

PRO-COMMUNITY ALTRUISM AND SOCIAL STATUS IN A SHUAR VILLAGE

Michael E. Price

University of California, Santa Barbara

Reciprocity theory (RT) and costly signaling theory (CST) provide different explanations for the high status of pro-community altruists: RT proposes that altruists are positively and negatively *sanctioned* by others, whereas CST proposes that altruists are *attractive* to others. Only RT, however, is beset by first- and higher-order free rider problems, which must be solved in order for RT to explain status allocations. In this paper, several solutions to RT's free rider problems are proposed, and data about status allocations to Ecuadorian Shuar pro-community altruists are analyzed in light of RT and CST. These data confirm that perceived pro-community altruists are indeed high status and suggest that (1) community residents skillfully monitor the altruism of coresidents, (2) residents who engage in opportunities to broadcast desirable qualities are high status only to the extent that they are considered altruistic, and (3) individuals who sanction coresidents based on coresidents' contributions to the community are themselves relatively high status. To a greater extent than CST, RT straightforwardly predicts all of these results.

KEY WORDS: **Collective action; Cooperation; Costly signaling theory; Mutual monitoring; Public goods; Punishment; Prestige; Reciprocal altruism; Reciprocity; Reputation; Reward; Status**

Received July 1, 2002; accepted September 30, 2002; revised version received January 6, 2003.

Address all correspondence to Michael E. Price, Center for Evolutionary Psychology, Department of Anthropology, University of California, Santa Barbara, CA 93016-3210. Email: mep2@umail.ucsb.edu

Copyright 2003 by Walter de Gruyter, Inc., New York
Human Nature, Vol. 14, No. 2, pp. 191–208.

1045-6767/03/\$1.00+.10

Why would an individual act to benefit a community? All else being equal, those who sacrifice more for the collective good will be disadvantaged compared with lesser-sacrificing "free riders." Pro-community altruism thus appears to violate the expectations of rational choice and evolutionary theory (Hawkes 1993; Olson 1965).

The costs of altruism may be offset by the benefits of social status. Many researchers have suggested that pro-community altruists should be high status (e.g., Alexander 1987; Henrich and Gil-White 2001; Olson 1965), including anthropologists focusing on the prestige of successful hunters (Gurven, Allen-Arave, Hill and Hurtado 2000; Hawkes 1993; Hawkes, O'Connell, and Blurton Jones 2001; Marlowe 1999) and warriors (Chagnon 1988; Patton 2000). But why are pro-community altruists allocated so much status? There are two main kinds of explanations: reciprocity and costly signaling theory. According to reciprocity theory (RT), the high status of pro-community altruists is attributable to positive and negative sanctioning behavior by community members. Contributors to the public good are rewarded by those who benefit from their altruism (Alexander 1987; Chagnon 1988; Gurven et al. 2000; Milinski, Semmann, and Krambeck 2002; Patton 2000), while non-contributors are punished (Fehr and Gächter 1998, 2000a, 2000b, 2002; Fehr and Schmidt 1999; Gintis 2000; Hirshleifer and Rasmusen 1989; Ostrom, Walker, and Gardner 1992; Sato 1987; Yamagishi 1986, 1988a, 1988b, 1992). According to costly signaling theory (CST), pro-community altruists are high status because one's contribution level determines not whether one is sanctioned by others, but whether one is attractive to others (Bliege Bird, Smith, and Bird 2001; Boone 1998; Gintis, Smith, and Bowles 2001; Neiman 1998; Smith and Bliege Bird 2000; Sosis 2000; see also Hawkes 1991, 1992, 1993). From this perspective, an ability to provide a public good indicates some desirable underlying quality (e.g., "competitive ability, genetic endowment, health and vigor, resource control" [Smith and Bliege Bird 2000:246] or "work ethic" [Sosis 2000:225]). People engage in pro-community activities because these activities involve a large audience, thus offering convenient "broadcast opportunities"—in other words, opportunities to widely advertise one's possession of desirable qualities. The high status of altruists is due to the fact that people want to interact with them socially as allies and/or mates, and it is unrelated to reciprocity.

THE FREE RIDER PROBLEM

For RT, cooperation requires sanctioning: without rewards and punishments for altruists and non-altruists, respectively, free riding is the only profitable strategy. Because sanctions are necessary in order for coopera-

tion to produce public goods, sanctions themselves are a public good, which presents the problem of second-order free riders (i.e., people who take the benefits of others' sanctioning efforts without helping pay the costs of sanctioning). Even worse, the free rider problem is recursive: the second-order problem could get solved by punishing second-order free riders, but that would require punishing third-order free riders, which would require punishing fourth-order free riders, etc. (Henrich and Boyd 2001; Sober and Wilson 1998). In contrast, CST does not require sanctioning: if pro-community altruism is the self-interested advertisement of desirable qualities instead of the self-sacrificial provisioning of public goods, then there is no free rider problem, and sanctioning is not essential to cooperation. And if cooperation can occur without sanctioning, there are also no higher-order free rider problems. CST thus avoids the free rider problems that bedevil RT.

RT's free rider problems are serious enough to have provoked some researchers to avoid RT in their explanations for the evolution of collective action (Boyd and Richerson 1985; Gintis et al. 2001; Henrich and Boyd 2001). However, it would be premature to rule out RT as an explanation for the high status of pro-community altruists. Several types of scenarios exist in which the administration of positive and/or negative sanctions might be profitable for collective action participants, circumstances that would curtail the infinite regression of the free rider problem.

1. *The Asymmetrical Benefits Model*: The benefits produced by a successful collective action may be distributed unequally among action participants. A potentially highly benefitting participant could motivate fellow participants to contribute to the collective action, thus increasing the chances of collective success, by administering sanctions to them. These sanctions could produce benefits (i.e., resources acquired by the sanctioner as the result of collective success) exceeding the costs of sanctioning. Such circumstances would render sanctioning profitable and free rider problems solved (Tooby and Cosmides 1988).

2. *The Deterrence Model*: A displayed willingness to punish people who act against your interests may function to deter such acts in the future (Daly and Wilson 1988). A punisher of free riders in a collective action could eventually recoup punishment costs by successively convincing observers that if they act contrary to his or her interests in the future (e.g., in dyadic transactions), they will also be punished.

3. *The CST Model*: Sanctioners in collective actions might develop reputations as relatively desirable cooperative partners because their sanctioning behavior signals that they possess some attractive quality (Gintis et al. 2001). Fessler and Haley (in press) suggest that pro-community punishers advertise their support for, and conformity to, community standards for behavior, which makes them attractive potential partners.

4. *The Sanctioning Skills Model*: Sanctioners in collective actions might develop reputations as relatively desirable cooperative partners because of their sanctioning behavior *itself*. If sanctioning is essential to collective success, then people involved in coalition formation should seek proven sanctioners as co-members, for the same reason that baseball team members should be interested in playing with a good pitcher: to improve their coalition's chance of success. If sanctioners are recruited to be members of better (i.e., more elite and productive) and/or more collective actions, these benefits could compensate for the costs of sanctioning. This view is similar to the CST model in that it casts sanctioners as more popular cooperative partners, but it explains the popularity of sanctioners in terms of their sanctioning skills per se (and not in terms of sanctioning being a signal of some other desirable quality).

5. *The Big Man Model*: A leader in a collective action might be sufficiently powerful to individually punish both first- and second-order free riders, thus solving free rider problems for his followers and gaining for himself the benefits of remaining a leader (Price 2002). In a collective action led by someone who is individually powerful enough to punish first-order free riders, all participants gain the benefit of membership in a collective action that is likely to succeed, and in which they will not be disadvantaged relative to free riders. If the benefits of the collective action are equally distributed, however, the leader will receive a lower net benefit because he will have assumed the costs of punishment. But the leader could charge a "tax" for his services; for example, he might agree to provide his punishment service only if every member of the collective action pays him a certain amount of respect. (Ultimately, of course, for this respect to have evolutionary consequences, it would have to afford the leader greater access to resources.) In order for this second-order collective action (the payment of respect to the leader) to succeed, the leader must be individually powerful enough to punish anyone who fails to respect him, thus solving the second-order free rider problem for those who do pay him respect. So a leader who could individually and simultaneously punish first- and second-order free riders could lead a successful collective action in a profitable manner.

PURPOSE AND LOCATION OF THE STUDIES

The purpose of this paper is to determine the extent to which field data from one small-scale society conform to the predictions of RT and CST. Two studies were conducted in a village of Shuar hunter-horticulturalists in the Ecuadorian Amazon. Results from Study One suggest that perceived pro-community altruists are indeed high status, and that villagers

are highly accurate monitors of how much village residents are contributing to the community. Study One also suggests that while status is boosted through engagement in what CST would consider to be opportunities to broadcast one's desirable qualities, this boosting occurs only to the extent that such engagement is perceived as benefitting the community. Results from Study Two suggest that status allocations may help solve the problem of second-order free riders: people who allocate status to pro-community altruists are themselves high status.

The site of the studies was a Shuar village in the Ecuadorian province of Morona Santiago. These villagers are typical Amazonian hunter-horticulturalists, and their most important crops are plantains (*Musa balbisiana*) and sweet manioc (*Manihot esculenta*). Timber sales are a significant source of cash, and cash cropping is of limited but increasing importance. At the time of this study, anthropologists had been working in the study site village for about three years. This village has had contact with Protestant missionaries for several decades, leading to a decline in traditional practices such as polygyny and warfare, and most villagers under age 60 now speak Spanish. Most residents are closely related descendents of two brothers who helped found the village. A KINDEMCOM (Chagnon and Bryant 1984) analysis of a six-generation genealogy revealed the average resident to be a relative of 47% of the other 299 current residents, and to have an average coefficient of relatedness of .045 with all other residents.

STUDY ONE

Are pro-community contributions monitored accurately, and how are they related to social status?

Study One aimed to determine whether social status was positively correlated with engagement in pro-community altruism (a relationship assumed to exist by most practitioners of both RT and CST), and to test the following two predictions:

Prediction 1: *Residents should be accurate mutual monitors of pro-community contributions; in other words, they should accurately assess the extent to which coresidents are engaging in pro-community altruism.* Prediction 1 necessarily follows from RT: residents must be able to assess altruism accurately in order to sanction based on level of contribution to the community. Prediction 1 could also be made by CST, which assumes that pro-community altruistic activities provide excellent broadcasting opportunities because they are widely noticed.

Prediction 2: *Engagement in pro-community activities—in other words, activities providing an opportunity to widely advertise one's desirable qualities, or "broadcast opportunities"—should enhance one's status only to the extent that it*

enhances one's reputation as a pro-community altruist. Prediction 2 is *necessarily* made by RT only. For RT, altruism per se merits status, and so participation in broadcast opportunities should be status-enhancing only to the extent that it enhances the participant's reputation as a pro-community altruist. For CST, in contrast, status is merited not by altruism itself, but by the possession of desirable qualities that, *incidentally*, allow one to benefit the community. There are two main reasons why RT alone necessarily makes Prediction 2:

1. Although CST predicts that people should notice altruistic acts that happen to occur in public-good provisioning contexts, it does not necessarily predict that people should notice the extent to which this provisioning contributes to the collective good. For example, imagine that "Leader" altruistically employs his political skills to benefit a community of which "Admirer" is a member. If, as CST hypothesizes, Admirer respects Leader only because Leader has thus effectively advertised a desirable quality (say, intelligence), then contrary to RT, Admirer's respect should not necessarily depend on noticing the extent of Leader's contribution to the community. For the purpose of deciding how much to respect Leader, Admirer would only have to assess Leader's intelligence, which he or she could presumably do without processing irrelevant information about the extent of Leader's contribution to the public good.
2. Even if, as CST predicts, Leader uses public-good provisioning contexts as opportunities to advertise his intelligence, he could also advertise his intelligence in other contexts (e.g., dyadic interactions). Admirer could respect Leader based on the intelligence displayed by Leader in these other contexts as well. Thus, Leader's intelligence could influence his status beyond the extent to which he advertised it in community-benefiting activities.

However, while Prediction 2 is a necessary prediction only of RT and not of CST, it does not necessarily contradict CST (see discussion below).

Method

Study population: The study population consisted of 25 adult male village residents. All had been elected official "citizens" (*socios*) of the village by other village socios. Male residents normally become socios in their twenties, and in so doing assume certain responsibilities towards the community, for example, the obligation to participate in communal work sessions and meetings. Because most (45 out of 50, or 90%) village socios were males,

and because the small N of 25 made it important to preclude the need to control for sex, all study population members were male, ranging in age from 24 to 58 years old (mean = 38).¹ All subjects were native Shuar speakers but fluent in Spanish, and all interviews were conducted in Spanish.

Measures: Three predictor variables measured the extent to which residents had engaged in pro-community altruism. These were (1) years spent working for the community in a public office (Public Office), (2) attendance record in community meetings and work sessions (Attendance), and (3) perceived work effort in community work sessions (Work Effort). Dependent variables measured the extent to which each resident was perceived by other residents to engage in pro-community altruism in general (Altruism), and the social status of each resident (Status). All variables passed the Shapiro-Wilk test for distribution normality except Public Office; values for the latter were transformed (see below).

Public Office was based on years spent serving the community in a political office or as a school director. Five political offices exist for the benefit of the whole community. They are, in order of prestige and responsibility, *presidente*, *vice-presidente*, *secretario*, *tersero* (treasurer), and *vocal* (*vocales* are responsible for disseminating information about upcoming community events). Officers are elected to one-year terms and are not compensated financially for their service. Another position essential to community well-being is that of school director, who oversees the education of village children. The school director receives some financial compensation for his service, and while he is elected by the community, he does not need to be re-elected every year in order to maintain his position. To measure Public Office, the 25 residents were assigned scores based on the number of years spent in public office, and on the level of responsibility entailed by their position. In order to determine how much responsibility these positions entailed, residents were asked to rank positions based on the question (asked in Spanish): "Which office involves more responsibility and hard work?" Essentially, offices were ranked with the school director position assigned near the top of the hierarchy. Because of high levels of respondent agreement, three subjects were sufficient to achieve a highly reliable ranking (Cronbach's $\alpha = .97$).² On average, the office of *presidente* was perceived to involve the most work and thus merited the highest score of 6 points for each year served. Next came school director (5 points per year), *vice-presidente* (4 points), *secretario* (3 points), *tersero* (2 points), and *vocal* (1 point). Number of years served in each position was determined by asking each resident to recall this information about himself. Public Office was non-normally distributed because many residents had very little political experience, while a few had a great deal. Thus, Public Office values were normalized by square-root transformation.

Attendance was based on the resident's record of attending community work sessions and meetings. During his term, the current president had organized five obligatory community work sessions or *mingas*, which involved outdoor landscaping and maintenance work such as weed-cutting and soccer field upkeep. The president had also organized eight obligatory meetings to discuss community issues. Absent residents were formally sanctioned with a fine of \$2.00 per missed minga and \$0.40 per missed meeting. (Ecuador uses U.S. dollars as its official currency; at the time of the study, \$2.00 was a standard day's wages in this part of the Amazon.) Attending a minga or meeting involved a nontrivial sacrifice (they generally last for the entire workday), and willingness to make this sacrifice was closely monitored in the written attendance records of the village secretario. Present residents were recorded as *presente*, absentees as *falta*, and excused absentees (due to illness or injury) as *justificado*. Attendance was based on these attendance records: 2 points were assigned for each "presente," 0 points for each "falta," and a neutral score of 1 point for each "justificado." Attendance records were available for 13 mingas and meetings, so a perfect attendance record would score 26. Attendance was normally distributed and ranged from 8 to 26 (mean = 18.7, s.d. = 4.7).

Work Effort measured how hard residents were perceived to work in mingas. Minga work effort is distinct from minga attendance because one could attend a minga but not work hard. Work Effort was measured by asking community members to rank residents according to how hard they worked in mingas, using a binary comparison pile sort technique in which each resident was compared with one other resident until a complete ranking of all residents had been achieved (see Appendix for details). Nine respondents ranked the 25 socios in response to the question (asked in Spanish), "Which of these two men works harder and faster when they are working in community mingas?" Each resident's Work Effort score was the average ranking that he was given by the nine subjects, coded so that greater values indicate greater perceived work effort. Because of high levels of agreement among subjects, Work Effort had high inter-rater reliability (Cronbach's $\alpha = .94$). How one's work effort is perceived by others reliably indicates one's actual work effort: Price, Barrett, and Hagen (under review) found that in mingas of Shuar sugarcane cultivators, perceived industriousness correlated highly with actual industriousness ($r = .79, p < .01$; actual industriousness was measured by scan sampling the number of machete swings made over the course of six mingas).

To measure Altruism, residents were ranked, using the pile sort method described above, based on responses to the question (asked in Spanish), "Which of these two men does more, in general, to help the community?" Nine community members provided Altruism rankings for the 25 socios. Each resident's Altruism score was the average ranking that he was given

by the nine subjects, coded so that greater values indicate greater perceived altruism. Altruism had high inter-rater reliability (Cronbach's $\alpha = .95$).

To measure Status, residents were ranked, using the pile sort method described above, based on responses to the question (asked in Spanish), "Which of these two men is more respected by the people of the village?" Nine community members provided Status rankings for the 25 socios. Each resident's Status score was the average ranking that he was given by the nine subjects, coded so that greater values indicate greater status. Status had high inter-rater reliability (Cronbach's $\alpha = .97$).

Results

As many proponents of both RT and CST assume, perceived engagement in pro-community altruism was highly correlated with social status: the r between Altruism and Status was $.87$ ($p < .001$; all p values are 1-tailed).

The three measures of engagement in specific pro-community altruistic activities were largely orthogonal, each with a tolerance close to 1.0 (Public Office = $.98$, Attendance = $.96$, Work Effort = $.97$);³ thus each appeared to measure a discrete altruistic activity. Multivariate linear regression was used to assess the influence of Public Office, Attendance, and Work Effort on Altruism. The results are summarized in Table 1. The three predictors together explained significant variance in Altruism ($R = .88$, R^2 -adj = $.75$, $p < .001$). Each predictor explained a significant component of this variance (part [semi-partial] r values: Public Office = $.75$, $p < .001$; Attendance = $.39$, $p < .001$; Work Effort = $.34$, $p = .001$),⁴ which, like the tolerance statistic, indicates high predictor orthogonality. Thus, residents appeared to be highly skilled monitors of altruism: their perceptions of individual engagement in *general* pro-community altruism were highly correlated with more objective, *specific* measures of such engagement.

Together, the three predictors also explained significant variance in Status ($R = .82$, R^2 -adj = $.63$, $p < .001$), and each explained a significant or nearly significant portion of this variance (part r values: Public Office = $.79$, $p < .001$; Attendance = $.20$, $p = .06$; Work Effort = $.22$, $p < .05$). However, the

Table 1. Relationship of Predictors with Altruism and Status

Predictor	r with Altruism	Part r with Altruism	r with Status	Part r with Status	Tolerance
Public Office	.679***	.746***	.757***	.791***	.980
Attendance	.351*	.385***	.138	.204	.955
Work Effort	.371*	.344**	.209	.218*	.970

* $p < .05$, ** $p < .01$, *** $p < .001$

predictors influenced Status mainly to the extent that they influenced Altruism: a hierarchical linear regression was conducted, with Altruism entered at step one, Public Office, Attendance, and Work Effort entered together at step two, and Status as the dependent variable (see Table 2). After controlling for the effects of Altruism on Status, the additional variance in Status explained by the other three predictors (as a group) was slight and did not quite achieve significance: while Altruism explained 75% of the variance in Status ($R^2\text{-adj} = .75$), Public Office, Attendance, and Work Effort together accounted for an additional 3% of the variance in Status ($\Delta R^2\text{-adj} = .03, p \text{ of } \Delta = .07$).

Further, these three predictors failed to explain additional significant variance in Status not just as a group, but also individually. When these three predictors and Altruism were all entered together into the model in the same step, only Altruism explained significant unique variance in Status (part r values: Altruism = .37, $p < .001$; Public Office = .11, $p = .13$; Attendance = .07, $p = .23$; Work Effort = .04, $p = .34$). These results indicate that Public Office, Attendance, and Work Effort explained so much variance ($R^2\text{-adj} = .63$) in Status because they explained even more variance ($R^2\text{-adj} = .75$) in Altruism.

STUDY TWO

Could status allocations solve second-order free rider problems?

As noted above, RT must confront the problem of second-order free riding. If positive and/or negative sanctions enable collective success, then sanctions themselves are a second-order public good. Why should anyone assume sanctioning costs instead of free riding on the sanctioning efforts of others? This problem's solution is not presently well understood, but there are several plausible scenarios (described in detail above) in which accepting the costs of sanctioning could ultimately prove profitable. However, regardless of exactly *how* sanctioners profit, if they *do* profit (say, by

Table 2. Stepwise Linear Regression of Status on Predictor Variables

Step	Variables Added	R	R ²	R ² -adj	ΔR ²	ΔR ² -adj	ΔF	p of ΔF
1	Altruism	.869	.756	.745	.756	.745	71.155	<.001
2	Public Office Attendance Work Effort	.902	.813	.776	.058	.031	2.055	.069

Note: R, R², and R²-adj are cumulative, and ΔR², ΔR²-adj, and ΔF denote change with step addition.

achieving high social status), then RT's free rider problems could be solved, and RT could stand as a viable explanation for the high status of pro-community altruists.

The goal of Study Two was to look for the evidence for the profitability of sanctioning by testing the following prediction: *Sanctioners in the study village—in other words, people who assume the cost of paying respect to the most altruistic member of the community—should themselves be allocated more respect.* This is a straightforward prediction of RT because RT creates a second-order free rider problem requiring sanctioner compensation. It is not, however, a prediction of CST because CST circumvents all free rider problems and does not require sanctioning, let alone sanctioner compensation.

Method

Study population: Same as Study One, except that 24 instead of 25 residents were ranked in the Respect for Altruist pile sort. This reduction was necessary in order to avoid asking subjects how much the altruist respected himself.

Measures: The predictor variables were the extent to which each resident was perceived to respect the highest-ranked pro-community altruist (Respect for Altruist), and the extent to which each resident was perceived to engage in pro-community altruism (Altruism, from Study One). The dependent variable was each resident's social status (Status, from Study One). All variables passed the Shapiro-Wilk test for normality of distribution.

To measure Respect for Altruist, I used the same pile sort technique described above. Residents were ranked in response to the question (asked in Spanish), "Which of these two men has more respect for the President of the community?" The President's Altruism score was the highest in the community: his average ranking was 1.2, and eight out of nine subjects ranked him highest. Respondents said that they based their Respect for Altruist rankings on, for example, who most often voiced support for the President's proposals at community meetings, and who most actively cooperated in events organized by the President. Nine community members provided Respect for Altruist rankings for 24 residents. Each resident's Respect for Altruist score was the average ranking that he was given by the nine subjects, coded so that greater values indicate greater perceived respect for the Altruist. Respect for Altruist had high inter-rater reliability (Cronbach's $\alpha = .90$).

Result

Sanctioners appeared to be highly respected in the community: Respect for Altruist was highly correlated with Status ($r = .67, p < .001$).

DISCUSSION

Study One

Most practitioners of RT and CST assume that perceived pro-community altruists will be high status, and Study One results suggest that this assumption is safe: the more a resident was perceived to deliver benefits to the community, the more respected he was. Study One also showed residents to be highly skilled at monitoring the extent to which others were, in general, contributing to the community: residents' perceptions of general pro-community altruism were highly correlated with more objective and specific measures of engagement in pro-community activities. RT necessarily predicts this result because in order to sanction based on level of contribution to the community, this level must be assessed accurately. This result could also be a prediction of CST, which assumes that pro-community altruistic activities provide excellent broadcasting opportunities because they are widely noticed.

Study One showed that engagement in public service, and attendance and effort in community work sessions, had positive effects on social status. However, participation in these activities—activities that CST would regard as opportunities to broadcast one's desirable qualities—explained significant variance in one's status only to the extent that they explained variance in how much one was perceived to be contributing in general to community well-being. This result is a necessary prediction of RT alone, because only RT regards pro-community altruism per se as meriting status. In contrast, CST might expect participation in these broadcast opportunities to correlate positively with status, not because these activities are seen as being pro-community but because they signal some desirable quality. For example, working hard in mingas (Work Effort) might signal physical vigor or industriousness; regularly attending mingas and meetings (Attendance) might signal diligence or reliability; being elected frequently to political office (Public Office) might signal popularity, dominance, intelligence, or any number of other socially desirable qualities. If these broadcast opportunity activities were related to status because they signaled such desirable qualities, and not just because they were perceived as being pro-community activities, then they could have explained significant variance in status that was different than that explained by perceived engagement in general pro-community altruism.

But the broadcast opportunity predictors did not explain such additional variance in status, and there are two kinds of reasons (discussed in more detail above) for why this result is more straightforwardly predicted by RT than CST. First, if community members attuned to costly signal broadcasts in public-good provisioning contexts are only interested in whatever desirable qualities the signaler is advertising, they could pre-

sumably evaluate these desirable qualities without processing irrelevant information about the extent of the signaler's contribution to the public good. Second, the desirable qualities advertised by a signaler in public-good provisioning contexts could be observable in other types of contexts as well; thus, these qualities should not necessarily influence status only to the extent that they are advertised in community-benefitting activities.

However, this result—the failure of the broadcast opportunity predictors to explain significant variance in status beyond what was already explained by perceived altruism—is not necessarily inconsistent with CST. It could be true that in Study One, residents who observed acts of pro-community altruism were primarily interested in the costly signals that these altruists were broadcasting about their own desirable qualities, that the information contained in these signals was available only in these public-good provisioning contexts, and that in the process of receiving these broadcasts, residents were also, for whatever reason, noticing the extent to which broadcasters were benefitting the community. If residents attuned to costly signaling broadcasts were concurrently assessing the degree to which signalers happened to be benefitting the community, then this would confound two variables (broadcast of desirable qualities, and delivery of benefits to the community), which could explain why one's engagement in broadcast opportunities explained variance in status mainly to the extent that it predicted one's reputation as an altruist. If so, then this result would be consistent with CST.

Study Two

Study Two demonstrated a correlation between *having* respect for an altruist and *being* respected. This correlation supported the RT prediction that sanctioners (in this case, people paying respect to pro-community altruists) are compensated for assuming these sanctioning costs. Several plausible scenarios (outlined above) could render sanctioning profitable without creating an infinite number of new, higher-order free rider problems. Study Two results do not specify which of the above-outlined scenarios (if any) actually do describe the process by which sanctioners acquired status, but these results are consistent with the notion that the problem of compensating sanctioners is getting solved somehow. If sanctioning is profitable in a way that liberates RT from higher-order free rider problems, then RT could explain why people engage in pro-community altruism in the first place.

If sanctioning were profitable in a way that precluded infinite recursion in the free rider problem, then not only would this allow RT to explain pro-community altruism, it would help explain why sanctioning sentiments and behaviors are so commonly observed in both experimental and survey studies (e.g., Fehr and Gächter 2002; Gintis 2000; Price, Cosmides, and

Tooby 2002) and also in everyday life. Positive and negative sanctioning based on contribution to a collective action is typical, widespread, and predicted by RT. CST, however, does not predict such sanctioning, because it does not predict free rider problems in the first place.

CONCLUSION

Studies One and Two analyzed the high status of pro-community altruists in light of CST and RT, two alternative explanations for this phenomenon. Both CST and RT were supported by at least one of the results of these studies, but other results were predicted more directly, or solely, by RT:

- The finding that villagers are very accurate monitors of the pro-community contributions of others is a straightforward prediction of RT (because sanctions based on such contributions require skilled monitoring) and could also be a prediction of CST (because pro-community altruistic activities provide excellent broadcasting opportunities only if they are widely noticed).
- The finding that engagement in opportunities to broadcast desirable qualities enhanced one's status only to the extent that it enhanced one's reputation as a pro-community altruist is a straightforward prediction of RT (because for RT, altruism itself merits status), but not CST (because for CST, altruism merits status not in and of itself, but only because it could incidentally signal the altruist's possession of attractive qualities). However, for reasons discussed above, this finding does not necessarily contradict CST.
- The finding that sanctioners (those paying respect to the most highly ranked pro-community altruist) are themselves relatively high status is consistent with the notion that sanctioners are compensated. This is a straightforward prediction of RT (which creates a second-order free rider problem requiring sanctioner compensation), but not CST (which circumvents all free rider problems).

Finally, consider Forrest Gump, the 1994 movie protagonist widely admired for his perceived altruism and decency, despite his apparent low intelligence. Gump's status was likely due less to underlying qualities (e.g., good genes) and more to his altruism itself. If people are capable of avoiding higher-order free rider problems and engaging in cooperative sanctioning, then a status-for-altruism reciprocal transaction could also explain why people are sometimes motivated to engage in pro-community altruism. Additional tests between CST and RT would help in adjudicating between these two theories as explanations for status allocations in collective action contexts.

Thanks to members of our host Shuar community for their friendship and cooperation, without which this research could not have occurred. The content of this paper was greatly influenced by conversations with Clark Barrett, Leda Cosmides, Ed Hagen, and John Tooby. I also thank Rob Boyd, Don Brown, Nancy Collins, Jade Gibson, David Price, Don Symons, and the students in Tooby and Cosmides's lab group. This research was funded by a Jacob K. Javits Fellowship from the U.S. Department of Education.

Michael Price has a B.A. in psychology from Duke University and is a Ph.D. candidate in biosocial anthropology at UC Santa Barbara and an affiliate of the UCSB Center for Evolutionary Psychology. His research, which focuses on the human psychological adaptations that enable collective action participation, has been conducted among Venezuelan Yanomamö, Ecuadorian Shuar, and California undergraduates.

NOTES

1. Age was determined by referencing each resident's state-issued ID card or birth certificate. If these sources were unavailable, self-reported ages were cross-checked through comparison to known ages of other individuals, and interpolation based on birth order.

2. Cronbach's α assesses how well a set of variables measures a single unidimensional latent construct and is used here to assess how well raters agree with each other. Cronbach's α increases with both the correlation among inter-rater assessments and the number of items being rated. In the social sciences, an α of .80 or above is usually considered acceptable.

3. Tolerance is the percentage of variance in a predictor that is unexplained by other predictors in the model.

4. A part (semi-partial) r is the correlation between a predictor and a dependent variable after controlling for all other predictors in the model—in other words, the variance in a dependent variable that is uniquely explained by a predictor.

APPENDIX

The binary comparison pile sort technique was as follows. First, I would randomly select two photographs, place them on a table, and ask the subject (in Spanish) the relevant question for whatever variable I was measuring. For example, to measure Work Effort, the question was "Which of these two men works harder and faster when they are working in community mingas?" The photo of the perceived faster worker would be placed to the right of that of the perceived slower worker. Next, I would present a new photograph and ask the subject to compare it with *one* of the two photographs already on the table (again, selected at random). If the subject replied that the new person worked faster than the previously chosen fast worker, the new photo would be placed to the right of both photos. If the subject replied that the new person worked slower than the

previous workers, the new photo would be placed to the left of both photos. If the subject replied that the new person worked faster than the slower already-sorted person, I would ask the subject to compare the new person with the faster already-sorted person, and then I would know whether to place the new person to the left or right of the faster already-sorted person. The sorting process continued in this fashion, with each newly presented person being compared with one already-sorted person at a time until I was able to determine how each subject thought all of the residents ought to be ranked. This method of binary comparison, while time-consuming, broke the ranking process down into relatively simple cognitive tasks of individual-against-individual comparisons.

REFERENCES CITED

- Alexander, R. D.
 1987 *The Biology of Moral Systems*. Hawthorne, New York: Aldine de Gruyter.
- Bliege Bird, R. L., E. A. Smith, and D. W. Bird
 2001 The Hunting Handicap: Costly Signaling in Human Foraging Strategies. *Behavioral Ecology and Sociobiology* 50:9–19.
- Boone, J. L.
 1998 The Evolution of Magnanimity: When Is it Better to Give than to Receive? *Human Nature* 9:1–21.
- Boyd, R., and P. J. Richerson
 1985 *Culture and the Evolutionary Process*. Chicago: University of Chicago Press.
 1992 Punishment Allows the Evolution of Cooperation (Or Anything Else) in Sizable Groups. *Ethology and Sociobiology* 13:171–195.
- Chagnon, N.
 1988 Life Histories, Blood Revenge, and Warfare in a Tribal Population. *Science* 239:985–992.
- Chagnon, N., and J. R. Bryant
 1984 *Kindemcom: The Fourth Style in the Study of Human Kinship Relationships*. New York: Harry Guggenheim Foundation.
- Daly, M., and M. Wilson
 1988 *Homicide*. Hawthorne, New York: Aldine de Gruyter.
- Fehr, E., and S. Gächter
 1998 Reciprocity and Economics: The Economic Implications of *Homo reciprocans*. *European Economic Review* 42:845–859.
 2000a Cooperation and Punishment in Public Goods Experiments. *American Economic Review* 90:980–994.
 2000b Fairness and Retaliation: The Economics of Reciprocity. *Journal of Economic Perspectives* 14:159–181.
 2002 Altruistic Punishment in Humans. *Nature* 415:137–140.
- Fehr, E., and K. M. Schmidt
 1999 A Theory of Fairness, Competition, and Cooperation. *Quarterly Journal of Economics* 114:817–868.

Fessler, D. M. T., and K. J. Haley

in press The Strategy of Affect: Emotions in Human Cooperation. In *Genetic and Cultural Evolution of Cooperation*, P. Hammerstein, ed. Cambridge: MIT Press.

Gintis, H.

2000 Strong Reciprocity and Human Sociality. *Journal of Theoretical Biology* 206:169–179.

Gintis, H., E. A. Smith, and S. Bowles

2001 Cooperation and Costly Signaling. *Journal of Theoretical Biology* 213:103–119.

Curven, M., W. Allen-Arave, K. Hill, and A. M. Hurtado

2000 “It’s a Wonderful Life”: Signaling Generosity among the Ache of Paraguay. *Evolution and Human Behavior* 21:263–282.

Hawkes, K.

1991 Showing Off: Tests of Another Hypothesis about Men’s Foraging Goals. *Ethology and Sociobiology* 11:29–54.

1992 Sharing and Collective Action. In *Evolutionary Ecology and Human Behavior*, E. A. Smith and B. Winterhalder, eds. Pp. 269–300. New York: Aldine.

1993 Why Hunter-Gatherers Work—An Ancient Version of the Problem of Public Goods. *Current Anthropology* 34:341–361.

Hawkes, K., J. F. O’Connell, and N. G. Blurton-Jones

2001 Hadza Meat Sharing. *Evolution and Human Behavior* 22:113–142.

Henrich, J., and R. Boyd

2001 Why People Punish Defectors: Weak Conformist Transmission Can Stabilize Costly Enforcement of Norms in Cooperative Dilemmas. *Journal of Theoretical Biology* 208:79–89.

Henrich, J., and F. Gil-White

2001 The Evolution of Prestige: Freely Conferred Deference as a Mechanism for Enhancing the Benefits of Cultural Transmission. *Evolution and Human Behavior* 22:165–196.

Hirshleifer, D., and E. Rasmusen

1989 Cooperation in a Repeated Prisoners Dilemma with Ostracism. *Journal of Economic Behavior and Organization* 12:87–106.

Marlowe, F.

1999 Showoffs or Providers: The Parenting Effort of Hadza Men. *Evolution and Human Behavior* 20:391–404.

Milinski, M., D. Semmann, and H. Krambeck

2002 Reputation Helps Solve the “Tragedy of the Commons.” *Nature* 415:424–426.

Neiman, F. D.

1998 Conspicuous Consumption as Wasteful Advertising: A Darwinian Perspective on Spatial Patterns in Classic Maya Terminal Monument Dates. In *Rediscovering Darwin: Evolutionary Theory and Archaeological Explanation*, C. M. Barton and G. A. Clark, eds. Pp. 267–290. Archaeological Papers of the American Anthropological Association, No. 7. Washington, D.C.

Olson, M.

1965 *The Logic of Collective Action: Public Goods and the Theory of Groups*. Cambridge: Harvard University Press.

Ostrom, E., J. Walker, and R. Gardner

1992 Covenants with and without a Sword: Self-governance Is Possible. *American Political Science Review* 86:404–417.

Patton, J. Q.

2000 Reciprocal Altruism and Warfare: A Case from the Ecuadorian Amazon. In *Adaptation and Human Behavior: An Anthropological Perspective*, L. Cronk, N. A. Chagnon, and W. Irons, eds. Pp. 417–436. New York: Aldine de Gruyter.

Price, M. E.

2002 Adaptations for Collective Action Participation. Paper presented for the Behavior, Evolution and Culture Speaker Series, December 2, University of California, Los Angeles.

Price, M. E., L. Cosmides, and J. Tooby

2002 Punitive Sentiment as an Anti-Free Rider Psychological Device. *Evolution and Human Behavior* 23:203–231.

Price, M. E., H. C. Barrett, and E. H. Hagen

n.d. Collective Action and Punishment in the Ecuadorian Amazon. Submitted to *Evolution and Human Behavior*.

Sato, K.

1987 Distribution of the Cost of Maintaining Common Resources. *Journal of Experimental Social Psychology* 23:19–31.

Smith, E. A., and R. L. Bliege Bird

2000 Turtle Hunting and Tombstone Opening: Public Generosity as Costly Signaling. *Evolution and Human Behavior* 21:245–261.

Sober, E., and D. S. Wilson

1998 *Unto Others: The Evolution and Psychology of Unselfish Behavior*. Cambridge: Harvard University Press.

Sosis, R.

2000 Costly Signaling and Torch Fishing on Ifaluk Atoll. *Evolution and Human Behavior* 21:223–244.

Tooby, J., and L. Cosmides

1988 *The Evolution of War and Its Cognitive Foundations*. Institute for Evolutionary Studies Technical Report 88-1. Reprinted in *Evolutionary Psychology: Foundational Papers*, Cambridge: MIT Press, forthcoming.

Yamagishi, T.

1986 The Provision of a Sanctioning System as a Public Good. *Journal of Personality and Social Psychology* 51:110–116.

1988a The Provision of a Sanctioning System in the United States and Japan. *Social Psychology Quarterly* 51:265–271.

1988b Seriousness of Social Dilemmas and the Provision of a Sanctioning System. *Social Psychology Quarterly* 51:32–42.

1992 Group Size and the Provision of a Sanctioning System in a Social Dilemma. In *Social Dilemmas: Theoretical Issues and Research Findings*, W. Liebrand, D. Messick, and H. Wilke, eds. Pp. 267–287. Oxford: Pergamon Press.

