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**Working Paper Series**

Working Paper No. 2005–1

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Posted on March 21, 2005

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# Cruel to be Kind: Effects of Sanctions and Third-Party Enforcers on Generosity in Papua New Guinea

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Perhaps nowhere in the world is the norm of generosity more pronounced than in Melanesia. Whereas purchase, via either money or barter, tends to be the dominant mode of resource acquisition in much of the world, apart from self-generated production, the generosity norm, manifested primarily through gift-giving, operates to provide people in most Melanesian societies with many of their resource needs (Sillitoe 1998). In some cases, the generosity norm dictates obligatory exchanges necessitated by ceremonial occasions that are highly structured in form and value; in others, the exchanges[1] are unsolicited and variable with respect to time, place and value. Regardless of form, Sillitoe (1998) argues that the norms of generosity and gift-giving are so pervasive and intrinsic to the basic social, political and economic structure of Melanesian society, that individual acts of 'gift-giving' should instead be referred to as 'socio-political exchange.'

The origin and maintenance of generosity norms is, however, problematic. In neoclassical economics, the central discipline concerned with understanding the basis of resource exchange, individuals are expected to be hyper-rational, having knowledge of not only their own preferences ('utility functions') but those of all others with whom they interact (Young 1998). Moreover, given this knowledge, individuals are expected to exhibit exchange strategies that are utility-maximizing for themselves, that is, those strategies that maximize the individual's personal payoff (Kreps 1990). Indeed, the notion that people exhibit 'self-regarding selfishness' (Tracer 2003), underlies the fundamental concept of the 'Nash Equilibrium' in game theory – that the optimal solution to any 'game' (n-person exchange situation) is reached when all participants are playing a strategy such that no individual can further increase his or her payoff by changing it unilaterally (Camerer 2003). The notion that exchanges are n-person games in which each person selfishly attempts to maximize payoffs at the expense of others, would seem, at face value, to preclude the idea that individuals would ever behave according to a norm of generosity -- providing for others, either in solicited or unsolicited fashion, at a cost to themselves.

Apart from economics, the discipline of anthropology is also concerned with the establishment and maintenance of social norms and for anthropology, the existence of the generosity norm is no less problematic. In place of the Nash Equilibrium, rigorous anthropological models of behavior are based on the concept of the Evolutionarily Stable Strategy (ESS), a strategy that, given that it is dominant in an ecology, cannot be supplanted by an invading alternative strategy (Maynard Smith 1982). The modeling of pro-social behaviors has shown that cooperation (as well as altruism and generosity) can be sustained as an ESS if groups are strongly kin based and thus, individuals have a high coefficient of relatedness ("kin selection" models) (Hamilton 1964) or where repeated interactions are likely ("reciprocal altruism" models) (Trivers 1971, Axelrod and Hamilton 1981). An alternative model of cooperation as an form of

[1] The term 'exchange' is used here to apply both to bidirectional exchanges and to gift-giving which may be unidirectional, at least in the short-term.

signaling that, by virtue of its costliness, is honest and thus serves as an indicator of worth as a mate or partner in future interactions has also recently been shown to be potentially evolutionarily stable under certain conditions (Gintis et al. 2001). Fehr and Gächter (2002), maintain that none of these explanations can fully explain the pervasiveness of human beneficence since it is seen to occur in situations involving unrelated individuals, where individuals are unlikely to meet repeatedly, or where signaling or reputation effects are negligible. While the former two situations clearly occur, it is unclear under what conditions reputation effects may be negligible. Nonetheless, the evolution and maintenance of a generosity norm remains not fully explained according to many of the dominant models employed within anthropology.

One other possible explanation for the evolution and maintenance of a generosity norm in human groups is that violators of the norm are sufficiently sanctioned or punished for non-compliance to the extent that it becomes more costly for individuals to violate the norm than to adhere to it[2]. Costly punishment itself may evolve because of a combination of benefits conferred on enforcers by their willingness to engage in an honest and costly signal of their preference for fairness coupled with reputational effects they accrue as an individual who will neither be cheated nor take a “sucker’s payoff” without retribution. The hypothesis that generosity norms are maintained by sanctions and enforcers is consistent with the neoclassical economic and evolutionary propositions that individuals are self-interested utility maximizers whose basic nature is to be non-cooperative whenever possible.[3] It also leads to the testable prediction that in cases where sanctions or enforcers are absent or the punishments imposed for norm violation are sufficiently small such that they do not offset the advantages of behaving non-cooperatively, individuals are expected to defect from the cooperative strategy.

In order to test the proposition that generosity is maintained by sanctions and punishments, a series of economic experiments was carried out in a remote region of Papua New Guinea, an area that like other parts of Melanesia has a pervasive and strong generosity norm. The series of experiments consisted of: (1) the Dictator Game, an experiment that tests for individuals’ propensities to be altruistic and in which individuals cannot be sanctioned for behaving selfishly, (2) a Strategy Method Ultimatum Game, in which one member of a bargaining dyad may be punished by the other member of the dyad, albeit at a cost to the punisher, for behaving in the game in a manner reckoned as being unfair, and (3) a Third-Party Punishment Game, in which a third-party “enforcer” may punish (at a cost to himself) a member of a

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[2] Conversely, a generosity norm could also be sustained by providing sufficient rewards to its adherents so that the benefits of complying outweigh its costs. In the current study, only the effects of sanctions and punishments in the case of non-compliance are examined and discussed. It would be relatively easy, however, to design a test of the complementary “rewards” hypothesis.

[3] It does not matter for the purposes of this hypothesis whether individuals seek to maximize utility in an absolute fashion or relative to others in their social group, only that they are self-interested. In either case, the expectations hold that individuals will seek to defect from cooperation in the absence of norm enforcement and will adhere to the norm in the presence of sanctions and enforcers. However, see Tracer, 2004 for a discussion of “absolute” or “self-regarding” maximization versus “relative” or “other-regarding” maximization.

dyad for dividing a sum between herself and the other member of the dyad in a manner perceived by the "enforcer" to be unfair. According to the notion that individuals are basically selfish and the hypothesis that the generosity norm is maintained by sanctions and enforcers, it is expected that individuals will behave more selfishly in the Dictator Game than in either of the two games in which punishment for non-cooperation is possible. In addition, the hypothesis that adherence to a generosity norm is perpetuated by enforcing sanctions and punishments implies that there must exist a corollary norm that dictates that individuals able to punish non-cooperators should in fact do so. The propensity of people to punish those perceived as behaving selfishly is also examined in this study using the Ultimatum and Third-Party Punishment games. Finally, data from previous economic experiments carried out in Papua New Guinea (Tracer 2004) and elsewhere (Eckel and Grossman 1998, Ensminger 2004, Henrich et al. 2001) suggest that demographic variables such as gender as well as measures of market integration including wealth and income may exert a direct influence on offer amounts. Consequently, effects of a roster of proxy measures of market integration and personal and household wealth on offer amounts are investigated here as well.

## Ethnographic Background

The experiments reported here were conducted among the Au people of Papua New Guinea, a group among whom the first author has been working for 16 years. The name 'Au' refers to the principal language spoken in the region by approximately 10,000 inhabitants of roughly 50 villages ranging in size from fewer than 100 to almost 500 individuals with mean village size approximately 280 persons. The dictator and ultimatum games were carried out in Weis, a village of 300 and the third-party punishment game in Wulukum, a village of 350 people. The former village is quite remote, being roughly 5 hours by foot from the nearest Mission Station (the site of the largest market as well as the central airstrip in the area) while the latter is only 1.5 hours and is more integrated into the social and economic life that is centered around the Mission Station. All individuals in these villages, as in most of contemporary Papua New Guinea, also speak Neo-Melanesian ('*Tok Pisin*') the *lingua franca* of the country.

The area of study is located at 3 degrees 30 minutes south of the equator, roughly 50 kilometers inland from the northern coast of Papua New Guinea. It is hot, wet and humid lowland tropical rainforest. Although there is one dirt track into the area from the mid-sized coastal town of Wewak, the overland route takes roughly 11 hours in a four-wheel drive vehicle over terrain that is frequently blocked by fallen trees and brush or flooded and impassable. Transport to the area is therefore usually conducted by light plane into a grass airstrip at the Yangkok Mission Station.

The Au are 'forager-horticulturalists' subsisting primarily on starch extracted from semi-wild stands of sago palm supplemented by tubers, fruits, leaves and nuts collected from the rainforest or grown in small gardens prepared using slash-and-burn techniques. They also hunt wild game, the most common

prey items being small marsupial mammals such as bandicoot and phalanger ('cus-cus') with large animals such as wild pigs being taken much less commonly. Husbandry of pigs and chickens is also practiced but these are considered prestige items and are seldom consumed except on ceremonial occasions. The Au also construct gardens specifically for small scale cash-cropping of coffee, cocoa, and, most recently, vanilla. Despite the availability of at least some income through cash-cropping and to a lesser degree, employment by local missionaries and government agencies, the area occupied by the Au has long been known as one of the poorest in Papua New Guinea with rampant chronic under nutrition, high infant and toddler mortality, and an average life expectancy at birth of only 43 years for males and one year less for females (Sturt 1972, Tracer et al. 1998).

Despite living in an environment characterized by a chronic scarcity of resources, Au society, like other Melanesian societies, revolves around an elaborate system of obligatory and non-obligatory exchange relationships. Moreover, within the context of these exchange relationships, a premium is placed upon generosity. For example, when a woman is betrothed to a man in another village, for a period of time, she initially continues dwelling primarily in her natal village but visits her husband's village periodically for several days at a time to work with his female kin. This period is essentially a "trial period" during which much union dissolution takes place. However, after it is deemed that she is a good fit for her future husband and works well with his female kin, a portion of the bride price is paid and a "sending ceremony" in which the bride formally leaves her natal village and is accompanied by a procession of villagers to that of her husband. Along with the bride, her village sends gifts to the husband's village consisting at minimum of betel nut, sago starch, leaves traditionally used as plates and coconuts. While no specific amount of these items is specified, her natal village is supposed to be as generous as possible in their gift-giving and, in addition to the aforementioned items, it is not altogether uncommon for the gifts to include additional items including store bought commodities such as rice and canned meat or fish. A parcel of gifts perceived to be less than adequate for the occasion may result in a dispute that if not resolved promptly may turn violent. A successful pig kill is another occasion in which both obligatory and voluntary exchanges occur and generosity is valued. According to traditional Au values, a hunter is barred from consuming any part of his own pig kill and must instead distribute shares to his and his wife's kin. Other villagers may be given shares at the discretion of the hunter or may specifically request to be given a share. As in the previous example, the hunter is expected to be generous in dolling out pig meat, and individuals who perceive themselves to be slighted by receiving smaller-than-expected shares or none at all, may retaliate against the hunter with a verbal assault or physical violence. In the 1998 field season, an alleged violation of the meat sharing norm resulted in severe physical

violence against the wife of the offending party[4]. Following the physical violence, ostracism continued and by one year later, the man and his wife were forced to flee his village and take up residence in the wife's natal village.

Apart from exchanges in the formal contexts of rites of passage and hunts, generosity is also emphasized in day-to-day relationships. Individuals who need specific items often make requests of other villagers (and sometimes people outside the village) for those items and the individuals of whom requests are made are expected to oblige. In 1989, my wife made a traditional *taanik* or string bag for a prominent elder in the village in which we lived. He was quite proud to possess a bag woven by an American woman and carried it virtually everywhere. When I returned several years later, I noticed that the man no longer carried the bag. When I inquired what became of it, fully expecting to be told it had ripped, he instead informed me that a distant relative from another village has passed through, seen the bag, and asked for it. "What could I do," continued the elder, "I was obligated to give it to him." While low value items such as betel nut and tobacco are by far the most common items requested, higher value items such as meat, string bags, clothing, metal tools and the like are also sometimes requested. It is perhaps for this reason that the Au tend to be discreet about their possessions and not talk about them too much. While the right to request and the obligation to give are ubiquitous norms recognized by the Au, it is also recognized that the right to request is one that must not be abused. Individuals who are viewed to make too many frivolous requests may be shunned or ostracized.

Unsolicited gift-giving is also an important part of Au village life. The giving of an unsolicited gift generates prestige for the giver and incurs a debt for the recipient. Although the debt is not explicit and is not required to be paid back in kind, by accepting the gift, the recipient implicitly acknowledges an alliance relationship with the giver and is expected to reciprocate in the future if asked for help. Help may be sought in such contexts as hunting, house building, or in disputes. Thus, as noted by Sahlins (1972) generosity may act to place such severe constraints on others that, as an Inuit proverb says, "'[g]ifts make slaves'" (1972:133). As such, among the Au, unsolicited gifts are sometimes rejected by potential recipients who may not want to enter into situations where they either perceive their debt to be unmanageably large or fear forming an alliance with someone with undesirable qualities, such as a person seen as overly belligerent. An ultimatum game conducted by Tracer (2003) in the villages of Anguganak and Bogasip produced results that seemed to reflect both a valuation of the norm of generosity and fear of overly large unsolicited gifts, as recipients rejected both very low offers (≤20% of the stakes) and hyper-fair offers (>50% of the stakes) more than 50% of the time.

**Methods**

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[4] It was contended that the new wife of the hunter had convinced him to give her family a larger stake of the kill at the expense of his own extended family.

The Dictator and Ultimatum games were carried out at Weis Village and the Third-Party Punishment game at Wulukum Village. Scripts explaining the games were prepared in Neo-Melanesian by the first author and back translated into English by Mr. Sakawi Meku of Anguganak Village. Some minor adjustments to the script were made during the back-translation process.

The first and third authors arrived at the villages one day prior to the scheduled game day in order to announce that a research project would be conducted the following day. It was explained that the project involved playing something akin to game but was in fact research. It was further explained that participation in the research was completely voluntary and that participating individuals would be compensated for their time with a show-up fee of 2 kina and the potential to earn an additional payoff. Individuals were also told that should they choose to participate, they should be prepared to remain at the research site all day as the project was fairly time consuming. To avoid further discussion among participants and the possibility of collusion, no details of the games were given during the prior day's announcement.

The Dictator and Ultimatum Games were conducted at Weis Village using 30 pairs of subjects on a single day over the course of approximately 13 hours. The stake for each game was 10 kina, a mid-level single day's wage for unskilled labor[5]. The games were conducted in a secluded room that normally serves as a birthing chamber under one of the village houses. Prior to entering the room, an interview was conducted with each participant during which basic demographic data as well as information on wealth, income, and proxy measures of market integration were collected. A list of the collected variables is given in Table 1, however only a subset of these is used in the present analyses. After individuals entered the room, they were given their show-up fee of 2 kina and the standardized script was used to explain each game to them. In addition, during the explanation ten one kina coins lined up on a cloth were manipulated and used to illustrate the options open to the proposers and recipients in the games. Following the explanation of each game, participants were given the option to ask any questions that they may have about it. A testing period then commenced during which individuals were presented with different scenarios of offer amounts and, for the ultimatum game, acceptance or rejection of those offers and were asked to identify the amount that the proposer and recipient would take home in each instance. Individuals who incorrectly answered test questions were given additional questions to answer. The number of test questions given varied from 5 to 12 with a mean number of 6.9 in the Dictator game and 6.0 in the Ultimatum game.

The Dictator game was conducted first among all 30 pairs of participants followed by the Ultimatum game. Participants kept the same role in both games (i.e., as either proposers or recipients)

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[5] However given that very few of the participants engaged in wage labor of any kind, the ten kina stake was highly valued.

however they understood that they would be paired up with different people playing the opposite role in each of the two games. Payoffs to the participants were disbursed at the end of the entire 13 hour day of game play. Because the game day lasted longer than expected, exit interviews during which persons were asked why they played the game as they did and whether they had any other comments about the game was administered to a sample of 12 players.

The Third-Party Punishment game was played at Wulukum Village during a single day lasting approximately 10 hours. The game was played with an allotment of 10 kina to the proposer and recipient and 5 kina to the punisher. In contrast to the previous games and owing to the complexity of the Third-Party Punishment Game, an initial explanation of the game using a prepared back-translated script was done among the participants as a group. Members of the group were asked not to comment on the game nor ask any questions during this group explanation. Following the group explanation, the game was conducted in a secluded structure used as a small church. Prior to entering the structure, an interview was again conducted with each participant to collect basic demographic data as well as information on wealth, income, and proxy measures of market integration. As individuals entered the structure to play, they were paid a 2 kina show-up fee, and the game was explained to them a second time. They were then given the opportunity to ask clarifying questions followed by a period of testing. The average number of test questions administered was 10.1. In total, 30 proposers, 30 punishers, and 25 recipients participated in the experiment. Five recipients were thus given two offers at the end of the game. This is not at all problematic since it is proposers and punishers who are active “decision-makers” in the Third-Party Punishment Game. Recipients are essentially “inert” participants who are merely awarded their endowments at the end of the game on the basis of the actions of proposers with whom they are paired.

## Results

### Sex, Age and Household Size

The sex distribution of the samples at Weis and Wulukum are shown in Figure 1. The sample used for the Dictator and Ultimatum Games at Weis (n=60) was 95% male and 5% female. The Wulukum sample (n=85) for the Third-Party Punishment Game was 74% male and 26% female. Although it was announced that both males and females could and indeed were encouraged to participate, the males of both villages dominated the sample.

Age could be definitively assessed for only 28% of the sample (n=17) at Weis and 71% of the sample (n=60) at Wulukum. Mean age of the participants at Weis was 36.2 years and at Wulukum was 38.4 years. The difference between the villages was not significant (two-tailed t-test, p=.51). Age is omitted as a variable in all further analyses since its inclusion would significantly reduce sample sizes.

Figure 2 shows the distribution of household size compared between the Weis and Wulukum samples. Household size at Weis ranged from 1 to 11 persons with a mean of 5.4 persons. At Wulukum,

household size ranged from 1 to 10 persons with a mean of 5.6. The difference between villages was not significant (two-tailed t-test, p=.20). The most common household structure at both villages consisted of the game player, a spouse and their dependent offspring.

Educational Attainment, Religious Attendance and Fluency in the National Language

Figure 3 shows the distribution of educational attainment, in years, compared between the Weis and Wulukum samples. The focal points of 0 and 6 years reflect the fact that in Papua New Guinea, many parents choose not to send their children to school but among those who do, primary schooling proceeds until grade six. Overall, the Wulukum sample is slightly better educated than the Weis sample, with an average of 3.7 versus 2.6 years of schooling. The difference however does not quite reach the level of statistical significance (two-tailed t-test, p=.06).

Figure 4 shows the frequency of attendance (times per month) at Christian church services at the two villages. Each village has several bush material churches located in several hamlets of the village, however Wulukum is an active center for the "Christian Revival" sect in Papua New Guinea and also has a large church made of sawn timber with a corrugated sheet metal roof. One can easily get the impression from being in the two villages, that religious life is much more central at Wulukum than it is at Weis. Indeed, as shown in figure 2, the percent of the sample never attending church services is much higher at Weis than Wulukum (83% versus 39%) and none of the sample at Weis attended services twice per week whereas 55% of the sample at Wulukum did. Overall, the mean monthly frequency of attendance at religious services was significantly different between the villages with a frequency of 0.4 at Weis and 4.6 at Wulukum (two-tailed t-test, p<.0001).

The official national language of Papua New Guinea is English, however, most local (and sometimes, national) discourse within the country in carried out in the *lingua franca*, Neo-Melanesian and nation-wide, only a small proportion of the populace is fluent in English. As shown in Figure 5, Weis, 80.4% of the sample reported no proficiency in English, while 17.6% reported some. At Wulukum, 62.4% of the sample reported no knowledge of English, while the remaining 37.6% reported some. The greater proficiency in the national language at Wulukum compared to Weis is undoubtedly a product of their higher educational attainment as most English is learned in community schools. In addition, the greater proximity of Wulukum to the Mission Station with its predominantly English-speaking missionaries may also contribute to the greater reported knowledge of at least some English in that village. It is worth noting, however, that in neither village can communication with villagers be accomplished solely in English.

Income, Wealth, and Indices of Market Integration

Individual annual income in the two villages, converted from PNG kina to US dollars, is shown in Figure 6. For most Au people, income is derived from the proceeds of selling cocoa and to a much lesser

extent, home produce. Income in the total sample ranged from $0 to just over $1200 with a mean of $41. A full 57.5% of the total sample reported no cash income whatsoever in the preceding year. Again, being closer to the Mission Station and airstrip, the people of Wulukum have a greater opportunity for commerce than those at Weis and this is reflected in the extreme difference in average individual income between the villages. Mean reported income at Weis was 2.98 dollars versus 80.25 dollars at Wulukum (two-tailed t-test, $p=.001$).

Household wealth, mostly derived from animal holdings (predominantly pigs and chickens) and land wealth, is shown in Figure 7. It ranged from $0 to $377 with a mean of $73.83. Household wealth did not differ significantly between the two villages. It is worth noting that household wealth was estimated in part based on the amount of land reported by participants to be currently under cultivation either for subsistence crops or cash crops. This method gives a very conservative figure for wealth as virtually all households possess much more land than they have under cultivation at any one time. In addition, since land is never sold, its contribution to wealth is derived from the crops produced on it rather than from the land itself. Although chronic under nutrition is extremely prevalent in the area, this is caused entirely by the high carbohydrate, low protein composition of the diet, rather than by food restriction. Indeed, it is exceedingly rare to hear anyone in the area complain of hunger. Food (especially the dietary staple, sago starch) is plentiful and among the majority of people who subsist on a traditional rather than store derived diet, household wealth per se does not contribute to differences in nutritional status.

Game Outcomes

Figure 8 shows the amounts offered by proposers in the Dictator and Ultimatum Games at Weis and in the Third-Party Punishment Game at Wulukum. Although it was predicted that the lack of a capacity to reject offers in the dictator game should lead to lower offers on average than in the ultimatum game, in fact the figure shows that the modal offer in both games was exactly 50% of the stakes. The distribution of offers in the dictator game is, however, slightly skewed towards lower offers such that the mean offer in the dictator game is 40% and in the ultimatum game is 44%. This difference in mean offers is significant ($p<.0001$).

The threat of punishment by a third party might be expected to coerce proposers to be fair if not overly generous in their offers, especially if the threat is believed to be credible. As shown in figure 8, this was obviously not the case at Wulukum. In contrast to the previous two games where the modal offer was 50%, the modal offer in the Third-Party Punishment Game was 30%. Moreover the distribution of offers in the game was such that the mean offer was 32.7% of the stakes, lower again than in the previous two games.

Figure 9 shows the frequency with which recipients in the Ultimatum Game and punishers in the Third-Party Punishment Game said they would reject and punish, respectively, each specific offer. The distribution of rejections in the ultimatum game is not monotonic but instead is highest at 67% rejection of offers of 0% of the stakes and falls gradually to 0% rejection of 50% of the stakes. The frequency of rejection then begins to rise slowly among the "hyperfair" offers, with a rejection of 3% of offers of 60%, rejection of 10% of offers of 70% and 80%, rejection of 17% of offers of 90%, and 33% rejection of offers of 100% of the stakes. Using the distribution of rejections, a "minimum acceptable offer" (MinAO), the lowest amount below 50% of the stakes acceptable to a recipient, and a "maximum acceptable offer" (MaxAO), the highest amount above 50% of the stakes acceptable to a recipient, was computed for each player. The average MinAO for the total sample of recipients was 20% of the stakes, and the average MaxAO was 93% of the stakes. The dark line in figure 9 shows expected payoffs to proposers given the amount of their offer and the likelihood that that offer will be accepted or rejected. It shows that the income maximizing offer in this sample is 20% of the stakes, much less than the overly generous 50% that in fact occurs with highest frequency.

Given that recipients in the Ultimatum Game tend to reject both low and hyperfair offers, it is instructive to examine whether third party enforcers punish proposers of both low and hyperfair offers. Figure 8 shows that this is in fact not the case. For offers of 0% to 40%, third party punishers are actually willing to punish at higher frequencies in the Third-Party Punishment Game than recipients are to reject in the Ultimatum Game. For example, while offers of 0% in the Ultimatum Game are rejected 67% of the time, proposers of 0% in the Third-Party Punishment Game are punished 80% of the time. Even at offers of 40%, third-party enforcers are willing to punish 7% more frequently than recipients in the Ultimatum Game reject such offers. As in the Ultimatum Game, punishment in the Third Party Punishment Game falls to 0% for offers of 50% of the stakes. Interestingly, and in contrast to the Ultimatum Game results, however, the frequency of punishment does not rise again thereafter, but remains at 0% for all hyperfair offers. The grey line in figure 9 shows expected payoffs to proposers given the amount of their offer and the likelihood that enforcers would punish such offers. It shows that the income maximizing offer is 0% of the stakes with offers of 50% yielding just slightly lower payoffs. The actual modal offer of 30% yields on average approximately 12-14% lower payoffs than either of the two income maximizing offers.

Demographic and Market-related Correlates of Offers

Tables 2 through 6 present the results of a series of multiple linear regression models examining predictors of offers in the three games as well as the minimum acceptable offer (i.e., the minimum offer not rejected) in the ultimatum game and its analogue in the third-party punishment game, the lowest offer not punished. Predictor variables include gender, educational attainment, individual income, household wealth, household size, frequency of church attendance and proficiency in the national language.

Significant effects of predictor variables are seen primarily for ultimatum game offers (table 3) and minimum acceptable offer in the ultimatum game (table 4). In the case of ultimatum offers, frequency of church attendance exerts a significant negative effect and proficiency in English exerts a positive effect. The adjusted r-squared for the final model, 16.7%, is, however, relatively small. For the minimum acceptable offer in the ultimatum game, both higher educational attainment and larger household size are significantly associated with lower acceptable offers. Again however, the adjusted r-squared for the final model, 16.6%, is small.

Qualitative Perspectives

Statements made by the game participants within the context of 12 post-game interviews and *ad libitum* remarks and questions during the game provide insights into the reasons that some individuals acted as they did during the game.

The strategic nature of several proposers' decision-making processes is illustrated by a question that recurred a number of times during the explanation of the Ultimatum and Third-Party Punishment games. These participants asked if they could make an initial offer and have a subsequent opportunity to add to it later should the other party decide to reject or punish. This question suggests that at least some proposers were in fact making strategic decisions about striking a balance between maximizing their own payoffs and preventing rejection or possibly, simply about not offending the other player with whom they were paired.

Another theme emerged recurrently in the Ultimatum Game among recipients who rejected high offers. These individuals consistently expressed an aversion or fear of accepting high offers though none could articulate exactly why: "it's not good for me to take too much from someone" and "ten kina is too much to accept from someone." These sentiments are very similar to those expressed in a previous Ultimatum Game study in the Au village of Anguganak and one neighboring Gnau village (Tracer 2004).

Several participants who said they would not reject any offer in the Ultimatum Game or punish any offer in the Third-Party Punishment Game were asked why they were willing to accept low offers or even an offer of nothing at all. Several themes recurrent themes emerged in response. One involved ceding control of the situation for the sake of keeping the peace because the other player was perceived to have been placed in the role of decision-maker: "he was the decision-maker, so I'll take what I'm given," "I don't like disputes so I'll let him do whatever and I would have no hard feelings, that was his choice to make," and "I am just agreeable, I don't like anger and fights." Another response that occurred several times expressed concern for the plight of the proposer: "it's alright, maybe he really needs it and has some work he has to do with it" and "it's not good, it's not a good split, but I don't care, he probably has a reason." Perhaps the most interesting, if not amusing, occurrence happened with a proposer in the Ultimatum Game. After finishing the explanation of the game, testing and being satisfied that the player

understood the game, he then proceeded to make the following offer: "I'd like to offer the second person 4 kina, keep 4 kina for myself, and give you 2 kina for setting up the deal between us. It's a little 'thank you' to you." After thanking him but explaining that I could not take any money in the game, he offered the recipient 50% of the stakes.

## Discussion

Results from previous cross-cultural research (Henrich et al. 2001) suggested that degree of market integration, and to a lesser extent, wealth and income, may exert a direct effect on offer amounts in several economic games. In the present study, neither household wealth nor personal income was correlated with offer amounts in the dictator, ultimatum and third-party punishment games. It must be noted however that the degree of variability in market integration measures among participants residing in the same village is exceedingly low. By contrast, there is somewhat more variability among individuals in family size, commitment to church attendance, and knowledge of spoken English. Moreover, of these, church attendance and knowledge of at least some English, may be better (or at least, more common, given the remoteness of the area) indicators of the diffusion of at least some "western" norms and values into the area than income or wealth. Indeed, these variables were related to offer amounts in the ultimatum game, albeit in different directions – frequency of church attendance exerting an inverse effect and more knowledge of English exerting a positive one. Animal wealth and land in cultivation were not related to offer amounts. In one of our previous studies (Tracer 2004) participants from the relatively wealthier and more market-integrated Anguganak village tended to offer slightly more in the ultimatum game than their poorer, less market-integrated counterparts at Bogasip village. The difference between mean offers was however not significant. Like that study, the present research suggests that some indices of market integration, or perhaps more accurately, "western" influence are associated with higher offers, but overall the association is fairly weak.

The modal offer amount was 50% of the stakes in both the dictator and ultimatum games conducted at Weis village. The lack of an ability by recipients to sanction by rejecting offers in the dictator game has usually been found to result in lower offers than are seen in the ultimatum game (Camerer and Fehr 2004). Although the modes were equal, in the present study, offers in the dictator game were more right skewed (i.e., toward lower offers) than in the ultimatum game so that the mean offer in the dictator game was approximately 4% less than in the ultimatum game. This difference was statistically significant.

In the ultimatum game, the income maximizing offer, the best strategy given prevailing rates of rejection was computed to be 20%, that is, 30% lower than the actual modal offer. In is possible that the prevailing generosity norm evident in everyday life among the Au is at play also in game behavior. It is

also possible that given the strong generosity norm and extremely close social fabric of Au villages, individuals are more averse to the risk of rejection than they are concerned with maximizing payoffs.

The threat of punishment by a third party enforcer in the third-party punishment game might have been expected to result in greater generosity and a higher modal offer than in either of the previous two games. This was, however, not the case. The modal offer in the third-party punishment game was 30% compared to 50% in the other games. One possible explanation for this result might be the recent experimental finding by Fehr and Rockenbach (2003) indicating that the threat of punishment (compared to a reliance on trust) actually has the effect of reducing cooperation. An alternative explanation is that the introduction of fining into the dictator game, produces a "crowding out" effect (Bohnet et al. 2001, Frey 1993); essentially reducing the intrinsic motivation of player 1s to be "fair" and shifting their attention to concerns an extrinsic fining authority. Expecting a fine to reduce their payoff by 3/5s, player 1s are induced to keep a larger amount of the stakes for themselves. Finally, however, because the third-party punishment game was carried out at Wulukum and the other games at Weis, village effects on game play cannot be ruled out as the cause of lower offers in the third-party punishment game.

In our previous experimental work in Papua New Guinea (Tracer 2003, 2004), we reported a remarkable pattern of rejections in the Ultimatum Game seen nowhere else in the world. In that research, ultimatum game participants in 2 villages (n=55 pairs) were seen to reject both low offers and, incredibly, hyper-fair offers just over one-third of the time. Low offers were seen as unfair and hyper-fair offers seemed to provoke a fear response. Large unsolicited gifts, which individuals sometimes refuse to accept, provoke a similar response among individuals in everyday life and we interpreted the game response as a translation of the familiar "everyday life" reaction to the new and unfamiliar circumstance of the economic game. The pattern of rejections seen in the previous ultimatum game study was replicated in the present one. Rejection is highest, at 67%, among offers of 0% of the stakes and falls to 0% among offers of 50%. It then rises again, albeit slowly, among "hyper-fair" offers to a rejection rate of 3% of offers of 60% , 10% of offers of 70% and 80%, 17% of offers of 90%, and a remarkable 33% of offers of 100% of the stakes. Moreover, our qualitative results confirm that the primary emotion involved in the rejection of high offers was fear – likely fear of indebtedness.

We tested to see whether the pattern of punishment in the third-party punishment game would follow the pattern of rejection in the ultimatum game. In particular, we were interested, first, in whether third party enforcers would punish proposers who made low offers at similar frequencies to rejecters in the ultimatum game, and secondly, whether enforcers would punish those making "hyper-fair" offers. Our results indicate that punishers are willing to punish low offers at frequencies that are higher on average than the rate of rejection among ultimatum recipients. Similar to the pattern observed in the ultimatum game, the rate of punishment fell to 0 among offers of 50%, but in contrast to it, it remained at

that level thereafter – that is, third-party enforcers punish violators of the generosity norm but do not punish individuals who are overly generous. Instead, it appears that generosity is always favored, and people leave it to the discretion of those directly involved in the exchange whether they choose to accept or reject the offer and the level of indebtedness that may be implied by it.

Overall, our results suggest that there is a strong generosity norm that prevails among the Au as in other Melanesian societies. The norm seems to persist even in the absence of sanctions for its violation (as in the dictator game) though the threat of sanctions (in the ultimatum game) does seem to raise the mean level of generosity modestly. However, rather than bolstering prosocial behavior, our work suggests that the introduction of third-party enforcers may actually sabotage it. Finally, like our previous work (Tracer 2003), this study again suggests the utility of experimental economic methods, especially when used in tandem with ethnography, for understanding the basis and persistence of human social norms.

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## References

Axelrod, R. and Hamilton, W.D.
1981 The Evolution of Cooperation. Science 211:1390-1396.

Bohnet, I., Frey, B.S., and S. Huck
2001 More Order with Less Law: On Contract Enforcement, Trust and Crowding. American Political Science Review 95:131-144.

Camerer, C.F.
2003 Behavioral Game Theory: Experiments in Strategic Interaction. Princeton: Princeton University Press.

Camerer, C.F. and Fehr, E.
2004 Measuring Social Norms and Preferences Using Experimental Games: A Guide for Social Scientists. *In* Foundations of Human Sociality: Economic Experiments and Ethnographic Evidence from Fifteen Small-Scale Societies. J. Henrich, R. Boyd, S. Bowles, C. Camerer, E. Fehr, and H. Gintis (eds.). Pp. 55-95. Oxford: Oxford University Press.

Eckel, C.C. and Grossman, P.J.
1998 Are Women Less Selfish than Men?: Evidence from Dictator Experiments. Economic Journal 108: 726-736.

Ensminger, J.
2004 Market Integration and Fairness: Evidence from Ultimatum, Dictator, and Public Goods Experiments in East Africa. *In* Foundations of Human Sociality: Economic Experiments and Ethnographic Evidence from Fifteen Small-Scale Societies. J. Henrich, R. Boyd, S. Bowles, C. Camerer, E.Fehr, and H. Gintis (eds.). Pp. 356-381. Oxford: Oxford University Press.

Fehr, E., and Gächter, S.
2002 Altruistic Punishment in Humans. Nature 415:137-140.

Fehr, E., and Rockenbach, B.
2003 Detrimental Effects of Sanctions on Human Altruism. Nature 422:137-140.

Frey, B.S.
1993 Does Monitoring Increase Work Effort? The Rivalry with Trust and Loyalty. Economic Inquiry 31:663-670.

Gintis, H., Smith, E.A., and Bowles, S.
2001 Costly Signaling and Cooperation. Journal of Theoretical Biology 213:103-119.

Hamilton, W.D.
1964 The Genetical Evolution of Social Behavior. Journal of Theoretical Biology 7:1-52.

Henrich, J., Boyd, R., Bowles, S., Camerer, C., Gintis, H., McElreath, R., and Fehr, E.
2001 In Search of Homo Economicus: Experiments in 15 Small-scale Societies. American Economic Review 91:73-79.

Kreps, D.M.
1990 Game Theory and Economic Modelling. Oxford: Oxford University Press.

Maynard Smith, J.
1982 Evolution and the Theory of Games. Cambridge: Cambridge University Press.

Sahlins, M.
1972 Stone Age Economics. New York: Aldine Publishing Company.

Sillitoe, P.
1998 An Introduction to the Anthropology of Melanesia: Culture and Tradition. Cambridge: Cambridge University Press.

Sturt, R.J.
1972 Infant and Toddler Mortality in the Sepik. Papua New Guinea Medical Journal 4:215-220.

Tracer, D.P.
2003 Selfishness and Fairness in Economic and Evolutionary Perspective: An Experimental Economic Study in Papua New Guinea. Current Anthropology 44:432-438.

Tracer, D.P.
2004 Market Integration, Reciprocity and Fairness in Rural Papua New Guinea: Results from a Two-village Ultimatum Game Study. *In* Foundations of Human Sociality: Economic Experiments and Ethnographic Evidence from Fifteen Small-Scale Societies. J. Henrich, R. Boyd, S. Bowles, C. Camerer, E.Fehr, and H. Gintis (eds.). Pp. 232-259. Oxford: Oxford University Press.

Tracer, D.P., Sturt, R.J., Sturt, A., and Braithwaite, L.M.
1998. Two Decade Trends in Birth Weight and Early Childhood Growth in Papua New Guinea. American Journal of Human Biology 10:483-493.

Trivers, R.
1971 The Evolution of Reciprocal Altruism. Quarterly Review of Biology 46:35-57.

Young, H.P.
1998 Individual Strategy and Social Structure: An Evolutionary Theory of Institutions. Princeton: Princeton University Press.

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