Knowledge of each individual's need, the level of producer control, or relative power levels will not be sufficient by itself to estimate the probability that food will be transferred; one also requires knowledge of the costs involved in defending the food item.

Key variables in tests of food sharing

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Abstract: Gurven discusses three key features of food sharing, specifically producer control, need, and contingency. I make two general points regarding the use of these variables in tests of food-sharing hypotheses. First, that these variables are relative, not absolute concepts; and second, that the predictions generated from these variables overlap significantly. In addition, I suggest frequency of sharing as a measure of contingency for the RA hypothesis.

In the long-standing debate over the function of food sharing, many of us investigating these issues in the field have come to recognize that multiple explanations are needed to account for the variety of food-sharing patterns observed among hunter-gatherer horticultural groups. Past attempts at resolving questions of food sharing have focused on testing different hypotheses, specifically costly signaling (CS), tolerated scrounging (TS), kin selection (KS), and reciprocal altruism (RA), for a single society. Gurven's approach is novel in that he looks at the various hypotheses together using multivariate models. Here he considers all the available evidence on patterns of food sharing in the ethnographic record and how this evidence plays out against the different hypotheses.

Three key features of food sharing are highlighted. For the sake of clarification I summarize below the four hypotheses for food sharing with respect to these key variables:

CS = no producer control + no need + no contingency
TS = no producer control + need + no contingency
KS = producer control + need + no contingency
RA = producer control + need + contingency

I would like to discuss two points here, the first relating to the relative nature of these key variables and a corresponding suggestion I have regarding the measurement of contingency, the second relating to the predictions generated from these variables.

First, I would like to emphasize that these key variables are relative, not absolute concepts. For example, producer control is not likely to be strictly present or absent. Control over distribution is probably more accurately considered as a range of control that may vary across time and circumstances, as Gurven acknowledges when discussing the ethnographic evidence. In addition, the absolute amount exchanged between households is likely to be a weak indicator of contingency because reciprocity should function according to marginal values (Winterhalder 1996). As such, in testing the RA hypothesis, I propose that the frequency of sharing events between households is a better measure of contingency than actual amounts exchanged. If a key component of RA is the expectation that a recipient today will return the favor in the future, then individuals may signal or reinforce their intention to cooperate by frequent episodes of sharing, even if they have little to give each time.

The second point is that the predictions generated from these key variables overlap even more than Gurven acknowledges. For instance, widespread sharing in the complete absence of producer control (or the abandonment of control that *could* exist) points clearly to costly signaling, however, TS, KS, and RA could all function together under various levels of producer control, especially if combined with strategies for non-detection to limit opportunities for tolerated scrounging. Gurven makes the statement that, "If a producer can control who receives and how much . . . then TS is unlikely to explain food transfers" (sect. 2.3). I agree that with increased producer control, TS is less likely, but it may still occur.

A hunter may not be required to relinquish all control over meat he brings back to camp, but he may still be faced with scroungers aware of his success. For such individuals with whom the hunter does not intend to share, the decision to share will then come down to marginal value for the giver and receiver, but this does not preclude intentional sharing of the same harvest with others. Especially in communities with lower visibility between households, it is possible that one scrounger becomes aware of a harvest without the entire community gaining knowledge. As long as the benefits of being a reciprocator remain greater than the benefits of being a scrounger, both strategies should be able to coexist. In other words, we might expect TS and RA to be mutually exclusive in a community if reciprocators receive no advantage over scroungers. However, if scrounging could be partially controlled through non-detection, then both types of sharing may occur, with scrounging behavior simply occurring less frequently.

There are overlapping predictions as well in terms of recipient need. Gurven discusses quantitative evidence from several groups showing that the number of consumers in a family predicts the amount the family receives from others. He concludes that recipient need is important and that this evidence is consistent with TS and RA. However, this result is also consistent with KS, because in the KS model the decision to share with a relative is determined by a cost/benefit analysis according to the equation $rB > C$ (Hamilton 1964). Thus, the more needy a relative is (or a relative's family), the more benefit he or she will receive, and the more likely the hunter is to make the decision to share with them. If the benefit is great enough, it could even account for the preferential sharing with less closely related kin.

The results of Gurven's analysis show that need and contingency are significant predictors of the amount a household shares with others. That recipient need is significant is consistent with TS, KS, and RA, but not with CS, and that contingency is significant lends support to RA. CS appears to be a special situation, and its occurrence does not necessarily show that producer control is absent, but rather, that the producer is abandoning control at that instance. As Gurven concludes, future research should focus on identifying and measuring the benefits to such costly signaling, as well as the benefits to delayed reciprocity that takes the form of social benefits. The question remains open as to when and under what specific ecological and social conditions each of these forms of sharing is most advantageous. A start to answering this question could be systematically identifying what ecological and social factors influence producer control, recipient need, and levels of contingency, or the ecological and social conditions which correspond to the prevalence of different sharing strategies.

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A kind man benefits himself – but how? Evolutionary models of human food sharing

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Abstract: Can evolutionary models explain food sharing in traditional human societies? Gurven's analysis cannot rule out any of the models (kin selection, reciprocal altruism, tolerated scrounging, costly signaling, or by-product mutualism), and quantitative partitioning of relative importance is not feasible. For now, the hypotheses seem like the proverbial blind men examining the elephant: each was partly in the right, and all were in the wrong!

Why do individuals give away valuable resources to others? Evolutionary theory, like many religions, leads one to expect that char-

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