

Will You Accept Without Knowing What? A Thuringian Newspaper Experiment of the Yes-No Game

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Abstract

Many economic experiments are run in the laboratory with students as participants. In this paper we use a newspaper experiment to learn more about external validity of lab research. Our workhorse is the Yes-No game. Unlike in ultimatum games responders of the Yes-No games do not know the proposal when deciding between whether to accept it or not. We use two different amounts that can be shared (100€ and 1000€). In line with findings for the ultimatum game, offers were fairer and rejections less likely when participants are older and submit their decisions via mail rather than the Internet. By comparing our results with other studies (using executives or students), we demonstrate, at least for this type of game, the external validity of lab research.

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1 Introduction

Quite often in life one has to decide whether to accept a proposal or not without knowing what exactly is offered. Examples are so-called experience goods whose quality is not known to customers and partnership proposals

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without knowing how reliable the partner(s) will be, as often in the case of employment, joint ventures, or spouse relationships. Studying situations where one has to accept or reject with knowing what exactly has been offered is therefore of enormous importance.

One can capture aspects of such problematic decision making by (possibly binary versions of) trust games (e.g. Berg et al., 1995) where the uncertainty of what one accepts or not is due to others having not yet decided. Typically others only have to act when one accepts. The Yes-No game, however, captures situations where the order of decisions is reversed.

Like for experience goods where first the producers select their quality which customers can only assess after buying, it is assumed that

- first proposers suggest how to share given positive monetary amounts (100€ or 1 000€ in our experiment) and
- then responders decide whether to accept or not without knowing the proposal how to share.

When played sequentially, responders thus have to accept or reject an offer which could be known which they, however, do not know when deciding. In our newspaper experiment, we cannot capture such psychological subtleties since we use the strategy vector method: each participant does not only decide for both pie sizes (100€ and 1 000€) but also as a proposer and as a responder. Although it does not matter game theoretically, experimentally observed behavior may depend on how (sequential play, strategy (vector) mode) choices are elicited. Oxoby and McLeish (2004), for instance, study an ultimatum game and find few differences between the strategy vector method and a sequential protocol.

From ultimatum games (see Camerer, 2003, for a survey of ultimatum experiments), Yes-No games differ since responders in ultimatum games know what they accept or reject. Unlike to dictator experiments (e.g. Forsythe et al., 1993), the responder in Yes-No games still has full veto power in the sense that without his consent the pie of 100€ or 1000€ is lost. Compared to former Yes-No experiments (Gehrig et al., 2007), our study differs since

- it compares behavior for a small (100€) and a much larger (1 000€) pie in a within-subjects design,
- it employs not only the strategy vector method but elicits also (1st order) expectations concerning the typical behavior in the other role,
- it is mainly performed with 871 readers of a Thuringian newspaper, the OTZ whose behavior we can compare with 128 executives of a large business company.¹
- Participants could voluntarily reveal their age and gender, and
- participated either via cutting out the newspaper part, filling it out, and mailing it or via using an internet platform.

Thus, we can test the robustness of former findings (Gehrig et al., 2007) which exclusively rely on lab studies with student participants with respect to

- socio-demographic background variables (like student vs. non-student, age, gender, executive vs. newspaper reader)
- the size of the pie as well as random payment (only 20 pairs, 10 for 100€ and 1 000€ each, were randomly selected for payment)
- external validity (lab vs. non-lab/newspaper readers vs. business executives)
- elicitation mode (strategy vector, describing own choices, and strategy vector describing one's expectations how others will typically decide).

A major aim of this study is to learn more about external validity of laboratory experiments. Many laboratory experiments are done with students. Members of this subset of the population have a similar age and a similar level of education. Hence, traditional laboratory experiments do not allow

¹As usual the specifics of the company will not be revealed by us.

us to measure how age and education affect behaviour. They also leave open the question how far results from the lab can be generalised.

Experimentalists can increase the variance of socio-demographic characteristics in the subject pool in several ways. In particular two games have been studied with a more heterogeneous population: The ultimatum game and the trust game.

Roth et al. (1991) study the ultimatum game with 79 students from different nationalities and find clear differences in behaviour between these groups. Murnighan and Saxon (1998) looks at the behaviour of 331 children and finds that generosity in the ultimatum game decreases with age. In a similar study with 310 children Harbaugh et al. (2003) find that, once on controls for size, generosity increases with age. Güth et al. (2003) run a newspaper experiments with the ultimatum game. With 1035 participants they find that the medium of participation, internet or email, has an effect on generosity. Güth et al. (2007) look at a three-person ultimatum game. They have 5132 participants and find that fairness and rejection rates increase with age. Köhler et al. (2007) play an ultimatum game with a heterogeneous sample of 334 German adults. According to their study generosity increases with age and income. Bellemare et al. (2008) integrate experiments into an existing survey, the Dutch CentER panel. They have 1214 participants who play either the the ultimatum or the dictator game. One finding is that generosity increases with age.

The trust game has been studied by Fehr and List (2004) who compare the behaviour of 126 students with that of 76 CEOs. CEOs turn out to be more trusting, more trustworthy, and punish less. Fehr et al. (2003) report data from a trust game with a randomly selected sample of 429 German households. Bellemare and Kröger (2007) compare behaviour in the trust game played by 100 students and 499 households of the CentER panel. They find a hump-shaped relation between age and trust, and a u-shaped relation between age and trustworthiness. Bornhorst et al. (2004) play a trust game with 110 Ph.D. students of different nationalities and, find significant differences in trust and trustworthiness between different regions of origin. Sutter and Kocher (2007) study a trust game played by 662 participants

from different age groups. They find a hump-shaped relation between age and trust and increasing trustworthiness with age.

Other games that have been studied with heterogeneous groups of participants include the beauty-contest game of Bosch-Domenech et al. (2002) or the prisoners' dilemma in the TV show "Friend or Foe" studied by List (2006).

All these studies show that, although we can learn a lot from a student subject pool, participants of a different age or a different level of education might behave differently. It is, hence, essential to compare behaviour of student participants with a more heterogeneous population. This is what we want to do in this paper.

In section 2, we introduce the design of the newspaper experiment which essentially coincides with that of the experiment with business executives. Section 3 discusses some hypotheses which, in section 4, are tested with the help of the rather large data sets (involving 871 participants from the newspaper experiment and 128 business executives, altogether 999 participants). Section 5 concludes.

2 Experiment

On Saturday, 6 September 2008, and on Saturday, 13 September, the Ostthüringer Zeitung (Gera, Germany) published the instructions to an experiment in their weekend supplement. A translation of the instructions can be found on our webpage <http://www.kirchkamp.de/ja-nein/>. These instructions also contained a link to a web page with essentially the same instructions and the same format. Furthermore, on Tuesday, 30 September, the newspaper published a note with the link to the web page. Readers of the newspaper knew that they could participate in the experiment either by mail or through the internet. They were also told that we would select 40 participants who would actually play the game.

The game can be described as follows:

- First, the 40 participants are randomly grouped into 20 pairs of two

Table 1 Participants of the newspaper experiment

platform	num. of participants	known sex [%]	females [%]	known age [%]	mean age [years]	median age [years]	known profession [%]	blue collar [%]
mail	303	100.0	57.1	96.0	49.8	50.0	65.0	27.4
internet	568	100.0	44.5	82.2	39.0	40.0	61.4	13.5
all	871	100.0	48.9	87.0	43.2	43.0	62.7	18.5

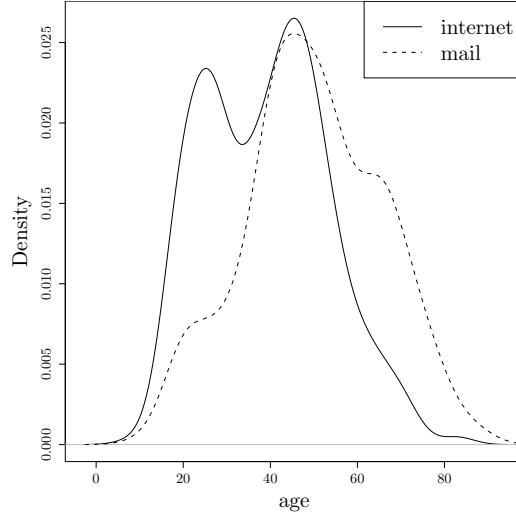
players.

- One of these two players will be the proposer in the Yes-No game (X -player), the other the responder (Y -player).
- A random draw decides for each pair the amount that is to be divided. For 10 pairs the amount is 100€, for the other 10 pairs the amount is 1000€.
- The X -player chooses a division. To simplify the evaluation of the questionnaires we only allow 10 divisions between 5€ and 95€ when 100€ could be divided. Similarly, divisions between 50€ and 950€ were allowed when 1000€ could be divided (see also the translation of the instructions on our webpage <http://www.kirchkamp.de/ja-nein/>).
- Simultaneously, the Y -player chooses “yes” or “no”.
- In case of “yes”, the amount is divided according to the proposal of the X -player. In case of “no” both players receive zero.

We used the strategy vector method, i.e. all participants submitted strategies and expectations for both amounts (100€ and 1000 €) and for both positions in the game (X and Y).

Table 1 shows characteristics of participants from the newspapers experiment. Since some participants did not reveal their age or their profession the table also shows the proportion of participants where we “know” these properties. Figure 1 shows the estimated density of age in our sample.

Figure 1 Age of participants in the newspaper experiment



Essentially the same method was also used in June 2008 to elicit choices of 128 business executives. For this subset of the data we have no information about age and sex.

3 Hypotheses

It is probably needless to state that a materially opportunistic responder should accept the unknown but necessarily positive offer. Anticipating such opportunism, an equally opportunistic proposer should offer the lowest possible amount. We, however, do expect only few participants to behave in line with such common(ly known) opportunism.

Whether “stakes” matter is often explored by using the same stakes in rich and poor countries, i.e., stake variation relies on large discrepancies of living conditions (see, e.g. Cameron, 1999). The possible disadvantage of confounding “stake” and culture is avoided by stake variation in our within-subjects design: the very same participants decide for a small (100€) and a much larger (1 000€) pie. But which stake effects do we expect?

Hypothesis S: “Stakes”

1. In view of the stake independence, observed for ultimatum games,

we expect the relative shares, offered by proposers for both pie sizes, to be rather similar, although we expect quite some heterogeneity of individual behavior.

2. Although game theoretically (assuming non monetary payoff maximization) responders should accept, some responder participants will use the small pie (100€) to “teach fairness to proposers”, by rejecting in case of small pie while accepting in case of the large one (1 000€).
3. Similarly to Gehrig et al. (2007), we, however, expect the rejection rates to be quite low.

By comparing the findings of Gehrig et al. (2007) with ours, we hope to confirm

Hypothesis EV: “External Validity”

At least for the large pie (1 000€) the results do not differ much between newspaper participants, business executives, where we rely essentially on the same elicitation method, and student participants (based on different elicitation).

With respect to socio-demographic variables, we will test

Hypothesis SD: “Socio-Demographics”

1. There is no significant gender effect.
2. Age matters a lot since older participants offer more as proposers and are less likely to reject as responders what is magnified by their expectations.
3. There is “more fairness in the mail than in the internet”.²

Hypothesis E: “Expectations”

²Güth et al. (2003) found in a newspaper experiment based on the ultimatum game significantly higher demands and also higher acceptance rates for participants who submitted their decision through the internet.

More generally, we expect all the former hypotheses to be more significantly confirmed by choice than by expectation data when claiming no difference whereas expectation data are expected to be more reactive, i.e., heterogeneity more likely triggers different expectations than different behavior.

More generally, one could predict that younger, e.g. student participants will be more clearly aware of the crucial aspect of the Yes-No game (that responder participants are buying a pig in a poke) than other participants for whom the Yes-No game might appear rather similar to the ultimatum game and possibly to the dictator game. For responder behavior this is, of course, hardly testable (there is no simple way to compare conditional with unconditional or even no responses).

But for proposer behavior one could easily test this by comparing the relative offers in ultimatum, dictator, and Yes-No games for both, student participants and non-student participants. We do not postulate an appropriate hypothesis concerning such different game dependence of different types of participants and will only comment on this in the concluding section.

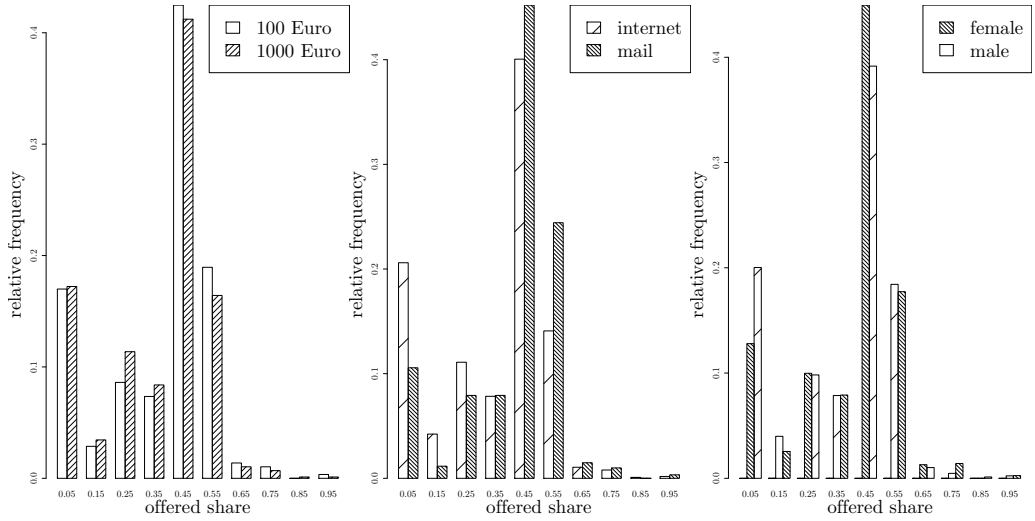
4 Results

We present the results by investigating whether they confirm the hypotheses stated above.

Hypothesis S-1 (stake independence of offers): The left part of figure 2 shows a histogram of relative offers for the two pie sizes. We see that the majority of players offers slightly less than one half. For an amount of 100€ the average offered share is 0.375 of the entire amount, for an amount of 1000€ the average offered share is with 0.361 slightly smaller. This difference is small, but significant. An exact (Streitberg and Röhm) paired Wilcoxon test yields a p -value of 0.00001, a paired t -test yields a p -value of 0.00003. Both contradict hypothesis S-1.

S-2 (rejection-behaviour) When the amount is 100€ then 7.2% of all participants reject, whereas, when the amount is 1000€, only 4.9%

Figure 2 Offers



of all participants reject. The difference is significant. A one-sided Fisher’s exact test for independence yields a p -value of 0.0282. This is in line with hypothesis S-2.

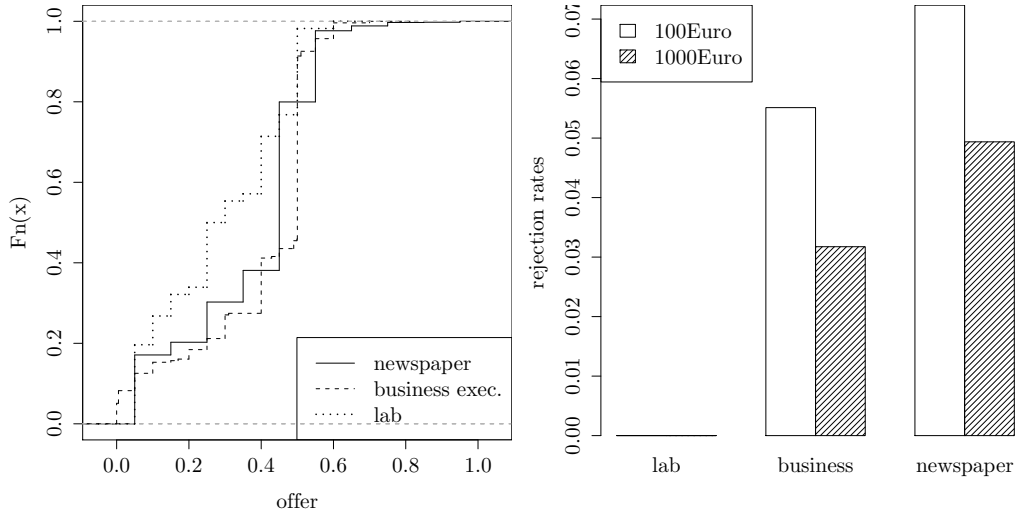
S-3 (low rejection rates) In our experiment we find rejection rates of 7.2% when the amount is 100€ and 4.9% when the amount is 1000€. We compare these figures with the laboratory experiment by Gehrig et al. (2007) who find for the Yes-No game 0% and for the ultimatum game 2.8%.³ Apparently, with newspaper readers rejection rates are significantly higher. A binomial test against rejection levels of 2.8% finds rejection levels in our experiment significantly higher ($p = 0.00000$ for 100€ and also $p = 0.00000$ for 1000€).

Compared to student participants newspaper readers do not refrain as clearly from vetoing somehow questions hypothesis S-3.

EV (external validity) The left graph in figure 3 shows the empirical distribution of offers for different experiments. The solid line shows offers

³We are grateful to Gehrig et al. (2007) for providing the raw data of their experiment. Here we refer only to what Gehrig et al. (2007) call their “first experiment series”. The games in their “second experiment series” were embedded in a bidding mechanism which can not easily be compared to the game we study here.

Figure 3 Results from different experiments

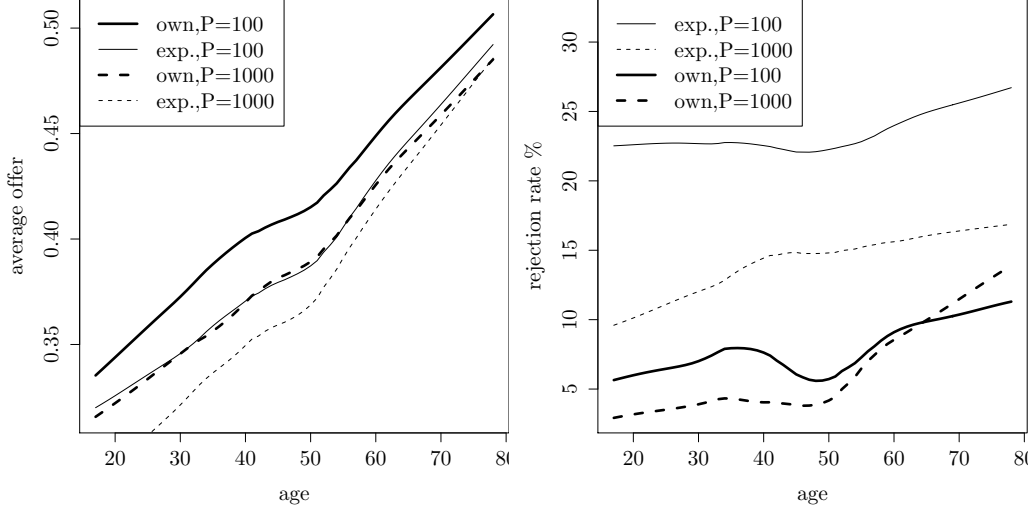


in a newspaper experiment, the dashed line shows results from a very similar experiment with business executives (conducted in June 2008), the dotted line shows offers from the lab experiment by Gehrig et al. (2007). One main observation from the lab is confirmed by newspaper readers and business executives: offers are always clearly larger than game theoretically predicted one (the smallest positive offer). However, we also see that relative offers are clearly smaller for the student population in the lab than for readers of the newspaper or business executives.

The graph on the right side in figure 3 shows the empirical relative frequency to reject offers. We see that the pattern is similar in the newspaper experiment and with business executives: with larger stakes participants are more cautious. Business executives are generally more cautious anyway. We also see that behaviour in the lab is fundamentally different. All participants in the laboratory accepted their unknown offer.

SD (offers) The left part of figure 4 shows how average offers depend on the age group. We see that for both amounts, 100€ and 1000€, and also for actual decisions as well as for expected decisions, the offer increases

Figure 4 Average offers and rejection rates



Graphs show own choices (own) and expected choices (exp.) of the other player. The lines are lowess-splines based on R's `plsmo` function.

with age. This is similar to what Sutter and Kocher (2007) observe for trust games. There trustworthiness increases with age. However, trust follows a hump-shaped relation in Sutter and Kocher (2007).

More formally, we estimate the following random effects model:

$$\frac{\text{offer}}{\text{amount}} = \beta_1 \cdot d_1 + \beta_{1000\text{€}} \cdot d_{1000\text{€}} + \beta_{\text{age}} \cdot \text{age} + \beta_{\text{internet}} \cdot d_{\text{internet}} + \beta_{\sigma} \cdot d_{\sigma} + \nu_i + \epsilon_{ik} \quad (1)$$

where $d_{1000\text{€}}$ is a dummy which is one if the amount is 1000€ and zero otherwise, d_{internet} is a dummy that is one for participants who submitted their strategy through the internet and zero otherwise, and d_{σ} is a dummy that is one for male participants and zero otherwise. ν_i is a random effect for each participant and ϵ_{ik} is a random effect for the individual decision. Results are shown in table 2. Alternative models where age enters as a polynomial of second or higher degree do not lead to a significant change in the estimation results. Also, when we add a dummy for white collar workers to equation (1) or to the following equations (2) and (4) we do not find a significant effect nor a

Table 2 Random effects estimation of equation 1

	β	σ	t	p value	95% conf	interval
1	0.326	0.0173	18.8	0.0000	0.292	0.36
1000€	-0.0158	0.00791	-2	0.0462	-0.0313	-0.00027
age	0.00209	0.000299	6.97	0.0000	0.0015	0.00267
internet	-0.0469	0.00975	-4.81	0.0000	-0.0661	-0.0278
♂	-0.0205	0.0092	-2.23	0.0258	-0.0386	-0.00248

Confidence intervals and p -values are based on a parametric bootstrap with 1000 replications.

substantial change in the estimated coefficients.

We see that with increasing age offers increase significantly.

There is also a significant gender effect. Male participants offer less than female participants. This is in line with Eckel and Grossman (1998) and Eckel and Grossman (2001) who find men to be less generous in dictator experiments and ultimatum games.⁴

The effect of the medium of participation, internet or mail, is highly significant. Even when we control for age, offers on the internet are significantly smaller and closer to the game theoretic solution behavior based on material opportunism. This finding is in line with Güth et al. (2003) who also observe “more fairness in the mail than in the internet”.

SD (rejection behaviour) The right part of figure 4 shows the relation between rejection rates and age. To measure this effect we estimate the rejection probability as a logistic function of age and other explanatory variables. Since we see in the left part of figure 4 that older people have more pessimistic expectations than younger people we include expectations as an explanatory variable in the following random effects

⁴More basically, one can control for the idiosyncratic testosterone level of male participants (see Burnham, 2007).

Table 3 Random effects estimation of equation 2

	β	σ	z	p value	95% conf interval
1	-8.09	2.54	-3.19	0.0014	-13.1 -3.11
1000€	-1.03	0.368	-2.79	0.0053	-1.75 -0.305
o^E	-1.12	1.85	-0.606	0.5443	-4.74 2.5
age	0.0327	0.0406	0.806	0.4201	-0.0469 0.112
internet	-0.351	1.39	-0.252	0.8009	-3.08 2.38
σ	0.264	1.3	0.202	0.8396	-2.29 2.82

model:

$$P(\text{reject}) = \mathcal{L}\left(\beta_1 \cdot d_1 + \beta_{1000\text{€}} \cdot d_{1000\text{€}} + \beta_{o^E} \cdot o^E + \beta_{\text{age}} \cdot \text{age} + \beta_{\text{internet}} \cdot d_{\text{internet}} + \beta_{\sigma} \cdot d_{\sigma} + \nu_i\right) \quad (2)$$

\mathcal{L} is the standard logistic function and o^E is the expected relative offer. Estimation results can be found in table 3. There are fewer significant effects than in equation (1). This is not surprising, since most offers are accepted anyway (we have 1413 accepted and only 93 rejected offers). The small number of rejection decisions does not yield the variance needed for highly significant results. The only significant factor is the amount: Participants are significantly less likely to reject a share of a large (1000€) pie than a share of a small (100€) pie.

What looks like increasing stubbornness of the elderly in figure 4 turns out to be insignificant in the estimation.

Eckel and Grossman (2001) find fewer rejections by women in ultimatum games. In our study we do not find such an effect.

E (expectations) Similar to equation (1) we explain expected relative offers o^E :

$$o^E = \beta_1 \cdot d_1 + \beta_{1000\text{€}} \cdot d_{1000\text{€}} + \beta_{\text{age}} \cdot \text{age} + \beta_{\text{internet}} \cdot d_{\text{internet}} + \beta_{\sigma} \cdot d_{\sigma} + \nu_i + \epsilon_{ik} \quad (3)$$

Table 4 Random effects estimation of equation 3 for expected offers

	β	σ	t	p value	95% conf	interval
1	0.33	0.0172	19.2	0.0000	0.296	0.363
1000€	-0.0151	0.00843	-1.8	0.0729	-0.0317	0.00141
age	0.00157	0.000312	5.04	0.0000	0.000958	0.00218
internet	-0.0464	0.00985	-4.71	0.0000	-0.0657	-0.0271
σ	0.0048	0.00933	0.514	0.6073	-0.0135	0.0231

Confidence intervals and p -values are based on a parametric bootstrap with 1000 replications.

Table 5 Random effects estimation of equation 2 for expected rejection rates

	β	σ	z	p value	95% conf	interval
1	-1.33	0.247	-5.39	0.0000	-1.82	-0.848
1000€	-0.368	0.127	-2.89	0.0038	-0.618	-0.119
age	0.0056	0.00435	1.29	0.1979	-0.00292	0.0141
internet	0.0357	0.139	0.257	0.7975	-0.237	0.308
σ	-0.163	0.129	-1.26	0.2071	-0.415	0.09

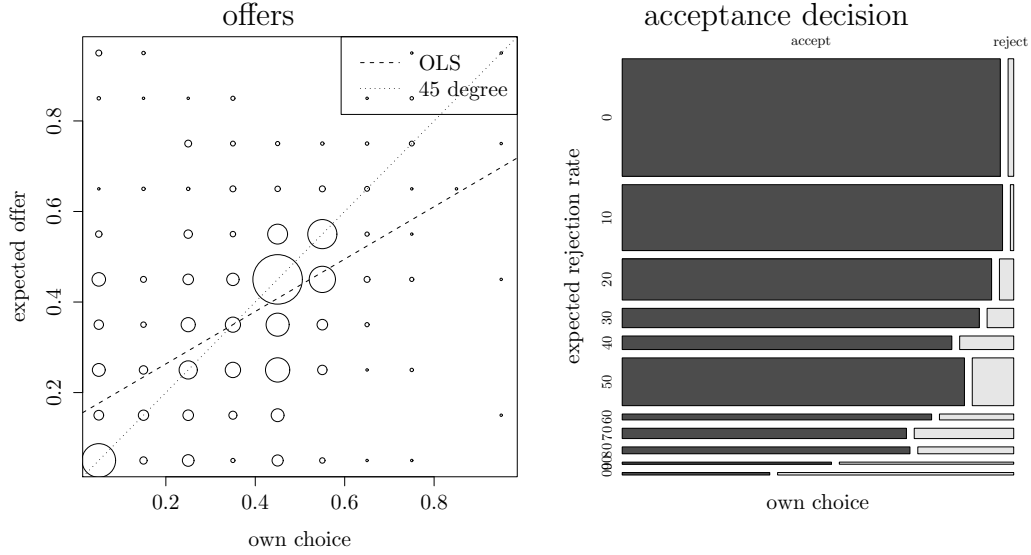
Results are shown in table 4 and do not differ much from estimation results for actual offers (table 2). Expected offers are smaller when stakes are higher, expected offers increase with age and are smaller in the internet. Only the (weakly significant) gender effect that we found for actual offers disappears for expected offers. Men expect the same offers as women.

As in equation (2) we explain expected rejection rates with a logistic regression with random effects. Since the rejection decision of another person can not depend on the own expectation equation 4 does not contain the expected offer o^E .

$$P(\text{reject}) = \mathcal{L}\left(\beta_1 \cdot d_1 + \beta_{1000\text{€}} \cdot d_{1000\text{€}} + \beta_{\text{age}} \cdot \text{age} + \beta_{\text{internet}} \cdot d_{\text{internet}} + \beta_{\sigma} \cdot d_{\sigma} + \nu_i\right) \quad (4)$$

We show results in table 4. As in the comparison of equation (1) and (3), also estimation results for equations (2) and (4) are not too different

Figure 5 Own choices and expectations in the newspaper experiment



The area of the circles (in the left diagram) and the area of the rectangles (in the right diagram) is proportional to the number of observations. The dashed line shows an OLS regression of expectations on offers.

from each other. Correctly, participants expect smaller rejection rates when stakes are larger. Older people and male participants expect higher rejection rates.

Let us next have a look at consistency of expectations. Do participants who make generous offers also expect those offers? And are participants who expect frequent rejections more likely to reject themselves? The answer to both questions is “yes”. The left graph in Figure 5 shows a bubbleplot of expectations over offers. We clearly see that on the individual level offers and expectations are correlated. Participants who make small offers expect others to make small offers, too. Participants who are generous expect other to be generous as well. The right graph in figure 5 shows a mosaicplot of actual and expected rejection decisions. Again, we find that expectations are in line with choices. Participants who expect a rejection rate of 0 do not reject themselves. There are not many participants who expect a high rejection rate but those who do will reject rather frequently.

5 Conclusion

Lab research is often questioned by arguing that

1. the stakes are minor⁵,
2. student participants may not be representative⁶, and
3. experimental games are far too abstract.

What this altogether concerns is the external validity of typical lab research in experimental economics. Here we did not try to overcome 3. All what we can say to defend our choice of game, the Yes-No-game, is that it

- is simple enough to be understood by reasonably educated newspaper readers and executives (possibly without an academic background) and
- captures some important aspect of life, namely the need to accept or reject some deal whose profitability has already been determined or manipulated but is not known to the responder.

With respect to 1., we are rather certain that we have explored stake dependence in a satisfying way, once by quite high pie sizes (even the small pie (100€) is quite large compared to usual pie amounts) and once by varying stakes by a factor of 10. Of course, one might object that the random selection of only 20 pairs questions the stake size. There is, however, little evidence for such random payment effects (see, for instance Cubitt et al., 1998). And as already mentioned, we agree that students are not representative, since they belong to a rather narrow age bracket. We have found two important socio-demographic variables: age and the medium (mail vs. internet). Even after controlling that media use changes with age, we could

⁵In view of the low-cost hypothesis (e.g. Kirchgässner, 1999) predicting more ethical behavior when its costs are low, small stakes could, for instance, explain other regarding concerns.

⁶We partly confirm this by the strong age dependency of behavior but otherwise prove the external validity since the results for newspaper readers, executives, and students are rather similar.

confirm the previous finding (Güth et al., 2003) of more “fairness in the mail and more material opportunism in the internet”.

Compared to the typical lab results we observe more generous offers but also more frequent rejections. This qualitatively confirms our expectation that student participants in a lab environment react more clearly to subtle strategic details⁷ like not knowing the offer by a generous offer) and by rejecting less often (in line with the principles of “in dubio pro reo” or “in dubio pro meo”, see Gehrig et al. (2007)). Outside the lab participants thus tend to be nicer but also more suspicious, i.e., less likely to trust that others will not try to exploit them. This tendency of our newspaper participants points into the direction of behavior, usually observed in ultimatum experiments, what seems to confirm our expectation that newspaper participants react less clearly to subtle differences in the rules of the game than typical lab participants. A more direct test of such game dependency should, of course, rely on a within-subjects design where participants confront different game types like ultimatum, Yes-No, and/or dictator games rather than only different pie sizes as in our experiment. To the best of our knowledge, we are not aware of newspaper experiments exploring such game dependency.

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⁷Such insensitivity has been claimed more generally for all experimental research (see, for instance, Pull (1999), Selten (2000)).

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