

## **Cross-cultural Ultimatum Game Research Group**

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### **Problem**

In an effort to explore how humans respond to bargaining situations, economists have administered a number of different experiments. Among the simplest and most widely used of these experiments, the ultimatum game, seems to provide a number of robust and important insights into human economic reasoning that strongly contradict the predictions of standard game theory. Because the ultimatum game yields results in many different places (including Taiwan, Israel, Tokyo, Pittsburgh, Slovenia and even in Java), many economists have come to think of this bargaining behavior as a product of innate human-universal economic reasoning processes. For example, Roth (1995) proposed that humans possess an evolved cognitive process that balances an immediate self-interest with a drive to directly punish associates for inequitable transactions. However, recent data from a remote region in the Peruvian Amazon substantially deviates from the typical ultimatum game responses, suggesting that game performance may not result simply from the functioning of some innate optimizing psychological machinery, but that, in addition, it may depend on socially transmitted behavioral rules that vary from cultural group to cultural group. Research currently underway at UCLA will provide an important control for any variations in experimental procedures and protocols used with the Machiguenga that might have generated these unexpected results. If these results hold up, we are left with an interesting and important research question: specifically how do culturally transmitted norms, rules and behaviors interact with innate cognitive economic calculations to produce ultimatum game performance? To address this question, we propose to assemble a group of between six and eight experienced, economically-oriented, researchers that specialize in very different cultural groups, train them in the theory and methodology of the ultimatum game and other related experimental games, devise a set of experimental variations to test specific hypotheses, and send them off their field sites cross the globe with a common research design intended to acquire cross-cultural, comparative data on ultimatum game performance. When all the researchers have completed their investigation, we will reconvene, share our data, and discuss our analyses. The results and conclusions of this conference, which will be published in an integrated form in an edited volume, should allow us to begin differentiating and delineating the aspects or components of ultimatum game behavior result from innate pan-human cognitive processors from the aspects rely on culturally evolved behavioral norms or rules.

### **Previous Ultimatum Game Research**

#### *Game description*

In ultimatum game, two players are allotted a sum of money. The first player, often called the “proposer,” offers a portion of the total sum to a second person, often

called the “responder.” The responder, then, has the opportunity to accept or reject the proposer’s offer. If the responder accepts, she receives the amount of the offer and the proposer receives the remainder. If the responder rejects, then nobody gets anything—both the responder and proposer receive zero.

The ultimatum game first sparked the interest of economists because its highly replicable results radically departed from the standard behavior of self-interested income maximizers. Game theory unambiguously predicts that proposers will offer the smallest non-zero amount possible, and responders will always accept. Instead, offers made by proposers typically average between 30 and 40 percent of total, with the modal offer at 50 percent. Responders usually accept the average offers, and will often reject offers lower than 20 percent (Camerer and Thaler 1995).

### *The effect of high stakes*

Experimental economists have systematically studied the influence of various factors on the game’s results, including stake size, degree of anonymity, context and “culture.” Lisa Cameron’s (1995) analysis game data from Indonesian, where she was able to provide sums equivalent to approximately three month salary for test subjects, strongly rejects the hypothesis that higher stakes move individuals closer to game-theoretic behavior. In fact, her data suggests that proposers generally move away from game-theoretical predictions and toward a 50-50 split; responders, consequently, accept these proportionately higher offers more frequently. Similarly, Hoffman, McCabe and Smith (1993) tested the effect of raising the stakes from \$10 to \$100 dollars, and found they could not “reject the hypothesis that the offers are identical with \$10 stakes and with \$100 stakes.”

### *Anonymity effects*

Researchers (Hoffman et al. 1991) have also suggested that the experimenter’s knowledge of the proposer’s behavior may contribute to non-equilibrium (non-game-theoretical) results. In several tightly controlled experiments designed to test this hypothesis, Bolton and Zwick (1992 and with Katok, forthcoming) concluded that subject-experimenter anonymity makes little difference. Subjects behaved similarly regardless of the experimenter’s knowledge of their behavior.

### *Context effects*

Experimental context, instructions and game terminology have some minor effects on game performance. Forsythe et al. have shown that using buyer/seller terminology drops the median offer slightly. Similarly, Hoffman et al. (1991) show that when participants believe that some individuals have “earned the right” to be proposers, offers tend to be lower, and responders are more likely to accept low offers, than when roles are perceived as randomly assigned.

### *The importance of punishment*

Bolton and Zwick (1992) provide substantial evidence for the importance of punishment opportunities in creating substantial deviations from equilibrium behavior. Bolton and Zwick hypothesized that an important determinant of player 2's behavior is a desire to punish player 1 for an inequitable or unfair division. To test this, they compared their ultimatum results to an identically scripted and structured game called the "impunity game," which has the same form as the ultimatum game, except that player 2's rejection does not affect player 1's take—that is, player 1 gets her portion no matter what player 2 does, and player 2 receives either the offered amount (acceptance) or zero (rejection). The impunity game rapidly achieves perfect equilibrium (regardless of experimenter anonymity). They conclude that the absence of punishment opportunities strongly affects game performance.

### *The effect of culture*

Economists have attempted to investigate the effect of cultural differences on ultimatum game performance. Taken together (Cameron 1995; Kachelmeier and Shehata 1992; Thaler 1988; Roth et al. 1991; Hoffman et al. 1994; etc.), this collection of cross-cultural studies shows that "culture" produces only minor deviations in the game's results. In the largest of these experiments, Roth, Prasnikar, Okuno-Fujiwara and Zamir conducted a carefully controlled comparative ultimatum game study in Jerusalem, Ljubljana, Pittsburgh and Tokyo. As expected, the results from all four locations differed greatly from game theoretical predictions, but comparatively, they differed only slightly from one another. However, some small, but interesting, differences did appear. For example, Israeli proposers tended to make somewhat lower offers (with a mode of 40%) than proposers in Pennsylvania (who provided a mode of 50%). And, Israeli responders were, on average, willing to accept somewhat lower offers than students at the University of Pittsburgh. Even Cameron's extensive data from students and faculty working at Gadjah Mada University in Yogyakarta (Indonesia), perhaps the best cross-cultural test of the ultimatum game, revealed no significant differences in comparison to data from Roth et al. (1991) or Hoffman et al. (1994). The mean proposer demands, for example, from Indonesia and the U.S. were 0.5734 and 0.5625, respectively.

In total, many factors generate small deviations in ultimatum game performance, but no alterations in experimental variables have produced substantial deviations from the usual results (except for fundamental changes like removing punishment possibilities from the game). After his review of these studies in the *Handbook of Experimental Economics* (1995), Alvin Roth concludes the following:

Thus we see here a series of experiments whose results seem to be that even initially very skeptical investigators are becoming persuaded that the experimental results observed in ultimatum games are not easily displaced artifacts of the experimental methods, but rather represent a very robust phenomenon.

Interestingly, in his cross-cultural analysis of the small differences between American and Israeli performance, Roth (1995) suggests that these apparent differences indicate, not a difference in “aggressiveness” or “toughness,” but rather a difference in what is perceived as “fair”, or what is “expected” under the circumstances. Some economists might suggest that these minor differences in what is “expected” or “fair” between cultural groups result from a sort of window-dressing effect that cultural beliefs can have on more fundamental, innate economic reasoning processes. Some new research supports Roth’s conclusions, and indicates that culture may be an important variable in understanding game performance.

Recently I (meaning Joe Henrich) conducted an experiment among the Machiguenga, an Arawakan-speaking indigenous group inhabiting the southeastern Peruvian Amazon, that strongly suggests that cultural differences can have a strong effect on behavior in the ultimatum game. Traditionally, the Machiguenga live in mobile, single family units or small family hamlets and subsist on a combination of swidden (sometimes called “slash and burn”) agriculture, hunting, gathering and fishing. Within the last 30 years, missionaries, government-sponsored bilingual schools, and markets have sedentized and centralized the Machiguenga in a gradual process of increasing market integration. Currently, most Machiguenga live in small semi-permanent agricultural communities (of between 250-350 people), grow some cash crops, and subsist primarily on manioc, plantains and some fish (Henrich, 1996). In the summer of 1996, during my third visit to the Machiguenga community of Camisea, I performed a modified version of the ultimatum game experiment. First, I gathered twelve men together between the ages of 18 and 30 under the auspices of “playing a fun game for money.” I explained the game to the group in Spanish using a set script written with simple terminology like “first person” to reference the proposer and “second person” for the responder. After this I had a bilingual school teacher (an educated Machiguenga) re-explain the game in the Machiguenga language (translating from my script), and display the money that we would be using to make payments. After this, each participant entered my house (the guest hut) individually, we (the teacher and I) explained the game a third time, and I asked a number of practice hypothetical questions intended to test the participants comprehension of the game. We re-explained parts of the game as necessary. After the individual confidently answered at least two hypothetical questions correctly, I would submit the actual question with a pile of *soles* (Peruvian money) in view. The following day, after having successfully gotten 12 responses and paid out some money, I began seeking randomly selected individuals to play the game. Most people had already heard of the game and were eager to play. I privately explained the game to each individual (usually in their house) and ran through the same testing procedure as the previous day. After three days of doing this I accumulated 32 responses. During this process several people were rejected because they, after 30+ minutes of explanation, could not understand the game (at least they could not answer the hypothetical questions). While typical U.S. results produce a mean offer of 40%, a mode of 50% and few offers below 20%, the Machiguenga proposed a mean offer of 27.5%, with a mode of 25%, and many offers of 15%. Similarly, Machiguenga responders, with one exception, always accepted—many offers of 15% were accepted. Whereas,

Americans frequently reject offers below 20%. These results seem to be very different from what has been observed elsewhere.

We hypothesize that the Machiguenga behave differently from subjects in other experiments because they are culturally different from those subjects—that is, because they have socially learned different values, beliefs and behaviors from preceding generations. We believe that cultural effects were not detected in previous experiments because the subjects in prior experiments were in fact culturally very similar—all were urban university students living in a sedentary, literate, market society. Jerusalem, Ljubljana, Pittsburgh and Tokyo represent only a tiny fraction of the range of human cultural variation in any observable dimension. Focus on kinship systems, religious systems, marriage rules, or property rights and the story is the same: industrial societies represent only a small subset of the global cultural diversity. Why should we expect that norms governing economic transactions to be any different? If one accepts that many aspects of culture are adaptive responses to local conditions, this makes sense. The urban, literate, market-dominated world shared by previous subjects represents only a small fraction of the spectrum of human life ways. For example, until very recently, the Machiguenga were nomadic subsistence horticulturalists without a cash economy, written language, or established government. It is quite plausible that Machiguenga behave differently in the ultimatum game because the culturally transmitted beliefs and values that evolve in such an environment are very different from the beliefs and values that characterize urban, literate, industrialized societies.

However, because the typical ultimatum game protocol had to be modified to be practical in small Machiguenga village, it remains possible that the divergent results observed among the Machiguenga are the result of these experimental differences. Presently, we are pursuing research to replicate the work done among the Machiguenga Indians with students at UCLA. By using the same protocol, experimenter and procedures, this research seeks to confirm that the unusual data found for the Machiguenga results from population differences, and not from the details of the experiment. If, under these fairly typical experimental circumstances, UCLA students behave like all other subject groups from industrialized populations, then we will have isolated an important cultural difference.

### **Proposed Research**

We propose to assemble a group of between six and eight experienced, economically-oriented, researchers that specialize in very different cultural groups, train them in both ultimatum game theory and methodology, devise a set of experimental variations to test specific hypotheses, and send them off their field sites cross the globe with a common research design intended to acquire cross-cultural, comparative data on ultimatum game performance. When all the researchers have completed their investigation, we will reconvene, share our data, and discuss our analyses. The results and conclusions of this conference, which will be published in an integrated form in an edited volume, should allow us to begin differentiating and delineating the aspects or

components of ultimatum game behavior result from innate pan-human cognitive processors from the aspects rely on culturally evolved behavioral norms or rules.

The research group will design ultimatum experiments to distinguish between alternative hypotheses about how culture affects game performance, and which recurrent aspects of game performance result from innate reasoning. These experiments will be designed to address questions such as: Does every culture punish “unfair” offers in at least some contexts, or are there some groups that never punish? How much cultural variation is there in what constitutes “fair” and “unfair?” How does what is fair vary with context? Are there cross-cultural recurrent patterns of “fairness”—that is, does “fairness” follow any predictable variation along some dimension as we move from one society to another. Do some cultural groups maintain standards of fairness with any enforcement by punishment. Or, in game terms, do most proposers provide amounts near 50/50 even though proposers who propose less are rarely (or never) rejected. The following discussion proposes several research possibilities that may be tested with an appropriate experimental design.

If economics is like other components of human culture, then certain context-specific elements may strongly influence behavioral responses. Analytically, context may be subdivided into three components: the medium of exchange, the sphere of exchange, and the situational characteristics of the exchangers. In addition, cultural evolution may have generated norms about fairness and norms that evoke punishment for different contexts. What’s fair when trading jaguar skins for steel tools may not be what’s fair when exchanging meat for sorghum. New circumstances or non-traditional items may not be governed by the same rules as traditional items or recurrent situations.

#### *Medium of exchange.*

Economic theory typically assumes that behavioral responses should be independent of the medium of exchange. It shouldn’t matter very much whether players in an ultimatum game are dividing a pot of ten dollars or ten candy bars that can be exchanged for a dollar each. Daily experience, however, contrasts with this assumption. Suppose you ask a friend to drive you to the airport, and he says that he can’t because he wants to watch his favorite TV game show, and instead, he offers you \$30—the cost of a cab ride to the airport. Is this socially acceptable? Does this friend suffer any loss in your eyes? Will you offer this friend cab fare when he has to go to the airport? To test the importance of the medium of exchange in influencing ultimatum behavior, the game can be played with different mediums, including cash, food, service time and symbolic items. For example, among a group of Amazonian Indians called the Machiguenga, Joe Henrich could perform the identical ultimatum experiments with cash and meat. Cash is relatively new to the Machiguenga (within the last thirty years), while it is very likely they have been sharing meat for many millennia. Thus even though the Machiguenga definitely understand the value of money, in terms of what it can buy, the social rules for meat distribution may be quite different from the rules for cash distribution.

#### *Sphere of exchange.*

The sphere of exchange may influence game performance. Although the game is usually played anonymously, people may have implicit assumptions about the pool of potential participants (the sphere) with which they're playing. Most experiments are performed at universities, so student participants may accurately assume they are paired with another student, and perhaps a class mate. In the Machiguenga experiment, individuals were told that they played with someone else in their community (of 300 people). How would it affect the results if we controlled for players assumptions about the sphere of exchange? Do cultural differences affect how people react to different spheres? Many villages (in Amazonian, Africa and New Guinea, for example) are subdivided into clans or moieties, what if we changed the sphere from the village (say about 500 people) to the clan (150 people) or moiety (250 people)? Does the sphere affect the tendency to make equal divisions or the desire to punish "unfair" offers? How does ethnicity affect the equation: What if we told Mongolian pastoralists they were playing against neighboring but ethnically distinct Khazaks? Would they play differently against other Mongols, then they would against anonymous Khazaks?

#### *Situational characteristics*

Moreover, the situational characteristics of exchangers may influence ultimatum game behavior. Individuals may use contextual clues about the status or character of the other anonymous player in accessing their behavior choices, and the rules used in assessing others may be culturally transmitted. In western industrial society, for example, Hoffman et al. (1991) shows that when participants believe that some individuals have "earned the right" to be proposers, offers tend to be lower, and responders are more likely to accept low offers, than when roles are perceived as randomly assigned. The perceived status of the proposer may suggest to westerners that this individual deserves more than would otherwise be acceptable. Both the contextual situation (e.g. "having earned the right") which evokes the modification in what is normatively acceptable, and the strength of that modification may be culturally transmitted. Among some cultures, it may be that apparently skilled or "deserving" individuals are not permitted larger shares in exchange situations. In many foraging societies for example, the hunter that made the kill (the more "deserving" by our norms) is not permitted to partake of the meat, or he may be only entitled to eat only a small or equal portion of the meat. Meanwhile, unsuccessful hunters are often apportioned generous shares. We can test this kind of effect by incorporating the same kind of information (about the status of characteristics of other players, but keeping them anonymous) as Hoffman et al., but do it in culturally different situations. The details of such an experiment would be worked out by the research group, thereby ensuring the feasibility, comparability and cultural sensitivity of the test.

#### *Economic and ecological correlates*

In addition to exploring the cultural variability of context-specific factors, this research will explore how different ecological factors direct the evolution of norms and behavior that influence ultimatum performance. For example, economic anthropologists (Plattner 1989; Johnson 1989) have suggested that people's economic behavior is

strongly affected by their degree of economic independence or self-sufficiency. Nomadic peoples like the Machiguenga who rely almost entirely on family-based production and kin-based exchange, and thus are much less tightly imbedded in anonymous exchange networks, will be less likely to expect “fair” (by our cultural norms) behavior in the ultimatum game. Sedentary, more economically interdependent, peoples establish longer term relationships with their neighbors, and therefore are more likely to expect fair behavior in the ultimatum game. Note, we are not proposing that participating in different economic systems evokes different individual-level economic calculations or notions of fairness, we are saying that certain economic systems provide conditions in which different norms about fairness and expectations of fairness will evolve in time through the differential transmission of behaviors/ideas (see Boyd and Richerson 1985).

To explore these possibilities, we propose to choose field sites so that people share some ecological and economic features but not others. For example, to test our hypothesis that a group’s degree of economic independence affects norms about sharing, we would gather ultimatum game data from Peruvian peasant agriculturalists who share an identical environment (both economically and ecologically) with the Machiguenga, Tibetan pastoralists who share little with the Machiguenga except a nomadic life style, family-based mode of production and kin-based exchange networks, Mapuche households who are highly economically independent but sedentary, and Cuban socialists. If our understanding of the relationship between culturally transmitted things, like expectations of fairness, and economic systems is correct, then the Machiguenga’s peasant neighbors should behave like American undergraduates and Cuban socialists, while Tibetan pastoralists and Mapuche farmers should behave like Machiguenga. Each population was selected to inform a specific aspect of the overall project, as well as the practical difficulties of population access, contacts and familiarity—this research will not be done through universities, with students or in urban centers. Each experiment will use similar stakes, the identical protocol as was used with both UCLA graduate students and Machiguenga Indians.

Working together, the research group will design an experimental protocol for the ultimatum game based on protocol used by Henrich among the Machiguenga (see the other Henrich and Boyd proposal) This group of experienced fieldworkers will be able to anticipate potential difficulties in administering the game in their particular communities, and the group will be able to discuss and agree on strategies for adapting the game to particular ethnological circumstances.

We have designed this research around ongoing projects and experienced researchers for a number of reasons. First, using existing projects greatly facilitates access to populations. Research among real populations, inhabiting inhospitable regions in politically delicate climates (where most people live) can be extremely difficult, time consuming and dangerous without an experienced researcher who has friends and contacts in the area, speaks the language, knows the local customs and political pitfalls. Second, ongoing research supplies key ethnographic data that will be essential to contextualizing and interpreting our results. Third, gaining a sufficient trust from a group takes months, and sometimes years. But, by cooperating with anthropologists who have



accumulated a group's trust through years of interaction, we will be able to use your time and money most efficiently. So far we've found a number of interesting and well-qualified researchers specializing in Tibetan pastoralists, Cuban collectivists, Mongolian herdsman, Tanzanian pastoralists, and Amazonian horticulturalists.

## **Methodological Issues**

Doing experimental economics in small scale societies creates a number of new methodological questions that must be resolved before the experimenters go to the field. Here, we raise all of the problems that we can think of. Our insight into these problems comes mainly from Joe Henrich and Natalie Smith's field work among the Machiguenga. Other field situations are likely to generate other problems that haven't occurred to us. We also propose preliminary solutions to each potential problem. These are meant only as concrete starting points useful for starting a discussion, and not as the final word.

***Experimental instructions:*** In order to make conditions consistent from subject to subject and between experimenters, the instructions are typically written down and then read by subjects in experimental economics. The Machiguenga weren't able to grasp the rules of the ultimatum or public goods games based only on such a reading, and both Henrich and Smith had to provide a lot more informal instruction. We suspect that this situation will be occur in many simple societies. It raises several interesting questions:

- *Should there be written instructions?* We think there ought to be written instructions because even though there will be a lot of informal instruction as well, the written instructions will begin each experiment in the same way and provide more uniformity.
- *How should the instructions be translated?* Clearly translation is an important issue in making cross-cultural comparisons. We think that wherever possible the translation ought to be done in collaboration with a local bilingual person to ensure that the translation reflects local usage and understandings
- *How to choose examples for informal instruction?* Informal instruction inevitably involves working through hypothetical examples. It seems possible that the use of particular numbers in examples might bias subjects toward choosing those numbers in the actual experiment. Two approaches suggest themselves here: First, we could insist that experimenters always use the same examples, or second we could keep track of the examples and try to determine post hoc if the examples used had any effect on the behavior of subjects. The problem with the latter approach is that if there is an effect, we may lose a lot of data. Nonetheless, we think that the second solution is the only practical one. It would be awkward in an informal teaching setting to use exactly the same examples no matter what kind of confusion the subject seems to exhibit. Also, the different subjects will require different number of examples. What about giving experimenters a general strategy for selecting examples. At least some rules: like don't consistently use low offers, don't always accept offers near half (avoid any patterns in your examples)

- *How to choose examples for testing?* Both Henrich and Smith found it necessary to test subjects to determine whether they understood the rules of the experimental game. The number used in the test raises the same issue as the numbers used in teaching. Again, we think that the best approach is to keep track of the numbers used in tests and determine post hoc if these had an effect on the outcome. same comment as above.

**Stakes:** Choosing the stakes raises two important issues:

- *How do we insure that the stakes are the same in different places.* Clearly, we should attempt to keep the stakes of the game the same in different places in order to reduce one source of variation in results—although existing ultimatum game data from western societies suggests that stakes have only a small effect on game performance. The problem is how to accomplish this. It is not sufficient to determine the marginal cash wage of locals and then use the exchange rate to convert from the local currency into dollars because the exchange rate may be a very bad estimator of the buying power of the local currency in the experimental setting. In remote locations the cost of goods may be inflated by transportation costs, monopoly power of local traders, and many other factors. Since such effects may be substantial it seems prudent to try to estimate a local cost of living index. We suggest that ethnographers record the prices of items that (1) are purchased using cash, (2) are likely to be comparable with items purchased in other cultures. We suggest the following list as starters: Cooking pots, machetes/panga/bushknives, transistor radios, western clothes, sugar, salt, and cooking fat. Using this data, post-ad analysis can determine the similarity of stake size for different groups. However, Ethnographers should record the marginal cash wage and set the stakes based on this wage.  
(rob: we could devise a system to calculate the stakes size based on the above items. For example: the price of a large aluminum pot plus the price of a machete times 3).
- *Should we use stakes other than cash?* For many reasons we believe that people might behave differently when stakes are in the form of commodities rather than cash, and it would be very interesting to determine whether this hypothesis is correct. Unfortunately, we see several problems: First, the most obvious commodity is some form of food, but non-western food is typically perishable, and cannot be consumed privately. Thus it may be as different from local food as is cash (what?). Second, the value of food depends on the nutritional state of the valuer, both in the long and short term, making cross cultural comparison difficult. We think the best solution here is to encourage ethnographers to try non-cash experiments if some non-cash reward seems practical but that such experiments have a lower priority than the comparable cash experiments. Under some circumstance cash may have little or no value. In which case, experimenters ought to select a medium of exchange that is valuable, divisible and storable, such as salt.

**Sample:** We need to choose sample sizes and, to the extent possible, the nature of the sample. We suggest the following as a target: 30 pairs in each experiment, equal numbers of males and females, all adults (17 years or older). Rob: let's ask the

economists if a sex-difference has ever been shown in the Ultimatum game or the other game (trust or moonlighting)

**Information on subjects:** If the experimental program turns up important cross cultural variation in behavior, it then becomes important to determine the causes of that variation. This requires that we collect information on the characteristics of individual subjects and different groups that can be used as independent explanatory variables. Obviously, what information is relevant depends on the hypothesis used to explain the experimental results. Here is a list of attributes that we think are likely to be important in wide range of explanatory hypotheses:

*Individual attributes:* Name (so other information can be collected post hoc, if necessary), age, sex, family size, some measure of income (e.g. garden size), some measure of wealth (e.g. household inventory), position in family (oldest brother, youngest brother, etc.), social status (e.g. political office), education, religion, language spoke, ethnic membership, debts owed, degree of market integration (amount of wage labor), exposure to western ideas other than formal education, and occupation.

**Group attributes:** We offer the following group attributes as an initial list of independent variables at the group level.

- *Scale of social organization:* We define this as the size of the social group to which individuals have reciprocal social obligations. One plausible hypothesis is that cultures like the Machiguenga in which few reciprocal obligations extend beyond the family will lack norms which oblige sharing in the ultimatum game. The hypothesis would predict that in other small scale societies with more widely dispersed networks of social obligation we would see more cooperation in experimental games.
- *Degree of market integration:* The basic idea here is that markets require fairness in anonymous transactions and thus may lead to the evolution of norms of fairness and reciprocity in large groups. This hypothesis would predict a positive correlation between market integration and reciprocal fairness. One possible measure is the per cent of time spent in wage labor, or labor devoted to producing goods for market.
- *Degree of social stratification:* Allen Johnson has suggested to us that reciprocal fairness should be correlated with the scale of social organization and the degree of social stratification. His hypothesis is that long term social evolution from small scale egalitarian societies to larger scale, hierarchically organized societies requires the spread of norms which generate a willingness to give up some of one's own goals for the good of larger groups, and that reciprocal fairness is plausibly related to this evolution. Social stratification could be measured in terms of degree of income/wealth inequality and the extent to which positions of authority are formalized.

*Relevance to policy*

Distinguishing the effects of culture from pan-human cognitive characteristics has important consequences for economic theory. The rational actor model carries with it the implicit assumption that people everywhere reason the same way, and the results of economic experiments are sensibly interpreted as revealing facts about these reasoning processes. However, if human economic behavior is affected by the cultural milieu, then theories of human economic reasoning that neglect of the cultural environment are incomplete. Thus, such experiments suggest that economic theory should be extended to consider the reciprocal effects of economic institutions and culturally transmitted beliefs.

From a policy standpoint, application-oriented scientists seeking to positively influence economic policy will have to model both innate human economic calculations and population-level process of cultural evolution. In general it will not be possible to predict patterns of behavior without understanding the cultural transmission of the norms, values, and rules that influence economic behavior. For example, development economists need to understand that millions of people in underdeveloped and developing nations may not respond as they anticipate because these peoples possess culturally evolved norms and rules that contrast greatly with the norms and rules possessed by western industrial peoples—the environment in which most of these theories were generated. Further, culture is an evolutionary process, and consequently the norms and behavioral rules that govern ultimatum game performance in western society may rapidly change with the rise of novel social intuitions. Economic theories founded on culturally-transmitted behavioral rules, but lacking any mechanisms for the temporal dynamics of those rules, will lose their explanatory power as our culture evolves and our society changes.

## Budget

Initial conference	\$5000
Research expenses for 8 investigators \$40,000	@\$5000 each
Final conference	\$5000
RA ship for Joe Henrich	\$5000
Total	\$55,000

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