this distinguished group of scholars. Some scholars have not taken experimental research seriously because college students are frequently the subjects recruited for study. Since I have spent more time conducting field research than experiments, the greater internal validity of experimental research has been for me a complement to the external validity my colleagues and I have achieved from field research. In our extensive research program on common-pool resources, one of our core strategies has been to go back and forth between field and laboratory research in an effort to understand what conditions enhance the likelihood of participants actually contributing to the sustainability of common-pool resources (see Gardner et al. 2000; Ostrom et al. 1994).

Therefore, it is encouraging that the findings reported in the target article from experiments conducted with residents of small-scale societies in many parts of the world are consistent with laboratory experiments conducted in a mid-western university (Ostrom & Walker 2003; Walker et al. 1990), as well as with parallel field experiments in Colombia (Cardenas 2000; Cardenas et al. 2000).

What is now well established from all of this research is that the narrow model of "economic man" is not a good foundation to explain behavior outside of open competitive markets. Scholars should no longer presume that individuals seek *only* short-term, material benefits for themselves in either experimental or field settings outside of competitive markets. We must not assume, however, that all individuals seek benefits for others, contribute to collective benefits, and thus are always "good guys." Individuals are capable of learning to trust others and to follow norms of reciprocity, but there are some individuals in every culture who are well modeled by the construct *Homo economicus*.

Individuals, who want to achieve collective objectives over time, must find a wide variety of institutional mechanisms that enable them to create fair rules of contribution and distribution and ways of monitoring people's contributions without squelching cooperation by overmonitoring. Without these mechanisms, a few individuals can begin to grab benefits, and levels of trust and cooperation can plummet rapidly.

The findings of the target article are particularly important for building better institutional theories. Until recently, the microfoundation for the theoretical study of institutions and incentives has been the canonical model of selfish individuals. With this model, one predicts that no one will cooperate in providing a public good (Olson 1965) or protecting a common-pool resource (Hardin 1968).

The tragedy of the commons does indeed occur in some settings. It has taken several decades of extensive field and experimental studies to show, however, that the tragedy of the commons is not a *necessary* outcome when resources are owned by a small community rather than by national governments or private owners. The real tragedy has been that so many scholars have assumed that individuals facing the problems of providing public goods or protecting common-pool resources were helpless and trapped in ongoing social dilemmas. When using the assumptions of selfish and trapped individuals, only one solution is proposed – to impose rules by external authorities. The preferred rules vary from those of central ownership to those of private ownership. The process of solving these problems, however, is always perceived to be in the hands of government officials. Those government officials are presumed to be acting in the public interest – contrary to the canonical assumption of economic man. The basic contradiction of modeling citizens as selfish and helpless while modeling public officials as all knowing and striving for the public interest is overlooked in the literature calling on the government to impose solutions for social dilemma problems.

With the accumulation of evidence of greater other-regarding behavior than previously assumed, it is now possible to build institutional theories on a more complex, but realistic foundation recognizing that individual humans seek multiple goals, including their own immediate material well-being as well as outcomes of benefit to others in their family, firm, community, and broader society (North 2005; Ostrom 2005).

Unfortunately, some readers have concluded from earlier reports of the target study that another primary foundation for explaining behavior exists – culture. Although it is extremely important that all social scientists recognize the importance of culture, it is also important that we recognize the creativity of humans and their adaptability. The studies reported on in the target article are all from small-scale communities. One can assume that in such communities, individuals facing repeated needs for cooperative efforts develop norms of reciprocity that facilitate gaining joint benefits. It is essential that scholars should not view culture as in itself an iron box determining outcomes.

Shared beliefs provide a broad environment in which individuals – if given opportunity and time – innovate and create rules for relating to one another, rules that enable them to build trust and the norms of reciprocity for solving problems of providing public goods and protecting common-pool resources. The culture of the whale hunters of Lamalera in Indonesia did not simply occur. Their high level of reciprocity evolved as members of hunting crews solved practical problems of dividing a catch, so that those who were directly or indirectly responsible for success were benefited and would contribute again in the future.

Henrich et al.'s important work on cultural evolution complements and extends the findings from biological evolution, and needs to be complemented by a more self-conscious awareness of institutional evolution. As individuals create the rules and norms affecting their rights and duties, they are creating new social environments that either foster or detract from the establishment and the evolution of productive societies.

Making it real: Interpreting economic experiments

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Abstract: The relationship between game play and naturalistic cooperation, generosity, or market involvement is ambiguous at best, making it difficult to link game results to preferences and beliefs guiding decision-making in daily life. Discounting reputation-based explanations because the games are anonymous, while arguing that game play is guided by motivational structures or framing effects reflecting daily life, is inconsistent.

Findings that people's choices in economic experiments often deviate substantially from those that would maximize their immediate material payoffs have generated substantial rethinking of the postulates of human decision-making. The work Henrich and colleagues have done in extending these methods to small-scale societies in many different cultural and ecological contexts is of great value, particularly to those of us concerned with the effects of cultural variation, ecological adaptation, and social interaction in shaping human behavioral variation. Now that some fairly extensive results are available, we are faced with the challenging and contentious task of formulating a new consensus. My comments on the target article, and on this broader challenge, focus on two related issues: (1) How do we interpret the relationship between experimental findings and real-world social behavior? (2) What are the implications of these findings for current theories of behavioral adaptation?

Relation to daily life. The advantage of experiments over naturalistic observation is that the researcher can control for various factors that might influence outcomes, and thus hope to arrive at a clearer understanding of the effects of various hypothesized determinants. The disadvantage is that the "ecological validity" or relevance of the experiment to naturalistic contexts can be questioned. If the experimental results are not simply artifacts, we have to ask what they really mean. A plausible hypothesis is that play in

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the games reflects daily life – that, as the authors put it, "experimental play often reflects patterns of interaction found in everyday life," and more specifically that variation in "market integration and the local importance of cooperation explain a substantial portion of the behavioral variation between groups" (sect. 1, para. 4).

Yet, data on the study populations published elsewhere reveal enough discrepancies to call these generalizations into question:

1. Among the Hadza, the only significant predictor of UG (ultimatum game) offers is camp size: the modal offer is 50% in large camps versus 20% in small camps (Marlowe 2004a, p. 179ff). Yet food sharing between households is greater in small camps than in large ones. So "generosity" in the UG is inversely related to real-life food sharing, something inconsistent with the target article conclusion but consistent with a signaling or reputation-based interpretation.

2. In the Conambo community, members of the Achuar coalition make much higher UG offers (mode = 50%) than do members of the Quichua coalition (25%). The target article ranks Achuar and Quichua as having identical "payoffs to cooperation" and very similar "aggregate market integration" (Fig. 5). The two coalitions do not differ in their frequency of between-household sharing of game, nor in the imbalance of such sharing (Patton 2004, p. 119). They do differ in the stability of the coalitions, which Patton argues explains the observed differences in UG offers, as well as the fact that among the Achuar (but not Quichua) higher status men share meat more widely (which Patton interprets as an alliance-building strategy). More recent data indicate that a reversal in coalition stability has led to a corresponding shift in relative generosity in game play, reinforcing this interpretation (Patton, personal communication).

3. Among the Tsimane, the five villages studied differ in closeness to market towns; although village membership is the best predictor of UG offers, the villages closer to town made smaller UG offers, contrary to the "market integration" hypothesis (Gurven 2004a). After analyzing a number of variables in relation to UG and PGG (public goods game) play, Gurven concludes that little "can be attributed to market exposure or acculturation, and the few differences that exist do not support the notion that exposure to modern markets produces game behavior similar to that found in the west" (Gurven 2004a, p. 217).

4. There is no relationship between generosity in the UG or the PGG and empirical data on food sharing between Ache individuals or households (Hill & Gurven 2004).

5. Neither the Tsimane (Gurven 2004a) nor the Ache (Hill & Gurven 2004) show any correlation between individual play in the UG versus the PGG.

6. The two New Guinea villages studied by Tracer (2004) differ substantially in degree of market integration, but UG offers do not differ significantly. Yet at the individual level, greater wealth, larger cash-crop gardens, and a history of wage labor, were all associated with higher UG offers.

These patterns suggest that generalizations regarding market integration and payoffs to cooperation are at best only part of the story; it is hard to see how the cross-cultural patterns claimed in the target article (which are based on subjective estimates of "market integration" and "payoffs to cooperation") could be very robust when so many of the within-society findings fail to find such patterns – even between different communities of the same culture.

Theoretical Implications. The "canonical model" of rational self-interest may still hold sway in much of economics and closely allied fields, but those of us with a more evolutionary approach to decision-making have a different take on this topic. First, "self-interest" is trumped by inclusive fitness considerations whenever the effects of one's actions alter the fitness of close relatives (Hamilton 1964) or well-defined sets of relatives even if not all are close (Jones 2000). Second (and more germane to the experimental findings), actions that sacrifice short-term self interest can be shown to be favored in various evolutionary regimes if they establish reputations (Hirshleifer 1987; Frank 2001; Milinski et al. 2002; Panchanathan & Boyd 2004), serve as commitment devices (Hirshleifer 2001; Irons 2001; Sosis & Alcorta 2003), or function as honest signals of underlying quality (Bliege Bird & Smith 2005; Boone 1998; Gintis et al. 2001). All of these strategic devices could be effective in attracting allies or discouraging competitors, thus recouping the short-term costs of providing public goods or engaging in costly enforcement of norms.

The hypothesis that reputation management is an important motivation for cooperation, generosity, and punishment of selfishness could account for at least some of the experimental results. For example, the target article notes that "the Tsimane and Machiguenga live in societies with little cooperation, sharing or exchange beyond the family unit. Ethnographically, both groups demonstrate little fear of social sanctions and seem to care little about local opinion" (sect. 8, para. 6). Indeed, several of the coauthors of the target article have proposed reputation-based explanations for the experimental results in the societies in which they work (see works cited above, as well as Alvard 2004; Gurven 2004b; Marlowe 2004b; Patton 2005; Tracer 2003).

However, other researchers cite experimental conditions (degree of anonymity, one-shot vs. repeated games) as evidence that reputation cannot explain the generosity exhibited in these and other studies (e.g., Bowles & Gintis 2003; Fehr & Henrich 2003; but see Haley & Fessler 2005 for a counterview). Because players do not maximize material payoffs from game play, alternative motivational structures (other-regarding, prosocial, strong reciprocity) are postulated to guide social interactions, and a history of group selection (cultural or genetic) is proposed to explain why these motivational structures exist (e.g., Bowles & Gintis 2003; Fehr & Fischbacher 2003; Gintis et al. 2003; Richerson et al. 2003).

I don't see how one can have it both ways: experimental conditions (e.g., anonymity, one-shot play, no opportunities for reputation management) strictly define the payoffs, but motivational structures or framing effects reflect daily life (market exposure, quotidian forms of collective action, etc.). This is the implicit argument in the target article's critique of the canonical model (or any self-interest based interpretation of the experimental results), yet it is internally inconsistent. If "individuals in experiments bring the preferences and beliefs that they have acquired in the real world into the decision-making situation" (sect. 9, para. 9), how is it that they cannot be guided by reputation issues because they are playing anonymously? I would like to see the authors' response address this discrepancy.

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Sociality and self interest

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Abstract: Selfishness narrowly defined as choosing dominant outcomes independent of context is widely rejected by experimentalists. Humans live in two worlds of personal and impersonal exchange; both are manifestations of human sociality, but the emphasis on preferences rather than cultural norms of personal exchange across time too much reflects a limited economic modeling, and fails to capitalize on the fresher experimental economics message of culture and diversity.

Economic theory is traditionally about proving theorems, not about studying economic behavior in a species whose largely autonomic sociality is as impressive as its intentional use of reason. The Scottish philosophers (e.g., David Hume, Adam Smith) understood that humans and their institutions achieve unintended ends, but somehow their ingenious discoveries got mislaid in our anthropocentric preoccupation with Cartesian logic (Smith 2003).

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