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Are Athletes Different? An Experimental Study Based on the Ultimatum Game

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Abstract

Recent econometric studies conclude to a "sport premium" on the labor market: athletes seem indeed to attain better labor market outcomes than their non-athlete counterparts. This effect is often attributed to a specific "economic" behavior of athletes that would make them more productive. For instance, athletes may have this so-demanded competitive spirit that should allow them to find better jobs, other things the same. In this note, we use experimental game theory to investigate whether athletes do behave differently. We rely on a questionnaire-approach to implement a standard ultimatum bargaining game on a population of students. We compare the responses of athletes and non-athletes. The results strikingly confirm that athletes have a more competitive perception of the game, coming closer to the Nash equilibrium predictions than their non-athlete counterparts.

Keywords: Sport, Athletes, Economic behavior, Experiments, Ultimatum game.

JEL Classification: C78, C90.

1. INTRODUCTION

Several econometric studies have identified a "*sport premium*" on the labor market. Athletes seem to attain better labor market outcomes than non-athletes, for instance getting (*ceteris paribus*) higher wages (Long and Caudill, 1991; Ewing, 1998; Barron et al., 2000). One of the frequently mentioned reasons is the specific "economic" behavior athletes are supposed to have, which would make them more productive. As noticed by Long and Caudill (1991, p. 528), participation in athletics could produce personal traits or behavioral patterns which enhance labor market productivity. For instance, the athletes' competitive spirit allows them to access to better jobs. According to Long and Caudill (1991, p. 526), "athletes may have relatively more "competitive drive" that ultimately results in greater career accomplishments, other things the same." Of course, such statements about the behavioural traits of athletes remain conjectures that are hardly verifiable.[1] Fortunately, experimental game theory allows us to observe athletes' behaviour in competitive and controlled environments.[2]

In the study reported below, we rely on the ultimatum game. In this very simple game, two players (A and B) are involved in the division of a fixed amount of money, e.g., 100 Euros. Player A is asked to make an offer to player B, which player B is free to accept or reject. If player B accepts player A's offer, each one receives the corresponding amount. In case of a rejection, each one ends up with zero Euro. If the amount to be divided is common knowledge, the game theoretical prediction is that player A will make the smallest possible offer to player B (e.g., 1 Euro) and player B will accept.

Güth et al. (1982) found that experimental A subjects send large amounts (37 % on average) to player B, and that B subjects often reject strictly positive offers (60 % of rejections for offers of 10 %). The results of the seminal paper by Güth et al. has been replicated hundreds of time, with many variants, especially for studying the effect of demographic variables such as age, gender or culture.

[1] Moreover, the psychology of sports does not give clear predictions about the effects of sports practice on people's behavior.

[2] See Camerer (2003) for a complete survey of experimental (or behavioral) game theory.

We investigate whether athletes behave differently in the ultimatum game than non-athletes. Our hypothesis is that because athletes are supposed to have more "competitive drive", they should come closer to the Nash equilibrium predictions of the game, i.e., make smaller offers as A players and have a lower acceptance rate as B players.

We report data collected from a sample of 104 university students subjects, based on a questionnaire design implementing the strategy method (Selten, 1967). The comparison between athletes and non-athletes strikingly confirm our hypothesis that athletes behave more "competitively" than non-athletes: on average they make lower offers, and simultaneously they are less demanding. The fact that athletes seem to make more "aggressive" offers and simultaneously exhibit lower acceptance rates implies that the usual interpretation in terms of "aggressiveness" or "toughness" is no longer appropriate (Roth et al., 1991). Rather, the lower offers could be explained by lower risk-aversion or lower inequity-aversion (Fehr and Schmidt, 1999). The fact that athletes are less demanding suggests that they are less inequity-averse, and accept more readily the weaker status of player B. Overall, athletes seem therefore to have a more competitive perception of the game, which leads them to be less other-regarding, less inequity-averse and thus more ready to accept their inherited condition (weak or strong).

The paper is organized as follows. The ultimatum game is presented in Section 2. The methodology is summarized in Section 3. Section 4 presents the results and Section 5 concludes. The Appendix contains a summary of the questionnaire.

2. THE ULTIMATUM GAME

Let S be the amount of money to be divided, and let x, $0 \leq x \leq S$, be player A's offer. The ultimatum game has a unique subgame-perfect Nash equilibrium (SPNE): player A offers $x = e$, where e is the smallest monetary unit, and player B accepts. The rationale is as follows: because a strictly positive amount is better than nothing, player B accepts any offer greater than zero. Working backwards from player B's decision, leads player A to make the smallest positive offer. Thus, the

typical SPNE of the game is featured by player A making the smallest positive offer and player B accepting it.[3]

The ultimatum game has been extensively studied by experimental economists, who found that people generally do not behave as predicted, but make offers averaging between 30 % and 40 % of *S* (with even splits generally the mode) and offers less than 20 % of *S* commonly rejected.[4] A large number of experimental studies have used the ultimatum game to study the effect of socio-demographic variables such as gender (Eckel and Grossman, 2001; Solnick, 2001), age (Murnighan and Saxon, 1998), culture (Roth et al., 1991; Henrich, 2000; Henrich at al., 2001) or majors (Carter and Irons, 1991; Kagel et al., 1996).

In the present study, the standard ultimatum game is used to investigate whether athletes behave differently than non-athletes. We conjecture that athletes practicing sports in competition should behave more competitively than their non-athlete counterparts. Thus, athletes should be closer to the SPNE in the ultimatum game, which leads to the two following hypotheses.

Hypothesis 1: *Proposer* (player A)
Athletes make lower offers than non-athletes.

Hypothesis 2: *Responder* (player B)
Athletes have lower minimum acceptable offers than non-athletes.

It is worth noticing that by no way do we assume with our hypotheses that athletes should be more "aggressive" or "tougher". Since the proposer's role is usually seen as the strong position, and the responder's the weak position, Hypothesis 1 implies that athletes in the strong position are more demanding, while Hypothesis 2 implies that athletes in the weak position are less demanding. Thus, the combination of both hypotheses is clearly in sharp contradiction with the "aggressiveness" interpretation: if athletes were more "aggressive", they should *simultaneously* offer less and exhibit a

[3] In reality, there is a second SPNE, featured by the proposer offering zero and the responder accepting it. However, both SPNE give virtually all the gains from trade to the proposer. They coincide as the smallest unity of transaction goes to zero.

higher rejection rate. As noticed by Roth et al. (1991, p. 1092), if the subject pools where offers are low exhibit lower rates of disagreement, this suggests that "what varies between subject pools is not a property like aggressiveness or toughness, but rather the perception of what constitutes a reasonable offer under the circumstances." In other words, the combination of Hypothesis 1 and Hypothesis 2 means that athletes have different expectations from non-athletes about what constitutes an acceptable offer, rather than different propensities to trespass on a shared notion of what constitutes such an offer. More precisely, our idea is that athletes have a more "competitive" perception of the game, in that they are less other-regarding and thus more ready to accept their inherited condition (weak or strong).

Moreover, the combination of Hypothesis 1 and Hypothesis 2 also implies that athletes are less "inequity-averse", whatever their position. In the position of the receiver they have less envy and in the role of the proposer they feel less guilty. This interpretation stems directly from the theoretical model of inequity aversion (Fehr and Schmidt, 1999), in which players not only care about their own payoffs but also about the difference between their payoffs and other players' payoff. In the ultimatum game, the proposer's utility from an accepted offer $x \leq S/2$ is $U_P(x) = (S - x) - \beta_P ((S - x) - x))$, where β_P is the proposer's "guilt" weight, while the responder's utility is $U_R(x) = x - \alpha_R ((S - x) - x)$, where α_R is the responder's "envy" weight. The responder should therefore reject any offer lower than $\alpha_R S/1+2\alpha_R$ and the proposer's offer should depend (positively) on her/his guilt weight β_P and on her/his guess about the distribution of rejection thresholds. Applying this theoretical framework to our context, our hypotheses mean that athletes should be featured both by a lower "guilt" weight β_P (Hypothesis 1) and by a lower "envy" weight α_R (Hypothesis 2).[5] In Fehr and Schmidt's terms, the combination of both hypotheses actually suggests that athletes are less "inequity-averse".

From such interpretation, our hypotheses refer to a specific economic behavior of athletes and could, consequently, be linked to the "sport premium" identified by the econometric literature. In fact, if athletes are closer to the SPNE, it suggests that they behave more competitively in bargaining

[4] As mentioned in the Introduction, the first ultimatum experiment is attributed to Güth et al. (1982). See Camerer (2003, chapter 2) for an up-to-date survey of the numerous results from ultimatum games.

contexts. This could imply that they are more able to find good jobs, other things equal, thanks to this particular behavior and/or that they value these bargaining capacities toward firms that recognize and reward them. Notice that, though it is of course difficult if not impossible to assess with an econometric approach the relevance of our assumption of a specific economic behavior from athletes, indirect evidence of athletes' competitive drive may be found. In particular, Ewing (1998) and Barron et al. (2000) find that former athletes are significantly more likely to be employed in jobs which have pay based on performance (piece rate, commissions, bonuses, and/or tips). Ewing (1998, p. 116) interprets this finding as follows: "more competitive individuals, as measured by their having competed in sports, self-select to jobs where they can be rewarded for the productivity of their competitive nature."

3. METHODOLOGY

We use the same questionnaire approach as Ortona (1991), Tompkinson and Bethwaite (1995) and Bethwaite and Tompkinson (1996). Rather than conducting direct trials of the ultimatum game, we used a questionnaire that asked subjects how much they would offer as a proposer, and what minimum amount they would be prepared to accept as a responder.[6] The *hypothetical* stake was fixed at 100 Euros.[7] Thus, in contrast to the experiments referred in Section 2, our study is implemented with hypothetical instead of real payoffs. Of course, this can be seen as a major drawback of our method. Even so, we believe that the approach has some relevance, at least as an *exploratory* and *preliminary* study.

Moreover, several arguments may be put forward to defend the questionnaire approach. Firstly, it allows to work with sums of money that are hypothetical but often more significant for the subjects. Generally, experiments of the ultimatum game use a real financial stake of $10; we may wonder if the potential biases of behavior (incentives, perception of risk, etc.) are really more important in a "real"

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[5] In reality, lower offers from proposers (Hypothesis 1) may come either from a lower "guilt" weight b_P or from a lower aversion to risk (namely, to the risk of seeing his offer rejected by the responder) and it is of course impossible to separate both effects.

[6] Notice that, consequently, our experimental design rests on the "strategy method" (and not the "game method") to elicit the pairs of offers and minimum acceptances from subjects.

[7] This sum was chosen because it represents an amount of money familiar to most students. It is neither too low, so that the (hypothetical) situation deal with a non-trivial stake, nor too high, so that the sum of money involved has a clear significance for subjects.

game with such a low stake ($10) than in a questionnaire-game with a hypothetical but significant stake (100 Euros in our experiment). Secondly, the experiment was conducted in conditions similar to an exam session and we have no reason to believe that our subjects, first-year university students, had any incentive to misrepresent their behavior. As noticed by Tompkinson and Bethwaite (1995, p. 441), "there is evidence from other contexts that answers to hypothetical questions provide good indicators of behavior." Thirdly, in so far as it is possible to compare, the responses we obtained using the questionnaire approach are similar to the results reported in experiments with real prizes. This is not surprising. Camerer and Hogarth (1999) report that, in bargaining experiments, financial incentives have no effect on mean behavior and performance though variance is usually reduced with high payments.[8]

Moreover, it should be noticed that, even if the subjects' behavior were biased because of our methodology, there is no reason to believe that the bias is different between athletes and non-athletes, so that our comparison between both groups could still be relevant.

Two questionnaires were administrated on a group of 104 first-year university political science students. Subjects were given numbers ranging from 1 to 104 in order to guarantee complete anonymity and to be able to match both questionnaires (administrated sequentially). The first questionnaire (see Appendix) asks students how much they would offer as a proposer, and what minimum amount they would accept as a responder. The second questionnaire contains demographic questions including the subject's sex, age and, of course, its participation to athletics. Notice that we actually use the same athletic "variable" as in econometric studies. In fact, we consider as "athletes" the subjects who report having a sporting licence. Since they are all affiliated to a sporting federation, it deals with students who practice sports regularly and, for a large majority, who participate in competitions. From the 104 subjects, 23 were identified as "athletes",[9] a proportion which is representative of the average proportion of French students participating in competitive sports.

4. RESULTS

[8] They argue that bargaining experiments that did not include financial incentives still provide important data.

[9] We ask students to give their main sport. The 23 athletes reported the following sports: soccer (5), volley-ball (4), handball (4), basket-ball (2), rugby (1), hockey (1), rowing (1), fencing (1), tennis (1), shooting (1), judo (1), sport dancing (1).

We compare the responses made by athletes and non-athletes in the first questionnaire.[10] Figure 1 shows the frequency distributions of offers and minimum acceptances.

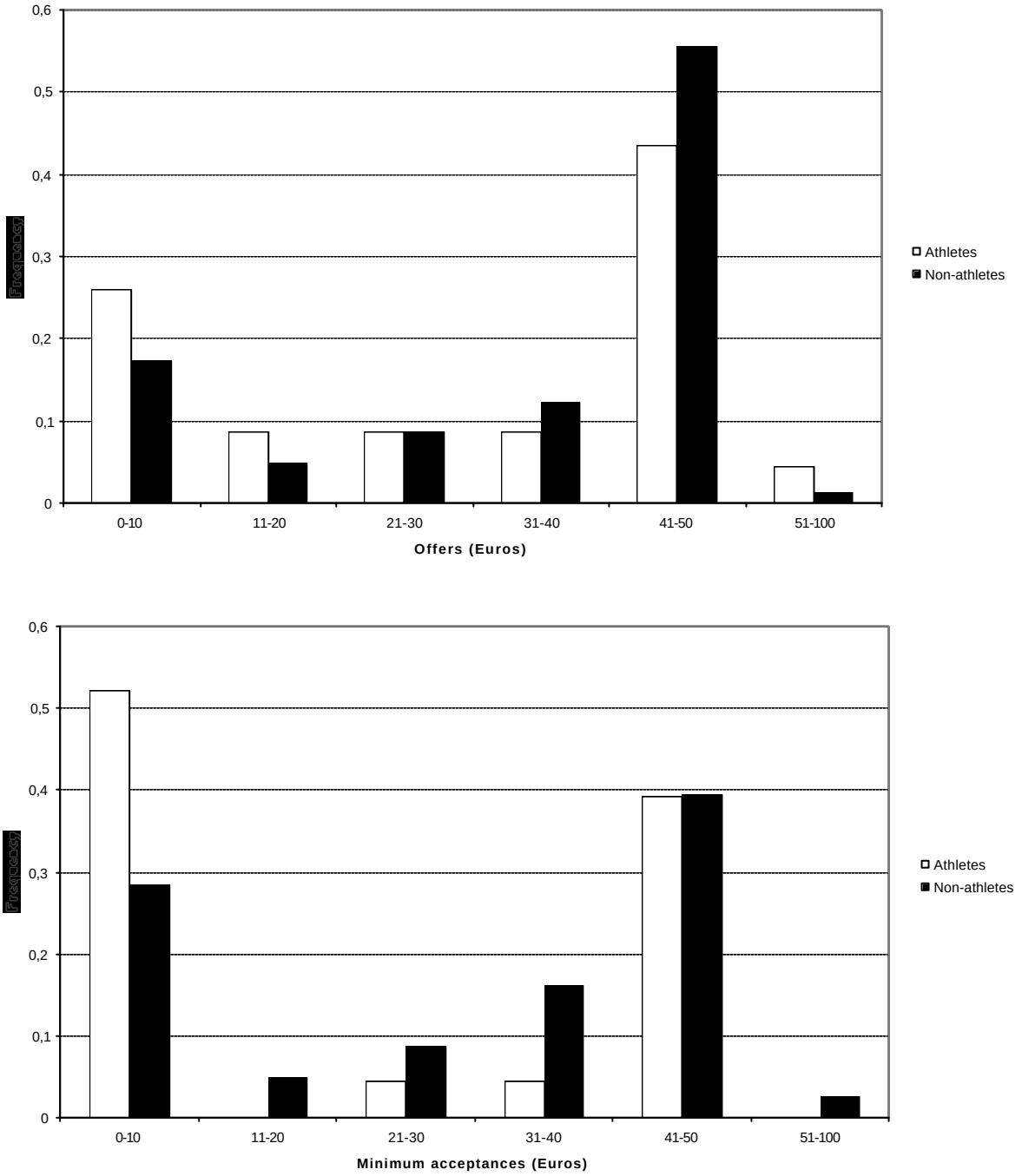

Figure 1: Frequency distributions of offers and minimum acceptances.

[10] We do not separate athletes by gender because of the too little number of subjects in the "Athletes" group. In fact, we get the same results both for males and females but the too few numbers of both male athletes and female athletes render the results (not reported) statistically insignificant.

The key summary statistics are in the following table.

	Non-athletes (n = 81)		**Athletes** (n = 23)	
	Offers	Minimum acceptance	Offers	Minimum acceptance
Mean	**37.15**	**31.59**	**31.30**	**22.83**
Mode	50.00	50.00	50.00	1.00
Standard deviation	17.92	19.86	15.94	18.36

Table 1: Data from the ultimatum game.

We use *t*-tests to compare average offer and minimum acceptable offers among both groups (athletes and non-athletes).[11] The results confirm both Hypothesis 1 and Hypothesis 2, i.e., that athletes are closer to the subgame-perfect predictions of the game:

Result 1: As proposers, athletes offer less than non-athletes: average € 31.30 versus average € 37.15, a difference significant at the 10 % level according to the *t*-test (*t*-value = 1.508, p = 0.0678).

Result 2: As responders, athletes elicit lower minimum acceptable offers than non-athletes: average € 22.83 versus average € 31.59, a difference significant at the 5 % level according to the *t*-test (*t*-value = 1.984, p = 0.0271).

5. CONCLUSION

According to our results, athletes seem to behave more competitively, that is, are closer to the Nash equilibrium predictions, in the ultimatum game. This result should not be interpreted in terms of "aggressiveness" or "toughness". Rather, we suggest that athletes have a more competitive perception of the game, which leads them to be less other-regarding, less inequity-averse, and thus generally more ready to accept their inherited condition (weak or strong). These elements tend to

[11] Of course, the data are far from normally distributed. However, since the *t*-test is robust to deviations from normality, it is an appropriate measure of the significance of differences (Solnick, 2001, p. 193).

confirm a specific economic behavior of athletes and we conjecture that they could contribute to improve the explanation of the "sport premium" identified in the labor market.

Our study should be viewed as exploratory, essentially because of our questionnaire based on hypothetical payments.[12] Obviously, our results are preliminary and need to be confirmed by further work, with real payoffs. There are many interesting issues. First, we could study whether the behavior of non-athletes change when they know that the other player is an athlete. In other words, it amounts to see whether athletes may benefit from a specific "status" when playing the ultimatum game.[13] Second, we could investigate whether athletes' behavior differ across sports, especially between team and individual sports.

APPENDIX: THE QUESTIONNAIRE

This questionnaire is part of a research project being carried out by the Strasbourg University. Your participation in the project by filling out this questionnaire is completely anonymous and voluntary. Thank you for your assistance.
From now and until all the questionnaires are collected, we ask you not to communicate.
Please read the following description of a situation involving two individuals:

Person A is given 100 Euros and is asked to divide it between herself and Person B. B knows how much money A has been given to divide, but they do not know each other, and the roles of A and B have been determined by the toss of a coin. A must make B an offer. B may either accept the offer, in which case she will receive the amount offered and A will get to keep the balance; or B can reject the offer, whereupon both receive nothing (€ 0). Note that A can only make just one offer and this offer may not be withdrawn, and B may give just one answer. In other words, bargaining is not permitted.

[12] Though they are of same magnitude as in the other questionnaire-based studies (e.g., Tompkinson and Bethwaite, 1995), standard errors of the variables are relatively high. This could result from the methodology, since some authors (e.g., Camerer and Hogarth, 1999) argue that hypothetical payments often increase the variance of the data (though do not generally affect the general trend).
[13] The role of "status" (though not for athletes) in the ultimatum game has been envisaged by Ball and Eckel (1998).

Imagine that your are placed in the situation described in italics above. The amount of money to be divided is € 100, in € 1 coins, i.e., offers can be € 0, € 1, € 2, and so on up to € 100.

1. If you were Person A, the amount you would offer to B is € _____

2. If you were Person B, the minimum amount you would accept from A is € _____

Thank you for your assistance.

REFERENCES

Ball, S., & Eckel, C. (1998). The economic value of status. *Journal of Socio-Economics*, *27*, 495-514.

Barron, J., Ewing, B., & Waddell, G. (2000). The effects of high school athletic participation on education and labor market outcomes. *Review of Economics and Statistics*, *82*, 409-421.

Bethwaite, J., & Tompkinson, P. (1996). The ultimatum game and non-selfish utility functions. *Journal of Economic Psychology*, *17*, 259-271.

Camerer, C. (2003). *Behavioral game theory: experiments in strategic interactions*. Princeton (N.J.): Princeton University Press.

Camerer, C., & Hogarth, R. (1999). The effects of financial incentives in experiments: a review and capital-labor production framework. *Journal of Risk and Uncertainty*, *19*, 7-42.

Carter, J., & Irons, M. (1991). Are economists different, and if so, why? *Journal of Economic Perspectives*, *5*, 171-177.

Eckel, C., & Grossman, P. (2001). Chivalry and solidarity in ultimatum games. *Economic Inquiry*, *39*, 171-188.

Ewing, B. (1998). Athletes and work. *Economics Letters*, *59*, 113-117.

Fehr, E., & Schmidt, K. (1999). A theory of fairness, competition, and cooperation. *Quarterly Journal of Economics*, *114*, 817-868.

Güth, W., Schmittberger, R., & Schwarze, B. (1982). An experimental analysis of ultimatum bargaining. *Journal of Economic Behavior and Organization*, *3*, 367-388.

Henrich, J. (2000). Does culture matter in economic behavior? Ultimatum game bargaining among the Machiguenga of the Peruvian Amazon. *American Economic Review*, *90*, 973-979.

Henrich, J., Boyd, R., Bowles, S., Camerer, C., Fehr, E., Gintis, H., & McElreath, R. (2001). In search of homo economicus: behavioral experiments in 15 small-scale societies. *American Economic Review*, *91*, 73-78.

Kagel, J., Kim, C., & Moser, D. (1996). Fairness in ultimatum games with asymmetric information and asymmetric payoffs. *Games and Economic Behavior*, *13*, 100-110.

Long, J., & Caudill, S. (1991). The impact of participation in intercollegiate athletics on income and graduation. *Review of Economics and Statistics*, *73*, 525-531.

Murnighan, J.K., & Saxon, M.S. (1998). Ultimatum bargaining by children and adults. *Journal of Economic Psychology*, *19*, 415-445.

Ortona, G. (1991). The ultimatum game. Some new experimental evidence. *Economic Notes*, *20*, 324-334.

Roth, A., Prasnikar, V., Okuno-Fujiwara, M., & Zamir, S. (1991). Bargaining and market behavior in Jerusalem, Ljubljana, Pittsburgh, and Tokyo: an experimental study. *American Economic Review*, *81*, 1068-1095.

Selten, R. (1967). Die Strategiemethode zur Erforschung des Eingeschränkt Rationalen Verhaltens im Rahmen eines Oligopolexperiments. In H. Sauermann (Ed.), *Beiträge zur Experimentellen Wirtschaftsforschung* (pp. 136-168). Tübingen, Germany: J.C.B. Mohr.

Solnick, S. (2001). Gender differences in the ultimatum game. *Economic Inquiry*, *39*, 189-200.

Tompkinson, P., & Bethwaite, J. (1995). The ultimatum game: raising the stakes. *Journal of Economic Behavior and Organization*, *27*, 439-451.