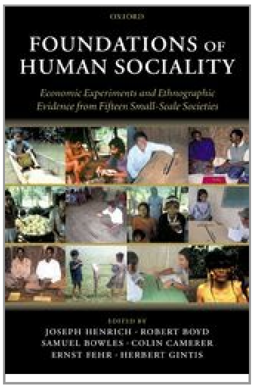

Foundations of Human Sociality: Economic Experiments and Ethnographic Evidence from Fifteen Small-Scale Societies

Joseph Henrich, Robert Boyd, Samuel Bowles, Colin Camerer, Ernst Fehr, and Herbert Gintis

Print publication date: 2004
Print ISBN-13: 9780199262052
Published to Oxford Scholarship Online: January 2005
DOI: 10.1093/0199262055.001.0001

Community Structure, Mobility, and the Strength of Norms in an African Society: The Sangu of Tanzania

Richard McElreath

DOI:10.1093/0199262055.003.0011

[–] Abstract and Keywords

Ultimatum Game results are presented from an African society, the Sangu of the Usangu Plains southwest Tanzania, with substantial internal economic variation. The study involved two communities: a more sedentary and stable community of farmers from the agricultural areas of Utengule, and a more mobile and compositionally fluid community of agro-pastoralists (individuals who sometimes farm but also derive a substantial amount of their income from livestock) from Ukwaheri. The Utengule community exhibited more rejections in the Ultimatum Game than the Ukwaheri community, although the two communities exhibited no differences in the distributions of offers made in the game, implying that they share an idealized norm for sharing (‘dividing equally’), but differ in their willingness or perception of the need to punish norm violations. Individual variables such as age and differences in the nature and duration (stability and longevity) of relationships among the two groups may explain some of the difference in offers and willingness to reject; an evaluation is also made of the possibility that differences in risk-aversion may account for the differences in rejection rates. A method for describing and comparing the rejection rates of different populations is presented, and problems caused by the structure of the Ultimatum Game in the interpretation of data like these are discussed.

Keywords: age, agro-pastoral community, internal economic variation, offers, punishment of norm violations, rejections, risk-aversion, sangu, sedentary agricultural community, sharing, stability of relationships, tanzania, ultimatum Game

Introduction

Both ethnographic and experimental evidence suggest that a significant number of individuals in many, and probably most, human communities have a tendency to punish individuals who violate local norms, often at a substantial cost to themselves and even when the norm violations do not directly cost the punisher anything (Boyd and Richerson 1985, 1992). The first of these lines of evidence is the widespread observation (typically ethnographic or anecdotal) of 'moralistic' punishment, wherein third parties punish violators of social rules. Another, line of evidence has emerged in experimental economics, where human behavior in several economic 'games' has generated unexpected and seemingly irrational results (see Kagel and Roth 1995).

The Ultimatum Game has been a favorite among these games, and the chapters in this volume indicate that the 'non-rational' game behavior is generally cross-cultural, although some societies do approach the standard definition of 'rational' choice. The Ultimatum Game involves an anonymous first player (*proposer*) who splits a pool of money any way she chooses, followed by an anonymous receiving individual (*responder*) who decides whether to accept her portion of the split, giving the remainder to the first player, or to reject the split, giving both herself and the first player none of the pool of money. The classic prediction is that the rational proposer should offer the lowest nonzero amount possible while the responder should always accept any offer greater than zero. However, not only do proposers commonly offer more than the lowest unit of money (mean offers are usually slightly below 50 percent in **(p.336)** industrialized settings), but responders sometimes reject low offers (Ultimatum Game data chapters here). To explain these results, some researchers (Bolton and Zwick 1995; Camerer and Thaler 1995; Roth 1995; Konow 1996) have suggested these offers and rejections constitute evidence that humans may have an innate taste for punishment and sense of fairness.

The results in this volume strongly suggest that any such taste is tuned by other factors. The next challenge is to discover which group and individual variables predict these variations in bargaining behavior. One source of relevant models is those developed by evolutionary ecologists and social scientists interested in the problem of cooperation. These models (e.g Axelrod 1984; Boyd and Richerson 1992) have explored how reciprocity and punishment can evolve and stabilize pro-social norms, and such models suggest again and again that stable, long-lasting relationships are important for the emergence and maintenance of both cooperative relationships and punishment (although see Henrich and Boyd 2001), which in turn can stabilize cooperation or any number of norm equilibria.

In this chapter, I present Ultimatum Game results from an African society with substantial internal economic variation. Among the Sangu of southwest Tanzania, a more sedentary and stable community of farmers exhibited more rejections in the Ultimatum Game than a more mobile and compositionally fluid community of agro-pastoralists (individuals who sometimes farm but also derive a substantial amount of their income from livestock). These communities exhibited no differences in the distributions of offers, implying that they share an idealized norm for sharing or, as they said, 'dividing equally', but differ in their willingness or perception of the need to punish norm violations. I examine how individual variables like age and differences in the nature and duration of relationships among the two groups may explain some of the difference in offers and willingness to reject, as well as evaluate the possibility that differences in risk-aversion may account for the differences in rejection rates. In doing so I present a method for describing and comparing rejections rates of different populations (which was used in the introductory chapter). I also discuss how the structure of the Ultimatum Game makes interpretation of data like these problematic, due to the functional ambiguity of rejection behavior.

(p.337) Sangu Environment, Society, and Economy

The Usangu Plains is a 15.5 thousand square kilometer (Pipping 1976; Hazlewood and Livingstone 1978) region of southwest Tanzania which is home to a number of ethnic groups living throughout a gradient between wet and dry environmental zones. In the wetter regions of the south, annual rainfall ranges from 600 to 1000 mm, and is dependable. The dry range lands and northern regions, which comprise most the Usangu Plains, vary widely in rainfall, from 200 to 600 mm annually. This rainfall is comparable to that experienced by the Nuer of the Sudan (Evans-Pritchard 1940) and Mursi of Ethiopia (Turton 1980) in both paucity and unpredictability.

The Sangu numbered about 40,000–50,000 in 1990 (Charnley 1994). At that time, the total population was somewhat greater than 150,000, most of them living in the southern wet zone and many of them immigrant farmers from more southerly ethnic groups, like the Nyakyusa. The dry regions in the north remain sparsely populated, but are increasingly sites of grazing competition, as cattle far outnumber people in those regions. The entire population of Usangu has probably doubled in the last decade (largely from immigration), but poor census estimates and transient residents make it hard to know.

Probably still the single largest ethnic group in the Usangu Plains, the Sangu originated from a mixture of Bantu peoples in the region in the late 1800s and early 1900s, when they united under a hereditary chief and began raiding their neighbors for wealth and livestock (see Wright 1971; Shorter 1972). At the peak of that power, the Sangu were wealthy cattle herders who held considerable military power in the region (aided partly by German colonial administrators). Now, most Sangu are farmers, although probably a few hundred households still keep herds in the Plains. The major crop is corn, which is processed for food as well as sold. Many people have begun to plant rice, which is largely a cash-crop, sold at market and changed into corn for food or disposable wealth. Wage work is very scarce and desirable.

Since 1997, I have been working with two Sangu communities. The agricultural areas of Utengule (Sangu for 'place of peace') and its surroundings is the first. Utengule was once the home of the hereditary chief of the Sangu ethnic group. Utengule residents live **(p.338)** in very closely spaced settlements, where there is often less than 10 miles between homes, and the vast majority of them farm. A small number make a living off transport between Utengule and the nearest paved road (about 10 miles) or by selling imported goods (mostly beer) in the market. Very few Utengule households own livestock, and since wealth (traditionally livestock, but now including cash) is required to pay bride fees to the families of women, most men can afford and marry only one wife. Family sizes are typically between four and six children. Most people below 30 years of age in Utengule have had some primary schooling, and most of them can read and write at a basic level.

Ukwaheri ('place of blessings') is less of a town or village and more of a region of interrelated communities. Ukwaheri lies about 20 miles north and east of Utengule, within the dry region of the Plains. Household compounds are very scattered: distances of 1 or 2 kilometers are the norm. In a region with no real roads, I have spent entire days traveling to a single household and back. Some Ukwaheri residents do not own cattle and instead live more densely near a spot where the water table is high (this is Ukwaheri proper). Most, however, own at least some livestock, and those with larger herds (typically more than twenty cattle) practice transhumance. That is, in those households with larger herds, men often spend part of the year away from the main household taking the herds to graze farther north, over great distances on foot. Access to markets is much more restricted in this area, and journeying to Utengule or the regional capital (Mbeya) takes place on the order of days. Family sizes can be considerably larger than in Utengule, as wealthy herders marry as many as five or six wives, each mothering an average of four or five surviving children during her fertile years. Very few people of any age in Ukwaheri region can read or write anything beyond their own names. While many children in Ukwaheri proper (near the high water table) attend school, the instructors are frequently absent and rarely hold classes.

Methods

In the summer of 1998, I played the Ultimatum Game with twenty pairs of Utengule residents (farmers) and twenty pairs of Ukwaheri residents (herders). I adhered to the standardized procedures **(p.339)** followed by other researchers in this volume, wherever possible. What wage work was available in the area paid 1,000–1,500 Tanzanian Shillings per day (in 1998, USD 1=TSH 650). I thus used, 1,200 shillings as the stakes, approximating one day's wages. These 1,200 shillings were divided into 100 shilling coins, in a stack of twelve. Participants were able to physically manipulate this pile when making and receiving offers. In the case of offering, they physically divided the pile themselves. In the case of receiving, they saw the original pile and then the portion the proposer had set aside for them.

All participants were adults of marriageable age, with equal numbers of males and females. I recruited players by several methods. Initially, I asked individuals to help me with my research about Sangu life by playing a game for money, while I was traveling the communities collecting other data. As word spread about the amounts of money involved (mostly the amounts won in the risk preference/aversion game I was playing concurrently with the Ultimatum Game; see Henrich and McElreath 2002), potential players began to seek me out. About half my samples are these self-recruited individuals, although I often rejected multiple individuals from the same family or household or selected older individuals when I had already played with plenty of young people. If self-recruited individuals altered the results, my intuition is that the risk aversion of the sample is lower than that of the population in general, as those most willing to travel and wait to play the games are overrepresented.

I played several games each day, selecting proposers and responders at random by slips of paper with ID numbers from a plastic bag. Participants got to see this selection process, which I hope helped to convince them of their anonymity and the randomness of the pairings. Each player first heard the translated script and then had to test correctly twice in example games before being allowed to play. Additional instructions, when necessary, were given ad lib in Swahili, with both myself and my best field assistant (who is himself Sangu) teaching them with instruction and examples. Very few participants failed to understand the game, but those who did fail to understand had to leave without playing (much to their disappointment).

I played the games in various locations, but always alone with the participant, my field assistant, and any nursing children. My field assistant spent much of the time keeping onlookers from spoiling the anonymity of player decisions. Despite this, it is unlikely that **(p.340)** player decisions were entirely anonymous, as several individuals announced their offers or rewards upon leaving the room in which we were playing the game (as was the case with the Machiguenga, Henrich and Smith Chapter 5, this volume).

Results

The distributions of offers among the Sangu look very much like typical western results (Figure 11.1). The mean offer for the entire sample is 497.5 shillings (41 percent) while the mode is 600 shillings (50 percent). The means and modes for the farmer and herder subsamples are the same: 495 (41 percent) and 600 (50 percent) for the farmers, 500 (42 percent) and 600 (50 percent) for the herders. The minimum offer is 100 (8 percent). The maximum is 800 (67 percent). There are no significant differences between the farmer and herder subsamples.

Variation in offers

Wealth and demographic variables do not seem to explain much of the variation in offers, in either community (Table 11.1). Age, however, explains some of the variation ($\beta = 0.337$, $p = 0.092$). Young individuals made many of the lowest offers.

Variation in rejections

The distributions of rejections, however, look quite different between the two samples (Figure 11.1). The farmer sample shows five total rejections, one each at 100, 300, 400, 500, and 600 shilling offers. The herder sample shows exactly one rejection, at 200 shillings. Figure 11.2 plots the proportions of each offer amount which the farmer and herder samples rejected. These distributions are seemingly quite different, and we might wonder if the difference is real, given how little data I have on rejections. The specific-offer method unfortunately generates little data on rejections, because if people fear rejections and make higher mean offers because of it, we will fail to see many rejections in the data. It would have been better for testing for differences in rejections if I had asked each responder to state the minimum offer they would accept. **(p.341)**

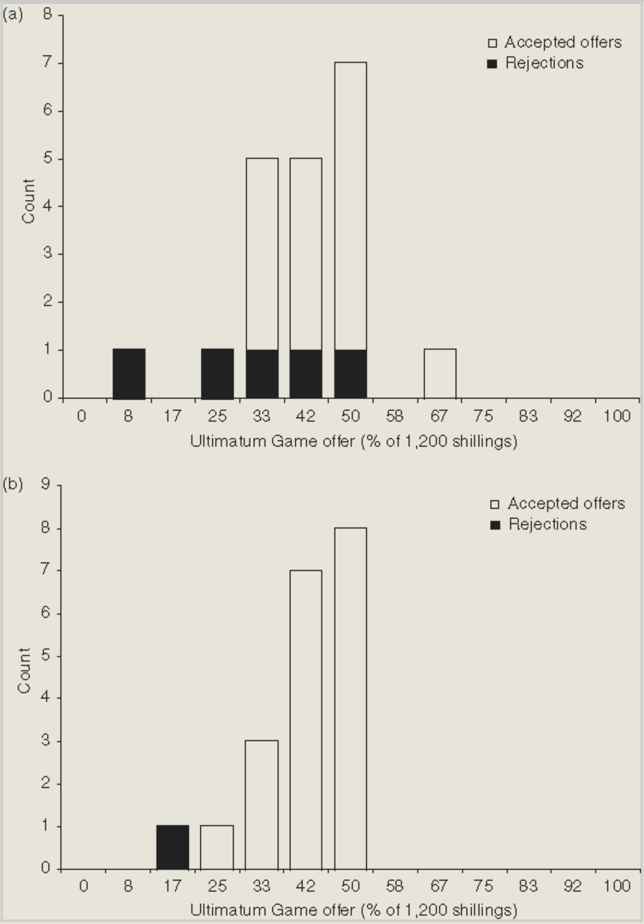

Fig 11.1. Distributions of offers and rejections for both communities: (a) farmers (*n*=20) in Utengule area and (b) herders (*n*=20) in Ukwaheri area

Notes: Light bars are numbers of offers at each amount which were accepted. Black bars are numbers of rejections at each amount. Thus the total height of each column is the total number of offers at that amount.

(p.342)

Table 11.1. Linear regression of Ultimatum Game offer on wealth and demographic variables

	Unstandardized coefficients		Standardized coefficients		Significance values
	β	SE	β	t	
(Constant)	393.705	160.824		2.448	0.020
Age	2.892	1.668	0.337	1.734	0.092
Education	6.976	10.364	0.197	0.673	0.506
Community	5.792	70.006	0.023	0.083	0.935
Gender	−35.656	44.367	−0.137	−0.804	0.427
Cattle	0.929	1.224	0.140	0.759	0.453

Note: Dependent Variable: Ultimatum Game Offer. In Gender, female = 1, male = 2. In Community, farming village = 1, herding areas = 2, Model = 1.

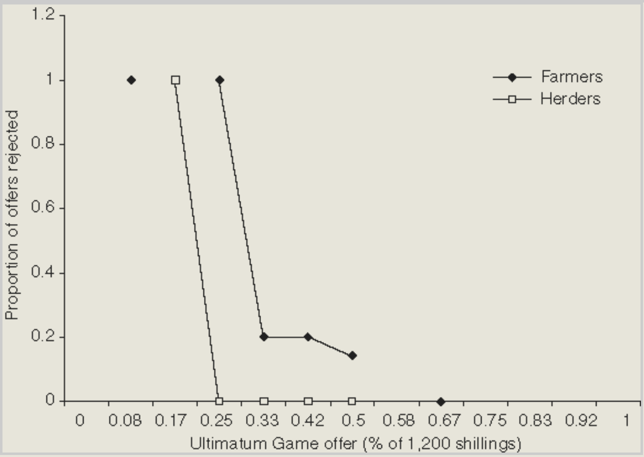

Fig 11.2. Proportions of offers rejected at each offer amount, for farmer and herder communities

A logistic regression of rejections against offer, community, and individual variables retains only offer, age, and community. However, community and age are highly correlated, and so the model including both together with offer is unreliable (Table 11.2). **(p.343)**

Table 11.2. Logistic regression of rejections against age, community, and offer

Variable	β	SE	Wald	Significant values	Exp (β)
Age	−10.9565	85.3048	0.0165	0.8978	0.0000
Offer	−0.1208	0.8534	0.0200	0.8875	0.8862
Community (1)	66.8998	808.0509	0.0069	0.9340	1.133E+29

Constant	266.4470	2240.4449	0.0141	0.9053

Both age and community are significant when included in a model with only one another. Either is marginally significant ($p < 0.10$) when included in a model with offer. Offer is always either significant ($p < 0.05$) or marginally significant. Offer clearly affects rejections, since lower offers are more likely to be rejected (which is consistent with the overall finding for rejections across all datasets; Henrich *et al*. Chapter 1, this volume). Both age and community may explain portions of the remaining variation in rejections, which is considerable. One of the two bears some actual relationship to the difference in rejections between the two samples.

Informants' explanations of their own behaviors

In postgame interviews, players often invoked a custom of dividing equally in explaining fair offers. Those who made unequal divisions offered no explanations, typically, although two individuals said they felt they were in greater need than the other person. Rejections were always explained as reactions to unfair behavior, except in the case of the farmer who rejected an offer of 600 (50 percent). In that case, the individual said he did not want the money and would provide no further explanation.

In general, as in some of the other chapters in this volume, informants are quite poor at providing explanations of their own behavior, and even when they are facile at it, we probably should not jump to believe them (Fiske n.d.). For this reason, I did not find the postgame interviews to provide good data about what motivated offers, especially given the fact that many people could provide no explanation at all without intense prompting. Explanations of rejections came much more readily, however, and so those data are perhaps more meaningful.

(p.344) In summary, the farmer and herder samples do not differ with respect to offers in the Ultimatum Game. Individual variables also do not seem to explain much of the variance in offers, although age explains a good fraction. There is evidence as well that the communities differ in the likelihood of rejections, farmers being more likely to reject a given offer amount than herders, although it is unclear if this is really an age effect, since the samples have different age profiles and regression cannot sort of which variable is responsible. In the next section, I attempt to motivate some explanation for these differences.

Discussion

There are several possible explanations for the observed differences in rejection behavior between farmer and herder samples. The crucial thing is to explain how both samples could have very similar offer distributions but different rejection patterns.

1. Farmers are more likely to reject than herders (for an unknown reason), but more risk-aversion among herders leads them to make similarly high offers as farmers.
2. Rejection rates differ perhaps because structural features of farmer and

herder life are different, and these differences may affect the benefits from punishment.

3. Age differences could explain the majority or a substantial amount of the difference in rejections, in which case younger people were more likely to reject than older people. Note that younger people were also more likely to make smaller offers than older people ($p < 0.10$, $\beta = 0.33$).

4. Farmers might also have different rejection rates than herders but offers may be unrelated to rejection behavior, as the game might confuse several functionally unrelated aspects of their social lives. That is, proposers and responders may be mapping the Ultimatum Game onto different social experiences and therefore playing different games.

In this section, I briefly explore each of these interrelated possibilities.

Similar offers may be due to risk-aversion

One way to go about testing if differences in risk-aversion could produce the same offer distribution is by estimating the functions **(p.345)** which might generate the different rejection distributions and calculating the amount of risk-aversion necessary to produce the same distribution of offers.

First, assume that individuals reject a specific offer with probability

$$p = 1 - \frac{\exp(\alpha + \beta x)}{1 + \exp(\alpha + \beta x)}$$

where

$$x = \frac{offer}{6} - 1$$

This function is logistic, and α and β describe its shape. The logistic is a good start for imagining such a function, since it provides for a transition between a high probability of rejection at low values and a low probability of rejection at higher or middle values.

We can estimate the separate functions for farmer and herder data with maximum likelihood estimation. The maximum likelihood function is the one with the greatest chance of producing the observed data. In general, one can find nonlinear maximum likelihood functions only by computer iteration, testing different values of function parameters (α and β in this case) and remembering those values which match the data best.

I estimated the maximum likelihood functions for independent farmer and herder data, as well as the pooled dataset. I estimated each function at 0.05 intervals, using an exhaustive search of positive parameter values. Figure 11.3 shows the independent farmer and herder functions. The pooled estimation allows me to test if the independent estimates are significantly more likely than a single function which estimates both distributions of rejections. That is, it allows me to test whether a null hypothesis that a single function estimated from the pooled data (farmer and herder data together) can explain the two distributions of rejections, or whether two independent estimates derived from the farmer and herder data separately fit the data better. Table 11.3 shows the significance test using the three estimated functions: the farmer, herder, and pooled estimates. Using these estimates, the difference is significant at the 5 percent level.

The trouble with these estimates, however, is that portions of the herder function have greater probabilities of rejection than the **(p.346)**

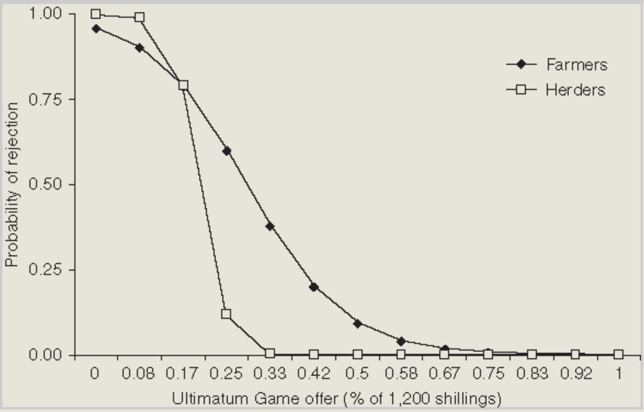

Fig 11.3. Maximum likelihood rejection functions for independent farmer and herder data

Notes: Farmer function is α=2.30, β=5.40. Herder function is α=12.0, β=20.0. (Both estimated at 0.05 intervals.)

Table 11.3. Test of significance of function estimates

Data	α	β	Likelihood function
Farmers	2.3	5.4	−8.9758
Herders	12.0	20.0	−0.3766
Pooled	3.4	6.6	−12.4665

Notes: χ^2=6.2282; *p*=0.04.

farmer function. That is, as you can see in Figure 11.3, for some offer amounts, herders are *more* likely to reject than are farmers. This odd estimate results from the poor nature of the data: there is only one rejection in the herder sample, and that rejection was 100 percent of offers at that amount (200 shillings). The maximum likelihood routine attempts to maximize (to 100 percent) the chance of rejection at this data point and minimize (to 0 percent) **(p.347)** the chance of rejection above it, where there were no observed rejections. In fact, the parameters α and β in this herder estimate will climb as high as I allow them. The slope of the function between 200 and 300 shillings is only limited by the size of the parameter search space, which I specify.

The reason this result is troubling is that it does not match the hypothesis about the difference between the two samples. The proposition is that the herders are less likely to reject offers in general, not just above 200 shillings. Another way to estimate the herder function is to restrict it such that it must always have a less than or equal chance of rejection as the previously estimated farmer function (α = 2.3, β = 5.4). I estimated the herder function again with this restriction, and Figure 11.4 shows the new function comparison. Table 11.4 shows the new significance test, using the new estimates. The result is no longer significant at the 5 percent level. Since the small amount of data in the sample creates such low power, however, significance at the 10 percent level is still a rather compelling result, and it matches the result from the earlier logistic regression.

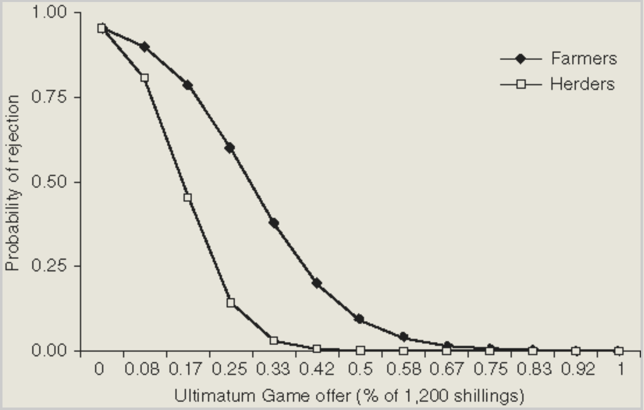

Fig 11.4. Maximum likelihood rejection functions for independent farmer and herder data

Notes: Herder function is restricted to always have a lower probability of rejection than the maximum likelihood farmer function. Farmer function is again α=2.3, β=5.4. Herder function is now α=6.65, β=9.70. (Both estimated at 0.05 intervals.)

(p.348)

Table 11.4. Test of significance of function estimates, using restricted herder function

Data	α	β	Likelihood function
Farmers	2.3	5.4	−8.9758
Herders	6.65	9.7	−1.0847
Pooled	3.4	6.6	−12.4665

Notes: χ^2=4.7920; *p*=0.09.

Using these estimated functions, one can derive the offer which maximizes expected utility (payoff adjusted for risk-aversion) for playing with someone who rejects using either function. The Utility Maximizing Offer is the offer which maximizes

$$U(offer) = (1 - p_o)(1{,}200 - offer)^{\,r},$$

where p_o is the probability of rejection of *offer*, given by the rejection function, and *r* is a fractional exponent specifying the amount of risk-aversion for the player making the offer. Assuming proposers make offers rationally in order to maximize their returns, we can simulate a distribution of offers by bootstrapping from the paired observed offers and rejections and estimating a new rejection function each time. This is meant to simulate a process by which individuals estimate the rejection function of those they play against by some sampling process. Thus there will be variation in individual estimates of rejection functions, and this will produce a distribution of offers as individuals make Utility Maximizing Offer's according to their personal estimates of these functions.

We can then estimate the difference in values of r necessary to produce the same distribution of observed offers. This is possible by varying r for each sample and creating bootstrapped offer distributions until we find the value of r that minimizes the largest deviation (D statistic, Z-test) between the bootstrapped Utility Maximizing Offer distribution and the observed distribution for **(p.349)** that sample. This procedure is explained again in the appendix (McElreath and Camerer Appendix, this volume).

Following the above procedure, the value of r for the farmer sample which minimizes the deviation between observed and simulated offer distributions is 0.51. The value of r for the herder sample is 0.02. This means that in order for risk-aversion to produce similar offer distributions for farmers and herders, given the estimates we have of the different rejection functions, herders would have to be more than 20 times more risk-averse than farmers—this finding is consistent with that of other groups discussed in the introductory chapter.

There are two obvious reasons to doubt that such a huge difference exists. First, my risk-aversion experiments with the same samples indicate little or no difference between farmers and herders in their likelihoods to accept equal-expectation gambles over fixed amounts of money (Henrich and McElreath 2002). Second, while the estimate of r for the farmer sample is perhaps plausible, the estimated risk-aversion for the herder sample is outrageously high.

Stable relationships and pro-social behavior in Usangu

The stability and longevity of relationships are important in the evolution and maintenance of reciprocity and cooperation. There are two ways such stability might affect the persistence of norms for fairness and, more importantly in the case of the Sangu, for punishment.

First, in classic models of reciprocal altruism (see e.g. Axelrod 1984), the probability of a relationship between two individuals continuing (w) strongly affects the likelihood that cooperative strategies will perform well. Clutton-Brock and Parker (1995) identify negative reciprocity, where an actor returns a retribution for a defection in cooperative behavior, as a natural form of ‘punishment’ which results from the evolution of reciprocal altruism. However, there is reason to believe that these models are not relevant to the evolution of third-party punishment as observed in human groups. It seems unlikely for negative reciprocity to be important in the evolution of human punishment, such as many think operates in the Ultimatum Game. First, reciprocity may be a strong source of cooperation in pairs of individuals, and stern behavioral rules which do not tolerate defections do well **(p.350)** (Axelrod 1984). However, reciprocity alone is unlikely to be a real source of large-scale cooperation, since groups larger than about three or four individuals have a very hard time evolving or maintaining reciprocal altruism (Boyd and Richerson 1992). Additionally, pair-wise reciprocity does not easily resemble the type of third-party punishment humans often perform. For these reasons, the evolution of pair-wise reciprocity appears tangential to the problem of how punishment in large groups evolved. Negative reciprocity is of course just as tangential (e.g. Clutton-Brock and Parker 1995). Models of the evolution of cooperation and punishment in sizeable groups, all of which resemble Boyd and Richerson 1992, indicate that third-party punishment evolves under quite different dynamics than pair-wise reciprocity, negative or positive.

Punishment in groups ('punishment' from here on), however, can maintain large-scale cooperation among many unrelated individuals, as well as stabilize any behavior for which individuals punish deviations from a norm (Boyd and Richerson 1992; Henrich and Boyd 2001). In this body of theory, as well, stability of interactions affects the strength of norms and of punishment behavior. Although it is unclear how punishment might get started, since it seems incapable of invading a population of non-punishers, longer lasting interactions promote the stability and strength of punishment even in quite large groups. Thus, whether one takes models of pair-wise reciprocity as the basis (a likely mistake) or models of punishment in large groups, the stability of relationships and community structure strongly impact the profits to be had from punishment.

Among Sangu farmers, life is rather predictable. The rains most always come, same time, same place. Individuals live very close to unrelated individuals and continue to do so for most of their lives, as they are tied to specific pieces of land. Land is becoming scarce, making tenure more pronounced. Relationships with one's neighbors, for a farmer, are very important. The farmer has nowhere else to go. All of these factors create very long tenure and stable community composition, both of which promote the relative effectiveness of pro-social behaviors, as well as punishment as a regulating behavior which maintains pro-social (or any, cf. Boyd and Richerson 1992) behavior.

Among Sangu herders, life is much less predictable. No one knows when the rains come, or where. Individuals live very closely with kin, but quite far from non-kin. Residence also shifts, as **(p.351)** households look for better locales. Polygynous herders often maintain multiple households, spending long periods of time away from one community to be in another. During part of the year, most of the unmarried and newly married men are away with herds in the north, largely isolated from any community. When disagreements occur, angry parties can simply move away. No one is tied too closely to the land, after all. All of these factors attenuate relationships and bring into doubt the chances of the same group memberships forming in the future. These shorter and less dependable interactions then weaken the advantages and feasibility of punishment.

If these differences in community structure and mobility do indeed influence rates of rejection, the problem of explaining how the two communities have the same offer distributions remains. Another explanation is needed for that substantial problem.

Age may explain differences in rejections and offers

I showed earlier how younger individuals both made lower average offers and were more likely to reject. One way to interpret these results is to imagine that younger subjects are better educated, and therefore better able to understand the game and play 'rationally', at least with respect to offers. This cannot be true, however, since education, while it varies quite a lot within the samples, explains little variation in either offers or rejections. A bigger problem with such an explanation is that it leads us to explain offer behavior as 'rational' while younger people are also more likely to reject positive offers, which is surely the most 'irrational' behavior possible in the Ultimatum Game.

It might be true, however, that younger subjects are more experienced with markets, wherein anonymous or functionally-anonymous interactions are common. This could be true regardless of educational level. Such exposure would then lead them somehow to play the Ultimatum Game more like peoples from industrialized areas. Again, however, this will explain higher rejections, but not lower offers, since offers appear to rise with industrialization or sociopolitical complexity (see Chapter 1). The trouble with this explanation is that we might then expect gender to explain some of the variation, since men have considerably more experience with markets than women. Women in Usangu travel far less than male **(p.352)** peers, are less likely to speak the national language (Swahili), and generally spend more time, both in production and recreation, at the homestead. Despite these substantial differences and exposure to markets, gender does not explain any substantial variation in either offers or rejections. It might be, of course, that a small amount of market exposure is just as good as a lot, and therefore gender explains little of the variation. If that were true, however, it is difficult to see how the differences in exposure between older and younger subjects could produce offer and rejection variation when comparable differences in market exposure do not produce similar variation based on gender.

A final possibility is that the younger subject are less risk-averse. This would produce lower mean offers, but it is unclear how less risk-aversion would produce more rejections as well.

Ultimatum Game possibly conflates punishment and retribution

The results of the many Ultimatum Game experiments, even without those in this volume, have motivated some to suggest that humans have an innate sense of fairness or taste for punishment (Camerer and Thaler 1995; Roth 1995; Konow 1996). In light of the cross-cultural results in this volume, it is clear that any such tastes are not entirely universal, however. They are widespread and vary with institutional setting and other unknown variables. One of the interpretations I have made above is that intracultural variation in social structure and residential patterns might explain differences in rates of rejection in the Ultimatum Game.

Yet while all these results provide a great deal of evidence that considerations including sharing, retribution, and punishment of norm violations strongly influence economic behavior, the game does little to help us disentangle the relative contributions of these considerations or clearly relate our theoretical variables to our game data. Some of this difficulty arises from the functional ambiguity of player behavior in the Ultimatum Game. Here are two examples of how that ambiguity complicates interpretation.

Actual (rather than observed) farmer and herder norms may be different

Perhaps farmers have a weaker sharing norm (which generates offers), but high rejection rates push up their modal offer so it resembles the herder norm, which is more fair and requires less **(p.353)** punishment (rejection) to maintain. This interpretation is consistent with the argument above that stability of relationships contributes to different rates of punishment. These different rates of punishment then create the illusion that the sharing norms (the offer behaviors) are the same for both farmers and herders. Playing the Dictator Game (which only involves offers with no chance of rejection) with the same population can help determine if the sharing norms are different, but it cannot resolve the role of rejection in altering these offers, especially if players' *expectations* of rejection are altering their offers. In light of Fehr and Gächter's (2000) data, which show that individuals begin to contribute more to a public good even before they are punished, we might easily expect that players alter their offers in response to imagined rejections.

Rejections may have little or nothing to do with the sharing norm

It is unclear if rejections function to promote sharing behavior, since retribution (desire to get revenge) may motivate part or the majority of rejections. It is important to distinguish punishment (a cost imposed on actors for violating a norm where the punisher pays a cost herself) from retribution (negative pair-wise reciprocity intended to preserve reputation) because models of the evolution of cooperation suggest that reciprocity and negative reciprocity (what I am calling ‘retribution’ here) have little or nothing to do with the formation or maintenance of public goods. It is possible, for example, that farmers ‘punish’ just as much as herders, but are more likely to pursue retribution. This would produce different levels of rejections, even though the actual functional rejections, punishments, were rare in both groups and maintained the same levels of sharing. Essentially, the Ultimatum Game cannot separate retributive motivations (‘That bastard cheated me, and I can't let him get away with that.’) from desire to punish norm violators (‘That is a bad person.’), since the player receiving the offer owns all reputational effects from accepting or rejecting. In this case, that plausible differences in rejections do not lead to different offer distributions would result from the fact that many rejections are retributive and have little to do with the maintenance of norms about sharing, which might still generate the observed offers.

These problems in interpretation arise from limitations of the structure of the game. To explore questions about the nature of **(p.354)** public goods and punishment, more complex multiparty games (such as Fehr and Gächter 2000, 2002) are more appropriate. The drawback is that such games may be nearly impossible to efficiently organize in the field.

References

Bibliography references:

Axelrod, R. M. (1984). *The Evolution of Cooperation*. New York: Basic Books.

Bolton, G. E. and Zwick, R. (1995). 'Anonymity versus punishment in ultimatum bargaining', *Games and Economic Behavior*, *10*, 95–121.

Boyd, R. and Richerson, P. J. (1985). *Culture and the Evolutionary Process*. Chicago, IL: University of Chicago Press.

—— —— (1992). 'Punishment allows the evolution of cooperation (or anything else) in sizable groups', *Ethology and Sociobiology*, *13*, 171–95.

Camerer, C. and Thaler, R. H. (1995). 'Anomalies: Ultimatums, dictators and manners', *Journal of Economic Perspectives*, *9*, 209–19.

Charnley, S. (1994). Cattle, Commons, and Culture: The Political Ecology of Environmental Change on a Tanzanian Rangeland. Ph.D. Dissertation, Stanford University.

Clutton-Brock, T. H. and Parker, G. A. (1995). 'Punishment in animal societies', *Nature (London)*, *373*, 209–16.

Evans-Pritchard, E. E. (1940). *The Nuer: A Description of the Modes of Livelihood and Political Institutions of a Nilotic People*. Oxford: Clarendon Press.

Fehr, E. and Gächter, S. (2000). 'Cooperation and punishment in public goods experiments', *American Economic Review*, *90*, 980–94.

—— —— (2002). 'Altruistic punishment in humans', *Nature*, *415*(10), 137–40.

Fiske, A. P. (n.d.) *Learning a Culture the Way Informants Do: Observation, Imitation, and Participation*.

Hazlewood, A. and Livingstone, I. (1978). *The Development Potential of the Usangu Plains of Tanzania: A Study*. London: Commonwealth Secretariat.

Henrich, J. and Boyd, R. (2001). 'Why people punish defectors: Weak conformist transmission can stabilize costly enforcement of norms in cooperative dilemmas', *Journal of Theoretical Biology*, *208*, 79–89.

—— and McElreath, R. (2002). 'Are peasants risk averse decision-makers?', *Current Anthropology*, *43*(1), 172–81.

Kagel, J. H. and Roth, A. E. (eds) (1995). *The Handbook of Experimental Economics*. Princeton, NJ: Princeton University Press.

Konow, J. (1996). 'A positive theory of economic fairness', *Journal of Economic Behavior and Organization, 31*, 13–35.

Pipping, K. (1976). *Land Holding in the Usangu Plain. Scandanavian Institute of African Studies Research Report No. 33*. Uppsala: Scandanavian Institute of African Studies.

Roth, A. (1995). 'Bargaining Experiments', in J. H. Kagel and A. E. Roth (eds), *The Handbook of Experimental Economics*, Princeton, NJ: Princeton University Press, pp. 253–348.

Shorter, A. (1972). *Chiefship in Western Tanzania*. Oxford: Clarendon Press.

Turton, D. (1980). 'The economics of Mursi bridewealth: A comparative perspective', in J. L. Comaroff (eds), *Meaning of Marriage Payments*, London: Academic Press.

Wright, M. (1971). *German Missions in Tanganyika*. Oxford: Clarendon Press.