Fairness in the Mail and Opportunism in the Internet: A Newspaper Experiment on Ultimatum Bargaining

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Abstract. *On 11 May 2001, readers of the* Berliner Zeitung *were invited to participate in an ultimatum bargaining experiment played in the strategy vector mode: each participant chooses not only how much (s)he demands of the DM1,000 pie but also which of the nine possible offers of DM100, 200, … , 900 (s)he would accept or reject. In addition, participants were asked to predict the most frequent type of behavior. Three randomly selected proposer–responder pairs were rewarded according to the rules of ultimatum bargaining and three randomly chosen participants of those who predicted the most frequent type of behavior received a prize of DM500. Decisions could be submitted by mail, fax or via the internet. Behavior is described, statistically analyzed and compared to the usual laboratory ultimatum bargaining results.*

1. INTRODUCTION

The notion of ultimatum bargaining has been introduced in Güth (1976). The first experiment with rather moderate pie sizes ranging from DM4 to DM10 has been performed in the winter semester 1977/78 at the University of Cologne (Güth *et al.*, 1982). The rules of the game are as follows. If p (>0) is the monetary pie, the proposer can first choose any demand d with $p \geq d \geq 0$ which then the responder can either accept or reject. Acceptance means that the proposer earns d and the responder $p - d$. In case of a rejection, both earn nothing. Thus, the demand d is an ultimatum proposal, respectively $p - d$, a 'take it or leave it' offer.

Of the many experimental studies of ultimatum bargaining (for surveys see Güth and Tietz, 1990; Güth, 1995; Roth, 1995) few have used non-student participants.[1] Newspaper experiments offer the chance to address a large audience from the general public with a sociological structure different from laboratory experiments. By inviting readers of the *Berliner Zeitung* on 11 May 2001 to participate in an ultimatum bargaining experiment we are able to provide insights into bargaining behavior and fairness preferences of a much broader audience than is usually recruited for laboratory experiments. We especially hypothesize that non-academic participants, as most of the readers of the *Berliner Zeitung* are, will generate their behavior more by applying social norms, e.g. of fairness, rather than by abstract (game-theoretic) rationality requirements.

Our experiment illustrates how to combine two purposes, namely to entertain active and passive participants and to interest them in and to promote research of social interaction. All participants act in both roles, as active bargainers and as passive social scientists predicting the most frequent mode of behavior. Our experiment shows that such a type of a prototypical experiment with a novel design can be explained to a broad (non-academic) audience and that this may yield new findings, compared to the usual observations with students, and will also propagate basic insights beyond the readership of scientific journals (Schmidt, 2001).

Running an experiment on a newspaper platform is, in many respects, different from the usual laboratory experiments.[2] Typically, participants in lab experiments are students of age 20 to 25. Newspaper experiments, however, allow for a variety of subject pools in terms of interest, knowledge or culture, depending on the particular readership of a newspaper. Even though the experimenter loses much of the control of the subject pool when running a newspaper experiment, participants of newspaper experiments can almost certainly be expected to have a broader range of socio-demographic profiles than the usual student population. Hence, running experiments in news-papers offers the chance to test the critical assumption of 'parallelism' between the lab and the field. Further, lab experiments seldom last longer than one or two hours. Participants in a newspaper experiment often have one or two weeks in which to send in their decisions, thus giving them much more time to reason about their choice. Finally, rewards for lab participants are typically about the hourly wage for students, whereas rewards for newspaper experiments can be much higher in absolute terms, even though typically not in expected rewards due to the much larger number of participants in newspaper experiments.

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1. For a very recent and striking example see Henrich *et al.* (2001) who have run ultimatum games in 15 small-scale societies across the globe, of which three are foraging societies, four are nomadic herding groups, three sedentary small-scale agriculturalist societies, and six practice slash-and-burn horticulture.
2. For a thorough discussion of differences between laboratory and newspaper experiments see Bosch-Domènech *et al.* (2001).

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In recent years, a series of newspaper experiments on the guessing game, which resembles decision-making in financial markets, has been conducted in newspapers (Thaler, 1997; Selten and Nagel, 1998; Bosch-Domènech *et al.*, 2002; Fehr and Renninger, 2000). However, to the best of our knowledge, no experiments on issues of income distribution, bargaining behavior or fairness have been conducted in newspapers thus far. Therefore, our study should serve as a starting point for such kinds of experiments in which we can gather evidence on a population's preferences for income distribution, decisions in bargaining and fairness on a much broader scale.

In Section 2 the experimental procedure is described in more detail. The large body of decision data by a total of 1,163 participants is described and also statistically analyzed in Section 3, restricting ourselves to the 1,035 complete decision forms. Section 4 compares the main regularities with those of the usual ultimatum bargaining experiments, before we conclude in Section 5.

2. EXPERIMENTAL PROCEDURE

In the following we will describe the experimental procedure of the newspaper experiment, the difficulties that we could observe, the recruited subject pool and how participants were rewarded.

  (i) We contacted a newspaper with a rather diverse readership since we did not want to substitute students by former students only. Fortunately, the *Berliner Zeitung* agreed to participate and also to share the costs of the experiment.
 (ii) We proposed instructions which avoid all the usual terminology and technicalities and refer to the proposer as Charlotte and to the responder as Friedrich. The DM1,000 pie is framed as a gift of an American uncle to his unknown niece Charlotte and nephew Friedrich who do not know each other in spite of being relatives. The instructions actually used were then restructured and rewritten by the responsible journalist (Mangold, 2001; see Appendix A). A decision form was developed that could be printed in the newspaper (see Appendix B) and integrated in the internet presence of the *Berliner Zeitung* (see http://experiment.wiwi.hu-berlin.de/UG).
(iii) We employed the strategy vector mode which asks each participant to decide both as a proposer and as a responder by relying on the rather coarse grid of DM100. More specifically, a participant had to make ten choices (the demand as a proposer or Charlotte, and nine acceptance decisions as Friedrich for the offers DM100, 200,…, 900).[3]

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  3. By avoiding the demands, respectively offers, DM0 and DM1,000 we do not only exclude the uninteresting border cases of (monetary) indifference for one party but also make sure

(iv) To check how expectations about others differ from own behavior participants were asked to predict the most frequent pattern of behavior again in the form of a strategy vector. Three of the 64 participants, who actually did predict the most frequent pattern, were rewarded by a DM500 prize.

(v) Participants could submit decisions by mail, fax or via the internet. Therefore, two different types of experimental media have been used: on the one hand, a pen and paper fill-out form by the subjects who participated by letter post and fax. On the other hand, a computerized fill-out form which was accessible by a standard web browser via the internet. For both media types the same decisions had to be made and in both cases a submission was called complete when a participant stated his name, address, and his ten choices as well as ten expected, most frequent choices.

To guarantee some variety participants were not only recruited by the newspaper announcement in the *Berliner Zeitung* but also via e-mail to two different mailing lists. More specifically, we contacted the mailing list of the virtual experimental laboratory in Berlin with a rather diverse subject pool of employees and students and the mailing list of Inn-Lab at the University of Innsbruck which exclusively includes students. The e-mails provided the link to the site where the experiment could be conducted via the internet. Note that we refrained from eliciting information about (the level) of education and demographics since a subject already had to make 20 decisions and provide its complete address. Therefore, there is no demographic data on the subject level available. To provide an overview, Table 1 reports the aggregate characteristics of the three different pools (*Berliner Zeitung*, German internet, Austrian internet) from which we recruited participants.[4] Remarkable aspects are that the non-academic readership of the *Berliner Zeitung* is (with more than 61%) much higher than in our mailing lists. Assuming that the participants by mail and fax have similar characteristics as the group of all newspaper readers, our attempt not to rely exclusively on academics had been well placed. Furthermore, readers of the *Berliner Zeitung* are usually older than members of the internet mailing lists.

The internet as a marketplace still resembles trade in anarchy[5] since one often cannot rely on civil law when one party misbehaves. Therefore, it has to be expected that those who use the internet will feel less obliged by the social

that both players can win something in case of an agreement that seems desirable for a newspaper experiment.

4. Sources for demographic information at an aggregate level are: Medien Markt Berlin 1/01, Berliner Verlag GmbH & Co. (*Berliner Zeitung*); own data (Austrian internet); for the German internet mailing list there is no aggregate demographic data available. Instead the self-reported subject characteristics from the participants of Anderhub *et al.* (2001), which used the same mailing list, are reported (German internet).

5. See Roth and Ockenfels (2002) or Resnick and Zeckhauser (2002) for a discussion of the trust problem in e-commerce.

Table 1 Characteristics of the different subject pools from which participants were recruited

	Berliner Zeitung[a] (letter/fax)	German internet[b]	Austrian internet[c]
Age			
0–19		8%	22%
20–23	17%	10%	56%
24–27		38%	15%
28–31		18%	5%
32–35	17%	16%	1%
>35	65%	10%	1%
Education			
9 years of schooling	21%	4%	0%
10 years of schooling		10%	0%
12–13 years of schooling	40%	40%	96%
Master's degree		38%	4%
Ph.D.	39%	8%	0%
Profession			**Faculty of study**
Business administration		20%	78%
Economics	39%	8%	
Other academic field		54%	21%
Other non-academic	61%	18%	1%

[a] *Source*: Medien Markt Berlin 1/01, Berliner Verlag GmbH & Co. The *Berliner Zeitung* has about 400,000 daily readers.
[b] German internet participants were recruited via the mailing list of the virtual experimental laboratory at Humboldt University Berlin, which included about 850 e-mail addresses in May 2001. For the German internet mailing list we do not have data on aggregate demographics; instead the self-reported subject characteristics of the participants of Anderhub *et al.* (2001) are reported, which used the same mailing list (German internet).
[c] Austrian internet participants were recruited via the mailing list of Inn-Lab at the University of Innsbruck, which included about 500 e-mail addresses in May 2001.

norm of fairness than those who rely on letter post or fax. Since internet participants are younger on average, this might be partly due to an age effect.

In total we received 1,163 decisions from different persons.[6] In Table 2 it is listed how often the different media (letter post, fax and internet) were used and how the percentage of usable (complete) decisions were dependent on the medium. In most cases of incomplete decisions,

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6. In order to avoid multiple participation of single persons, we checked the names of all participants and dropped three submissions which were handed in twice. Joint participation of persons living at the same address has been observed a couple of times. It is, however, noteworthy that decision sheets have been identical in such cases only very seldom.

Table 2 Frequencies of participation by different media

Medium	Letter	Fax	Internet	All
Submissions	216	132	815	1,163
Incomplete	47	17	–	64
Unfinished	–	–	64	64
Usable	169	115	751	1,035

participants reacted in the responder role only to their own offer as proposer.[7] In total, 47 (22%) letters and 17 (13%) faxes were only partly filled out.[8] Participants in the internet had to navigate through four consecutive pages. The first page replicated the newspaper article (see Appendix A). The second (third) page requested actual and expected decisions as Charlotte (Friedrich). On the fourth page, participants had to fill in their name and address. Internet participants could only move on to the next page if all information required on the previous page was fully provided. Sixty-four internet participants (8%) did not finish, by dropping out of the experiment before submitting the information of the fourth page. Aggregating fax and letter submissions as pen and paper, we find that the frequency of incomplete decisions is significantly larger with pen and paper than with the internet ($\chi^2 = 27.6$, df = 1; $p < 0.01$).

The participants who were randomly chosen for payment and an overview of the results were published in the *Berliner Zeitung* two weeks after the initial announcement (Schmidt, 2001). The monetary rewards were as follows:

- Of the three chosen pairs, all reached an agreement with all proposers demanding DM500 and all responders accepting this offer.
- The most frequent mode of behavior was to demand DM500 as a proposer and to accept all offers as a responder. This was predicted by 64 (6%) of all participants. Three of them were randomly selected and received the prediction prize of DM500.

3. RESULTS

First, the large data set – compared to laboratory experiments – is analyzed on the aggregate level. Second, we consider the different types of media which

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7.   Rather than attributing this kind of behavior to a false consensus ('Others will choose the same demand and thus offer the same amount!') we rather think that this expresses forward-induction thinking ('The obvious result is that the proposer asks for half the pie which, of course, will be accepted; so there is no need to engage in counterfactual considerations for the other offers!').

8.   We did not count forms that could not be received because of transmission errors. In four cases a fax was illegible. Transmission errors via letter post and internet could not be controlled for by the experimenters.

Table 3 Actual and expected demands of proposer (Charlotte) – aggregate data

| Own demand (in DM)	Actual demands (relative frequency in %)	Expected demands (relative frequency in %)
100	0.6	0.1
200	0.0	0.1
300	0.5	0.5
400	2.7	1.8
500	50.0	49.1
600	22.4	22.1
700	9.1	15.9
800	3.8	3.8
900	10.9	6.6
Average demand ($N = 1,035$)	589.57	588.12

were used to participate in the experiment (pen and paper versus internet). Third, we check whether there are differences in behavior with respect to the geographic origin of the participants. For the analysis we rely on the 1,035 complete decision forms only.

3.1. Aggregate results

Table 3 summarizes the actual and expected demands as Charlotte. Both, actual and expected demands, are double peaked with a somewhat surprising minor peak at the greediest demand of DM900.[9] One-half of all actual demands are DM500 and thus proposing to split the pie equally. The second most frequent demand is DM600 (22.4%). The game-theoretic benchmark when payoffs are given by own monetary rewards, namely the highest possible amount of DM900, is chosen by 113 participants (10.9%). The arithmetic average of all demands is DM589.6.

Expected demands are on average DM588.1, which is similar to actual demands. There is no significant difference of both cumulative distributions ($p > 0.2$; Kolmogorov–Smirnov test). A notable difference to actual demands is the fact that considerably fewer subjects (6.6%) expect most others to actually demand the maximum amount (10.9%). Figure 1 plots the relative frequencies of the difference between a subject's own demand as Charlotte and her expected demand. Note, a negative sign indicates expecting others to demand more than oneself. Zero difference is the most frequent behavior (49.9%). The difference ranges between +100 and –100 for 80% of the subjects. The rest of the decisions are distributed almost equally on both tails.

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9. Strictly speaking, actual demands have a third peak at the demand of DM100, which is more frequent (0.6%) than the demand of DM200.
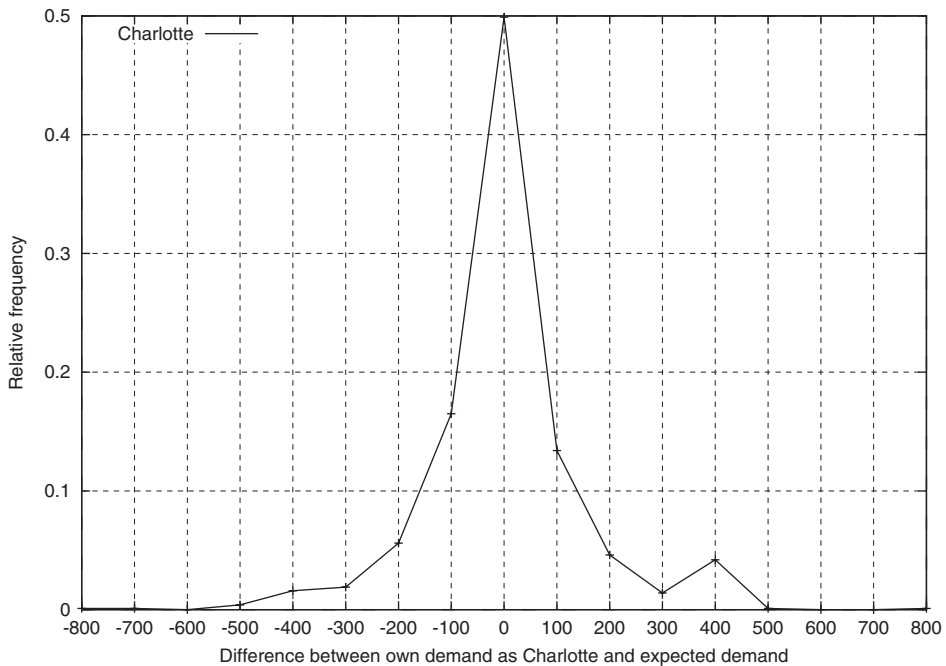
Figure 1 Relative frequency of difference between own demand as Charlotte and expected demand

Thus, half of the participants view their demand as typical whereas about one-quarter consider themselves as more, respectively less, modest.

Turning to behavior in the role of Friedrich, Table 4 reports the relative frequencies of actually accepting a certain offer as well as of expecting others to accept. When an equal split is proposed, participants accept the offer most often (98.1%). The lowest offer of DM100 is accepted in 34.9% of the cases. Although only one-third of the subjects behave fully rational with respect to monetary payoffs, this share is much higher than in usual ultimatum experiments, as will be discussed in Section 4.

Note that the frequency of accepting offers declines monotonically from the peak at DM500 when offers get larger. This result is driven by what we call non-monotonic strategies. Non-monotonic response behavior is by no means irrational. It indicates a strong aversion against more or less biased reward allocations. Whereas rejection of too low offers can be justified by the argument that it costs little to punish, rejection of too high offers implies an even larger sacrifice of the responder than for the proposer. A monotonic strategy is characterized by accepting all offers above a certain minimum acceptance level min ≥ 100. In the role of Friedrich, 90.6% of the subjects have monotonic strategies. The rest have two kinds of non-monotonic strategies. First, 47 subjects (4.5%) accept only one single offer with 40 of

Table 4 Actual and expected decisions as responder (Friedrich) – aggregate data

Offer of (DM)	Actual acceptance rates (relative frequency in %)	Expected acceptance rates (relative frequency in %)
100	34.9	17.3
200	40.8	23.3
300	57.0	48.8
400	79.2	72.6
500	98.1	97.2
600	94.3	94.4
700	92.6	94.0
800	90.7	92.8
900	90.6	92.3

them accepting only DM500 and rejecting all other offers.[10] Another 47 subjects accept two or more offers in an intermediate range, rejecting all offers below a minimum *and* above a maximum (with max < 900). Only three subjects switched more than once from accepting to rejecting such as accepting the offers of DM100, 300 and 500 to 700.

Figure 2 shows the difference between the actual frequencies of accepting and the expected frequency for given offers. A positive sign indicates that subjects actually accept more often than they expect others to accept. This is the case for offers from DM100 to 500 which subjects accept more often than they expect others to do. Hence, subjects expect others to care less for money and more for equality than they do themselves (the frequency distributions of actual and expected decisions as Friedrich are significantly different for offers ranging from DM100 to DM400; $\chi^2 > 10$ for each offer, df = 1; $p < 0.01$).

3.2. Differences in media type

For the following analysis we pool the fax and letter submissions[11] and compare them to internet submissions. This allows us to check whether participants using pen and paper behave differently from those using the computerized version. Our data set of complete decision forms consists of 284 (27.5%) letter/fax forms and 751 (72.5%) forms submitted via the internet.

Table 5 reports actual and expected demands as Charlotte for both types of media. On average, internet participants demand DM604.3, which is 9.7% more than letter/fax participants with an average demand of only DM550.7.

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10. Our guess is that most incomplete decision forms actually are aiming at non-monotonic response behavior in the sense that unanswered offers are viewed as unacceptable.
11. We tested for differences in averages or in the distribution of values between fax and letter submissions but found none. Therefore, we decided to group the data by letter/fax and internet in the following.
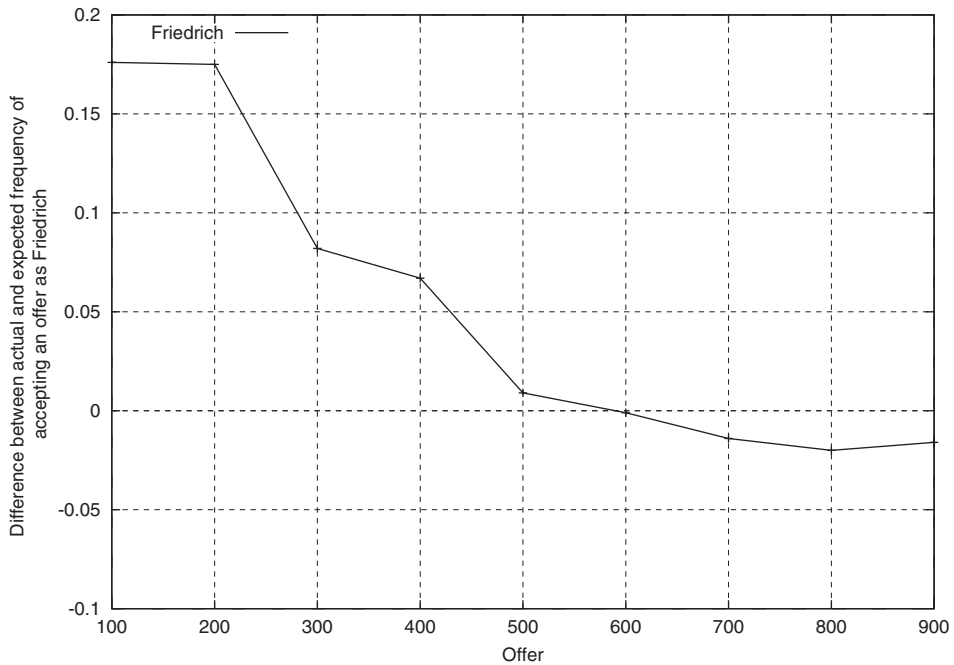
Figure 2 Differences between actual and expected frequency of accepting an offer as Friedrich

Table 5 Actual and expected demands of proposer (Charlotte) by medium

Own demand (in DM)	Actual demands (relative frequency in %)		Expected demands (relative frequency in %)	
	Letter/Fax	Internet	Letter/Fax	Internet
100	0.4	0.7	0.0	0.1
200	0.0	0.0	0.4	0.0
300	0.0	0.7	0.0	0.7
400	2.5	2.8	0.7	2.3
500	64.1	44.7	54.2	47.1
600	20.8	23.0	26.8	20.4
700	7.0	9.9	10.6	18.0
800	1.4	4.7	2.8	4.1
900	3.9	13.6	4.6	7.3
Average demand	550.70	604.26	572.89	593.87
	(N = 284)	(N = 751)	(N = 284)	(N = 751)

Whereas 64.1% of letter/fax participants propose an equal split, only 44.7% of internet participants do so. Very remarkable is the share of 13.6% of internet participants demanding the maximum amount of DM900. Only 3.9% of

letter/fax participants decide for maximum exploitation. The demands as Charlotte are significantly different between both types of media both with regards to mean values ($p < 0.01$, U-test[12]) as well as with regards to the distribution of demands ($p < 0.01$, Kolmogorov–Smirnov test).

Expected demands in the role of Charlotte also differ between both types of media ($p < 0.05$, U-test). However, the differences are not as pronounced as observed in actual demands. Internet (letter/fax) participants expect, on average, a demand of DM593.9 (572.9) and 47.1% (54.2%) of subjects expect others to demand DM500 in the role of Charlotte. Compared with their actual demands (DM604), internet participants expect others to demand a lower share (DM594), meaning that internet participants often view others as being relatively more equity oriented.

In the role of the responder (Friedrich) subjects accept the equal split most often, i.e. in 98.9% of the letter/fax submissions and 97.7% of the internet submissions, respectively. Yet, the equal split is the only offer in which the relative frequency of accepting is higher in letter/fax submissions than internet submissions, as can be seen in Table 6. A remarkable 39% of internet participants accept the smallest possible offer of DM100; only 23.9% of fax and letter participants do so. Relative acceptance rises monotonically until the equal split and falls again thereafter. Whereas in the internet acceptance levels stay above 93% for offers larger than DM500, they decrease monotonically to 82% for an offer of DM900 in faxes and letters owing to non-monotonic response behavior. With the exception of the equal split, internet participants accept each possible offer significantly more often than letter/fax participants (χ^2-test for each offer separately, df = 1; $p < 0.01$).

The results on expected behavior as Friedrich mirror actual behavior as can be judged from Table 6. With the exception of DM500 offers, expectations on acceptance levels are significantly different between both types of media (χ^2-test for each offer separately, df = 1; $p < 0.01$). Both letter/fax and internet participants expect others to accept less often than they actually do up to an amount of DM500. Hence, with relatively low offers participants think that others care, on average, less for money and reject the (relatively low) amount more often. The reverse is true for offers starting from DM600, although the difference between actual and expected behavior is, by far, less pronounced in this range of offers than for offers from DM100 to 400.

In the following, we will examine whether responders in the role of Friedrich differ also with respect to chosen strategies. Remember, we call a strategy monotonic if a responder accepts all offers above a certain minimum acceptance level min ≥ 100. Most of the internet participants (93.9%) but only 82.0% of letter/fax participants can be classified as having a monotonic strategy in the role of responder ($\chi^2 = 33.9$, df = 1; $p < 0.01$). A similar result holds for the expected strategies: letter/fax participants expect the strategies

Table 6 Actual and expected decisions as responder (Friedrich) by medium

Offer of (DM)	Actual acceptance rates (relative frequency in %)		Expected acceptance rates (relative frequency in %)	
	Letter/Fax	Internet	Letter/Fax	Internet
100	23.9	39.0	12.3	19.2
200	27.8	45.7	17.6	25.4
300	44.0	61.9	41.9	51.4
400	73.9	81.2	68.3	74.2
500	98.9	97.7	97.2	97.2
600	90.1	95.9	90.5	95.9
700	85.9	95.1	89.4	95.7
800	83.5	93.5	88.0	94.5
900	82.0	93.9	87.0	94.3

to be more often non-monotone (13.0%) than internet participants (5.7%) ($\chi^2 = 15.4$, df = 1; $p < 0.01$).

Furthermore, we compare the differences of the own demand as Charlotte and the expectations about the most frequent demand of other participants. Subjects with a negative (positive) difference expect others to be meaner (more generous). Figure 3 shows the relative frequencies of differences. Interestingly, the relatively more game-theoretic 'rational' internet participants (judged by their higher demands and their higher frequency of accepting low offers) expect others more often to be more generous than themselves (27.0%) than letter/fax participants do (15.5%). Letter/fax participants, on the contrary, tend to expect more often others to be meaner than internet participants do (32.0% vs. 24.1%). This altogether indicates that internet participants expect and accept to (be) exploit(ed) whereas pen-and-paper participants resent exploitation more strongly. There is thus more fairness in the mail and more opportunism in the internet.

Participants with monotonic strategies as Friedrich can be classified according to the sum of the own demand d as Charlotte and the minimum acceptance level 'min' as Friedrich. We distinguish three types:

- the *careful* ones where $d + \min < 1,000$;
- the *dogmatic* ones where $d + \min = 1,000$; and
- the *greedy* ones where $d + \min > 1,000$.

Table 7 summarizes the relative frequency of different types in both media. In the internet we find 5 percentage points more greedy types. In fact, the distribution of types as classified by the sum of own demand and minimum acceptance level is significantly different between both media ($\chi^2 = 7.99$, df = 2; $p < 0.05$).

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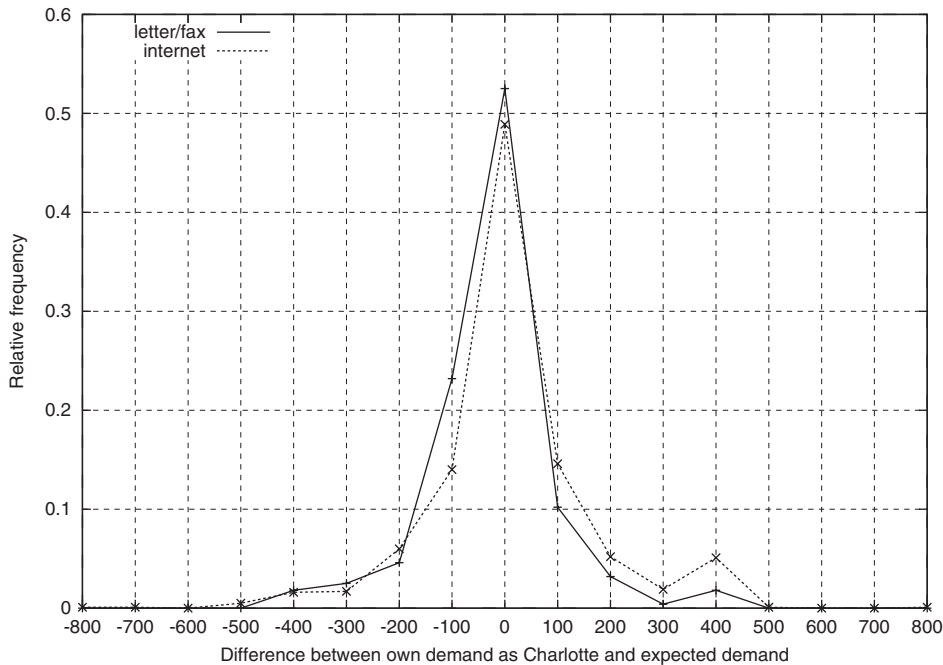
Figure 3 Own demand minus expected demand: letter/fax versus internet

Summarizing the results of this subsection we conclude that the behavior of internet participants appears to be more opportunistic,[13] whereas behavior of letter/fax participants seems fairer. These differences can either be attributed to the type of medium or to differences in the subject pool.

3.3. Differences in geographic origin

Since we have observed different patterns of behavior in both types of media we separate our data into letter/fax and internet participants and check whether geographic origin of participants in the respective medium plays a role. Postal codes were used to separate faxes and letters, respectively internet submissions, into the following geographical 'categories'. We attributed 'East' for participants who live in the 'Neue Bundesländer' and East Berlin, and 'West' for subjects who live in the 'Alte Bundesländer' and West Berlin.[14] By letter and fax we received 92 valid forms from the West and 192 forms from

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13. In Section 4 below it will be shown that demanding DM500 is opportunistic, too, in the sense of maximizing one's own expected payoff given that expectations are consistent with actual response behavior.
14. Of course, we cannot control whether participants with an address in the 'West' were brought up in the 'East' or vice versa. Note, however, that the *Berliner Zeitung* has a large majority of readers from the former 'East'.

Table 7 Types and medium

Type	sum $d + $ min	Relative frequency (in %)	
		letter/fax ($N = 233$)	Internet ($N = 705$)
Careful	$<1,000$	60.9	58.9
Dogmatic	$=1,000$	36.5	33.3
Greedy	$>1,000$	2.6	7.8

the East. Via the internet 200 participants with valid forms were from Austria, 383 from the East and 168 from the West.

3.3.1. Letter and fax submissions

When we compare the East and West subjects, who participated via letter/fax, most of the decision variables do not differ significantly. In the role of Charlotte East residents demand, on average, DM550, participants living in the West DM552. There are some marginal differences in their behavior as Friedrich: all 192 East participants accept the equal split whereas 'only' 96.7% of West participants do. East participants accept low offers less often (the effect is, however, only significant for an offer of DM400). Altogether, the group of participants who responded via letter and fax seems to be quite homogeneous in their decisions, irrespective whether they live in the East or in the West.

3.3.2. Internet submissions

With regards to the internet participants the previous result is, basically, replicated: behavior of participants living either in the East or the West of Germany does not differ significantly. Because we recruited German internet participants mainly from the mailing list of the virtual experimental laboratory in Berlin this led to a rather homogeneous subject pool of former participants of experiments that consists to a large extent, yet not exclusively, of students. We conclude from this that the major difference in the subject pool is the medium[15] by which one participates and not the geographical origin as far as German participants are concerned.

In a next step we will compare this group of German internet participants as a whole to the Austrian internet participants. As is evident from Table 1, Austrian internet participants are drawn from a mailing list containing exclusively students, with almost 80% of them studying either economics or business administration. Table 8 splits proposer and responder behavior of internet participants by nationality. Austrian participants demand on average about 3% more than their German counterparts as Charlotte (DM618.5 vs.

15. Although readers of the *Berliner Zeitung* could also rely on the internet, the other participants were purely approached by using electronic mailing lists. Thus the medium of participation could also reflect different compositions of subject pools.

Table 8 Internet participants and nationality

(a) Demands of proposer (Charlotte)

	Actual demands (relative frequency in %)		Expected demands (relative frequency in %)	
Own demand (in DM)	Germany	Austria	Germany	Austria
100	0.5	1.0	0.2	0.0
200	0.0	0.0	0.0	0.0
300	0.5	1.0	0.7	0.5
400	2.7	3.0	2.0	3.0
500	48.1	35.5	51.4	35.5
600	21.1	28.5	19.2	23.5
700	10.3	8.5	16.7	21.5
800	3.4	8.0	3.3	6.5
900	13.2	14.5	6.5	9.5
Average demand	599.09 ($N = 551$)	618.50 ($N = 200$)	584.39 ($N = 551$)	620.00 ($N = 200$)

(b) Decisions as responder (Friedrich)

	Actual acceptance rates (relative frequency in %)		Expected acceptance rates (relative frequency in %)	
Offer of (DM)	Germany	Austria	Germany	Austria
100	38.5	40.5	19.8	17.5
200	44.3	49.5	24.9	27.0
300	60.6	65.5	51.4	51.5
400	79.9	85.0	75.0	72.0
500	97.3	99.0	96.6	99.0
600	94.6	99.5	94.7	99.0
700	93.8	98.5	94.7	98.5
800	92.0	97.5	93.5	97.5
900	92.7	97.0	93.5	96.5

DM599.1; $p < 0.05$; two-sided U-test) and expect others to demand more in this role (DM620 vs. DM584.4; $p < 0.01$, U-test). The difference in demands between Austrians and Germans is mainly driven by the considerably lower fraction of Austrians proposing the equal split (35.5% vs. 48.1%). Austrians are significantly more often willing to accept offers above DM500 ($p < 0.05$ in any case; χ^2-test). Furthermore, Austrians more often rely on monotonic strategies as Friedrich than Germans (97.0% vs. 92.7%; $\chi^2 = 4.6$, df = 1; $p < 0.05$).

Given the differences between Austrian and German internet participants, we have to check the robustness of the results of the previous subsections on differences by media type, because the observed differences might have been caused by pooling Austrian and German internet participants versus

(exclusively German) letter and fax participants. For this reason, we compare pen-and-paper submissions with German internet participants.[16] As it turns out, behavior still differs considerably between users of different media types. Whereas letter/fax participants demand as Charlotte on average DM550.7, German internet participants demand DM599.1 ($p<0.01$, U-test). Expected demands are no longer significantly different (DM572.9 vs. DM584.4 for letter/fax and internet, respectively). Regarding responder behavior as Friedrich, the relative frequency of accepting a given offer is significantly larger for German users of the internet than users of fax or letter in all cases except the equal split (χ^2-test for each offer separately, df $= 1$; $p<0.05$). German internet participants have also more monotonic strategies (92.7%) than letter/fax participants (82.0%, $\chi^2 = 22.1$, df $= 1$; $p<0.01$), and the distribution of careful, dogmatic or greedy types is different between both media ($\chi^2 = 8.9$, df $= 2$; $p<0.05$), with 7.9% greedy, 30.5% dogmatic and 61.6% careful types in the German internet.

4. COMPARISON WITH OTHER ULTIMATUM EXPERIMENTS

One of the most surprising results of our study is the fact that acceptance of all offers is the mode of responder behavior and that 34.9% of participants are willing to accept the lowest possible offer of DM100, which is only 10% of the distributable pie. Since most ultimatum experiments do not employ the strategy (vector) method the evidence to test responses to lowest offers is limited. The results reported in Slonim and Roth (1998), who used a repeated ultimatum game but not the strategy method, indicate that even with high stakes[17] the frequency of rejecting offers of about 10% of the pie is around 90%.[18] In other words, an offer of 10% of the pie is accepted only in about 10% of cases, whereas our newspaper readers are willing to accept the lowest offer of DM100 approximately in every third case.

Of course, it is more appropriate to compare our newspaper results with ultimatum-game experiments which used the strategy method. In a study on the influence of physical attractiveness and gender on one-shot ultimatum-game decisions, Schweitzer and Solnick (1999) asked 70 responders to

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16. Note from Table 1 that the two subject pools, readers of the *Berliner Zeitung* and the German internet mailing list, are both diverse with respect to education when compared to the Austrian internet mailing list. Still, the readers of the *Berliner Zeitung* have a much higher portion of non-academic readers compared to the German internet participants.

17. Experiments were conducted in the Slovak Republic. The middle and high stakes were approximately equivalent to a student's earnings from one day (middle stakes) or one week (high stakes) of work. For an extensive review on the influence of financial incentives on behavior in experiments see Camerer and Hogarth (1999, Table 1).

18. See their logit regressions of rejection probabilities dependent on the proportion of the pie offered in Figure 2 (Slonim and Roth, 1998, p. 582). As can be calculated from the data in their appendix, offers below 20% of the pie were rejected in 10 out of 11 cases in the middle stakes treatment, respectively in 4 out of 5 cases in the high stakes treatment.

indicate their minimum acceptable offer, given a pie of €10.[19] Only four out of 70 subjects (5.7%) stated a minimum acceptable offer of €1 or less. This fraction of accepting very low offers is clearly smaller than in our newspaper study. However, in another study of Solnick (2001), she found that 26 out of 89 (27%) subjects were willing to accept an offer of €1 or less out of a pie of €10. Though this acceptance rate does not differ significantly from acceptance rates in our whole data set (with $N = 1,035$), it is still smaller than acceptance rates (of 39%) in our subpopulation of internet participants ($\chi^2 = 3.24$; $p < 0.05$, one-sided test). In a recent study by Güth and Kovacs (2001), where the responders of a modified ultimatum game had to bid for the degree of veto power,[20] 20 out of 80 subjects (25%) are willing to accept 10% or less of the pie in the standard ultimatum-game condition. Also, this share of acceptances is significantly smaller than the acceptance rates of the lowest DM100 offer in our experiment ($\chi^2 = 3.22$; $p < 0.05$, one-sided test).

One might argue that the higher acceptance rates of meager offers in our newspaper experiment are driven by the higher stakes, implying that even though absolute acceptance thresholds increase with pie sizes, relative acceptance thresholds, i.e. acceptance thresholds divided by pie sizes, go down when pies become large. The evidence from Hoffman *et al.* (1996) and Slonim and Roth (1998) suggest that rejection rates go down when the pie increases to high stakes. However, when considering expected payoffs, the *ex-post* expected payoff for our newspaper readers was at best DM3 (about €1.5), which is below the expected payoffs of lab participants in Schweitzer and Solnick (1999), Solnick (2001), or Güth and Kovacs (2001). Hence, we arrive at our Observation 1.

Observation 1. Compared to usual ultimatum bargaining experiments the willingness to accept unfair offers, e.g. of only 10% shares, is surprisingly high, especially for participants using the internet.

Since offers larger than DM500 are accepted slightly less often than the fair offer of DM500, only offers in the range from DM100 to 500 are candidates for maximizing expected proposer gains when assuming rational expectations. In Figure 4 we have plotted the expected proposer profits for all such offers, separating letter/fax and internet participants. The expected profit-maximizing offer is DM500 in both cases. The unprofitability of meager offers is, however,

19. Note that asking for minimum acceptable offers restricts responders' choices to monotonic strategies, which may be at odds with subjects' preferences. See our results on non-monotonic strategies in Section 3.1.
20. There were four different degrees of veto power. With no veto power at all, the dictator game was played. The highest veto power led to the standard ultimatum game, where the responder's rejection leads to both players receiving nothing. The intermediate degrees of veto power created a linear combination of ultimatum and dictator game. With $\lambda = \frac{1}{3}$ ($\frac{2}{3}$), a rejection led to $\frac{1}{3}$ ($\frac{2}{3}$) of the pie being distributed according to the proposer's offer (of relative shares).
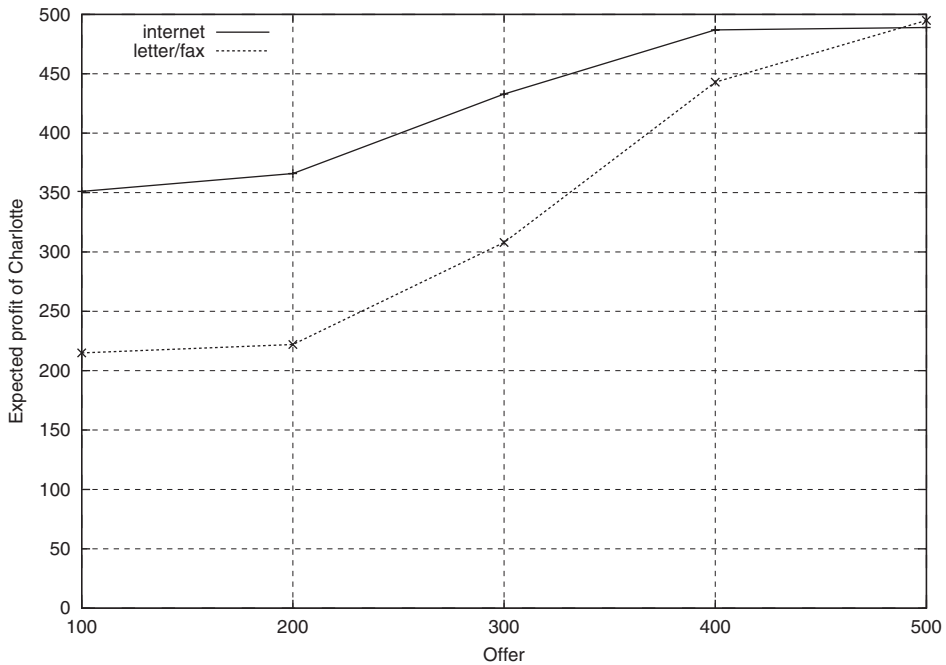
Figure 4 Expected profits of offers DM100 to 500 separated by letter/fax and internet

less striking for internet participants than for those who rely on pen and paper.[21] In our newspaper experiment, offering the equal split maximizes expected earnings, as has also been found for many laboratory ultimatum experiments (see the survey of Roth, 1995). This confirms that the striking result of laboratory ultimatum experiments is not proposer fairness (Harrison and McCabe, 1996), but that responders reject substantial offers.

Observation 2. The modal behavior of offering DM500 and accepting all offers is consistent with maximizing own expected profits, given the actually observed behavior. Offering an equal split maximizes expected profits, as has also been found in many ultimatum games in the laboratory.

Another remarkable result is the 9% proportion of non-monotonic response behavior (see also Güth and Huck, 1997, who unfortunately used a biased elicitation method), which cannot be observed with the sequential game-playing method and the monotonic strategy method asking for minimally acceptable offers. Hence, it seems more appropriate to ask participants of

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21. When including incomplete decisions (assuming that offers to which one did not react at all are rejected) the optimality of equal splits when only confronting pen-and-paper participants is even more striking.

ultimatum games to accept or reject any possible offer instead of asking for acceptance thresholds only.

If one is strictly inequality averse, rejection of extremely generous offers larger than DM500 is as natural as (but far more costly than) the rejection of too low offers. Rejecting high offers means that the responder sacrifices more than the proposer does. Participants who refuse too low and too high offers apparently insist quite strongly on fair outcomes.

Observation 3. Insisting on fair outcomes is the main motivation of 9% of all participants to apply non-monotonic response strategies. This behavior is more frequently observed when relying on mail or fax than for internet participants.

5. CONCLUSION

Previous newspaper experiments (of which we are aware) have exclusively relied on the guessing game, which is taken as a vehicle to study decision-making in financial markets. Compared to this we have used the ultimatum game to address a large public, the readers of *Berliner Zeitung*, with issues of fairness, opportunism, bargaining and income distribution. The ultimatum game is a simple two-player game which has been predominantly studied with student populations. Our paper has demonstrated that one can explore such bargaining situations in the form of newspaper experiments, and that a large share of non-academic readership is no obstacle.

We have found new and surprising results, e.g. that acceptance of all, even meager, offers is the modal response behavior. Furthermore, we have noticed that the medium by which participants submit their decisions is an important signal: internetters appear as more greedy and opportunistic than participants relying on letter or fax which, of course, might simply mirror an average age discrepancy. Unfortunately, we have no data on age or education of our participants. Gathering more socio-demographic data of participants in newspaper experiment, thus, seems to be a promising avenue for future research into the parallelism of the lab and the field. Our study may serve as a starting point for such kinds of experiments in which one can gather evidence on a much broader population's preferences for income distribution, decisions in bargaining, or fairness.

APPENDIX A: TRANSLATION OF THE INSTRUCTIONS

The 1,000 DM prize game

How would you decide?
Looking into any standard textbook of economic science from past decades, one will come across an assertion that experiments are impossible in

economic science. In the meantime, this has changed. For example, at the Humboldt University, where experiments have been conducted for a long time by the Institute of Economic Theory III (chair of Werner Güth). These are either carried out as laboratory tests with specifically invited students or arranged as prize-winning games for a broader public group via a newspaper. Today we would like to introduce the 1,000 DM Prize Game which is staged by this Institute in cooperation with *Berliner Zeitung*. You are invited to take part in it. On 25 May the prize winners will be announced under this headline with a background report interpreting the results of this experiment.

The game is based on an intuitive setup: an uncle in America has a niece and a nephew in Germany named Charlotte and Friedrich respectively. They are related to, but do not know, each other. Their uncle has decided to donate a total of 1,000 DM to these two. He has, however, linked this charitable gift to the condition that Charlotte makes an initial proposal regarding how much of that 1,000 DM sum she would like to keep for herself and how much she intends to leave for Friedrich. Should Friedrich agree with Charlotte's proposal, their uncle will promptly credit the corresponding amounts to their accounts. If Friedrich, however, declines Charlotte's proposal, neither of them will receive anything. One example: if Charlotte assigns 700 DM to herself, and 300 to Friedrich, Friedrich can still cash in 300 DM. On the other hand, if he rejects this proposal, both are going to end up with nothing. If you join and are lucky in the game, you, dear reader, may be picked for the role of Charlotte or that of Friedrich. We shall select six participants (male and female) who will be grouped into three pairs in a random procedure without consideration of sex. These three pairs will then be paid out as decreed by 'the uncle'. This means that money will only be awarded to the participants if a pair agrees on Charlotte's proposal.

Regardless of that, you have another chance of winning, provided you are good in forecasting. What you are required to do is predict the typical behavior of the participants as accurately as possible. Of all mails received with a correct forecast, three will be drawn and each awarded a prize of 500 DM. All in all, we shall distribute up to 4,500 DM. Each (he or she) participant will be faced with decision-making in both roles, i.e. that of Charlotte and of Friedrich, since roles are randomly allocated. You should enter your decision in the left column of your newspaper decision form. The remaining amount would go to Friedrich. When acting as Friedrich, all you need to do is to cross-mark which of Charlotte's offers you want to accept or reject. You can mark your guesses about the typical behavior of all participants in the roles of Charlotte and Friedrich in the right-hand column of that same form.

APPENDIX B: NEWSPAPER DECISION FORM

Newspaper decision form

Your decision as Charlotte. How much will most of the other participants
Acting as Charlotte I demand for themselves in the role of
demand for me DM. . . . . . . Charlotte? DM . . . .

(Please enter only one of the nine possible demands in the left and right column respectively (DM 100, 200, 300, 400, 500, 600, 700, 800 or 900!)

Your decision as Friedrich/Charlotte offers you	Your reaction as Friedrich	How will most of the other participants decide in the role of Friedrich?
100 DM (i.e. Charlotte keeps 900 DM)	accept/reject	accept/reject
200 DM (i.e. Charlotte keeps 900 DM)	accept/reject	accept/reject
300 DM (i.e. Charlotte keeps 900 DM)	accept/reject	accept/reject
400 DM (i.e. Charlotte keeps 900 DM)	accept/reject	accept/reject
500 DM (i.e. Charlotte keeps 900 DM)	accept/reject	accept/reject
600 DM (i.e. Charlotte keeps 900 DM)	accept/reject	accept/reject
700 DM (i.e. Charlotte keeps 900 DM)	accept/reject	accept/reject
800 DM (i.e. Charlotte keeps 900 DM)	accept/reject	accept/reject
900 DM (i.e. Charlotte keeps 900 DM)	accept/reject	accept/reject

(Cross 'accept' or 'reject' in the left and right column in all nine lines)

Sender's address

Name

Street   Postal code   Place

ACKNOWLEDGMENTS

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