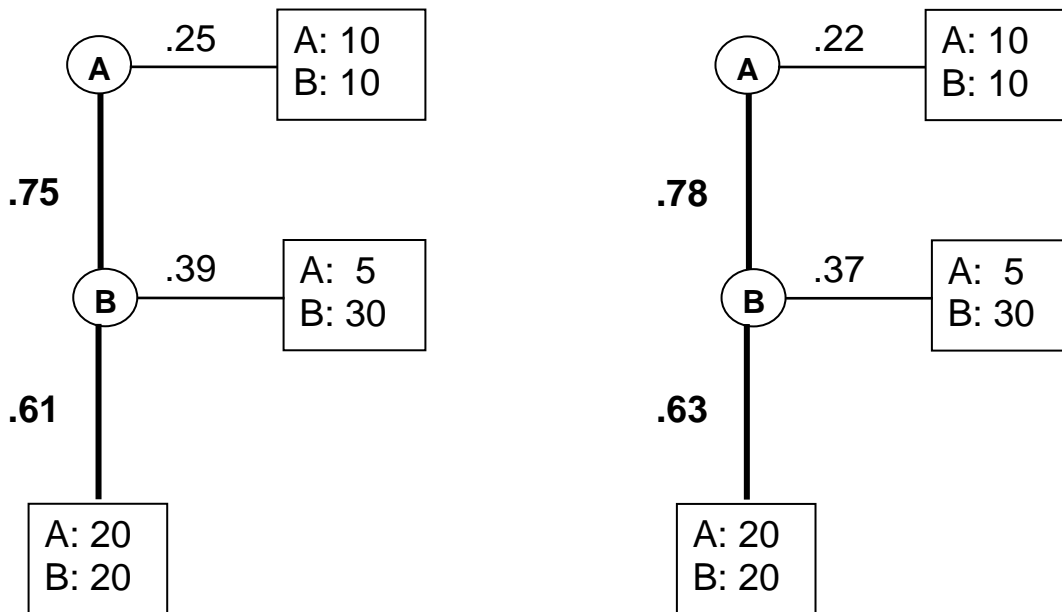


Figure 5 Frequencies of strategies played the trust game with a friend (left) or a family member (right) and with punishment option.

| Treatment | Player A       |                |               | Player B       |                |               |
|-----------|----------------|----------------|---------------|----------------|----------------|---------------|
|           | village-family | village-friend | friend-family | village-family | village-friend | friend-family |
| Baseline  | -2.000*        | -2.236*        | -1.000        | -1.000         | -1.000         | -.577         |
| TPP       | -2.324*        | -3.207**       | .000          | -2.000*        | -3.742**       | -.535         |

Table 3 Wilcoxon Signed Ranks Test for paired sample (Z-value and sig.level).

From observation of family members and the psychological literature we would expect prediction (ix) that actions among family members will be less based on calculative self-interest and more on altruistic giving without expecting any returns. For example we expect that a father does help his daughter without expecting that the daughter will return a similar favour to the father. People's expectation of trust and trustworthiness among friends, family members and villagers were also asked during the experiment. But, is expectation of reciprocity higher that a family member or a friend will be trustworthy? And does the expected reciprocity lead to a change in behaviour. A correlation between what Player one did and what he expected player two to do should be highly correlating with each other if one expects player one to be rational. The Spearman correlation coefficient is highest among friends (Spearman = .79,  $p < .01$ ) than villagers (Spearman = .61,  $p < .01$ ) and family members (Spearman = .60,  $p < .01$ ). In the baseline scenario which has no reinforcing expectations through punishment and thus uncertainty is higher there is a huge difference between the coefficient for friends (Spearman = .83,  $p < .01$ ), villagers (Spearman = .88,  $p < .01$ ) and family members (Spearman = .44,  $p = .11$ ). Thus without other treatment the expectation of player one that player two would play fair had no significant impact on his behaviour. In 50% of the cases player one expected player two to be fair however 64% of first players nevertheless

played “D”. In the village scenario 24% of first players expected player two to be fair and only 29% of the first players played “D”. Thus, the results are not surprising in the light of prediction (viii) of Hamilton’s rule of altruism. Trust among unrelated people corresponds to expected trustworthiness (Barr 2003). Also Nooteboom (2002:48) uses a definition of trust that is based on expectations of trustworthiness. For him “‘Real’ trust is an expectation that things or people will not fail us [...] even if there are perceived opportunities and incentives for it”. The role of expectations for trust is declining when playing with a family member as a fraction of first players seem to behave altruistic without necessarily expecting reciprocity.

#### **4.2. Third party punishing behaviour**

In the TPP treatment player who were assigned role C were endowed with 20 ZAR and could use any amount of their money to punish Player A when he was not trusting respectively Player B when he was not equally sharing the money<sup>13</sup>. For one ZAR invested into punishment the punished player got 5 ZAR subtracted. Since I used the strategy method player C was asked how he would punish a transaction between two friends, two family members and two unrelated villagers. Figure xx and xx show the amount invested by the third party player when punishing player one and player two. Deviations from the fairness norm were punished more often and more severe than when player one was not exhibiting trust. On average player C punished deviations from a fairness norm between two friends [family; villager] with 1,2 ZAR [0,87 ZAR; 0,77 ZAR] and with a frequency of 53 % of all cases [45 %; 38 %]. A non-trusting behaviour between two friends [family; villager] was punished on average with 0,38 ZAR [0,3 ZAR; 0,13 ZAR] and with a frequency of 24 % [20 %; 10 %]. The effects that third party punishers punished encounters between friends more often is significant for the fairness norm when compared with family members ( $Z = -3.03$ ;  $p < .01$ ) and a villager ( $Z = -3.25$ ;  $p < .01$ ). The difference between family members and villagers is not significant ( $Z = -.53$ ;  $p = .59$ ). However, punishing non altruist or non trusting acts there are no difference between friends and family members ( $Z = -1.23$ ;  $p = .2$ ). Thus, altruistic behaviour is as much punished between family members as among friends but adhering to the fairness norm of equally sharing is much more frequent punished among friends than family members. Deviating from the norm of altruism is significantly stronger enforced among friends than among villagers ( $Z = -3.21$ ;  $p < .01$ ) and also between family members compared to villagers ( $Z = -2.35$ ;  $p < .05$ ). However, compared with the laboratory setting of Fehr and Fischbacher

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<sup>13</sup> I deliberately omitted the possibility of antisocial punishment. However, see Herrmann et al., (2008) for recent evidence on the existence of antisocial punishment.

(2004) where 60 % of third parties punished norm deviating behaviour and Bernhard et al. (2006) where 58 % of third parties punished norm deviating behaviour if the dictator transferred nothing, enforcement of third parties in this study much less frequent. This could be due to peculiarities of the studied population or the difference between a trust and the dictator game.

The motivation for the chosen punishment design was to test whether people would feel it more inappropriate to deviate from a norm if the two players do not know each other or between two people who know each other. The punisher could find it either more necessary to enforce a norm within the village or between two family members or two friends who are not his own family members or friends. From the data and the reaction of players, people tended to punish other strongest when they were friends and when they deviated from the fairness norm. Thus, since punishing people has a strong emotional component<sup>14</sup> people punished friends where one of them failed to allocate an equal share to another friend the most. As people easily refer to a common understanding of friendship treating someone's friend badly does activate the need for punishing the most. Contrarily, people did not punish unfair encounters between families as often as unfair encounters between friends which might entail the fact that rural villages consist of many family disputes that are known to most people but the solution of the conflicts is private and does not concern others. Although family members seem to get less punished as third parties feel to interfere in private encounters they get equally likely punished when not exhibiting trust/altruism. Again, this underlines that player ones action is perceived to involve altruism and thus leads to a stronger reaction among kinship.

Although family members exhibited more trust and more fairness among each other this is not due to a higher likelihood of being punished or a higher fear of norm enforcement. Indeed, second players who choose option "r" expected a punishment more often when they free-rided on another friend (28,6 %) than on a family member (14,3 %). The same was true for first player who did not trust their friend and played "R". 15,4 % of the participants feared a punishment when they did not trust their friends compared to 11,1 % of the participants who feared a punishment when they did not trust their family member. There seems to be an inherent human motivation to act altruistic towards family members whereas friendship ties

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<sup>14</sup> Costly punishment might itself be used to express negative emotions, recognizing that human demand for emotion expression can have significant behavioural consequences in social environments including families, (Xiao and Houser, 2008)



that refer to similar norms are more fragile and only combined with TPP reach similar result as within families. It seems that this is anticipated by people as they punish norm deviating behaviour among friends more often.

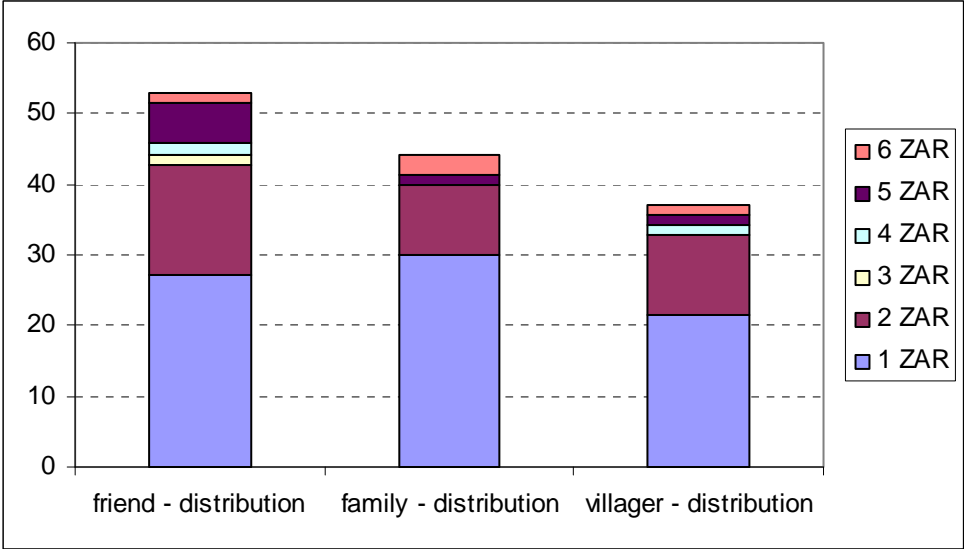


Figure 6 Amount of punishment spent by third parties for deviation of fairness norm.

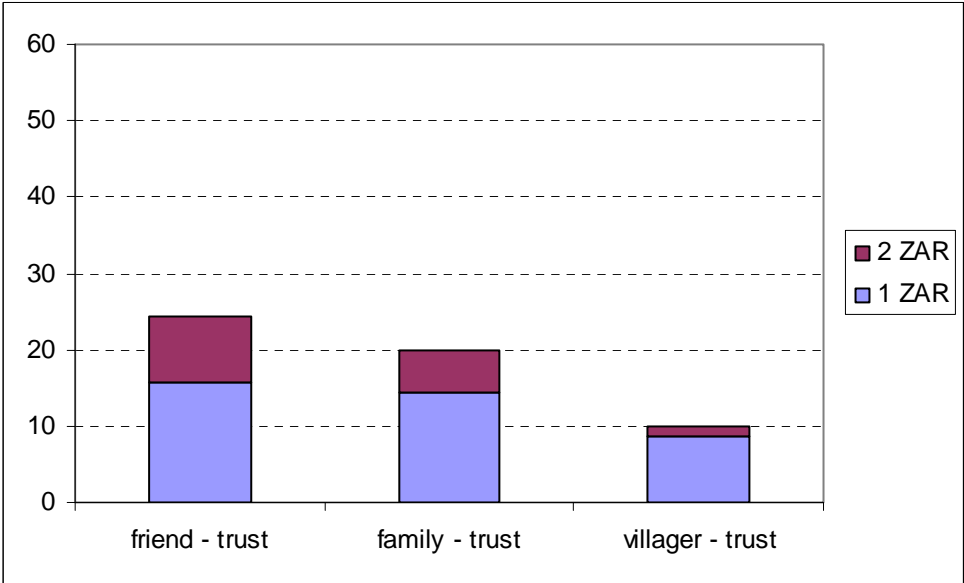


Figure 7 Amount of punishment spent by third parties for deviation of trust/altruism norm.

### 5. Concluding remarks

The field experiments carried out in rural communities of Namibia and South Africa aimed at testing several hypotheses derived from the kin selection theory and strong reciprocity hypothesis. In this paper I analysed the relative strength of trust/altruism and fairness due to kinship and third party punishment. As some authors have argued, player one’s contributions

in the trust game refer to a large degree to altruism since also the predictions from kin selection theory seem to be appropriate for the first player.

I found that people treated their family members with more trust and more fairness although their actions were less enforced through third parties and that was also expected by family members. Family members played more trusting even though they did not as often expect a reciprocal fair behaviour. Moreover family members exhibited more trust the closer the average and total relatedness of their kin in the experiment was thus the propositions from kin selection theory and especially Hamilton's rule were accurate. The results for friendship were almost as good as for family members but it seemed that their outcome relied more on TPP and reciprocity than on altruism. However, a personal exchange among friends that has a third party observer performs better than a personal exchange among family members without third party punishment. Contributions to family members can substantially be increased by third party punishment and so human ability to sustain a norm by punishing free-riders at personal costs could also have played an important role in sustaining co-operation among kin. As each theory can explain co-operation within groups, generalizations that ignore or deny the value of any one model may be ambiguous. It remains a task for future empirical or theoretical studies to analyse the evolutionary origins of co-operation.

I drew on a proposition of Madsen et al. (2007) who wrote that norms are only proxies for kinship (and not an independent influencing factor distinct from kinship) and humans use Hamilton's rule as baseline behaviour that is coloured by other ethical considerations and that humans use affection, cohabitation or norms as proxies for kinship. Based on that proposition I derived hypotheses and tested them with the within and between subject design. It turns out that kinship is the baseline behaviour when no other features are available to humans and people refer to Hamilton's rule of relatedness when they have the possibility. However, people also make use of the norm of altruistic punishment and the enforcement of that norm significantly changes behaviour of people who know they are paired with a family member. Thus, norms are a distinct factor independent from kinship and norms are also applied in family settings.

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