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Working Paper

Interregional diversity of fairness concerns: an online ultimatum experiment

Jena Economic Research Papers, No. 2007,016

Provided in Cooperation with:
Max Planck Institute of Economics

Suggested Citation: Goerg, Sebastian J.; Güth, Werner; Walkowitz, Gari; Weiland, Torsten (2007) : Interregional diversity of fairness concerns: an online ultimatum experiment, Jena Economic Research Papers, No. 2007,016, Friedrich Schiller University Jena and Max Planck Institute of Economics, Jena

This Version is available at:
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JENA ECONOMIC RESEARCH PAPERS

2007 – 016

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www.jenecon.de

ISSN 1864-7057

The JENA ECONOMIC RESEARCH PAPERS is a joint publication of the Friedrich-Schiller-University and the Max Planck Institute of Economics, Jena, Germany. For editorial correspondence please contact m.pasche@wiwi.uni-jena.de.

Impressum:

Friedrich-Schiller-University Jena
Carl-Zeiß-Str. 3
D-07743 Jena
www.uni-jena.de

Max-Planck-Institute of Economics
Kahlaische Str. 10
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Jena Economic Research Papers 2007-016

Interregional diversity of fairness concerns - An online ultimatum experiment*

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Gari Walkowitz†, and Torsten Weiland‡

May 15, 2007

Abstract

Does geographic distance or the perceived social distance between subjects significantly affect proposer and responder behavior in ultimatum bargaining? To answer this question, subjects play a one-shot ultimatum game with three players (proposer, responder, and a passive dummy player) and asymmetric information (only the proposer knows what can be distributed). Treatments differ in their geographic scope by involving either one or three different locations in Germany. Observed behavior reflects the robust stylized facts of this class of ultimatum experiments and can be adequately explained by other-regarding preferences. While responder behavior does not condition on co-players' location of residence, self-interest of proposers varies significantly with the latter. Altogether, we do not detect strong discrimination based on geographic distance.

Keywords: ultimatum bargaining, cross-cultural experiments, social preferences
JEL classification: C78, C91, Z13

*We are grateful for the help of Heike Hennig-Schmidt, Emanuela Ianescu, and Daniel Wiesen in supporting the conduct of the experiments in Berlin and Bonn and for valuable comments. Furthermore, we would like to thank the participants of the 2006 GEW Annual Meeting in Magdeburg (Germany) for valuable comments and support. Financial support by the Deutsche Forschungsgemeinschaft (SE 137/3-1) is gratefully acknowledged.

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1 Introduction

It has long been known (e.g., Homans, 1961) that fairness, e.g. in the form of equal rewards for equal contributions, is guiding allocation behavior at the workplace, on markets, and in private life. More recently, such equity concerns are captured by (trade-off) models of inequity aversion allowing for smooth substitution between equity and material success (cf., Bazerman, Loewenstein, & Thompson, 1989; Bolton, 1991; Fehr & Schmidt, 1999; Bolton & Ockenfels, 2000). There is no doubt that individuals are guided by fairness whenever they can easily compare the material success of the interacting parties (for the prerequisites of such comparisons, see Selten, 1978), but that they display, e.g. in ultimatum experiments, heterogeneity in distribution proposals and reactions to them. In line with the discussion on heterogeneity, Botelho, Hirsch, and Rutström (2000) stress that bargaining is highly sensitive to contextual and procedural issues and moreover urge experimenters to control for the potentially biasing effects of demographic variables.[1]

Until now, only few studies have tried to evaluate the sensitivity of outcomes in bargaining experiments with respect to the geographic distance of interacting co-players. So far geographic effects have mainly been explored by performing the same experiment with participants from various (national) subject pools which would, however, never mingle (e.g., Roth, Prasnikar, Okuno-Fujiwara, & Zamir, 1991; Henrich, 2000). Such studies do not aim at identifying behavioral patterns which result from the direct interaction of subjects from different regions of residence. In contrast to these studies, we are particularly interested in exploring truly interregional interaction, the central question being: 'Is offer and acceptance behavior in distribution games sensitive to effects of the geographic or social distance between players?'

With regard to the local and the national treatment of our study, namely the interaction of subjects who may be assessed as being hardly or only moderately distant from each other, we do not expect location to be a very influential factor. Yet the factor of location may significantly alter decision patterns in bargaining when geographic or social distance among interacting subjects increases, as is systematically analyzed in a follow-up study to this paper. The present experimental study features two treatments which only differ in that either one local or three

[1] Güth, Schmidt, and Sutter (2006), e.g., illustrate that even the medium of participation (via mail, fax, or internet) causes substantial variety in observed subject behavior.

geographically distinct subject pools are being used. In the following, we distinguish between a

- local treatment (LOC) in which all participants (commonly know that they) are present at the same computer laboratory (in Jena, Germany) and a
- national treatment (NAT) in which it is commonly known who of the three interacting players comes from which of the three (German) towns (Berlin, Bonn, and Jena).

The national treatment thus provides a controlled test environment in which subjects may (or may not) condition their choices on their co-players' residence in the same country. To attenuate possible biasing effects resulting from demographically differing subject pools, all three regional subject pools are constructed to be structurally similar: we rely on student participants whose behavior seems, at least to a certain extent, to be representative for the behavior of their age group (Maguire, Taylor, & Gurmu, 2003; Güth et al., 2006).

Our experimental workhorse is the three-person ultimatum game (Güth & van Damme, 1998) with proposer X, responder Y, and dummy player Z whose allocation shares are henceforth denoted by x, y, and z. Offers to the respective parties are nonnegative (x,y,$z \geq 0$), and their sum ($x + y + z$) must equal the monetary pie $A(> 0)$. As in Mitzkewitz and Nagel (1993), only proposer X is aware of the actual pie size A which can be either small ($\underline{A}$) or large ($\overline{A}$) with probability $p = 0.25$ and $(1 - p) = 0.75$. In case of $A = \overline{A}$, proposers can hide their greed by offering their co-players fair shares (equal split) of $\underline{A}$ and collecting $\overline{A} - \underline{A}$ in addition to their own share of $\underline{A}$.

In the local and national treatment (LOC and NAT), the location of each participant in the role of X, Y, and Z is commonly known. The two active players X and Y may thus not only condition their behavior on their active co-player's location, but also on the location of dummy Z. If, for instance, a proposer wants to discriminate between his more (Z) or less (Y) helpless fellow players from a different town, this should show up in our data.

The remainder of this paper is organized as follows: In section 2, we briefly survey the relevant recent literature on social preferences and summarize some important experimental and theoretical findings on location effects and factors that influence a person's social identity. After stating our behavioral hypotheses in section 3, we introduce the experimental design and procedure in section 4. Descriptive summary statistics and the results of a set of regression

analyses from the local and national treatment are reported in section 5. Central findings are then summarized and discussed in section 6, and an outlook for future research is provided.

2 Equitable distributions vs. material self-interest

In situations in which subjects have to decide on how to distribute a pecuniary amount – be it a previously earned income or manna from heaven – among themselves and one other or several others, they usually have to mediate between conflicting interests. For one thing, many humans are brought up with an inclination for sharing more or less equitably with others with whom they are interacting. Yet, at the same time, most of them give at least some thought to their own material well-being, which may induce them to value their own income more highly than that of others. The scope of human distribution behavior may thus range from the extremes of pure altruism to exclusive material self-interest, in which fairness and further other-regarding preferences have no place.

In the following, we briefly present a selection of key concepts from the literature on social preferences to describe frequently observed patterns of pro-social distribution behavior that defy any predictions based on narrow rationality. By now, it has been made unmistakably clear in many studies (e.g., Güth, Schmittberger, & Schwarze, 1982; Fehr, Kirchsteiger, & Riedl, 1993; Berg, Dickhaut, & McCabe, 1995; Dufwenberg & Gneezy, 2000; Fahr & Irlenbusch, 2000; Walkowitz & Goerg, 2007) that most humans feature social preferences and that the latter's influence on distribution choices is meaningful and consistent. Most notably, pro-social behavioral traits in subjects can be witnessed in situations in which players give up secure income to improve the earnings of a co-player, support players without sanctioning power, or dearly punish others who display behavior they consider unfair.

Let us mention some incidents in which other-regarding preferences can be regularly observed. (i) Subjects tend to pay attention to the efficiency of bargaining outcomes and, to a certain extent, sacrifice own payoff if social welfare can be substantially augmented in return, i.e., they make a 'helpful sacrifice.' For this motive it is, of course, necessary that the interaction setting grants subjects the discretion to influence the level of efficiency. In ultimatum games, which include the present study, efficiency is commonly not a major concern since it can only be

affected (namely wiped out) by a rejecting responder. (ii) Subjects may derive a psychological benefit from raising the payoff of the least earning subject in their reference group (Rawls, 1971). In ultimatum bargaining, this may induce proposer participants to consider the relative payoffs of their co-players. (iii) Subjects may psychologically suffer from different payoffs in their reference group (cf., Bazerman et al., 1989; Bolton, 1991; Fehr & Schmidt, 1999; Bolton & Ockenfels, 2000), which can be a strong promoter of equitable distributions. (iv) Subjects foster reciprocity which leads them to reward (sanction) acts of others which they perceive as (un)kind (Rabin, 1993; Young, 1996; Dufwenberg & Kirchsteiger, 2004; Falk & Fischbacher, 2006). In the setting of our study, we speak of 'intended reciprocity' or 'conditional cooperation' (e.g., Bolle, 2002) since, given the simultaneous move structure of our model, subjects may only 'react' to an anticipated action of their co-player. (v) Subjects may not feel morally entitled (Hoffman, 1985; Güth & Tietz, 1986) to exploit their superior bargaining position, which would again evoke the equitable sharing norm.

Such systematic traits in humans can be captured by formal social preference models, which concede that humans are inherently self-interested, but also care for the payoffs of others (e.g., Fehr & Schmidt, 1999; Bolton & Ockenfels, 2000; Charness & Rabin, 2002; Falk & Fischbacher, 2006). One common drawback of the experimental evidence on other-regarding concerns is that they result from deterministic experimental scenarios allowing for easy payoff comparisons (in auction experiments, see Kagel and Roth (1995), such concerns are not even mentioned). In our view, commonly known payoffs are very questionable, especially across different locations. This is why we rely on privately informed proposers, allowing to easily compare the payoff of responder Y and dummy Z, but rendering the comparison between what X (presumably) receives and the payoffs of Y and Z more difficult.

So far we have provided a series of arguments why subjects may exhibit socially minded behavior in settings in which a pecuniary amount is to be distributed among several persons. Yet, for a fair representation, we will not omit to also address conflicting incentives which may encourage subjects to act in the opposite way, namely to behave more self-servingly.

Evidently, myopic or narrow self-interest which corresponds to fully rational behavior is the prime motivator of inequitable distribution proposals. According to this mind-set, more money for oneself is generally preferred to less. But apart from the dominant profit-maximization

scheme, we think that there are further determinants which affect subjects – who principally do not have a preference for behaving opportunistically – motivating them to willingly circumvent choices that would bring about equitably outcomes. In our view, the geographic, or closely linked, social distance between interacting subjects is one such determinant. Let us therefore briefly illustrate why we think that our experimental approach, which rests on the concept of geographic or social distance, is both of interest and relevance for the characterization of regular bargaining behavior between heterogeneous agents.

In recent years, an increasing number of laboratory and field studies sought to explore whether aspects of social identity or group association of subjects significantly influence bargaining behavior and, ultimately, the outcomes of such interactions. In this context, the subject's group association may be discerned at various levels, be it by geographic entity (town, region, country) or by social identity (from minimal or social group to ethnicity or culture). In particular, social identity theory, which has been introduced by Tajfel and Turner (1979) to study the psychological basis of intergroup discrimination, is now seen as one of the central theories in this field. It suggests a number of important effects at the group level, which are based on processes of (group) categorization, identification, and comparison and which may significantly alter the way in which individuals engage in bargaining. Considering oneself part of a particular group generally tends to motivate one to be primarily interested in the well-being of one's own in-group. If necessary, this goal may also be pursued at the expense of others, namely the out-group. In other words, the group's exhibited in-group favoritism may induce discrimination of others with whom the former's members consider themselves to be less or (un)related and for whose well-being they do not assume responsibility.

At present, the accumulated laboratory and field evidence is ambiguous and has produced mixed results. In some studies, the authors are finding factors which they use as proxies for social identity to be significant. For instance, in a series of bargaining and market experiments that were separately conducted in four countries with presumed heterogeneous cultural backgrounds, Roth et al. (1991) observed significant behavioral differences between national subject pools (Tokyo, Jerusalem, Ljubljana, and Pittsburgh) which they interpreted, after controlling for demographic variables, as being culturally determined. Similar experimental evidence is provided in the extensive survey on bargaining games in Roth (1995) and the study of Henrich (2000), in which

the latter contrasts bargaining regularities in small-scale societies, particularly the Machiguenga, and Western societies, exemplified by U.S. subjects. In other studies, however, it is argued that any reported significance of the cultural factor may easily stem from inadequately controlling for demographic subject characteristics as well.[2]

In our study, we therefore strive to answer as unambiguously as possible whether a geographic or social association scheme significantly contributes to structuring the observed data. Remember that 'geographic proximity' exclusively refers to the distance between towns within the same country while 'social proximity' relates to the perception of being socially close (or distant), irrespective of one's own and others' geographic location. We think that geographic or social distance may be a key factor in determining whether a co-player is considered a member of the own in-group (or identity group) or rather the remote out-group. Once a pronounced in-group vs. out-group mind-set has been established, it may well reinforce existing stereotypes about prominent characteristics of out-group members. All of this may become problematic inasmuch as it is a common property of stereotypes to be favorable to oneself, which may be accomplished by attributing negative properties to others with the aim of strengthening the one's self-esteem. That very process may turn out to be detrimental as it tends to impede an objective comparison between the groups, ultimately inducing members of distinct groups to focus on their dissimilarities rather than to collaborate for their mutual benefit.

In our view, the various aspects mentioned above allow us to rationalize the existence of discrimination in ultimatum bargaining between geographically or socially distant subjects. Nonetheless, before we set out to discuss or try to explain any possible discrimination between geographically or socially distant bargaining partners, we have at first to verify whether discrimination can be actually and systematically observed in controlled bargaining experiments in the lab. By establishing sound empirical data in settings with varying levels of social distance, we hope to be able to systematically evaluate that factor's (systematic) impact on choices in simple bargaining games. Moreover, identifying locational factors and quantifying their effect could then be helpful in devising adequate coordination mechanisms and institutions that govern the economic interplay of agents with differing geographic or cultural backgrounds in the global economy.

[2] Considering this caveat, we paid attention to the demographic characteristics of the involved subject pools and constructed roughly homogeneous subject pools with approximately matching characteristics.

3 Experimental procedure

The three players X, Y, and Z are asked to share a positive and stochastically determined monetary amount A by means of the distribution vector (x,y,z) with $x+y+z=A$, $A \in \{\underline{A}, \overline{A}\}$, with $\overline{A}=120$ and $\underline{A}=80$. The sequential structure of the game runs as follows:

- Proposer X suggests a distribution of $\underline{A}$ and $\overline{A}$, namely (x,y,z) with $\underline{x}+\underline{y}+\underline{z}=\underline{A}$ and $\overline{x}+\overline{y}+\overline{z}=\overline{A}$. The possible allocations for $\overline{A}$ are given in Table 1 and those for $\underline{A}$ in Table 2, respectively.
- Nature selects $A=\underline{A}$ with $p=0.25$ and $A=\overline{A}$ with $(1-p)=0.75$. These a-priori probabilities are made commonly known in the instructions.
- While proposer X is aware of the actual realization of A, responder Y never learns about A's actual value and is only informed about the offered amounts y and z.
- Responder Y may either accept or reject X's distribution vector (y,z).
- If Y accepts, he earns y and Z earns z while X collects the residual $A-y-z$, whereas otherwise all three players earn 0.

Table 1: Possible allocations $(\overline{x},\overline{y},\overline{z})$ of $\overline{A}$

Offer to	Offer composition															
x	40	40	40	40	40	60	60	60	60	80	80	80	100	100	100	120
y	80	60	40	20	0	60	40	20	0	40	20	0	20	10	0	0
z	0	20	40	60	80	0	20	40	60	0	20	40	0	10	20	0

Table 2: Possible allocations $(\underline{x},\underline{y},\underline{z})$ of $\underline{A}$

Offer to	Offer composition								
x	20	20	40	40	40	60	60	60	80
y	40	20	40	20	0	20	10	0	0
z	20	40	0	20	40	0	10	20	0

As for usual ultimatum games, the benchmark solution, based on own monetary incentives only, is straightforward:

- Responder Y can accept any offer.
- Proposer X, anticipating responder Y's rational response, should offer the minimal ϵ amount to Y and Z. Given the possible proposals from Tables 1 and 2, he is indifferent between giving the whole minimal amount to Y or splitting it between Y and Z.
- If responder Y rejects all offers with $\tilde{y} < y$ and $\tilde{z} < z$ but would accept (y,z), the optimal reply for X is to offer y and z. This shows that any proposal (x,y,z) with $y,z \geq 0$ is an equilibrium outcome.
- The benchmark solution thus requires sequential rationality and not just the equilibrium property.

We conducted two treatments which differ only in the geographic scope of the involved subject pool(s). In the following, the parameter of geographic or social distance is to be understood as a factor which may be either 'low' or 'medium.'[3]

- In the *local treatment* (LOC), the three players X, Y, and Z in each group are students who attend the same university (University of Jena, Germany). Since all members of the subject pool are associated with the same institution and share numerous aspects of their daily lives, we presumed their distance to be 'low.'
- In the *national treatment* (NAT), the game is played by groups of three participants who each attend a different university in Germany (Humboldt University of Berlin, University of Bonn, University of Jena). The details of the matching mechanism are presented in Table 3. Although the three subject pools still share many common characteristics (citizenship, language, age, lifestyle, knowledge about social norms, shared values, etc.), we did not expect them to be as homogeneous as the members of the subject pool in (LOC). We therefore rated their distance as 'medium.'

We ran two computerized sessions for the local treatment (LOC) in Jena as well as two sessions in Berlin, Bonn, and Jena for the national treatment (NAT). While a total of 27 students participated in one session in (LOC), we conducted two sessions in (NAT) which each comprised 18 participants per location or laboratory. Upon arriving at the lab, subjects were placed in

[3] We reserved a third realization ('high') to denote an international setup.

Table 3: Matching mechanism in (LOC) and (NAT)

	Role			
	X	Y	Z	Observations
Subjects' place of residence	Jena	Jena	Jena	27
	Berlin	Bonn	Jena	18
	Berlin	Jena	Bonn	18
	Bonn	Berlin	Jena	18
	Bonn	Jena	Berlin	18
	Jena	Berlin	Bonn	18
	Jena	Bonn	Berlin	18

individual cabins, each equipped with a computer terminal. Without any direct communication with others, they were given some time to carefully study the first part of the written instructions which were also read out aloud by the experimenter.[4] Given the complexity of the task, we implemented a quiz to verify the subjects' understanding of the game rules and the consequences of own and others' choices.

At the start of the experiment, subjects learned about the location of each of the other two player types. More specifically, each participant was informed about her co-players' place of residence on the initial decision screen (see Figure 3 in Appendix B)

- that her co-players shared the same university affiliation as herself (LOC) or, respectively,
- that all three interacting players had different university affiliations (NAT).

To gather as much data as possible, all subjects had to make decisions in the role of both proposer and responder, using a computerized version of the strategy method. The role of each player was randomly determined at the end of the experiment.[5] In a first step, subjects were asked to separately state their distribution proposal of the amount A for the case of A being large or small. Instead of choosing any arbitrary allocation of A, subjects were restricted to selecting one proposal from a menu of alternative proposals with varying allocations to X, Y, and Z. The applicable menus of choices are shown in Tables 1 and 2.

Next, subjects had to state their reaction in case they were assigned the role of responder Y. Again, decisions were elicited using the strategy method, prompting subjects to state their

[4] Refer to Appendix A for the English version of the instructions.
[5] Thereby it was not possible to be matched with own decisions made in another role.

acceptance or rejection for each of a total of 16 distribution proposals (y,z). Remember that the responder is only rarely able to unambiguously infer the amount x kept by the proposer and, derived from this, the actual realization of A. Having specified their respective decisions for the two hypothetical role assignments (X and Y), subjects were, in the second part of the experiment, further asked to state their beliefs[6] about the most frequent decisions of members of their reference group.[7] We intentionally refrained from initially pointing out to subjects that beliefs were to be inquired about subsequent to the elicitation of hypothetical choices since awareness of this procedure might well have influenced their decisions.

The experiment was designed as a one-shot interaction to rule out belief adjustments, reputation building, and trigger strategies. Subjects were told in the instructions that the experiment was limited to one single interaction. After having collected subjects' choices for both player roles and their beliefs about the behavior of their corresponding reference group, the actual pie size A ($\underline{A}$ or $\overline{A}$) and the player roles (X, Y, or Z) were randomly determined. Individual payoffs were then calculated accordingly and converted from ECU (Experimental Currency Unit) into U.S. dollars at the exchange rate of 1 ECU = 0.20 U.S. dollars.[8]

4 Results

To begin with, we first provide a brief summary of the choices of proposers and responders.

4.1 Proposer behavior

Figure 1 comprises four histograms which detail the frequency of offers, given that the large ($\overline{A}$) or the small amount ($\underline{A}$) was available to the proposer. The individual graphs are grouped by location, where, in the case of Jena proposers, observations are additionally separated by treatment (LOC or NAT). For each location and each possible offer (x,y,z), the bar plots show two distinct frequency statistics; the left bar (grey) denotes the actual frequency of proposals, while the right bar (white) indicates the expected frequency of proposals within the subjects'

[6] More precisely, every subject stated her two beliefs about the modal proposal given $\overline{A}$ and $\underline{A}$ in her in-group, as well as her belief about the modal responder behavior for each of the 16 possible distribution proposals in the form of (y,z).

[7] We define the subject's reference group as those participants who share the location of the subject (i.e., attend the same university) and also interact with co-players from the same two towns (e.g., a responder from Berlin and a dummy player from Jena).

[8] U.S. dollars were chosen as the reference currency for the forthcoming international experiments.

reference group. Putting the bars adjacent to each other allows to directly compare whether proposers as a group hold (rather) realistic beliefs about the typical, i.e., the modal, behavior of their fellow proposers.

Expected and actual choices of proposers match to a large extent. The majority of offers concentrates on few focal points which further tend to coincide across locations. When distributing the small amount ($\underline{A}$), proposers seem to share a more common understanding of what to offer. Irrespective of the individual proposer's location and treatment, the self-favoring split of (40,20,20) is clearly preferred over all other possible distributions. This applies equally to proposers' beliefs about their reference group members. About half of all proposers expect their fellow proposers to act self-interestedly and display conformity.[9]

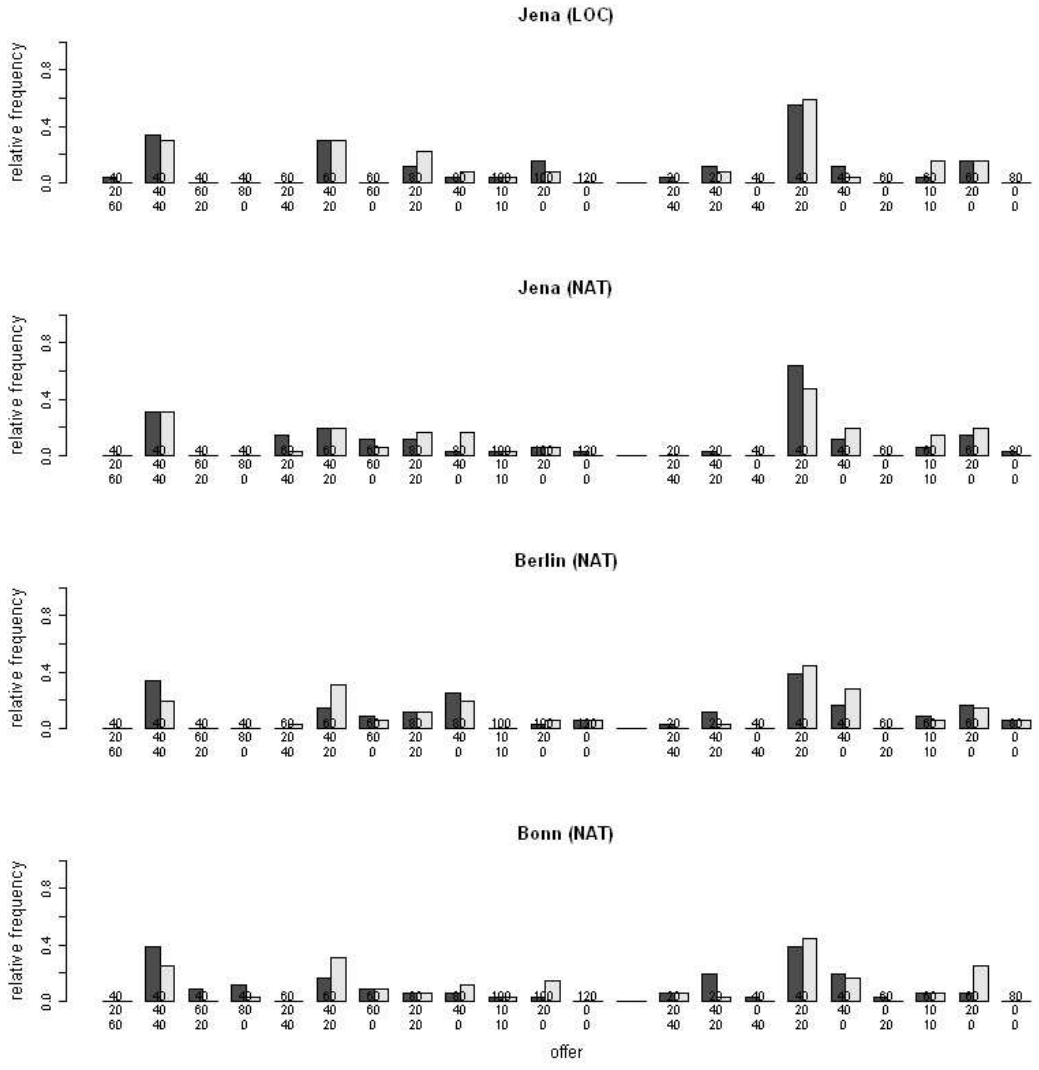
Additionally, the distribution of offers in our experiment once more provides empirical support for the prevalence of other-regarding preferences. Typically, these cannot be unambiguously imputed from data generated in usual ultimatum experiments in which proposer generosity may merely represent fear of rejection.[10] If, however, a self-interested responder is not affected by the size of the distribution share to the dummy, and if that share consequently does not impact on the responder's acceptance decision, positive allocations to the dummy should never be made by opportunistic proposers. On the other hand, if proposers believe that a sizable share of responders does care about the (economic) well-being of others, a positive offer z by X may be considered as being strategic. The majority of observed proposals assigns a positive amount to both responder and dummy, suggesting that proposers are indeed averse to (largely) inequitable payoff distributions. Yet, as can be seen in Figure 1, proposers consider a disadvantageous inequality to be more discomforting than an advantageous inequality: only few proposers suggest a split of (20,40,20) or (20,20,40) which are just as 'equitable' as (40,20,20).

In case of the large amount $\overline{A}$, proposers no longer concentrate on a unique focal offer, but sway between acting equitably (40,40,40) or pursuing their own interest (60,40,20). Irrespective of subjects, location, or treatment, we can always observe proposers who pursue their own interest more or less ambitiously: for instance, consider the proposers from Berlin (offering

[9] In saying this, we are aware of the limitation that proposers' beliefs may be influenced by their preceding choices. However, since beliefs were elicited only after proposals had been previously specified, we can securely state that the choices of proposers were not biased by the, at that time, still unannounced belief elicitation.

[10] In this respect, a fully rational responder would reliably consent to an ϵ-offer, whereas a less rational one would require a (substantially) higher transfer in order to accept the overall offer.

Figure 1: Actual and expected frequency of proposals for $\underline{A}$ and $\overline{A}$



80,40,0 in (NAT)) or from Jena (offering 100,20,0 in (LOC)) who claim a substantial share of $\overline{A}$ for themselves.

One frequently recurring offer is to split $\overline{A}$ into monotonically decreasing fractions, e.g., (60,40,20), which exemplifies a regularly observed pattern in the literature known as the 'power hierarchy' (to share according to bargaining power): proposers are entitled to the largest share due to their ultimatum power and information privilege, while responders are entitled to a somewhat lesser share since they hold veto power. Finally, dummy Z is deprived of any active strategic influence.[11] Summary statistics on the composition of offers are presented in Table 4.

Table 4: Average offer composition (x,y,z) by treatment and location

		Offer composition		
Treatment	Location	x	y	z
(LOC)	Jena	0.52	0.29	0.20
(NAT)	Jena	0.54	0.28	0.19
	Berlin	0.55	0.30	0.15
	Bonn	0.46	0.35	0.19

Another stylized fact in three-person ultimatum games, which is also found in our data, is the so-called 'power coalition,' wherein the proposer and the responder split the available amount exclusively among themselves, leaving the 'helpless' dummy empty-handed. This kind of behavior is most frequently observed in proposers from Jena and Berlin ((60,60,0) and (80,40,0)). Interestingly, the latter offer is also expected by a sizable share of proposers from Bonn, who nonetheless refrain from actually making such an offer.

In view of our data, we find that strongly self-interested proposals are clearly in the minority, with offers of $x \geq 100$ being very rare. We can thus summarize proposer behavior as generally being equity-minded, though accompanied by a slight inclination for personal betterment.

> **Result 1:** Proposers generally split both large and small amounts rather equitably but exhibit a self-serving tendency nevertheless.

Remember that beliefs are always elicited with respect to the subject's reference group which, in terms of the group association approach, may also be thought of as the subject's 'in-group.'

[11] The pure fact of the existence of Z might influence proposers' behavior. However, Z is a passive player. The power hierarchy may be either strict ($x > y > z > 0$) or weak ($x \geq y \geq z > 0$).

We already found that proposers, at least on the aggregate level, hold realistic beliefs about the typical (modal) offer in their reference group, given that $\overline{A}$ or $\underline{A}$ is realized. Moreover, an analysis at the individual level confirms the preceding aggregate findings. About half (49%) of all proposers assign the very (x-)amount to themselves which they presume to be the most frequent claim x in their in-group. Simultaneously, a minority of 18% (33%) believe they are actually more (less) generous to their co-players than their fellow proposers, as if trying to reduce any disturbing cognitive dissonance.[12]

Furthermore, a minority of proposers are found to systematically treat their co-players more kindly than they expect the latter to treat them. This 'niceness' effect is well documented in the literature and is commonly explained by the subject's motivation to perceive herself as a carrier of socially desired characteristics, possibly with the aim of enhancing her social acceptance and boosting her self-esteem. Roughly half of both equity-minded and (more or less) selfish proposers presume that other proposers act in the same way as they do. If there is a gap between the actual and the expected modal choice, it is generally negligible. The regular pattern of bimodal distributions of offers, given $\overline{A}$ and across all locations, however, strongly weakens the hypothesis that stated offers are derived from one universally known and obeyed (social) norm.

> **Result 2:** About half of all proposers make proposals in accordance with their expected offer behavior. Actual and expected modal offers often coincide or are closely related. They do, however, not concentrate at a unique focal point.

With offer data of proposers from Jena, we may answer whether subjects actually (and significantly) respond to a variation in the (geographic) scope of interaction. For this purpose, we test for the significance of the treatment variable 'location.' We start by verifying whether the relative frequencies, i.e., the proportions of the various offers, differ significantly across treatments. Relying on a series of binomial and z-tests, which both test for the equality of the two proportions, we recognize that actual choices of X do not, with one exception, condition on treatment.[13] Analogously, we repeat the series of tests, this time comparing the relative frequencies of expected modal choices. Again, we find general conformity which is only slightly

[12] See Festinger (1957).

[13] The exception is found in the offer (60,20,40) which is never selected in (LOC), but chosen by five proposers in (NAT) ($p = 0.044$/ $p = 0.062$ in two-sided z-test/ binomial test).

Table 5: Linear mixed-effects models explaining offer composition

Regressand	**x**			**y**			**z**		
Regressor	Estimate	Std.error	p-value	Estimate	Std.error	p-value	Estimate	Std.error	p-value
Intercept	0.538	0.026	< 0.001	0.306	0.018	< 0.001	0.153	0.020	< 0.001
$\underline{A}$	0.021	0.011	0.053	-0.014	0.012	0.254	-0.006	0.010	0.589
X_{Bo}	-0.093	0.036	0.011	0.052	0.024	0.035	0.041	0.028	0.144
X_{Je}	-0.022	0.032	0.497	-0.018	0.022	0.411	0.040	0.025	0.110

disturbed by weakly differing proportions of the offer (40,40,0).[14]

To gain more insights into the decision process of individual proposers, we establish a set of linear mixed-effects models with random intercepts for the subject. Each of the three individually fitted models explains one of the three components (x, y, and z) which together define an offer.[15] The models to be presented comprise the following covariates: an intercept, a dummy indicating whether the offer is conditioned on A being large or small, and two location dummies marking the proposer's region of residence. Note that the three regression models are reduced versions of more extensive initial models. Initially, two additional covariates were tested, namely the responder's region of residence and the geographic scope of the interaction among co-players, but were removed from the model due to lacking explanatory power.[16].

The estimated coefficients are presented in Table 5. Our first finding is that the intercepts of the three models strongly reflect the 'power hierarchy' distribution scheme. This may lead us to conjecture that a considerable share of the individual behavior of proposers is already explained by the intercepts alone. We pursue this question by computing the McFadden's pseudo-R^2 statistic, which quantifies the improvement in explanatory power of a particularly specified model over its null model.[17] We find that the value of the realization of A ($\underline{A}$ or $\overline{A}$) does not trigger differentiated behavior in proposers. The amount x retained by the proposer increases by a mere 2%, which in our view is primarily attributable to the absence of a perfectly equal

[14] 'Power coalition' behavior is apparently more widespread in the national treatment (1 proposer in (LOC) vs. 7 proposers in (NAT), $p = 0.063$, two-sided z-test).

[15] The values of the dependent variable were transformed into percentages, imposing x,y,$z \in [0, 1]$ irrespective of which value of A applies ($\overline{A}$ or $\underline{A}$).

[16] Insignificant covariates which did not improve model fit at the 5% level using likelihood ratio tests were iteratively removed until only significant coefficients remained.

[17] In this context, pseudo-R^2 values close to zero point out that the more extensive models fail to substantially raise the accuracy of predictions above that of the null model. This, in turn, would suggest that the independent variables are of little support and may possibly even be discarded.

split in the $\underline{A}$ scenario and the generally coarser grid of offer specifications in that setting. Out of the three included covariates, only the location dummy for proposers from Bonn (Y_{Bo}) is both statistically and economically significant. The sign and magnitude of the coefficient estimate indicate that they demand about 9% less of the available amount than the proposers from the other two locations. Overall, proposers from Bonn thus behave in the least egocentric fashion of all observed proposers. The 'surplus' amount which is not claimed by the proposer (from Bonn) is then nearly equitably divided between the responder and the dummy, whereby the region of residence of the receiving co-players is statistically irrelevant.

> **Result 3:** Given the insignificance of the location dummy for responders, we have strong evidence for arguing that proposer behavior is generally unaffected by the geographic scope of the interaction among co-players.

4.2 Responder behavior

The responders' reactions to the various offers of X are illustrated in Figure 2. Observations are grouped by location and, in the case of responders from Jena, by treatment. Clearly, responders almost uniformly reject offers yielding nothing to themselves ($y = 0$). The responder's willingness to accept X's offer or, respectively, her propensity to reject, generally increases (decreases) with the amount y. The relation between offer y and the responder's rejection propensity is, however, not linear across the entire value range of $y \in \{0,80\}$. For offers which deviate from the equal split by favoring the responder at the expense of the dummy the rejection rate actually rises. To summarize, we find that rejection behavior as a function of y is not generally monotonic, but features a kink at the equal split (x,40,40) given $\overline{A}$. We moreover detect another offer (x,20,20), representing the nearly equitable split given $\underline{A}$, which enjoys almost universal acceptance.

> **Result 4:** Proposers and responders hold rather realistic beliefs about modal offers and the modal acceptance behavior in their reference group. Locational influences lead to a significant change in reacting to self-serving offers and bring about a shift in acceptance thresholds.

To identify the determinants of responder behavior more formally, we fit a logit mixed-effects model with random intercepts for the subject which explains the responder's binary choice of

Figure 2: Actual and expected frequency of rejection

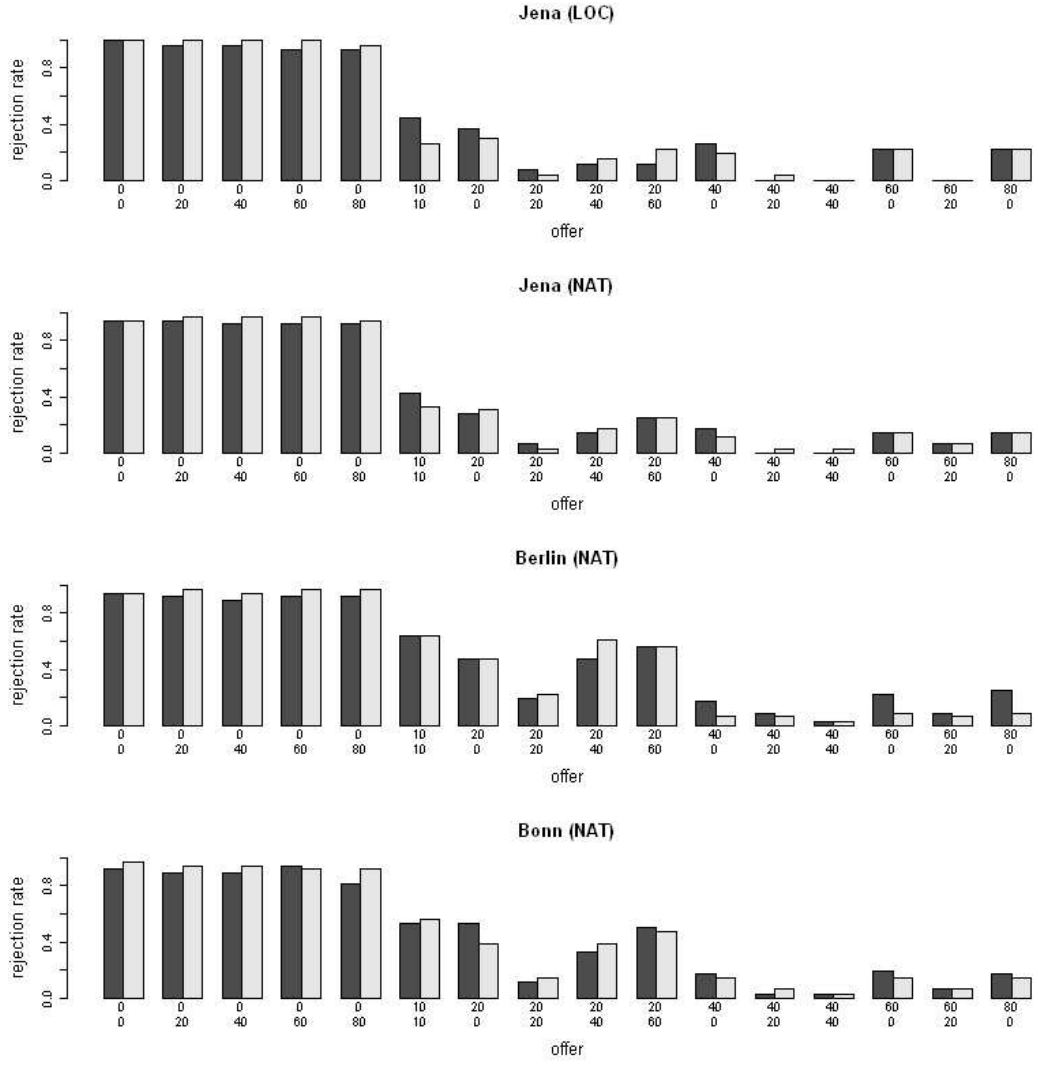


Table 6: Logit mixed-effects model explaining rejection behavior

Regressor	Estimate	Std.error	p-value
Intercept	0.066	0.031	0.034
$max(0, \frac{\hat{A}}{3} - y)$	0.017	0.001	< 0.001
$\delta_{y=0}$	0.262	0.033	< 0.001
$\delta_{z=0}$	0.140	0.016	< 0.001
δ_{ambig}	0.106	0.014	< 0.001
Y_{Bo}	-0.042	0.040	0.292
Y_{Je}	-0.084	0.035	0.017

rejecting (or accepting) a given offer. The set of coefficients comprises an intercept, a statistic measuring the negative deviation of the responder's share from the equal split, two dummies marking particular offer structures (entire neglect of Y or Z), a dummy denoting ambiguous (which are possible in case of $A = \underline{A}$ and $A = \overline{A}$) offers, and two location dummies for the responders' region of residence.

The model is, once again, a reduced version of a more comprehensive initial model. The latter model additionally controlled or tested for the effect of the geographic scope of the interaction, the region of residence of the proposer and the dummy, and potential advantageous inequality aversion in responders. We additionally scrutinized for envy and greed in responders when the dummy's payoff exceeded (was short of) their own. All above-mentioned covariates turned out to be insignificant and were therefore removed from the initial model.

Table 6 shows the results from the regression. The obtained coefficient estimates generally support our intuition that responder behavior significantly conditions on both observable components of X's distribution vector (y,z) rather than only on the transfer of y to the responder. Apparently, responders strongly rely on acceptance thresholds. Any zero offer to Y or Z, as expressed by the dummies $\delta_{y=0}$ and $\delta_{z=0}$, generates substantial discontent in responders and thus significantly raises the probability of a rejection. Granting at least the equitable amount $y = \frac{\hat{A}}{3}$ to the responder ($\hat{A}$ may not be unambiguously discernible for Y) significantly lowers the propensity of potential rejections by Y.[18]

Result 5: Responders clearly exhibit other-regarding preferences and show soli-

[18] If unable to discern the realization of A ($\overline{A}$ or $\underline{A}$), Y, we arbitrarily assume, will impute $\underline{A}$ to be drawn, thus granting X the benefit of the doubt. Therefore, Y is imputed to set $\hat{A} = 80$ if X's offer is ambiguous.

Table 7: Rejection rates by offer composition and location

	Berlin						Bonn						Jena					
z ↘ y	0	10	20	40	60	80	0	10	20	40	60	80	0	10	20	40	60	80
0	0.94		0.47	0.17	0.22	0.25	0.92		0.53	0.17	0.19	0.17	0.97		0.32	0.21	0.17	0.17
10		0.64						0.53						0.43				
20	0.92		0.19	0.08	0.08		0.89		0.11	0.03	0.06		0.95		0.06	0.00	0.03	
40	0.89		0.47	0.03			0.89		0.33	0.03			0.94		0.13	0.00		
60	0.92		0.56				0.94		0.50				0.92		0.19			
80	0.92						0.81						0.92					

darity with the dummy. If offers are deemed excessively inequitable, responders are willing to sacrifice own (certain) income to sanction 'misbehaving' proposers. In consequence, the rejection propensity does not decrease linearly or, respectively, monotonically over the entire possible range of the responder's share y.

Responders apparently dislike situations in which X's offer remains ambiguous in the sense that it could have been derived from both the large ($\overline{A}$) or the small ($\underline{A}$) amount. In the regression, these occurrences are captured by the dummy δ_{ambig}. When responders receive such a proposal, they can never be sure that they have not been taken advantage of by the proposer. Inspecting the subset of ambiguous distribution vectors (y,z), it becomes obvious that most of them allow for large shares of x given that $\overline{A}$ is realized, which just adds one more reason for responders to be suspicious of X's true intentions.[19] A responder who is sufficiently inequity averse may thus actually prefer to reject the offer rather than having to bear the psychological cost of being treated inequitably in all likelihood. Finally, the two location dummies Y_{Bo} and Y_{Je} reveal a subtle downward shift in the rejection propensity of responders from Bonn and Jena, of which, however, only the latter, is statistically noteworthy. Another peculiarity is that responders from Jena are generally, i.e., irrespective of the geographic scope of the treatment, less inclined to reject a particular range of offers. The gap in rejection rates between members of their subject pool and the other two subject pools is most pronounced for values of y in the lower range of $[10, 20]$. Table 7 clearly demonstrates the structural differences in response behavior across the three locations.

[19] Recall that any ambiguous offer (y,z) to Y allows for a much wider range of x ($x \in [0, 120]$) than any unambiguous one ($x \in [0, 60]$), which is invariably based on $\underline{A}$.

The results discussed here generally confirm earlier findings of Güth et al. (2006), stating that responders significantly react to disadvantageous inequality more than to its advantageous counterpart. Moreover, our findings underline that responders do indeed show concern for the dummy, even though the latter is unrelated to them and could (at least theoretically) be neglected. A new insight of our study is that acceptance propensity is, to a minor extent, also affected by the responder's region of residence. However, as we do not find any conditioning of responder choices on the location of co-players, we can convincingly exclude any sort of location-based discrimination. Essentially, responders may be affected in their choices by own locational influences, but they are not influenced by the provenance of their interaction partners.

> **Result 6:** Bargaining outcomes are largely insensitive to variation in the (geographic) scope of the interaction among participants. Subjects do not systematically condition their offer and response behavior on the location of their co-players.

4.3 Decision rationality, payoffs, and efficiency

Perfect decision rationality in our model would require the proposer to retain all but an ϵ-increment[20] of A, which is passed on to the responder who universally accepts. However, this type of proposer is only rarely identified in our data (see Table 8).[21] Only 6% of all proposers actually state claims of $x \geq \frac{4}{5}A$ (with $A \in [\underline{A}, \overline{A}]$). About one third of all proposers acts perfectly equitably, and another third only moderately favor themselves. These proportions of socially minded proposers are seemingly robust and largely insensitive to variations in the scope of interaction. On the contrary, when that scope is expanded, substantial self-interest diminishes and is partly substituted by coalition agreements between the proposer and the responder.

Rationality on the side of responders is more widespread.[22] Whereas only a minority of responders (8%) are willing to accept one or several zero offers ($y = 0$ with varying allocations to Z), about half of all responders accept an offer from X which assigns them any (marginally)

[20] Hereby, ϵ denotes the smallest possible allocation to the responder, which differs according to the realization of A.

[21] The subsequently reported shares of proposer and responder types are derived as follows: Proposers are assigned to clusters according two their stated relative allocation shares of x and y. The two clustering parameters $\hat{x}$ and $\hat{y}$ each represent the mean (relative) offer given $\overline{A}$ and $\underline{A}$ (with $0 \leq \hat{x}, \hat{y} \leq 1$). Responders are allocated to clusters according to their entire vector of (binary) response choices, yielding 16 clustering parameters (refer to Table 1). Proposer (responder) data is partitioned into 4 (3) clusters by way of the 'partitioning around medoids' method, a more robust version of K-means.

[22] Table 8 also lists prominent responder types.

Table 8: Proposer and responder types

Role	Description	Characteristics x	Share (LOC)	Share (NAT)
Proposer	equal split	$x = y = z$	0.37	0.34
	power hierarchy	$x = 0.50$, $y = 0.33$	0.33	0.28
	self-interest	$x = 0.67$, $y = 0.17$	0.30	0.22
	power coalition	$x = y$, $z = 0$	0.00	0.16
Responder	rationality	$y > 0$	0.56	0.50
	self-interest	$y \geq 20$, $y - z \geq 0$	0.22	0.33
	solidarity with dummy	$y > 0$, $z > 0$	0.22	0.17

positive amount y. A fraction of 20% of responders additionally require the dummy's share to exceed zero or otherwise reject any nonconforming offer. Lastly, we find that self-serving responder behavior increases in the geographic scope of interaction, as the percentage of responders who demand a positive share $y \gg 0$ of A and moreover require to be compensated more generously than the dummy, increases from 22% to 33%. We thus find support for the hypothesis that the relative size of groups of proposers or responders, which exhibit particular distribution preferences, is not constant, but varies with the geographic – and possibly also social – distance between subjects.

In the following, we provide yet another piece of evidence in support of other-regarding preferences in subjects. For this purpose, we return to the elicited beliefs of proposers from Jena in the local treatment (LOC). First, identify on an individual basis all those offers which the proposer expects to be accepted by the majority of all subjects.[23] Next, associate share x with each offer that is presumed to be accepted. Determine the maximum value of x in this set, which shall be denoted by x^* and which represents the maximal payoff which the proposer expects to be accepted. Now contrast x^* with the retained share x of the proposer's actual offer, while arbitrarily assuming that $\overline{A}$ has been realized. If proposers were predominantly egocentric profit maximizers, we should not be able to detect a significant shift in the central tendency of both samples. Yet the opposite is true, and we observe a highly significant shift between the highest expected acceptable offer x^* and the actual offer x.[24] We can therefore reject the hypothesis

[23] Remember that there are no reference groups in (LOC). Consequently, the proposer has a positive chance of interacting with any other participant in the session.

[24] While proposers presume that, on average, an offer with a claim of $x = 96.3$ would still be accepted by the responder, the actual mean share of x only equals 63.0. Generally, proposers content themselves with a

Table 9: Efficiency and payoffs

Treatment	Efficiency	Role	Payoff	Share
(LOC)	1.00	X	57.78	0.52
		Y	28.89	0.26
		Z	24.44	0.22
(NAT)	0.86	X	45.56	0.48
		Y	30.00	0.32
		Z	18.89	0.20

that proposer behavior in this ultimatum game is adequately explained by expected own-payoff maximization.

To summarize the subjects' payoffs in the two treatments and evaluate the overall efficiency of play, it can be stated that the relative payoff shares across the three player types (X, Y, and Z) are rather insensitive to the variation in geographic scope of interaction (see Table 9). If anything, the payoff distribution in (NAT) is marginally closer to the theoretical benchmark, suggesting that choice behavior in settings of increased subject heterogeneity, which is attributable to the geographic or social distance among players, is slightly more opportunistic. Further, absolute payoffs in (NAT) are inferior to those in (LOC), mainly due to the higher conflict ratio. Astonishingly, the coordination between proposers and responders in (LOC) is nearly perfect. Let us also stress once more the pivotal relevance of the 'power hierarchy' allocation scheme which rather precisely predicts proposer choices, and in close correspondence with that, the payoff implications for all three player roles.

5 Discussion

With our experimental study on ultimatum bargaining we explore the behavioral relevance of geographic or social distance between interacting subjects to their choices as proposers and responders and consequential bargaining outcomes. While there exist a large number of studies, in which the authors have implemented similar bargaining settings to test locational effects (in geographically distant countries or regions (Roth et al., 1991), or between regions or cultures (Fershtman & Gneezy, 2001; Boarini, Laslier, & Robin, 2002; Bornhorst, Ichino, Schlag, &

significantly lower amount x than the one (x^*) which they presume to be realizable ($p < 0.001$, one-sided, paired MWU-test).

Winter, 2004; Chuah, Hoffmann, Jones, & Williams, 2004; Walkowitz, Oberhammer, & Hennig-Schmidt, 2005; Dakkak, Hennig-Schmidt, Selten, Walkowitz, & Winter, 2006; Walkowitz & Goerg, 2007), studies which simultaneously involve subjects from several locations are apparently much rarer.

In experiments in which the experimenters rely on only one local subject pool, participants invariably know that they, in all likelihood, have many aspects (e.g., demographic characteristics, beliefs, and attitudes) in common with their co-players. The individual perception that other participants are very much like oneself is then likely to guide the subject's prior beliefs, which in turn may profoundly affect her initial choices. In a truly interregional or intercultural decision task, a participant's beliefs may vary contingent on her prior experience with, or exposure to, members of the associated subject pool(s) and may be further affected by limitations in her knowledge and stereotypes about the respective other. As a result, it seems possible that increasing locational or social distance between interacting subjects significantly modifies their bargaining behavior.

Our experimental findings, however, clearly refute this conjecture. Statistical test results plainly rebut the hypothesis of bargaining behavior being significantly shaped by factors of geographic or social distance. Though it is well documented in the literature that several socio-demographic factors such as age and gender do systematically modify bargaining choices,[25] this is obviously not true for measures of distance among subjects. On the contrary, bargaining behavior appears to be insensitive to locational effects, and behavioral patterns are largely robust in this respect. Indeed, stylized facts like the 'power hierarchy' and the 'power coalition' distribution schemes (Güth et al., 2006) perform very well in organizing the data.

Although we do not find evidence for discriminatory offers and responses that condition on the location of, or distance to, co-players, we do observe that a subject's location by itself is a significant source of variance in behavior. Similarly, Dakkak et al. (2006) found national levels of trust and reciprocity to differ significantly in an intercultural trust game experiment. At the same time, however, subjects did not substantially discriminate in terms of trust and reciprocity attitudes between different national groups. The authors argue that one reason for this behav-

[25] See, e.g., Sutter, Bosman, Kocher, and van Winden (2003), Dufwenberg and Muren (2002), Andreoni and Vesterlund (2001), Eckel and Grossman (2001), and Botelho et al. (2000). Note, however, that controversy remains about the magnitude of demographic effects and their ramifications on (un)controlled laboratory experiments.

ioral pattern could be that subjects hold wrong beliefs about their matched players' behavior which may have been shaped by prominent stereotypes within their own society. Interestingly, in the experiment participants from one country actually chose the contrary approach and derived their beliefs about their co-players' behavior by extrapolating from their own.

Nevertheless, the question remains why, contrary to our initial conjecture, ultimatum bargaining behavior is insensitive to variations in the (geographic) scope of interaction among co-players. In a number of recent studies, attempts have been made to disentangle several ambiguous effects which occur when employing the experimental method in interregional or intercultural settings, and which at least partially explain the observed behavioral regularities.

Chao and Bowles (2006) argue that behavioral differences caused by the social distance among subjects do in fact exist but are very difficult to ascertain in laboratory experiments for the following reasons: The composition of the involved subject pools in laboratory studies regularly fails to adequately represent the overall population of the respective regions or societies, which already biases results. Even worse, experimental studies typically address (under)graduate students as their target group, which may indeed constitute a problem if the authors' assertion holds that these students have developed very homogeneous characteristics all around the world. To substantiate their claim, the authors argue that there is a universal convergence in beliefs and preferences and identify the growing worldwide standardization in education and of lifestyles as its source.

We think that this viewpoint is debatable as Güth et al. (2006) and Guillen and Veszteg (2006), among others, provide serious counterevidence to their argumentation. Contrary to the claim by Chao and Bowles (2006), these studies find that distribution behavior in the frequently criticized experimental subject pool comprising undergraduate students is not fundamentally different from the behavior of other samples taken from the overall population. Moreover, Güth et al. (2006) find that distribution choices of subjects in ultimatum bargaining in- and outside the lab do not differ statistically once the effects of age and gender are controlled for. This insight, at least to some extent, eases the concern that the neutral framing of instructions and the general anonymity of subjects in an experimental setup exercise a strongly biasing effect on individual choice behavior. We nonetheless acknowledge the possibility that the neutral and seemingly 'cold' ambiance of lab experiments may attenuate the pressure of social norms

and expectations on the individual in a minority of participants, thereby encouraging them to pursue their material self-interest more vigorously. Yet, as this potentiality does not show up prominently either in the presented descriptive or inductive statistics, we consider this objection to be of minor overall relevance. The above-mentioned results are thus encouraging in the sense that laboratory experiments on social preferences in subjects do hold external validity after all.

Irrespective of this criticism, we nonetheless share the concern of Chao and Bowles (2006) that other-regarding preferences in subjects, based on their locational or social distance, may be difficult to ascertain in controlled laboratory studies. The deliberate absence of a social context in (distribution) decision tasks, technically a framing effect, may indeed hinder participants with differing historical and cultural backgrounds from linking the task in the experiment to real life situations they have experienced before. As a result, some of them may significantly deviate from the behavior they would have demonstrated in a structurally identical, but richer social context.

Further, confidence in the truthfulness of the experiment may turn out to be another important issue, especially when the geographic scope of the involved subject pools widens. Arguably, it may indeed be less difficult to convince participants that their co-players come from the same location where the laboratory is located than to persuade them that their co-players are located faraway. Should the experimenter(s) fail to convince participants that the experiment is entirely 'real' and not just a fake, the validity of the obtained results must invariably be low.

What we can derive from our results is that the impact of geographic or social distance on regular behavior in ultimatum bargaining is rather limited and only relates to the proposer's retained share of the distributable amount. To more thoroughly explore the effect of locational and social – or more generally cultural – distance of interacting subjects on their social preferences and derived distribution choices, we chose to further increase the geographic scope of interaction and performed a truly interregional (and arguably intercultural) ultimatum experiment allowing for direct online interaction of German, Israeli, and Palestinian participants that we report on in a companion paper to this study.

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Appendix

A Experimental instructions

The following instructions were originally in German.

Welcome and thank you very much for participating in this experiment. For arriving in time, you receive a fixed amount of $4.00. You will have the possibility to earn an additional amount of money during the experiment. This amount depends both on your own decisions as well as on the decisions of other participants. In the experiment, all amounts are stated in ECU (experimental currency units). At the end of the experiment, your accumulated amount of ECU is converted into $ at the following exchange rate:

$$1 \text{ ECU} = 0.20 \text{ U.S. dollars}$$

and is paid to you in cash.

Please do not talk to any other participant in the room during the experiment. If you have questions, please raise your hand. An experimenter will then come to your place and answer your question individually. It is very important that you respect these rules since we would otherwise have to exclude you from the experiment and from any payoff.

Information on the participants

All participants are assigned to groups of three members each, i.e., you are together with two other participants in one group. Participants are randomly assigned to groups by the computer.

The following passage appears only in instructions for treatment (NAT)

The other two group members are ***not*** *with you in the same room, but stay in similar computer labs at two other universities. More specifically, this experiment is jointly carried out by the Humboldt-University of Berlin, the University of Bonn, and the University of Jena. You will be informed on your computer screen at which particular location the other two group members are located.*

Each participant within a group is randomly assigned a certain role (**X**, **Y**, or **Z**). However, you will not be informed about your own role until the very end of the experiment.

Your task

It is the task of the three participants **X**, **Y**, and **Z** to distribute a positive monetary amount A. This amount can be either 'large' or 'small,' whereby the actual amount is randomly determined. The distributable amount will equal $A = 120$ ECU with a probability of 75% ('large amount') and will equal $A = 80$ ECU ('small amount') with a probability of 25%.

Initially, **X** proposes a distribution of amount A among **X**, **Y**, and **Z**. The amount that **X** wants to keep is denoted as x, the amount assigned to **Y** (**Z**) as y (z). The amount x may assume the following values $x \in \{20, 40, 60, 80, 100, 120\}$, the possible amounts for y and z are $y, z \in \{0, 10, 20, 40, 60, 80\}$. Please note that the distribution of A among **X**, **Y**, and **Z** is subject to certain constraints. Attached to this instruction sheet, you find a list with all possible distributions. In any case, the sum of the three amounts x, y, and z must add up to amount A.

Since **X** does not know yet whether amount A is small or large, he/she is required to specify a distribution proposal in case that A is 'large' ($A = 120$) as well as in case that A is 'small' ($A = 80$). With a probability of 75% (25%), the actually proposed distribution is the one chosen by X for $A = 120$ ($A = 80$).

Next, **Y** is provided with a list of all possible amounts y and z that **X** may propose to **Y** and **Z**. More precisely, **Y** is shown a table with 16 combinations of the amounts y (offered to her- or himself) and z (offered to **Z**). Yet **Y** does not know whether the actually chosen amount A is 'large' or 'small.' If **Y** accepts the proposed distribution of **X**, then the participants' payoffs will be determined as follows: **X** receives x, **Y** receives y, and **Z** receives z. If **Y** rejects **X**'s proposed distribution, then all three participants **X**, **Y**, and **Z** will receive 0-amounts.

Since you will not learn about your actual role until the end of the experiment, you are required to specify your decisions in case you are assigned the role of **X** as well in case you are assigned the role of **Y**. Due to the fact that **Z** is inactive, you do not have to make any decision in role **Z**.

Information at the end of the period

After the experiment, you will be informed about the role (**X**, **Y**, or **Z**) assigned to you and to the other two group members. If you were assigned the role of **X** by random draw, you learn about the actual amount A, as well as about the amounts x, y, and z which represent all participants' payoffs. If you were assigned the role of **Y**, you are only informed about the amounts y and z which **X** has passed on to you and to participant **Z**, respectively. Finally, if you were assigned the role of **Z**, you only learn about the amount z which has been passed on to you by **X**. In addition, you will always be informed about the actual response of **Y**, no matter which particular role you were assigned.

Your payoff at the end of the experiment

Your final payoff is determined by your achieved payoff in the experiment, to which the previously stated, fixed amount of 4.00 U.S. dollars is added. The resulting sum is converted into U.S. dollars at the exchange rate stated on the first page and will be directly paid to you in cash.

Before the experiments starts, we kindly ask you to answer a control questionnaire on your computer screen. The questions therein are asked to assure that you have clearly understood the rules of this experiment. Please remain seated at your place during the entire duration of the experiment. If you have questions concerning the experiment, please raise your hand and an experimenter will come to your place and answer them.

Continuation

We now start with the second phase of the experiment. In this phase, you are asked to provide an accurate prediction of the decisions of all other participants

- who are seated together with you in this room and
- who are interacting with the same constellation of co-players (e.g., having a **Y**-player from the University of Bonn and a **Z**-player from the University of Jena).

The composition of your group does not change in the second phase and is thus identical to the one in the first phase. Considering their structure, the first and the second phase of the experiment are exactly alike.

However, contrary to the first phase, you now do not state your own decision but predict how, according to your opinion, the largest number of participants (with characteristics corresponding to yours) has decided in the role of **X** and **Y**. Thus, you do not specify your own actions but make an assumption about the behavior of others. If you provide the most accurate prediction of all participants (with characteristics corresponding to yours), you receive an extra bonus of 20.00 U.S. dollars in addition to your 'regular' payoff from the experiment.

B Decision screen snapshot
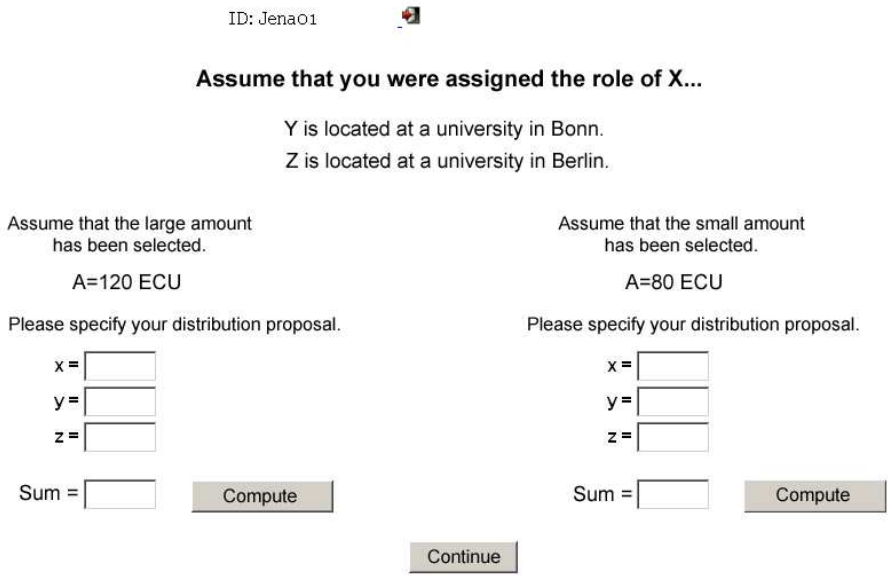
Figure 3: Information provided on co-players' location of residence