Chapter 46

RECIPROCITY IN ULTIMATUM AND DICTATOR GAMES: AN INTRODUCTION

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1. Motivation

Social norms of "fairness" have been said to cause the observed deviations from non-cooperative game theoretic predictions in ultimatum and dictator games. But where do social norms and concepts of "fairness" come from? We present data based on treatment manipulations intended to affect subjects' expectations about others' behavior, and degree of social isolation (anonymity) from the experimenter and others who might see the results, holding constant subject anonymity with respect to each other (Hoffman et al., 1994; Hoffman, McCabe, and Smith, 1996a, 1996b). Our manipulations are motivated by the idea that such treatments operate on subject expectations of reciprocity which are hypothesized to underpin putative norms of "fairness." Hence, when people give money away, or otherwise exhibit other-regarding behavior, this need not be contrary to self-interest, but rather an expression of the desire either to avoid punishment or to maintain their reputations (or images) as individuals who reciprocate in ordinary day-to-day social exchange. They expect to be made better off by avoiding punishment and by forming and maintaining such valuable long-term reputations. For certain agent types, such behavior is largely intuitive, unconscious and automatic in social exchange.

This view of social cognition, and evidence consistent with a predisposition to reciprocity, also comes from evolutionary psychology, prominently espoused by Cosmides and Tooby (1992): "the mind should contain organized systems of inference that are specialized for solving various families of problems, such as social exchange, threat, coalitional relations, and mate choice. Advocates of evolutionary views do not deny that humans learn, reason, develop, or acquire culture; however, they do argue that these functions are accomplished at least in part through the operation of cognitive mechanisms that are content specialized – mechanisms that are activated by particular content domains that are designed to process information from those domains" (p. 166).

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In contrast, the standard economic/game theoretic model predicts that the (conscious) reasoning process that applies to social exchange – optimization in the self interest against other presumed self-interested protagonists – applies also to coalitional relations, games against nature and other content-specific decision problems. Of course, this paradigm makes provision for cooperative behavior in repeat play interaction, but such outcomes emerge out of reward and threat possibilities, that channel the self-interest into longer term betterment over time. According to game theory, such behavior is strictly ruled out in any one-shot game, unless one postulates a taste (utility) for fairness, a topic to which we shall return after introducing our experimental design and results.

2. Ultimatum and Dictator Games Described

Ultimatum and dictator games are typically two-person games. In an ultimatum game, player 1 makes an offer to player 2 of $\$X$ from a total of $\$M$. If player 2 accepts the offer, then player 1 is paid $\$(M - X)$ and player 2 is paid $\$X$. If player 2 rejects the offer, each gets \$0. In the dictator game, player 2 must accept player 1's offer. Hereafter we will refer to player 1 as the proposer, and player 2 as the recipient.

Under the usual rationality assumptions, the non-cooperative equilibrium of the ultimatum game is for the proposer to offer the recipient the smallest \$ unit of account, and for the recipient to accept the offer. In the dictator game, the equilibrium is for the proposer to offer the recipient \$0. In the ultimatum game, however, the recipient can punish the proposer for "cheating" on an implied social norm of reciprocal sharing across time in social exchange, by rejecting the proposer's offer. That response is a dominated strategy, if viewed in isolation, since both players would be financially better off with even a vanishingly small offer. But, in the absence of common knowledge of self-interested behavior, the possibility of punishment may change the proposer's equilibrium strategy. In the dictator game, the recipient cannot punish the proposer, and therefore the dictator game controls for the strategic property of the ultimatum game. However, if the proposer wishes to maintain a long-term reputation as one who reliably reciprocates in social exchange, that image is threatened if others (such as the experimenter) can observe the proposer not offering a positive amount to the recipient.

3. Experimental Designs and Summary Results

In the next few entries in this *Handbook*, we present our experimental designs and results in some detail. In this entry, we outline the development of the experimental designs and summarize the main results. The design we invoke has its direct origins in a paper by Kahneman, Knetsch, and Thaler (1986) and indirectly in the seminal contribution by Guth, Schmittberger, and Schwartz (1982). Kahneman, Knetsch, and Thaler (1986) describe an ultimatum game in which proposer and recipient are "provisionally allocated" \$10 and the proposer is asked to make an initial offer to "divide" the \$10 between the two players. The recipient may veto the division, in which case they both

get \$0. Kahneman, Knetsch, and Thaler (1986) find that most proposers offer \$5 to recipients. Offers of less than \$5 are sometimes rejected.

Forsythe et al. (1994) replicate Kahneman, Knetsch, and Thaler (1986)'s results from the ultimatum game, and also study the dictator game. They find that about 20% of dictator proposers offer \$0 to their recipient counterparts, as non-cooperative game theory would predict, and conclude that fairness alone cannot be an explanation for the generous offers observed in the ultimatum game. However, in the dictator game, Forsythe et al. (1994) find that about 20% of proposers also offer \$5, more offer \$3 and offers of \$1 and \$2, are also made.

Recognizing that the desire to maintain reputation might create expectations that change proposers' behaviors, Hoffman et al. (1994) consider experimental treatments explicitly designed to affect subjects' expectations about operating norms of social exchange: equality, equity, and reciprocity. The design of Kahneman, Knetsch, and Thaler (1986) and Forsythe et al. (1994) invoke the equality norm. No distinction is made between the two individuals "provisionally allocated" \$10 and they are told to "divide" the money. Hence, deviations from equal division are more likely to be punished as "cheating" on the social "contract." Using the same task description, Hoffman et al. (1994) replicate Forsythe et al. (1994) in a "random/divide \$10" treatment.

To invoke equity, Hoffman et al. (1994) explore three variations on their random/divide \$10 treatment in a 2×2 experimental design. First (the exchange treatment), without changing the reduced form of the game, Hoffman et al. (1994) describe it as a market, in which the "seller" (proposer) chooses a "price" (division of \$10) and the "buyer" (recipient) indicates whether he or she will "buy" or "not buy" (accept or not accept). This treatment follows from Fouraker and Siegel (1963). Second (the contest treatment), following Hoffman and Spitzer (1985), they require each proposer to earn the property right to be a proposer by scoring higher than the recipients on a general knowledge quiz. Winners are told they have "earned the right" to be proposers. Finally, the exchange and contest treatments are combined into a third treatment.

These treatments invoke the norm of equity: sellers in a market are justified in earning a profit and individuals who have earned the right to a higher return are justified in collecting it. With each treatment, Hoffman et al. (1994) find a significant movement in the direction of the game theoretic equilibrium, with no change in the rejection rate, although the actual equilibrium is not observed and infrequent rejections still occur.

Moreover, these results extend to a division of \$100 (Hoffman, McCabe, and Smith, 1996a) and to the dictator game (Hoffman, McCabe, and Smith, 1994). In the random/divide \$100 experiments, proposers typically offer \$50 and offers less than \$50 occasionally get rejected; in the contest/exchange \$100 experiments, proposers typically offer \$30, but offers of \$10 are usually rejected. In the dictator game experiments, dictators do offer less to their counterparts than proposers offer recipients in the ultimatum game; but, few offer \$0 and the contest/exchange treatment still results in a significant move toward more self-regarding offers.

Interestingly, however, if sellers in the exchange treatment \$10 ultimatum game are prompted by the instructions to ". . .consider what choice you expect the buyer to make,"

and to "...consider what you think the buyer expects you to choose," they revert to equal division. Therefore, results in both random/exchange and contest/exchange (with the added instructions) are indistinguishable from random/divide (without the added instructions; see Hoffman, McCabe, and Smith, 1997).

But why do these treatments change offers without changing the rejection rate in the ultimatum game? One hypothesis is that both players infer one another's mental states – in this case expectations – from relevant information in the experiment (Baron-Cohen, 1995). "Mind reading" implies the subconscious, intuitive ability to take the perspective of another person who has common information. In the ultimatum experiment, under contest/exchange without the added instructions, proposers expect recipients to find a lower offer acceptable; while recipients expect, and are prepared to accept, a lower offer. When the instructions to proposers to "think" about what recipients will do are added, proposers are alerted to consciously focus on the strategic possibility of rejection and make more generous offers.

Expectations about recipients' willingness to accept cannot, however, explain why dictators offer any money to their counterparts. We hypothesize that, in this case, observability is potentially powerful in the enforcement of social norms, by exposing lapses in one's intended reputational image. Thus, although Forsythe et al. (1994) recruited proposers and recipients to separate rooms, and the players were anonymous with respect to one another, subject decisions were not anonymous with respect to the experimenter. Someone was still "watching"; hence proposers were still not entirely removed from a social exchange setting where reciprocity norms might subconsciously apply.

This led Hoffman et al. (1994) to design a "double blind" dictator experiment, with several features that were later changed two or more at a time, to investigate the role of social isolation in extinguishing behavior reflecting social norms (Hoffman, McCabe, and Smith, 1996b). In the double blind treatment, 64% of proposers take all $10; about 90% take at least $8.

These results are strikingly different from the dictator results in Forsythe et al. (1994), and from the replications in Hoffman et al. (1994). Next, in three stages, Hoffman, McCabe, and Smith (1996b) vary each of the elements of the double blind dictator experiment in ways intended to reduce the "social distance" between the subjects and anyone who might see their choices. The experimental results form a predicted ordered set of distributions. As the social distance between the subjects and others increases, the cumulative distribution of offers to recipients decreases. These results demonstrate the power of isolation from implied observability in the enforcement of norms of equality, equity, and reciprocity.

4. Interpretations and Discussion

Forsythe et al. (1994) showed via the dictator game that "fairness" as a utilitarian ethic could not, by itself, account for the generosity of offers in the ultimatum game. But, dictators still offered anomalously large sums to their counterparts – 62% gave $2 or more

(65% in our replication, Forsythe et al. (1994)–R) – based on standard economic/game theoretic reasoning. Originally, in Hoffman et al. (1994), we hypothesized that this generosity arises from unconscious expectations of reciprocity which we assumed emerged somehow from cultural experience with repeat interaction outside the laboratory. Subsequently, we systematically varied "social distance" in Hoffman, McCabe, and Smith (1996b) and showed that as this distance, or social isolation, increased, subjects made systematically more self-regarding offers.

In Hoffman, McCabe, and Smith (1996b), our interpretation of what we were doing was importantly influenced by the evolutionary psychology perspective (Cosmides and Tooby, 1992). We had come to realize that simply saying that people were culturally conditioned to reciprocity, left unexplained how and why this occurs. Thus, to say it comes from culture ("fairness," "manners," etc.) begs the question of where culture, particularly these elements of it, comes from. Although the forms and norms of reciprocity vary endlessly across cultures, they are functionally equivalent in promoting cooperation, and in moderating the impact of self-interested actions on social cohesiveness. The evolutionary argument is that a predisposition to reciprocity has fitness value, which has promoted its persistence across homo sapien cultures, ancient and modern, over the past 2–3 million years. Hence, culture is not independent of these evolutionary forces, and vice versa.

From the beginning, our perspective sought explanations in terms of expectations rather than other-regarding utility functions, or a taste for fairness, as in Bolton (1991) and Rabin (1993). Bolton's model was born refuted because it violated the known dictator game results, but Rabin's model is more general. We do not rule out utilitarian models as useful place-holders for more general expectational, judgmental and interactive considerations. The problem is that there is a professional tendency to view utility explanations as final – once a result is deemed due to utility, the conversation stops, implying that there is nothing left to explain or test. Also, we have a problem in seeing how the utilitarian approach can handle the many treatment variations we and others have shown to be effective. If utility varies with all these parametric treatment conditions, why is this so, and how can such a perspective, and modeling, motivate new experiments? Which perspective is most useful (neither can be said to be either true or untrue) will ultimately depend upon its capacity to motivate testable new hypotheses and to coherently explain behavior across observational sets. Currently, we are attracted to the comprehensiveness of the evolutionary/reciprocity interpretation, while remaining open to other possibilities. For a fuller examination of these issues see Hoffman, McCabe, and Smith (1998). For a recent articulation of the fine structure of a utility approach, and its testable implications, see Konow (1996).

References

Baron-Cohen, Simon (1995). "Mindblindness: An Essay on Autism and Theory of Mind". MIT Press, Cambridge, MA.

Bolton, G.E. (1991). "A comparative model of bargaining: Theory and evidence". American Economic Review 81, 1096–1136.

Cosmides, Leda, Tooby, John (1992). "Cognitive adaptations for social exchange". In: Barkow, Jerome H., Cosmides, Leda, Tooby, John (Eds.), The Adapted Mind: Evolutionary Psychology and The Generation of Culture. Oxford University Press, New York.

Fouraker, Lawrence, Siegel, Sidney (1963). "Bargaining Behavior". McGraw–Hill, New York.

Guth, Werner, Schmittberger, Rolf, Schwartze, Bernd (1982). "An experimental analysis of ultimatum bargaining". Journal of Economic Behavior and Organization 3, 367–388.

Forsythe, Robert, Horowitz, Joel, Savin, N.E., Sefton, Martin (1994). "Replicability, fairness and pay in experiments with simple bargaining games". Games and Economic Behavior 6 (3), 347–369.

Hoffman, Elizabeth, Spitzer, Matthew (1985). "Entitlements, rights, and fairness: An experimental examination of subjects' concepts of distributive justice". Journal of Legal Studies 15, 254–297.

Hoffman, Elizabeth, McCabe, Kevin, Smith, Vernon (1996a). "On expectations and monetary stakes in ultimatum games". International Journal of Game Theory 25 (3), 289–301.

Hoffman, Elizabeth, McCabe, Kevin, Smith, Vernon (1996b). "Social distance and other regarding behavior in dictator games". American Economic Review 86 (3), 653–660.

Hoffman, Elizabeth, McCabe, Kevin, Smith, Vernon (1997). "Thinking about it doesn't help". Unpublished manuscript.

Hoffman, Elizabeth, McCabe, Kevin, Smith, Vernon (1998). "Behavioral foundations of reciprocity: Experimental economics and evolutionary psychology". Economic Inquiry 36 (3), 335–352.

Hoffman, Elizabeth, McCabe, Kevin, Shachat, Keith, Smith, Vernon (1994). "Preferences, property rights and anonymity in bargaining games". Games and Economic Behavior 7 (3), 346–380.

Kahneman, Daniel, Knetsch, Jack, Thaler, Richard (1986). "Fairness and the assumptions of economics". In: Hogarth, R., Reder, M. (Eds.), Rational Choice. University of Chicago Press, Chicago.

Konow, James (1996). "Fair shares: Accountability and cognitive dissonance in allocation decisions". Department of Economics, Loyola Marymount University.

Rabin, M. (1993). "Incorporating fairness into game theory and economics". American Economic Review 83, 1281–1302.