

# Chapter 8

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## The Tsimane' Rarely Punish: An Experimental Investigation of Dictators, Ultimatums, and Punishment

Michael D. Gurven

With a revised, standardized set of protocols, the Roots of Human Sociality Project examined whether prior “anomalies” not predicted by any of the available social preference models would reappear in the second round of games played in fifteen small-scale cultures. If they did, we could be more confident that the initial results were robust and not artifacts of an inconsistent methodology. Furthermore, the non-industrialized environmental settings characteristic of the fifteen cultures, with varying degrees of market integration, would allow for a serious treatment of the role of culture, the development, maintenance, and evolution of social norms, and the effects of market access and integration on prosocial behavior (see chapter 2). In this second round of games, with a systematic set of variables measuring different aspects of market access and integration, we were able to examine whether integration, acculturation, and experience with anonymous others in market settings leads to the more uniform and modal patterns of game behavior seen in industrialized societies.

Adding the third-party punishment game to the repertoire and applying the strategy method to the ultimatum game gave us greater insight into responder behavior and therefore into second-party and third-party punishment of perceived cooperative norm violations as well. The results of these new games have important implications for our understanding of how reciprocal altruism and other models of cooperation operate in natural populations and how different social preferences lead to variable game behavior in different contexts (see, for example, Bolton and Ockenfels 2000; Charness and Rabin 2002; Falk and Fischbacher 2000; Fehr and Schmidt 1999; Rabin 1993). Finally, the inclusion of follow-up interviews of selected game players provides additional ethnographic insight into how players viewed the games and their expectations of others' game behavior. Only through ethnographic interviews can we understand the links between emotional responses to specific situations, the internalized norms brought to bear on emotions and behavior, and individuals' actual behavioral choices.

This chapter examines the strategy method ultimatum game (UG), the dictator game (DG), and the third-party punishment game (TPG) as played among the Tsimane' of Bolivia. By allowing

comparison with the results reported in the other chapters of this volume, it addresses several questions aimed at assessing cross-cultural validity:

1. To what extent is within-culture variation in game behavior explained by demographic and market-oriented variables? Are more educated, fluent, and market-oriented individuals more likely to uphold equality-based norms or norms that favor short-term gains?
2. How prevalent is second- and third-party punishment?
3. To what extent is proposer (player 1) behavior in the strategy method UG and the TPG linked to the taste of responders (player 2s) for punishment?
4. How good are people at guessing how others will behave?
5. Is there consistency in the offers made by the same individuals across the strategy method UG and the DG?

Two more questions are uniquely addressed in this chapter:

6. Do the same people show similar game behavior in the DG after a two-year gap?
7. Are those individuals who are good at guessing others' decisions (as measured by a matching game) more likely to choose modal offers in the DG and income-maximizing offers in the strategy method UG?

### THE STUDY POPULATION: TSIMANE'

The Tsimane' are Amazonian forager-horticulturalists living in the Beni Department of Bolivia in the eastern foothills of the Andes Mountains. Tsimane' live in small villages consisting of fifty to two hundred individuals, and these are usually composed of a number of extended family clusters. Villages are located along major rivers, although villages can also be found in terra firma areas in the Isiboro-Sécure region. The majority of Tsimane'—over four thousand—occupy over sixty villages along the banks of the Maniqui River. Almost all of the food the Tsimane' consume comes from horticulture, fishing, hunting, and gathering. They cultivate plantains, rice, corn, and sweet manioc in small swiddens and regularly fish and hunt for meat. Fish, game, and gathered foods make up about one-quarter of their diet, although this varies depending on the season and local abundance. More detailed background information on the Tsimane' is provided by Avecita Chicchón (1992), Viki Reyes-García (2001), and my colleagues and myself in Gurven, Kaplan, and Supa (2007). I focus here on the relevance of cooperation in daily economic and social life and the relevance of markets and acculturation.

### Cooperation

There is a strong sense of economic independence at the level of the nuclear family and extended Tsimane' household. Each family has its own set of fields, and sometimes individuals within families own specific fields. Over 70 percent of the diet comes from the fields and house gardens. Men within a household clear and burn unused primary or secondary forest to create new fields during the dry season, while both men and women harvest and weed fields throughout the year. Occasionally male relatives or affines collaborate in some of these activities. Single-day hunting and fishing activities are usually done alone or with up to two male partners, usually a sibling, son, in-law, or age-mate. Group fishing events are the exception to this pattern: several families, or sometimes entire villages, use plant poisons to fish in closed-off sections of rivers, streams, and lagoons. Several men perform

all of the work (acquiring the plant poisons, closing off the body of water, pounding the poison), and many more individuals, including women and children, harvest the fish with bow and arrow, machete, or knife. In a cross-village sample, Ricardo Godoy and his colleagues (2004) estimated that one-fourth of all fishing events are communal. Finally, entire families often go on extended fishing trips in riverine villages or on extended hunting trips in the interior forest villages; these trips can last anywhere from two days to several months.

An estimated 10 percent of household consumption derives from gifts or transfers from relatives and friends, while 88 percent comes from the labor efforts of household members (Godoy et al. 2004). Some foods are shared more than others. The most widely shared food is manioc in the form of home-brewed beer (shocdye). Strong beer always draws many visitors, and beer-drinking often continues until none remains. Any Tsimane' can visit another Tsimane' household and expect to be served. As in other small-scale populations, large game may be shared with great depth but restricted breadth: that is, most of it is shared, but with only several households (Gurven, Hill, and Kaplan 2002). Small game, such as birds and squirrel monkeys, tends to be shared only within the household. Food preparation and cooking is usually done in the open (kitchens usually do not have walls), but food is consumed inside houses. Cooked meals are usually consumed by household members. Though people eat communally in smaller villages, they usually do not go out of their way to invite others to partake in their meals. Tsimane' often turn their backs to others when they eat, and people in more modern villages often complain that neighbors do not share meat. Some evidence suggests that food is not shared extensively during difficult times. In a study of risk management in two Tsimane' villages, Ricardo Godoy, Elizabeth Byron, and their colleagues (2005) report that only 5 percent of those interviewed said that kin or neighbors help them cope with misfortunes such as illness or crop loss.

In villages with schools and chiefs, men usually engage in communal village labor, such as clearing soccer fields and building schools. Both men and women also help organize festivities. In a panel study done during 2001–2002 in thirty-seven villages, Godoy, Byron, and their colleagues (2005) found that 92 percent of households had made some gift of food and that 61 percent of households had engaged in some communal labor in the week prior to the interview. Nonetheless, gifts are usually small and given to close kin, while communal labor is of brief duration.

### Market Affiliation and Acculturation

Although the Tsimane' were exposed to Jesuit missionaries in the late seventeenth century, they were never successfully settled in missions, and they remain relatively unacculturated. The extent of their isolation is suggested by the fact that their language is an isolate, even within Bolivia; it shares a similar vocabulary and grammar only with the Mosetene, who inhabit the southern and northern stretches of Tsimane' territory. New mission posts were not established in several of the villages until the 1950s (Chicchón 1992). The greatest influence of one of those posts, the New Tribes Mission, was to create a system of bilingual schools with trained Tsimane' teachers and an elected village chief in each village downstream from the Catholic mission, Fátima. Chiefs act as representatives primarily in interacting with outsiders and helping to organize group labor. They receive neither salary nor tribute and are generally not awarded much prestige.

Tsimane' villages vary in their degree of market access and interaction with outsiders. Acculturation occurs in several domains, beginning with the schools that have been established in over three-quarters of all Tsimane' villages over the last two to twenty years. Tsimane' also occasionally visit the main market town, San Borja (with a population of about 24,000), to attend town festivals, sell agricultural produce and handicrafts, and acquire highly valued market items such as clothing, aluminum pots, salt, sugar, kerosene, utensils, and school supplies. On

average, however, only 2 to 6 percent of their diet derives from market purchases. In addition, since the 1970s Tsimane' have come into greater contact with outsiders as new roads have been built; a burst of logging, trading, and encroachment by lowland and highland colonists has ensued, and some Tsimane' engage in wage labor for logging companies. Near San Borja, some Tsimane' also work as farmhands for local ranchers. Along the upper Maniqui River, Tsimane' often collect jatata palm leaves and weave them into roofing panels. These panels are then traded with itinerant merchants who provide market goods and alcohol. The exchange rates vary among merchants, but most are unfavorably low. Goods are usually given in advance of payment, and Tsimane' rarely refuse these "gift" advances, which puts many households under debt peonage to these river merchants.

A study by Godoy and his colleagues (2004) has shown that neither market access nor economic development is consistently associated with economic inequality across a sample of fifty-nine Tsimane' villages, where inequality was measured in terms of either monetary income, household wealth, or rice production. Gini coefficients estimating these inequalities vary from 0.3 to 0.8 (mean = 0.539) for monetary income, 0.1 to 0.5 (mean = 0.281) for household wealth, and 0.2 to 0.8 (mean = 0.471) for rice production. Thus, there is little direct evidence that increased market exposure has led to substantial increases in inequality beyond what already existed in the traditional domains of economic production.

### Prior Results

An ultimatum game without the strategy method was played in five villages along the Maniqui River in 1999 (Gurven 2004a, 2004b). Mean and median for the combined sample was 37 percent with modal offers at 50 and 30 percent. In multivariate analyses, fluent Spanish speakers gave about 13 percent more than monolingual Tsimane' speakers, men gave about 10 percent more than women, and the least-educated gave about 14 percent more than the most-educated. However, the strongest predictor of offer level was the identity of one's resident village.

A dictator game was played in Cosincho in 2000 (Gurven 2004b). Mean, median, and modal offers were 32, 30, and 25 percent, respectively. As in the ultimatum game, men gave about 6 percent more than women, and the most frequent visitors to San Borja offered about 10 percent more than those who rarely left the village to go to market. Both games used increments of 5 percent rather than the 10 percent increments used in the current games.

A series of dictator games played in eight villages in 2005 confirmed that there was substantial variation in prosocial game behavior among villages, and that village patterns were recognized by residents (Gurven, Zanolini, and Schniter 2008). Differences in socioeconomic condition, acculturation, immediate demand for money, and perceived fair offers did not explain away the village differences in game behavior, suggesting that village effects may reflect fluctuating social expectations rather than stable differences in fairness norms.

## THE DICTATOR GAME AND THE ULTIMATUM GAME

### The Study Village: Cosincho

The DG and strategy method UG were played in the village of Cosincho (Gurven 2004a), which is located about sixty kilometers, or up to several days' journey upstream, on the Maniqui River. Much of the village is located about a fifteen-minute walk from the Maniqui River to the interior and is close to the smaller Cosincho River. Cosincho had 215 residents during the time of the games, although 12 of these individuals had not lived there for at least several months.

In the center of the village was a soccer field, a new school, and a scattered cluster of eleven families. There were two nearby clusters about a five-minute walk away, one with six families and the other with two. A cluster of four families lived another ten- to fifteen-minute walk away on the other side of the Cosincho River. The other two clusters were more distantly located. One of these clusters, with four families, lived near the Maniqui River about thirty minutes away, and the other lived across the Maniqui River, about forty-five minutes away. The latter cluster moved across the river after political conflicts within the village several years earlier.

## Methods

The DG and strategy method UG protocols followed the standard versions translated into Spanish by Clark Barrett (chapter 10, this volume, available at [http://www.russellsage.org/Ensminger\\_Chapter10.pdf](http://www.russellsage.org/Ensminger_Chapter10.pdf)). These were translated into Tsimane' with the help of a bilingual Tsimane' assistant, Alfredo Zelada Supa. Zelada, a resident of a community outside this sample, also acted as a personal assistant during all the games. The Tsimane' protocols were then orally back-translated into Spanish to assess the accuracy and clarity of the Tsimane' translation. Revisions were then made in the Tsimane'-language version. Games were played on November 30 and December 1, 2002. All Tsimane' who were eighteen years of age or older were invited to appear at the school in the early morning, upon the ringing of a bell. Roughly 90 percent of eligible residents were present for the group meeting. People were told that they would be playing two games, that they would receive 5 Bolivianos (Bs) as a show-up payment for each game, and that they should play the first game only if they could play the second game. The DG was played first, and the UG second. The sample for the DG was seventy-one individuals (thirty-eight player 1s), and sixty-seven individuals (thirty-six player 1s) for the UG. Four individuals did not return to play the UG after the DG. The stake for each of the games was 20 Bs (or U.S.\$2.75; 7.3 Bs = U.S.\$1.00), which represented (in 2002) about one day's wage labor with food, or about 0.8 day's wage labor without food. This was the same stake used in Gurven (2004b).

The DG was explained in both Spanish and Tsimane' by Zelada and myself. We gave several examples, according to the script, putting special emphasis on capturing the attention of younger and older individuals, who, experience has shown, have a more difficult time listening to spoken rules in group settings. All questions concerning procedure were answered ("How long will this take?" "When do I play?" "Can we watch the movie about the man and the coconuts [*Castaway*]?" ), but these were minimal. We emphasized the confidentiality of responses, and by repeating the appropriate portions of the protocol, we stressed that player 1 (the proposer) could choose to give whatever he or she wished to give, and that the money derived from a U.S.-based foundation solely for this purpose. Both Zelada and I felt that repetition was important, given the relative lack of experience among the Tsimane' with games, or with formal instructions read aloud to an audience.

The initial group explanation took about one and a half hours. Players then entered the school one by one in a random order chosen by an American assistant, Jeffrey Winking. Inside the school, windows were barred and children were dissuaded from peering or listening in. The only people present inside the school were the player, myself, and Zelada. However, Zelada's presence was minimized, as his back was turned during actual play. Zelada is from a different community with no relationship with any of the study communities, and community members said that they did not mind his presence in the room. Nonetheless, I requested his assistance only when test questions were answered incorrectly and therefore the game rules needed to be explained again.

Upon entry into the room, players received additional instruction, a series of test questions, and additional help from myself and Zelada (if necessary) until the test questions were

answered correctly. Outside the school, individuals were seated on a concrete patio watching DVD movies. It was forbidden for anyone to discuss the games, and Winking confirmed that no one did. After playing the game, individuals were urged to stay and watch the films. A vat of refreshment was also prepared for players to encourage them to stay. However, several players who lived nearby needed to return to their homes to attend to their children or to eat a midday meal after playing the DG. The majority watched the films eagerly (because these are unavailable in jungle villages). Those who had already played sat on the opposite side of the patio, separated from those waiting to play, to avoid any potential for interaction. It took five hours for sixty-two people to play the DG on day 1. On day 2, it took one and a half hours for eleven more people who were not present on the previous day to play the DG.

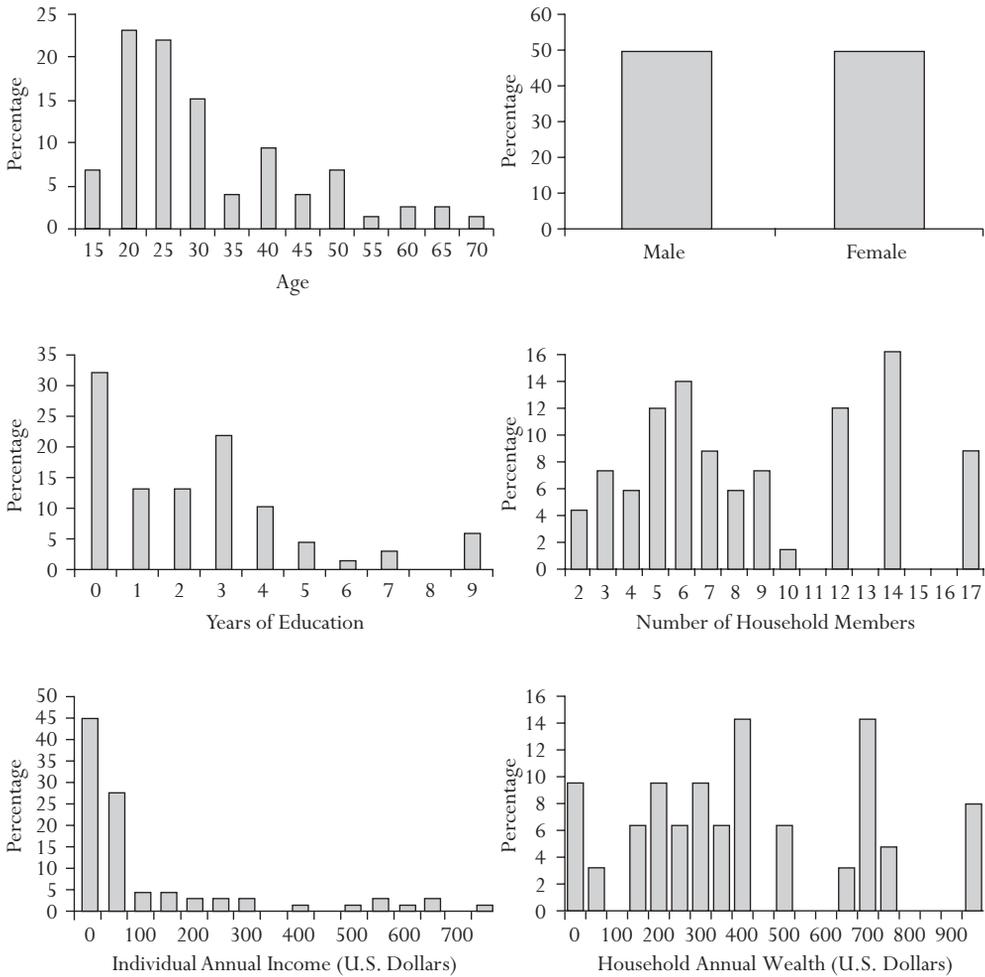
The strategy method UG was explained in a procedure similar to that used for the DG. Explaining the game in the group took about one hour. It then took two hours for thirteen people to play the UG, after which the sun had already set, players were bored and hungry, and the truck battery powering the movie-displaying laptop computer had died. The UG was then continued the next morning for seven and an half additional hours until fifty-four others had played the game (but see chapter 3 for discussion of the effects of this methodological “anomaly”). About half of the players were paid for both of the games in the late evening on day 2, and the remainder of the players were paid the following morning. People were paid individually in a private house location. At this time, selected individuals were asked several questions about their opinions of the game and of others’ behavior in the games.

A matching game (MG) was also played in Cosincho—in May 2003 with fifty-nine individuals during household visits—to see whether the ability to converge on focal concepts with other community members would be associated with game play. Individuals were asked to leave their house by themselves to talk privately for several minutes, whereupon they were asked to play a very short game in which they could win 5 Bs. Upon agreement, they were asked to “name a plant [or animal] that others in Cosincho might also name if they were asked the same question. If you name the same plant [or animal] that most others in this village name, then you will win 5 Bs.” They were asked this for two categories of objects: forest game animals (jebacdye’) and plants (cătidyē). It took only a few minutes to play this game with each person. Players were told not to discuss the game with anyone until after payment. Indeed, there was no effect of order of play on the popularity of the responses given for animals ( $r = 0.11$ ,  $p = 0.43$ ) or plants ( $r = 0.07$ ,  $p = 0.63$ ), with popularity measured as the percentage of others who gave the same answer. Individuals were paid after everyone had played. Total play covered two days.

## Predictor Variables

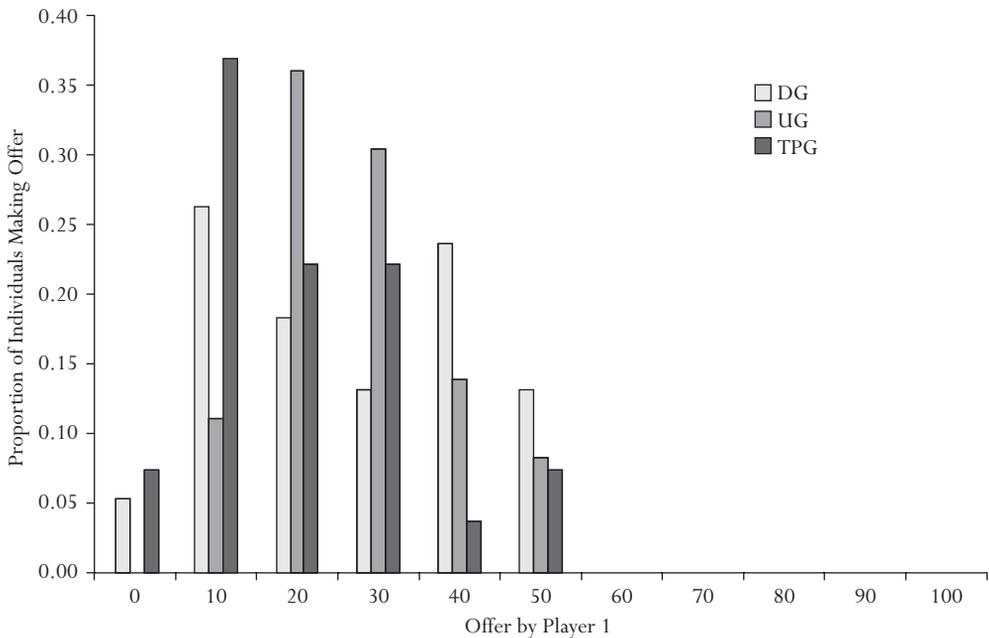
Market-oriented experiences tend to fluctuate by week or month. Thus, rather than use the standard interviews based on the previous day’s or week’s experiences, I estimated the market-oriented variables in Cosincho using a combination of interviews and direct observations of household clusters from a concurrent study (the Tsimane’ Health and Life History Project). Interviews during hunting and fishing returns, town visits, and market purchases were done two to three times per week for all households in Cosincho over a ten-month span. From these data, I estimated the number of town visits, wage labor activities, and incomes. I examined food production and consumption during three-hour blocks of time spent observing household clusters. From these data, I estimated market contributions to the diet. To estimate household wealth and domestic animal-based wealth, I conducted wealth surveys in each household, defining wealth as income-generating capital. I estimated land-based wealth from a combination of interviews about household agricultural production and GPS mapping of sample agricultural fields for different cultigens.

FIGURE 8.1 Predictor Variables for Dictator Game and Ultimatum Game Offers by the Tsimane'



Source: Author's figure based on author data.

I estimated ages of participants from demographic interviews, which incorporated known ages and estimates based on interviews regarding reproductive histories and comparisons with individuals of known ages. Years of education, linguistic competence in Spanish (categorized as 0 = cannot speak, 1 = speak some, 2 = fluent), marital status, number of offspring, household size, and length of residence in Cosincho (total number of years the player had lived in the study village over his or her entire life) were also garnered from demographic interviews. An examination of cross-correlations reveals that many of these variables are correlated with each other. For example, Spanish ability correlates positively with frequency of and income from wage labor ( $r = 0.31, p < 0.01$ ;  $r = 0.34, p = 0.004$ ), annual income ( $r = 0.35, p = 0.003$ ), trips to market ( $r = 0.26, p = 0.028$ ), and education ( $r = 0.71, p < 0.0001$ ). Figure 8.1 displays histograms for each of the independent variables for the DG and UG samples.

FIGURE 8.2 *Offer Distributions for the Dictator Game, Ultimatum Game, and Third-Party Punishment Game*

Source: Author's compilation based on author data.

### Results: The Dictator Game

Figure 8.2 shows the distribution of offers made by player 1s in the DG. The mean, median, and modal offers were 26, 30, and 10 percent, respectively. A secondary mode at 40 percent is also prominent. Only 13 percent offered half of the 20 Bs stake. To examine significant differences across populations (and also across games), I employed three nonparametric statistical tests. A Mann-Whitney (M-W) test examines differences in means across samples, a median test examines differences in medians across samples, and an Epps-Singleton (E-S) test examines distributional differences across samples. Table 8.1 compares the DG sample in Cosincho in 2002 with DG results obtained in two other samples, including the Hadza (Marlowe 2004) and the Tsimane' from Cosincho in 2000. The M-W and median tests reveal no significant differences between the Cosincho DG and the other two DG samples, at the 5 percent significance level, as shown in table 8.1. Focusing exclusively on means or medians can be deceiving, however, as revealed by the E-S test, which shows highly significant differences in DG results between the Tsimane' 2002 and 2000 samples, but no difference between the former and the Hadza.

There was no statistically significant difference between mean offers for the first and second days of play (27.5 percent ( $N=32$ ) versus 20.0 percent ( $N=6$ ), respectively;  $p=0.33$ , M-W). The order of play also had no significant effect on offers ( $r=-0.14$ ,  $p=0.39$ ). However, play day becomes significant after controlling for other predictors in a stepwise regression, using the predictors described in the next section. After controlling for household wealth and income, offers on day 2 were 12 percent lower than those on day 1. This effect is mainly driven by the

TABLE 8.1 Statistical Comparison of Game Samples Drawn from the Tsimane', Hadza, and Germans

Population 1	Population 2	N	Epps-Singleton		Mann-Whitney		Median Two-Sample Test		Wilcoxon Signed Rank	
			CF	p-value	Z	p-value	Z	p-value	Z	p-value
DG 2002	DG 2000	24	26.519	0.000	1.474	0.140	0.835	0.404	-0.140	0.236
	DG Hadza	43	6.520	0.164	1.822	0.069	1.716	0.086		
UG 2002	UG 1999	70	14.675	0.005	-3.679	0.000	-3.037	0.002		
	UG 1999 PM	17	10.212	0.037	2.840	0.005	2.091	0.037		
	UG 1999 LP	16	4.066	0.397	0.757	0.449	1.081	0.280		
	UG 1999 OC	16	11.455	0.022	3.218	0.001	2.421	0.016		
	UG 1999 CAT	10	7.621	0.107	2.141	0.032	0.637	0.524		
	UG 1999 CACH	11	18.377	0.001	3.129	0.002	2.699	0.007		
DG 2002	UG MACH	21	5.248	0.263	-1.039	0.299	-0.764	0.445		
TPG 2003	UG 2002	36	9.964	0.041	0.337	0.736	0.148	0.882	27.000	0.517
	DG 2002	38	4.569	0.335	-1.623	0.105	-1.342	0.180		
	DG 2000	24	24.718	0.000	3.616	0.000	2.440	0.015		
	TPG Berlin	22	2.863	0.581	0.752	0.452	0.617	0.539		

Source: Author's compilation. For DG 2002, author data; for UG 2002 Gurven (2004a); for DG 2000, Gurven (2004b); for DG Hadza, Marlowe (2004); for UG 1999, UG 1999 PM, UG 1999 LP, UG 1999 OC, UG 1999 CAT, and UG 1999 CACH, Gurven (2004a); for UG MACH, Henrich (2000); for TPG Berlin, Fehr and Fischbacher (2004).

Notes: DG 2000 = Dictator Game 2000

UG 2002 = Ultimatum Game 2002

TPG 2003 = Third-Party Punishment Game 2003

DG 2002 = Dictator Game 2002

DG Hadza = Dictator Game 2004 Hadza

UG 1999 = Ultimatum Game 1999 (five villages combined)

UG 1999 PM = Ultimatum Game 1999 Puerto Mendez

UG 1999 LP = Ultimatum Game 1999 La Pampita

UG 1999 OC = Ultimatum Game 1999 Ocuna

UG 1999 CAT = Ultimatum Game 1999 Catumare

UG 1999 CACH = Ultimatum Game 1999 Cachuela

UG MACH = Ultimatum Game 2000 Machiguenga

TPG Berlin = Third-Party Punishment Game 2004 Berlin

TABLE 8.2 *Linear Regressions of Tsimane' Dictator Game Offers*

Variable (Divided by Standard Deviation)	(1)	(2)	(3)	(4)	(5)
Age	1.05 (2.61)				
Female	3.86 (3.21)	3.74 (3.15)			
Education	0.02 (2.98)	-0.29 (2.84)	-1.36 (2.71)		
Individual income	17.51* (9.91)	17.44* (9.76)	12.48 (8.88)	11.67 (8.62)	14.35* (8.36)
Household wealth	-5.75** (2.76)	-5.52** (2.66)	-6.39** (2.58)	-6.40** (2.55)	-5.97** (2.54)
Household size	2.30 (2.72)	2.16 (2.65)	2.93 (2.59)	3.00 (2.56)	
Individual income-squared	-5.77** (2.64)	-3.80** (2.60)	-4.85* (2.50)	-4.72* (2.45)	-5.34** (2.41)
Constant	20.48* (2.64)	23.37** (2.60)	29.42*** (2.50)	28.42*** (2.45)	33.07*** (2.41)
Observations	34	34	34	34	34
Model significance	0.137	0.086	0.082	0.046	0.038
Adjusted R-squared	0.14	0.16	0.15	0.17	0.16

Source: Author's calculations based on author data.

Note: Standard errors are in parentheses. All coefficients are normalized (divided by standard deviation).

\*\*\*Coefficient significant at < 0.01 level in two-tailed test

\*\*Coefficient significant at < 0.05 level in two-tailed test

\*Coefficient significant at < 0.10 level in two-tailed test

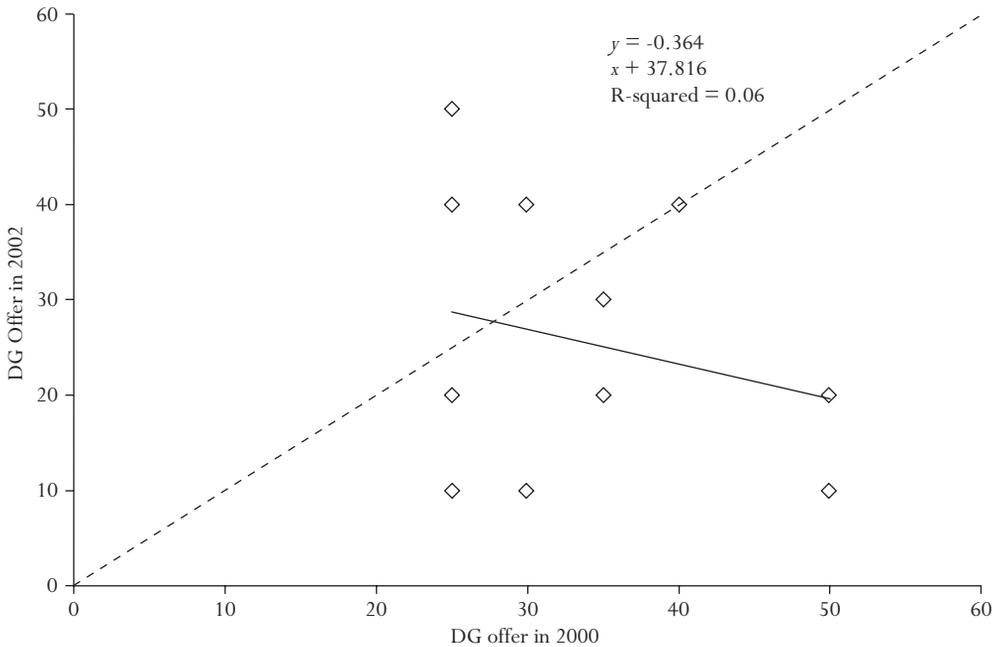
lack of fifty-fifty splits on day 2. The sample from day 2 was of individuals who were away fishing or visiting another village or who were too tired to appear on the first day of the games. It is possible that this represents a slightly biased sample rather than a decrease in offers due to contamination. Nonetheless, the effect is small and does not change the qualitative results described here (see also Chapter 3).

### Predictors of Dictator Game Offers

I performed regression analyses to examine whether demographic and market variables predict DG offers. Demographic variables include age, sex, number of years of formal education, and household size. Market-oriented variables, such as percentage of diet derived from the market (whether purchased or traded), frequency of wage labor in the past month, the number of trips to the market town in a typical week, and the amount of land devoted to cash crops, are insignificant and therefore not included in the analysis of DG and UG offers.<sup>1</sup> Additional variables included are household wealth (in U.S. dollars) and individual income (also in U.S. dollars). Figure 8.1 shows histograms of the predictor variables. The results of multivariate analyses are shown in table 8.2. As for all regressions, all independent variables are normalized by dividing by the standard deviations of each variable. Model 1 includes all independent variables, and each reduced model subtracts each of the insignificant variables from model 1.

The only variables found to be statistically significant are household wealth and individual income. Every 100 Bs of additional wealth is associated with a 2 percent decrease in

FIGURE 8.3 Dictator Game Behavior for Repeat Players in 2000 and 2002



Source: Author's compilation based on author data.

Notes:  $N = 12$ . The dashed line of equality shows where the same players made the same DG offer in both years.

offers. The wealthiest therefore gave 19 percent *less* than the poorest in the sample, controlling for other factors. A linear effect of income is not statistically significant. Instead, income has a quadratic effect such that those with the lowest and highest incomes gave less than those with intermediate incomes.<sup>2</sup> In particular, those who earned more than 4,000 Bs (about U.S. \$533) a year gave 1.2 percent less for each additional 100 Bs they earned, while each additional 100 Bs earned up to 2,000 Bs was associated with a 0.3 percent increase in offers. Reduced models reveal robust patterns for household wealth and reasonably robust patterns for individual income. Wealth and income account for 16 percent of the adjusted variation in DG offers.

### Repeating the Dictator Game

Of the thirty-eight player 1s, twelve were also player 1s in the DG played in 2000. Does repeated play lead to a decrease, increase, or no change in offers? The same people offered an average of 7 percent less in 2002 than in 2000. A Wilcoxon signed rank test for matched pairs shows no significant difference in offers given across study years ( $F = -14$ ,  $p = 0.236$ ). However, the emphasis on mean differences may be misleading. There is no correlation between offers made two years apart by the same twelve participants ( $r = 0$  to  $0.25$ ,  $p = 0.44$ ). Of the twelve players who participated in both study years, only one offered the same, while eight lowered their offer and three raised their offer (figure 8.3). There were significant distributional differences, however, at the village level, despite the insignificant M-W and median tests (table 8.1, row 1).

For example, in 2000 there were no offers of 20 percent or less, while in 2002 half of the sample gave 20 percent or less. Some 17 percent of the offers in 2000 were at 40 percent or higher, whereas 37 percent were at this level in 2002. If their experience in learning the game in 2000 helped players better understand the rules as well as how to earn the most money, we should expect less variance in offers in 2002. However, variance in offers actually increased from 2000 to 2002 (standard deviation = 8.2 in 2000 versus 15.5 in 2002). Regression analysis of sex and age on the difference given between 2002 and 2000 shows that men gave 18 percent less in 2002 ( $p = 0.07$ ), and each additional year of age is associated with 0.82 percent ( $p = 0.03$ ) more given ( $F = 4.05$ ,  $R$ -squared = 0.47). Each year of education is associated with 3 percent less given, but this result is significant only at the 10 percent level. The strongest predictor is the household wealth of the player: every 100 Bs of wealth is associated with an offer decrease of 9 percent ( $p = 0.002$ ,  $R$ -squared = 0.62) (7 percent controlling for sex and age). It is important to note that whether or not a person played the DG in 2000 shows no significant effect on DG offers in 2002. The  $p$ -values for the dummy variables on previous play are insignificant in both univariate analysis ( $p = 0.90$ ) and when added to the reduced regression model 5 from table 8.2 ( $p = 0.99$ ). Offers made by player 1s who played previously therefore were no different than those made by player 1s in 2002.

### Results: The Strategy Method Ultimatum Game

Figure 8.2 shows the distribution of offers made by proposers in the strategy method UG. The mean, median, and modal offers were 26, 30, and 20 percent, respectively. Two-thirds of the offers were between 20 and 30 percent. Only 8 percent offered half of the 20 Bs stake. Table 8.1 compares the means, medians, and distributions of strategy method UG offers with those from the UG played in 1999 in five separate Tsimane' villages and the pooled UG samples. The strategy method UG is significantly different from the pooled 1999 sample and three of the five villages, using all three statistical tests. It is only similar to the UG offers in a village farther upstream, Catumare, and a village near San Borja, La Pampita. The pattern of strategy method UG offers was also indistinguishable from the offers in a sample of Machiguenga, a group of Peruvian forager-horticulturalists similar to the Tsimane' (Henrich 2000).

The mean offer given on the first play day was 30.0 percent ( $N = 6$ ). On day 2 the mean offer was 28.3 percent ( $N = 23$ ) for session 1 and 21.4 percent ( $N = 7$ ) for session 2. The mean from this last session was only marginally significantly different from the means of the first two sessions ( $p = 0.14$ ,  $p = 0.10$ , respectively;  $M$ - $W$ ). The order of play tracks these sessions and is significantly associated with a small decrease in offers ( $r = 0.35$ ,  $p = 0.04$ ). However, there is no order effect for day 1 or session 1 of day 2 (see also chapter 3). The decrease in offers with order of play is due to the same group of people who gave less on the second day of the DG. Unlike in the DG, however, session or order is not significant in stepwise regressions including the other predictors described here. There are no significant differences between the mean minimum accepted offers made across sessions (7.1 percent [ $N = 7$ ], 6.2 percent [ $N = 21$ ], 8.0 percent [ $N = 5$ ],  $p = 0.70$ ; Kruskal-Wallis test).

### Predictors of Strategy Method Ultimatum Game Offers

Table 8.3 shows the regression results examining the effects on strategy method UG offers of the same set of independent variables examined with respect to DG offers (see table 8.2; see figure 8.1 for histograms for these variables). The only significant predictors of offers are indi-

TABLE 8.3 *Linear Regressions of Tsimane' Ultimatum Game Offers*

Variable (Divided by Standard Deviation)	(1)	(2)	(3)	(4)	(5)
Age	-2.13 (1.93)				
Female	2.70 (2.30)	2.92 (2.30)			
Education	-0.38 (2.20)	0.29 (2.12)	-0.55 (2.04)		
Individual income	15.32** (7.54)	14.88** (7.56)	10.91 (6.96)	10.57 (6.73)	11.03* (6.11)
Household wealth	2.58 (2.10)	2.13 (2.06)	1.49 (2.02)	1.52 (1.99)	
Household size	3.97* (1.97)	4.16** (1.97)	4.73** (1.94)	4.74** (1.91)	4.61** (1.74)
Individual income-squared	-4.09** (2.05)	-3.89* (2.06)	-3.11 (1.98)	-3.05 (1.94)	-3.36* (1.79)
Constant	13.86**	8.20	12.88**	12.47**	15.57**
Observations	32	32	32	32	34
Model significance	0.060	0.052	0.051	0.025	0.013
Adjusted R-squared	0.22	0.21	0.20	0.22	0.22

Source: Author's calculations based on author data.

Note: Standard errors are in parentheses. All coefficients are normalized (divided by standard deviation).

\*\*Coefficient significant at < 0.05 level in two-tailed test

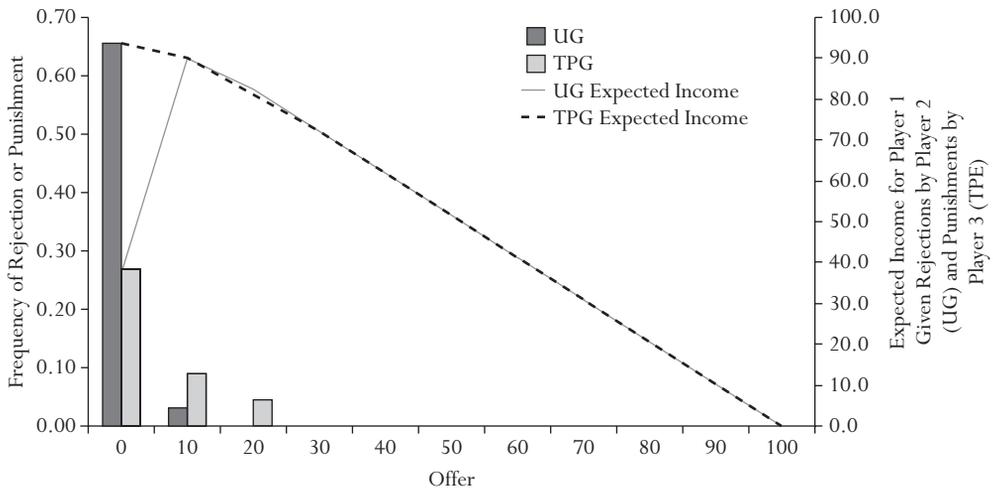
\*Coefficient significant at < 0.10 level in two-tailed test

vidual annual income and household size. As in the DG, the linear effect of income is statistically insignificant, yet income shows a significant quadratic effect on offers. Thus, intermediate annual income is associated with higher UG offers than low or high income. Those who earned more than 4,000 Bs a year gave 0.8 percent less for each additional 100 Bs they earned, while each additional 100 Bs earned up to 2,000 Bs was associated with a 0.4 percent increase in offers. Although not a market-oriented measure, household size acts as a proxy for household demand for resources because larger households have more mouths to feed. Yet each additional member in the household was associated with 1 percent *more* given away. Each standard-deviation-unit increase is associated with a 4 to 5 percent increase in offers. Income accounts for 13 percent and household size for 20 percent of the variance, while the multivariate model accounts for 22 percent of the adjusted variance in offers.

### Predictors of Strategy Method Ultimatum Game Minimum Acceptable Offers

No actual offers were rejected in the strategy method UG, and the strategy method does not provide much evidence that there is punitive sentiment toward low hypothetical offers. All hypothetical offers of 20 percent or higher were unanimously accepted, and only one of thirty-three player 2s rejected an offer of 10 percent. Interestingly, only twenty-one of the thirty-three player 2s (or 64 percent) said that they would reject offers of nothing! Thus, 36 percent of player 2s would accept no money in the game. Although a self-interested money-maximizer should accept any positive offer, there is no absolute gain from accepting a null offer, and a definite loss in terms of relative payoffs. Given the empirical pattern of acceptances and rejections

FIGURE 8.4 *Rejection, Punishment, and Expected Income in the Ultimatum Game and the Third-Party Punishment Game*



Source: Author's figure based on author data.

for all offers, the income-maximizing offer (IMO) for Tsimane' player 1s is 10 percent (figure 8.4). This offer yields an expected 17.5 Bs (87.3 percent of the stake), with only a 2.7 percent loss. On average, Tsimane' player 1s offer more than the IMO. Only 11 percent of player 1s offered 10 percent of the stake. If offers were made in coordination with expected player 2 behavior, then there should be a positive correlation between the amount of expected income generated from a specific offer and the proportion of player 1s making that specific offer. The Pearson correlation is 0.77 ( $p = 0.006$ ) when all possible offers (including those above 50 percent) are considered. If we restrict the analysis to the set of offers of 50 percent and below, the correlation drops to 0.65 and loses statistical significance ( $p = 0.16$ ).

Regression analyses examine the potential explanatory power of the set of predictors tested in the prior analyses of DG and UG offers on the minimum acceptable offer (MinAO) elicited from the strategy method (table 8.4). The proportion of land devoted to cash-cropping and linguistic competence in Spanish showed significant effects in model 1 and so are included in the analyses. Figure 8.4 displays histograms of the independent variables. Even though only offers of 0 percent and 10 percent met with rejections, there are still significant effects. Model 1 reveals that males, the least-skilled Spanish speakers, people from less wealthy and larger families, and those with a greater percentage of their land devoted to cash crops were all more likely to reject a lower offer. Household wealth shows a quadratic effect: those of intermediate wealth are predicted to accept offers as low as 4 percent, whereas members of the poorest and wealthiest families will not accept offers below 10 percent. Only household size and cash-cropping land show robust results across all models in table 8.4. Household wealth is nearly robust, but loses significance in model 4. Each standard-deviation-unit increase in land percentage devoted to cash-cropping and household wealth is associated with a 3 percent and 2 percent higher MinAO, respectively. A comparison of standardized estimates reveals that sex, household size, and the percentage of cash-cropping land have equal predictive power

TABLE 8.4 *Linear Regressions of Tsimane' Ultimatum Game Minimum Acceptable Offers*

Variable (Divided by Standard Deviation)	(1)	(2)	(3)	(4)
Age	0.85 (1.11)			
Female	-1.85 (1.29)	-2.32** (1.12)		
Education	2.69** (1.24)	2.28** (1.11)	2.01 (1.19)	1.88 (1.28)
Individual income	1.98 (1.22)	1.61 (1.11)	2.36** (1.13)	
Household wealth	-9.21** (4.11)	-8.04** (3.77)	-7.81* (4.08)	-6.53 (4.36)
Household size	1.94* (1.08)	1.79* (1.05)	1.50 (1.12)	2.45** (1.11)
Household wealth-squared	8.00* (3.94)	6.72* (3.53)	6.71* (3.82)	5.44 (4.07)
Proportion of land devoted to cash-cropping (hectares)	3.01** (1.13)	2.97** (1.12)	2.54** (1.19)	2.67** (1.29)
Competency in Spanish language	-2.60* (1.43)	-2.69* (1.41)	-1.00 (1.24)	-0.85 (1.34)
Constant	6.12	9.13**	5.02	3.65
Observations	26	26	26	26
Model significance	0.016	0.009	0.022	0.055
Adjusted R-squared	0.45	0.46	0.37	0.26

Source: Author's calculations based on author data.

Note: Standard errors are in parentheses. All coefficients are normalized (divided by standard deviation).

\*\*Coefficient significant at < 0.05 level in two-tailed test

\*Coefficient significant at < 0.10 level in two-tailed test

with respect to the MinAO. A maximum of 45 percent of the adjusted variance in MinAOs is explained by these models.

### Comparison of Dictator Game and Strategy Method Ultimatum Game Offers

Because the same individuals acted as player 1s in both the DG and the strategy method UG, we can compare offers to examine whether they were similar across games (figure 8.4). On average, the same people ( $N = 36$ ) gave 1.9 percent more in the UG than in the DG. Of the thirty-six player 1s who played both games, nine gave the same amount, fifteen gave more in the UG, and twelve gave more in the DG. A Wilcoxon signed rank test on paired offers reveals no significant difference in mean offers across games ( $p = 0.52$ ; see table 8.1). Additionally, there is a significant positive correlation between offers in the DG and UG (Pearson's  $r = 0.38$ ;  $p = 0.02$ ). The more stringent Epps-Singleton test, which compares distributional shapes and does not account for the lack of independence between games, shows a significant difference across games ( $p = 0.04$ ; see table 8.1). Linear regression analysis on the difference between UG and DG offers reveals that player 1s from larger and wealthier households gave more in the UG than in the DG, even though household wealth, as shown earlier, is associated with lower offers in the DG.

## The Matching Game

The matching game (MG) examines people's ability to converge on common focal points with other community members. In the MG on game animals, 32 percent of the sample converged on tapir (shi'), 25 percent on red brocket deer (ñej), and 15 percent on collared peccary (quiti'varej). Hunting is not so common an activity in Cosincho, where the majority of animals encountered are small monkeys, birds, and coatis. Tapir is the rarest and largest animal in South America. For the MG on plants and trees, 40 percent of the sample converged on mahogany (tyura', *Swietenia macrophylla*), and 17 percent on almendrillo (cojma, *Dipteryx odorata*). Less than 10 percent of the sample converged on each of the remaining responses. In total, there were nine animal and seventeen plant responses. My catalog of forest resources includes 43 animals and 428 plants or trees. Thus, Tsimane' converge on 21 percent of the animals and 4 percent of the plants that have been documented by both myself and others.

If modal responses in the DG are construed as perhaps more representative of group norms, then we can examine whether those individuals who are best at guessing what most others will say in the MG are also more likely to give the modal response in the DG. If those who perform best at the MG are better able to predict the behaviors or actions of other group members, then they should also be more likely to offer the income-maximizing offer in the strategy method UG. Neither of these predictions is borne out. There is no relationship between the percentage of others who offered the same amount in the DG and the percentage of others who also said the same plant ( $r = 0.08$ ,  $p = 0.70$ ,  $N = 24$ ) or animal ( $r = 0.11$ ,  $p = 0.60$ ,  $N = 24$ ) in the MG. There was also no relationship between the expected income from the offer (given the observed pattern of rejections; see figure 8.4) made in the UG and the percentage of others who also said the same plant ( $r = 0.07$ ,  $p = 0.77$ ,  $N = 23$ ) or animal ( $r = 0.17$ ,  $p = 0.43$ ,  $N = 23$ ) in the MG. Thus, those who performed the best in the MGs did not make offers closest to the mode in the DG or to the IMO in the UG.

## THE THIRD-PARTY PUNISHMENT GAME

### The Study Village: Fátima

The third-party punishment game (TPG) was played in Fátima, located about seventy kilometers upstream on the Maniqui River, or up to a four-day river journey.<sup>3</sup> A different village was used for the TPG because of the large sample of subjects required to play the game. At the time of the TPG, Fátima had 444 residents, making it one of the largest Tsimane' villages.<sup>4</sup> Fátima was chosen for the TPG because of the large population and because economic games had never been played there before. Like Cosincho, much of the village is also located in the interior, along the smaller Chimanes River. Fátima is home to a well-organized Catholic mission, which flourished under the stewardship of the Alsatian father Martín Bauer in the 1950s. He attracted Tsimane' from other parts of the Maniqui region to congregate and live near the mission. In its current form, much of the village is highly dispersed along the Chimanes River. It is at least a half-day's journey from the mouth of the Chimanes River to where it reaches the last household. At least half of the village congregates routinely at the weekly Sunday masses. After Father Martín's death in 1997, the only Tsimane' "priest" was given charge of the mission, with occasional assistance from Bolivian priests who arrived by airplane during bimonthly visits via a small airstrip near the mission. Father Martín had struggled against river merchants and loggers and had strongly discouraged the village residents from interacting with them. The majority of agricultural production traded or sold was, and still is, purchased by the mission at a reasonable price, rather than by the merchants. In recent years, river merchants and loggers have started to revisit the region.

## Methods

The TPG protocol followed the adapted standard version translated into Spanish by Clark Barrett. Villagers were given initial notice about the game at the conclusion of mass one week prior to the games, and then reminded during frequent household visits and by word of mouth. The TPG was played after a Sunday service in June 2003. Over ninety individuals had congregated to listen to the rules of the game. Following the procedure outlined earlier, the game was explained in one hour. Players then entered a private area inside the mission courtyard, one by one. Game rules were explained again, test questions were given, and rules were re-explained until the test questions were answered correctly. The total sample size for the TPG was seventy-three (twenty-seven player 1s, twenty-three player 2s, and twenty-three player 3s). It took five and a half hours for sixty-three Tsimane' to play the game on the first play day. On day 2, it took one and a half hours for an additional eleven people to play. All players were paid at the end of the second day, as well as the day after the game was over. There was no significant effect of day of play on the offers made (19.6 percent on day 1 [N = 23], 22.5 percent on day 2 [N = 4],  $p = 0.76$ , M-W) or on the minimum accepted offer (4.2 percent on day 1 [N = 19] versus 2.5 percent on day 2 [N = 4],  $p = 0.60$ , M-W) (see chapter 3). There was also no effect of order of play and offer ( $r = 0.03$ ,  $p = 0.88$ ).

## Predictor Variables

Time constraints and the lack of a concurrent anthropological project in Fátima prevented the collection of market-oriented variables, as was done in Cosincho. During brief interviews with players after payment, however, I asked about prior visits to market towns over the previous two months and about the total number of arrobas (about twelve kilograms) of rice they had sold, either to the mission or in San Borja. Rice is a principal cash crop and so can be used to roughly estimate the amount of land devoted to cash-cropping. We did collect demographic data in the same manner as was done in Cosincho. Histograms of these predictor variables are shown in figure 8.5.

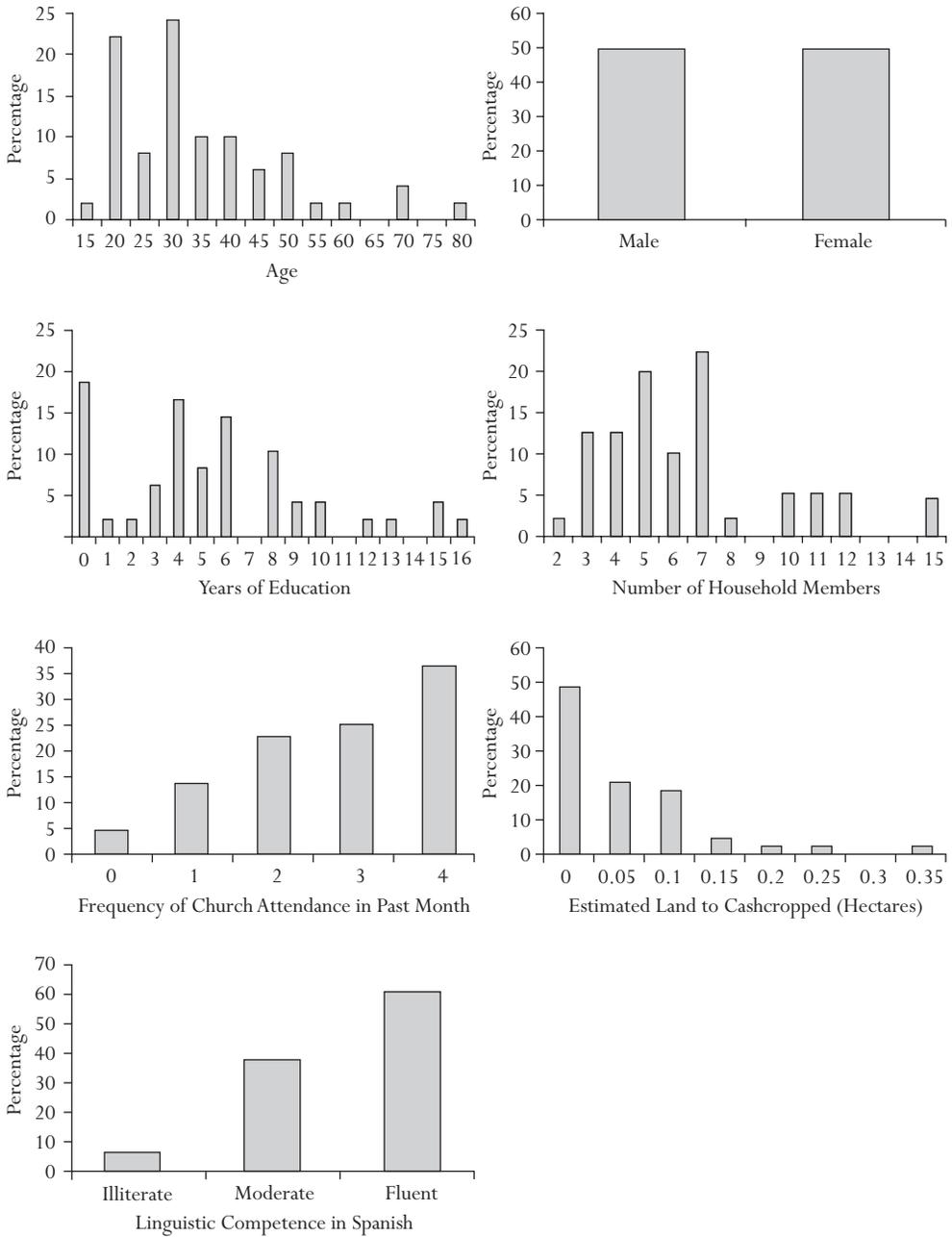
## Results: The Third-Party Punishment Game

Figure 8.2 shows the distribution of offers in the TPG. Mean, median, and modal offers were 20, 20, and 10 percent, respectively. Neither the Mann-Whitney nor the Epps-Singleton test reveals significant differences between TPG offers in Fátima and DG offers in Cosincho (table 8.2). A comparison of the TPG offers in Fátima with those from a sample in Berlin, Germany (from Fehr and Fischbacher [2004]) also reveals no significant differences using both statistical tests (table 8.1).

## Predictors of Third-Party Punishment Game Offers

Table 8.5 shows the regression results examining the effects of predictor variables on TPG offers. Figure 8.5 shows the histograms of the distribution of predictor variables from the sample of players 1 and 3. None of the demographic or acculturation variables are significant predictors of TPG offers in models 1 to 3, probably owing in part to the small sample size. In reduced models, Spanish ability and frequency of attendance at weekly church services over the previous month (range: zero to four) are significant. When analyzed together, each additional church visit is associated with giving 5 to 7 percent more, while the most fluent

FIGURE 8.5 *Predictor Variables for Third-Party Punishment Game Offers by the Tsimane'*



Source: Author's figure based on author data.

TABLE 8.5 *Linear Regressions of Tsimane' Third-Party Punishment Game Offers*

Variable (Divided by Standard Deviation)	(1)	(2)	(3)	(4)	(5)	(6)
Age	1.20 (4.85)					
Female	-2.06 (4.00)	-2.45 (3.55)				
Education	0.83 (4.28)	0.45 (3.82)	0.09 (3.71)			
Household size	3.12 (5.25)	2.50 (4.40)	2.52 (4.31)	2.69 (3.59)		
Frequency of church attendance in past month	6.72 (4.81)	7.10 (4.36)	6.89 (4.25)	6.96** (3.37)	6.45** (3.00)	4.85* (2.62)
Amount of land devoted to cash-cropping (hectares)	2.05 (3.84)	2.28 (3.57)	2.13 (3.49)	2.08 (3.07)	1.25 (2.84)	
Competency in Spanish language	-4.71 (4.58)	-4.81 (4.36)	-4.06 (4.13)	-3.98 (3.19)	-4.04 (2.93)	-4.91* (2.75)
Constant	0.33	3.98	1.43	0.84	8.77	15.04**
Observations	17	17	17	17	17	17
Model significance	0.760	0.638	0.564	0.268	0.162	0.094
Adjusted R-squared	-0.21	-0.11	-0.06	0.09	0.12	0.13

Source: Author's calculations based on author data.

Note: Standard errors are in parentheses. All coefficients are normalized (divided by standard deviation).

\*\*Coefficient significant at < 0.05 level in two-tailed test

\*Coefficient significant at < 0.10 level in two-tailed test

in Spanish gave 8 percent less than the non-Spanish-speaking. Fluency in Spanish is associated with increased church attendance ( $r = 0.30$ ,  $p < 0.05$ ). Using non-normalized parameter estimates, fluent Spanish speakers who went to church 3.2 times in the previous month gave an average of 15 percent, while non-speakers who went to church 2.5 times in the previous month gave an average of 22 percent. This model accounts for 13 percent of the adjusted variance in TPG offers.

### Predictors of Third-Party Punishment Game Minimum Accepted Offers

Out of twenty-three offers that could have been punished, three were met with punishment by third parties.<sup>5</sup> Two of these were offers of 10 percent, and one was an offer of 0 percent. No player 3s said that they would punish an offer of 30 percent or greater. One player (4 percent) said that he would punish someone who offered 20 percent. This individual was an educated person with significant contact with outsiders. Two individuals (9 percent) said that they would punish those who offered 10 percent, and six (26 percent) said that they would punish those who offered nothing. Given the pattern of third-party punishment, the income-maximizing offer was 10 percent (figure 8.4). Thirty-seven percent of TPG player 1s offered this amount. The Pearson correlation between expected income from an offer and the proportion of player 1s making that offer is 0.58 ( $p = 0.06$ ). Restricting the set of possible offers from 0 to 50 percent increases the correlation to 0.69, but reduces the significance level ( $p = 0.13$ ).

TABLE 8.6 *Linear Regressions of Tsimane' Third-Party Punishment Game Minimum Acceptable Offers*

Variable (Divided by Standard Deviation)	(1)	(2)	(3)	(4)	(5)
Age	-0.15 (2.61)				
Female	-1.85 (3.30)	-1.87 (3.14)			
Education	-3.46 (3.92)	-3.35 (3.28)	-2.63 (2.96)		
Household size	1.00 (3.07)	0.91 (3.26)	0.69 (3.15)	-1.27 (2.23)	
Frequency of church attendance in past month	-1.17 (3.07)	-1.18 (2.92)	-1.88 (2.60)	-1.60 (2.56)	-1.63 (2.50)
Amount of land devoted to cash-cropping (hectares)	-1.13 (2.42)	-1.13 (2.30)	-1.33 (2.22)	-1.59 (2.18)	-1.87 (2.08)
Competency in Spanish language	1.02 (3.82)	0.93 (3.35)	2.14 (2.59)	1.23 (2.36)	1.38 (2.29)
Constant	8.67	8.63	2.92	5.52	2.76
Observations	17	17	17	17	17
Model significance	0.938	0.874	0.830	0.856	0.795
Adjusted R-squared	-0.40	-0.28	-0.21	-0.19	-0.13

Source: Author's calculations based on author data.

Note: Standard errors are in parentheses. All coefficients are normalized (divided by standard deviation).

Regression analysis on MinAOs using the same predictor variables as used earlier does not reveal any statistically significant effects in any of the regression analyses shown in table 8.6.

## SUMMARY

Several important findings emerged from these game experiments with the Tsimane' in 2002:

1. The patterns that emerge from these dictator game and ultimatum game experiments are similar to those found in previous experiments that used a different protocol and methodology. Tsimane' UG results are also similar to the results reported by Joseph Henrich (2000) for the Machiguenga, who show many ethnographic similarities to the Tsimane' (Johnson 2003).
2. Both second-party and third-party punishment are rare. Consistent with this general lack of punishment, player 1 offers were very similar across the three games. Despite the overall low rate of rejection, being male, educated, a cash-cropper, and a resident of a larger and less wealthy household are all associated with a greater tendency to reject the lowest offers in the strategy method UG.
3. Income had an inverted U-shaped effect on offers in the DG and UG. Those with greater household wealth gave less in the DG. Members of larger households gave more in the UG.
4. Sex, education, and Spanish ability had no effect on offers in the DG and UG games.
5. A repeat of the DG in Cosincho revealed lower offers in 2002 than in 2000. Being male, younger, educated, and wealthier were all associated with a greater tendency to give less in

2002. However, those who played in 2000 did not play differently from those who, in 2002, had never played the DG before.

6. The distribution of UG offers is different than that of several other Tsimane' villages studied in 2000.
7. Offers made by the same people were similar across the DG and UG, but significant distributional differences remain.
8. Those who were adept at guessing common plants and animals were not more likely to give modal offers or income-maximizing offers in the DG or the UG.

## DISCUSSION AND CONCLUSIONS

### What Have We Learned About Norm Salience and Market Influence?

There are a variety of ways by which market integration and acculturation can affect social norms and lead to cross-cultural discrepancies in game behavior. First, in large societies, interaction with outsiders and anonymous others (“strangers”) who have no common history or close kinship may lead to less daily cooperation, but also to a greater emphasis on courtesy and etiquette. For example, experimental evidence supports the notion that score-keeping occurs more profoundly and explicitly with casual friends and strangers than with kin and close friends (Silk 2003). Second, familiarity with a competitive, money-based market system, perhaps in combination with etiquette norms, may be associated with norms of fairness and equality (see chapter 2). If money is a novel currency, then more familiarity with and appreciation of the value (and rarity) of money may produce more selfish behavior. If money is instead viewed as just another type of resource, then it may not lead to any differences in game behavior. Third, formal education in a classroom often emphasizes the importance not only of information and linguistic competence but also of rules and structure for interacting in national society. Exposure to formal education may thus favor more prosocial norms. Fourth, individualistic entrepreneurship may couple with market integration to produce ambiguous outcomes. The norms that emerge may either emulate Western-style norms or diverge from them if those actively seeking out the market tend also to be more “selfish.”

Thus, none of these components of “modernization” necessarily produces Western-style game behavior. Even in samples in industrialized societies, framing and anonymity matter in the DG (Hoffman, McCabe, and Smith 1996), and the few nonstudent samples studied have shown different behavior in the DG (Carpenter, Burks, and Verhoogen 2004; Henrich and Henrich 2007; see also chapter 18, this volume, available at <http://www.russellsage.org/Ensminger>). Similarly, an increasing body of work is showing that market integration can have both positive and negative effects on other features of people’s lives, such as deforestation, health, and indigenous knowledge (Godoy 2001). For example, markets foster new kinds of wealth that can improve nutrition, but as opportunities for wealth and spending increase, some individuals choose to spend much of their income on more status-oriented goods that do not have a positive impact on the health or general welfare of their families, and this income usually is earned at a cost to other investments in family and community.

The market and demographic variables analyzed in this chapter are proxies that tie into several domains of modernization. For example, fluent Spanish speakers most likely received formal schooling, engage in wage labor, and make frequent visits to town to purchase or trade items

or attend the occasional educational workshop. It is appropriate that Spanish ability is correlated with the greatest number of other acculturation-oriented variables. While Spanish competency and visits to San Borja were positive predictors of offers in prior ultimatum and dictator games (Gurven 2004b), these relationships do not consistently reappear in the multivariate analyses presented here, nor are they consistent predictors in other studies (Henrich et al. 2005; Gurven et al. 2008). Spanish competency was negatively associated with offers in the TPG and mostly absent in the UG and DG as presented here. Income and per capita wealth showed significant nonlinear effects on offers in the UG and DG. Those with the highest incomes or wealth gave less, perhaps indicative of the entrepreneurship of the wealthiest few.<sup>6</sup> Indeed, the wealthiest were most likely to have reduced their DG offers over the two-year gap and to accept lower UG offers. As mentioned earlier, these effects may be indicative of self-selection on market behavior by the Tsimane'. Wage labor was measured in days spent in labor, not in total earnings, in the earlier study (Gurven 2004a), which saw no effect on UG offers. The market contributions to the diet did not predict anything in the current analyses, although they positively predicted UG offers and negatively predicted DG offers in earlier games that used a cruder, shorter-term measure of diet composition (Gurven 2004a).

One problem with acculturation variables is the potential for high measurement error given the relatively short time frames over which they are measured. This study has tried to avoid some pitfalls of one-shot interviews about behavior or activities in the past week or past month (see the methods described in chapter 3) by examining behavior over a year's duration. The longest-term effects can probably be observed with Spanish literacy and years of education, whereas market contributions to diet, visits to San Borja, cash-cropping, income, and wealth can all fluctuate both seasonally and annually. It is not clear a priori whether short-term or long-term salience should be a better predictor of game behavior. Norm internalization may require long-term exposure, but the salience of, say, a recent trip to San Borja may also carry weight in the minds of players.

### Why do the Tsimane' Punish So Little?

There was little evidence of second-party or third-party punishment in the UG and TPG, in marked contrast to results in samples from industrialized societies and in several other cross-cultural samples (see, for example, chapter 6, this volume, available at: <http://www.russellsage.org/Ensminger>). Although rates of punishment tend to be lower when a strategy method is employed (Brosig, Weimann, and Yang 2003; Oxoby and McLeish 2004), the absence of overt punishment may be more common than previously thought. The same result was found in all of the UGs played among the Tsimane' in 1999, as well as in those played among the Ache (Hill and Gurven 2004), Achuar (Patton 2004), Machiguenga (Henrich 2000), and Igbo (Gowdy, Iorgulescu, and Onyeiwu 2003). If moderate to high levels of second-party or third-party punishment are required to maintain prosocial norms, then why is the punishment of low offers not a more universal phenomenon in these groups?

Punishment of true norm violations does occur in these groups, so the absence of punishment in the games does not mean that punishment does not exist in the social world of these groups. Several examples from the Tsimane' and Ache illustrate the point. After being ignored several times during meat distributions by a hunting partner, one Tsimane' man refused to go hunting or to share with that individual until he changed his behavior. Another Tsimane' man, upon the disclosure of his infidelity with an outsider, was beaten by male members of his wife's family. Similarly, accusations of stealing sometimes result in verbal or physical violence against perpetrators among Tsimane'. An Ache woman who had lived in Paraguayan society, trained

as a schoolteacher, and now received a steady income saw her house burned down, along with all of her possessions, by envious others. Another young Ache woman who worked as a prostitute in Paraguayan society was subjected to having her head shaved to publicly display her transgression.

These cases connote clear transgressions of local norms, whereas the economic games do not. Receiving little from another person is unpleasant, but it may not necessarily be viewed as particularly “unfair” and therefore does not elicit punishment (for a similar argument, see Fehr and Fischbacher 2002). Four of ten individuals interviewed after the DG and three of nine after the UG said that the games did not remind them of anything in their daily lives. There is little precedent for fifty-fifty-split offers in many domains of Tsimane' social life, beyond distribution rules for wild game among hunters. Only one person reported giving half in the UG so that “the other person wouldn't be sad.” In informal interviews about distribution rules for a wide variety of resources, people commonly reported that “you can give what you want,” emphasizing individual choice. Thus, the fact that the games elicited little punishment may not be so strange. Additionally, the setup of the games does not mimic any kind of traditional system, in most of which the rules governing distribution are tied to systems of production that incorporate labor or capital inputs (Gurven 2004a, 2004c; Güth 1994; Kaplan and Gurven 2004). Instead, the games provide arbitrary windfalls received as manna from heaven. In a DG in which the stake was earned based on performance on a quiz, U.S. undergraduates offered very little to others (Cherry, Frykblom, and Shogren 2002). In another study, in a series of clever experiments, differential inputs or costs incurred explained twice as many UG offers as the equality norm when stakes were produced through joint production decisions (Königstein 2000, table 1.4). Those more likely to punish may therefore not be representative of most people. In the current study, the highest offer rejection (20 percent) was in the TPG, and it was made by only one person.

Despite the examples of confrontational behavior mentioned earlier, the Tsimane' generally avoid confrontation and are not overly eager to establish reputations as norm-enforcers (Gurven et al. 2008). After severe incidents, such as murder, the perpetrator usually “escapes” and moves to a different community in a distant region of the Tsimane' territory. If the murderer returns years later, that person is not always formally punished, but may be ignored and avoided by a majority of the community. If disgruntled with an individual, Tsimane' usually gossip about the transgression and through word-of-mouth hope to induce a change in behavior. If this is unsuccessful, Tsimane' ignore or avoid interaction with the transgressor (they may do this anyway), which is often not difficult owing to the dispersed layout of the villages. Grievances are often voiced during public drinking festivals, which can result in either an alleviation of conflict or an eruption of physical violence. Individuals in conflict often resolve their differences, but frequently one or both leaves the village, either temporarily or permanently. Thus, even if individuals were annoyed or upset with the prospect of receiving or having others receive low offers, they were not provoked enough to impose a punishment that carried a monetary cost.

Two other possibilities are considered in Gurven (2004a) and Hill and Gurven (2004). Even though the identities of players are anonymous, some players may believe that offer rejection will stir discontent in their small community, where people need to live with each other long after the games are over. This seems unlikely among Tsimane', however, considering that many did not care if others were present while they received their payment. There is also the possibility that the cost of rejecting offers is too high, given the scarcity of wage labor and hence money. It remains to be seen whether the UG or TPG played with a more locally abundant alternative currency might invoke a higher rate of rejections.

### Why Are Results Different Across Villages and Even in the Same Village over Time?

An interesting finding is that player 1 behavior in the DG differed more from the pattern of player 1 behavior in the same village two years earlier than from that observed among other similar, traditional populations such as the Hadza and Machiguenga. Similarly, strategy method UG proposals differed substantially from several of the UG samples from 1999. What can account for the relatively high degree of intracultural and even intravillage variation in game behavior?

One hypothesis is that differences in player 1 behavior across villages are real and reflect variation in norms. No obvious differences in norms exist across all villages, although there are definitely obvious differences in communality, personalities, and recent histories of interpersonal conflict. Some of these differences may be due to variation in group size, shared history, kinship, and the extent of exploitation by loggers, merchants, and encroachers. A study of DG behavior in nine Tsimane' villages shows that residents were reasonably able to identify giving patterns in their home villages and that offers tended to reflect village patterns of morally appropriate or fair offers. However, village membership was still highly significant after controlling for these expectations. No village effect (for example, encroachment by outsiders, distance to market, population size, village dispersion) was more significant than village membership (Gurven et al. 2008).

A second hypothesis is that learning or practice is required for game behavior to be “representative” of an individual’s preferences because Tsimane' have no experience playing economic games, and thus differences in first-run games played in different villages may reflect confusion by at least some proportion of village members. Two related ideas are that players conceptualize the games differently and that the same individuals may change the way they view the same game via learning effects. For example, minimal observation of another pair showed a significant decrease in UG offers over repeated rounds in a U.S. sample (Duffy and Feltovich 1999), although this and most studies report only mean offers over time. Repeat offers over multiple rounds in an ultimate game conducted in Germany decreased somewhat, then converged (Königstein 2000). Support for a learning effect comes from Cosincho, where the mean DG offer decreased from 32 percent in 2000 to 26 percent in 2002. An altered DG played exclusively among women using plastic beads as the currency showed a further decrease in offers (Rucas et al. 2010). The game was played in four villages, and women in Cosincho gave an average of only 16 percent of the beads to another woman. This was less than women gave in the other three villages (combined average of 34 percent). This game was played in 2002 after the DG reported here, but with a different methodology, and so is not directly comparable to the DG.

Informal follow-up interviews did reveal a variety of ways to interpret the games. As mentioned earlier, several people said that the DG and UG did not remind them of anything in their lives. Others remarked that these games reminded them of loggers’ failed promises to pay for wood extraction, of “river merchants who offer low because they can,” and of the gifting of fish, meat, or money to other Tsimane'. One informant said the UG reminded him of the craps games he saw played on the streets in San Borja. Regardless of these anecdotes, the learning hypothesis is unlikely to explain the inter- and intravillage game behavior variation because all players answered test questions correctly, the variance in DG offers increased in the repeat play, and game behavior was systematically associated with several predictors unrelated to learning.<sup>7</sup>

A third hypothesis is that the differences are real and reflect differences in unmeasured state variables that can lead to variable levels of prosociality (for example, an immediate need for money, impatience, changed social relations with group members). This would explain both the intra- and intervillage differences. For this to be true, it would have to be shown that Tsimane'

are more whimsical, or more easily influenced, than players in other cultures who show more similar patterns, or that among the Tsimane' the absence of any obvious norms applied to the games means that individual-level factors carry more psychological weight.

Because Tsimane' villages have no strong social norms governing a specific form or level of resource distribution (and little evidence for overt punishment), some of the behavioral differences in these experiments may instead reflect current “moods” of small groups of people who interact frequently rather than distinct, stable subgroup conventions or norms (Gurven et al. 2008). The “flavor” or character of specific villages based on their history of past interactions became more apparent to me after extensive village visits, and I suspect that certain events in some villages, such as community meetings, drinking parties, and soccer games, often act to shift the mood in a more prosocial direction. Grievances against perceived troublemakers are likely to be voiced at these group events. These events may be the cultural equivalent of boosting contributions in repeated public goods games by reshuffling players or by allowing some punishment, thereby acting to erase past grievances with known defectors and start interacting again with a higher level of cooperation (even if levels may dwindle again later). The lack of strong social norms regarding distributions and the lack of clear punishment of stingy behavior allow local moods or flavors to dominate social interactions, whereas these same moods or flavors may be swamped by adherence to strong social conventions in Western industrialized societies.

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## NOTES

1. I do not report the frequency of trading goods for purchase or resale because this level of integration is extremely rare, and therefore this variable is uninformative.
2. This quadratic effect is not due to a single outlier. There were at least three low offers made by high-income player 1s. Without these three points, income is marginally statistically significant ( $p = 0.06$ ). However, this effect is driven by two other outliers, without which income shows no significant effect. For these reasons, I leave all data points in the analysis of DG and UG offers.
3. Cosincho and Fátima are connected by means of a poorly maintained, four-hour trail. By river, Fátima is up to a day's journey upstream from Cosincho.
4. Technically, the village of Ijnanarej is part of Fátima, although members live on the opposite side of the Maniqui some distance from the rest of Fátima. Residents of Ijnanarej only sporadically visit the mission for mass or for social visitation. Inclusion of Ijnanarej puts the census of Fátima at 469.
5. Several players left the game scene before playing, and so several player 1s were not paired with third parties.
6. Only four player 1s in the UG and DG had annual incomes estimated at over 3,000 Bs.
7. In a study designed to estimate the rate of time-discounting among the Tsimane', Godoy and his colleagues employed repeat trials of a task once every three months over the course of a year and a half (Kirby et al. 2002). The first several trials showed little intra-individual correlation, although subsequent trials proved to be more stable (Ricardo Godoy, personal communication, 2004).

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