Social Science Research 39 (2010) 1181–1194

Contents lists available at ScienceDirect

Social Science Research

journal homepage: www.elsevier.com/locate/ssresearch

# A sociological perspective on measuring social norms by means of strategy method experiments

Heiko Rauhut [a,*], Fabian Winter [b]

[a] ETH Zurich, Swiss Federal Institute of Technology, Clausiusstrasse 50, 8092 Zurich, Switzerland
[b] Max Planck Institute of Economics, Kahlaische Straße 10, 07745 Jena, Germany

ARTICLE INFO

*Article history:*
Received 25 June 2009
Available online 1 July 2010

*Keywords:*
Social norms
Measurement
Ultimatum game
Strategy method
Factorial surveys

ABSTRACT

The measurement of social norms plays a pivotal role in many social sciences. While economists predominantly conduct experiments, sociologists rather employ (factorial) surveys. Both methods, however, suffer from distinct weaknesses. Experiments, on the one hand, often fall short in the measurement of more complex elements, such as the conditionality or the level of consensus of social norms. Surveys, on the other, lack the ability to measure actual behavior. This paper argues that the so-called "strategy method" compensates for both weaknesses. We can demonstrate the applicability of the strategy method for the measurement of conditionality and consensus of fairness norms which take individual effort into account. To substantiate our claim, we present a methodological experiment comparing results for the strategy ultimatum game with those from a "conventional" ultimatum game. We find that offers do not differ, but the acceptance rate is substantially lower in the strategy method experiment compared to the conventional one. This confirms our theoretical expectations that strategy method experiments rather measure normative principles, whereas the "conventional" method the willingness to sacrifice own profits to adhere to these principles. Our results are consistent with previous comparative research between factorial surveys and observational data.



The understanding of social norms is crucial for all disciplines in the social sciences. The content, dynamics and effects of norms have been on the sociological agenda since the beginning of the discipline (Durkheim, 1897/1997; Parsons, 1937). The emphasis on social norms cumulated in the *homo sociologicus*, who is a pure marionette of normative and role expectations (Dahrendorf, 1958). This notion has quickly been criticized as "oversocialized" (Wrong, 1961). In contrast, economists have been working for a long time on the other side of the road: Their conception of man as a *homo oeconomicus* considers a purely forward looking egoistic maximizer, who can consequently be described as "undersocialized". Only within the past decades, there has been fundamental research on the integration of both concepts.

The theoretical progress in both disciplines is therefore dependent on an accurate measurement of normative behavior. However, the methods for measuring social norms have taken separate paths in economics and sociology. In economics, behavioral experiments have been increasingly attracting attention. Besides the "core topics" of economic research, e.g. auctions (Cox et al., 1982) or price bubbles (Smith et al., 1988), also issues closer related to neighboring fields have been investigated, such as risk attitudes (Kahneman et al., 1979) or problems of collective action (Ostrom et al., 1992). Later, Fehr and Gächter (2002) could demonstrate the relevance of social norms by illustrating the human's motivation for 'altruistic' punishment in collective goods situations. This evidence paved the way to analyze the heterogeneity of societies with regard to

* Corresponding author. Fax: +41 44 632 12 94.
*E-mail address:* rauhut@gess.ethz.ch (H. Rauhut).

0049-089X/$ - see front matter © 2010 Elsevier Inc. All rights reserved.
doi:10.1016/j.ssresearch.2010.06.009

the coexistence of *homo oeconomicus* and *homo sociologicus* (Gintis et al., 2001; Fehr and Gächter, 2002; Herrmann et al., 2008). By now, behavioral experiments have become the leading tool for the empirical measurement of social norms in economics.

In sociology, the economists' experimental toolbox has long been neglected for the understanding of social norms. This is surprising, given the promising results from economics and the fact that experiments have a "sociological" tradition (for reviews see Bonacich and Light, 1978; Cook and Hegtvedt, 1983; Kollock, 1998; Diekmann, 2008). The undervaluation of the experimental method is even more surprising considering the potential to rigorously test "social mechanisms" (Hedström and Swedberg, 1996), and the high internal, construct and statistical conclusion validity (Shadish et al., 2002). Furthermore, the sociological insights achieved by behavioral experiments are quite remarkable.[1] Instead of lab experiments, sociological research rather relies on factorial surveys when it comes to experimental techniques [see (Wallander, 2009), for a recent review]. Factorial surveys have been established as an experimental measurement of social norms (Jasso and Rossi, 1977; Jasso and Opp, 1997).

We argue that different conceptions of and research interests in social norms explain the focus on experiments in economics and on factorial surveys in sociology. In this article, we will demonstrate how the relatively undervalued experimental measurement called *strategy method* (Selten, 1967) can overcome the relative weaknesses of both methods. It combines the investigation of many (often counterfactual) conditions with incentivized experiments. We will apply it to the ultimatum game (Güth et al., 1982) and demonstrate how the sociological concepts of *conditionality*, *intensity* and *consensus* of social norms can be experimentally measured with the strategy method. By means of this, we will extend the related studies in the field of economics (Fischbacher et al., 2001; Herrmann and Thoeni, 2009; Oxoby and McLeish, 2004) to sociological research questions regarding the conditionality of distributive justice norms with respect to individual effort and to the question as to whether the importance of effort receives normative consensus.

In what follows, we will present empirical evidence that the strategy method is better capable of discriminating between different social norms than "usual" experiments, just as factorial surveys are better suited than usual surveys to measure the complexity of norms. The following section will present data gathered with the strategy method and discuss this method's advantages compared to other methods. We will then derive hypotheses regarding different response behavior for data elicited with the strategy method compared to the conventional experimental method. Subsequently, we report the results of our methodological experiment, which adjudicates normative behavior under both conditions. The findings can be interpreted in line with previous comparisons between factorial surveys and observational studies. Finally, the results will be discussed with aiming at more efforts in interdisciplinary research.

## 1. Towards methodological integration of economics and sociology

The different measurement of social norms in economics and sociology may be due to different research interests and as well to different jargons in the different disciplines. If, for instance, the meaning of the term "social norm" differed across academic fields, it would be no surprise that the measures of norms were different as well. Many quantitative social scientists might agree to the (economists') definition of a social norm as

> "1) a behavioral regularity; that is 2) based on a socially shared belief of how one ought to behave; which triggers 3) the enforcement of the prescribed behavior by informal social sanctions." (Fehr and Gächter, 2000, p. 166)

Defined in this way, specific social norms can be measured in the laboratory with the so-called *ultimatum game* experiment (Güth et al., 1982). This game can be regarded as a parsimonious measure for distributive justice and fairness norms. One proposer and one responder bargain over a given amount of money, called the *cake*. The proposer offers a share of the cake to the responder. If the responder accepts the offer, she receives the share and the proposer can keep the rest of the cake. If the responder rejects the offer, the cake is lost and nobody receives anything (for illustration see Fig. 1).

Empirical results indicate that the ultimatum game meets the three criteria of social norms stated above. Responders have normative expectations about the proposer's behavior so that low offers are frequently rejected. This rejection can be regarded as informal sanctioning of norm violations. Proposers anticipate such potential punishment and form respective beliefs. These beliefs trigger behavioral regularities, such that offers below 20% of the cake are rare and close-to-equal splits are the most frequent outcome (Roth, 1995). This matches the definition of social norms given above that the behavior is (1) a regularity, it is (2) based on socially shared beliefs, and (3) it is sanctioned in case of violations. In the meanwhile, ultimatum game experiments have become one of the most prominent laboratory measures for social norms and have even been applied in anthropology for measuring cultural differences in normative behavior and punishment of norm violations (Henrich et al., 2001, 2004).

[1] Scholars studied the effect of power (Cook and Emerson, 1978) or reputation in social networks (Raub and Weesie, 1990), the effect of trust in business relations (Buskens and Weesie, 2000), or the behavioral impact of reciprocity (Diekmann, 2004).

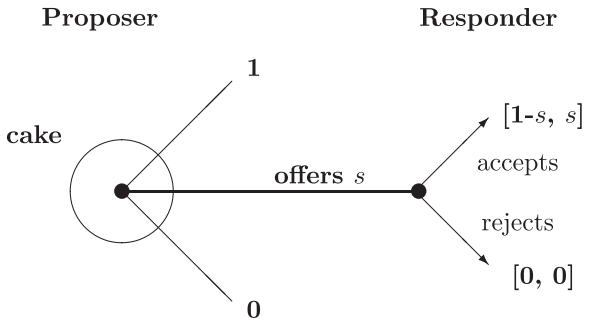


**Fig. 1.** Ultimatum Game. The first value in the squared brackets denotes the outcome for the proposer, the second value denotes the outcome for the responder. The absolute value of the cake is normalized to 1.

## 2. Measuring conditionality, intensity and consensus of social norms

Traditional ultimatum game experiments have a major shortcoming with respect to sociological research questions; social norms are rarely a yes/no decision. A long history of sociological research emphasizes (at least) four additional aspects of norms:

> "1) polarity, whether a norm is prescriptive, proscriptive, or bipolar; 2) conditionality, whether a norm holds under all circumstances; 3) intensity, the degree to which individuals subscribe to the norm; and 4) consensus, the extent to which members of a society share a norm." (Jasso and Opp, 1997, p.974)

A well developed sociological method for answering such questions is the "factorial survey". In factorial surveys "respondents are asked to judge descriptions of situations which are complex sets of attributes. [...] For this purpose, attributes (i.e. values) of dimensions are combined so that descriptions of situations ensue. Each of the possible and meaningful situational descriptions is judged by respondents" (Beck and Opp, 2001). Subjects answer to a systematic set of *counterfactual* questions. Researchers can thereby elicit the conditional and the unconditional parts of social norms by varying the relevant attributes.

While *polarity* is a linguistic property and depends on the accurate formulation of the norm, the latter three aspects can (and should) be measured using behavioral data. Strategy method experiments give us the opportunity to measure these dimensions in lab experiments. However, until now conditionality, intensity, and consensus were primarily approached with factorial surveys in sociology.

The *conditionality* of norms refers to the question as to whether the normative expectations hold under all circumstances or rather depend on characteristics of the situation or the protagonists. "Although norms are often formulated unconditionally, in everyday life they actually hold only in certain situations, and actors seem to be aware of this." (Jasso and Opp, 1997, p. 948). In contrast to the unidimensional measurement of distributive justice norms in the ultimatum game, factorial surveys allow to consider conditionality.

Let us illustrate the criterion of conditionality in the framework of distributive justice norms. For example, *equity norms* assert that the individual "input", usually some kind of effort, is the only norm-relevant criterion and determines the individual output to a certain extend. According to (Eckhoff, 1974), most norms of distributional justice are based on the principle of allocating resources with respect to the criteria of need, status or effort. Those who contribute more, who need more, or who have a higher status shall receive more (Homans, 1961; Blau, 1964; Adams, 1965; Cook and Emerson, 1978). The equity norm may be defined as follows: the more someone contributes to a common project, the higher the share of the returns this person can claim. A vignette of a factorial survey can measure this effort with the level of education or the hours worked per day and ask whether a respective employee is perceived as underpaid, fairly paid or overpaid for a given level of education and working hours (cf. Jasso and Opp, 1997; Jasso, 2006). The equity norm is thus a *conditional norm* in the sense that the actions prescribed by the norm are conditional on a person's relative level of effort put into a project.

Moreover, a suitable measurement device should give us the possibility to measure *unconditional norms*. The norm of equality is an example: equality norms can be described with fairness considerations that are independent of criteria such as individual effort, need or status. Here, the material equality of outcomes is the only criterion that ought to be satisfied. The measurement of equality norms in a factorial survey would require that the respondents regard education or the hours of work as being irrelevant for the justness of earnings of employees. More specifically, equality norms prescribe that the return to be claimed from a project ought to be unconditional of individual contributions.

The *consensus* of norms considers whether social norms are commonly shared among subgroups. Consensus can be described with the homogeneity of acceptance concerning the validity of one particular norm within a population. The introduction of a discriminating normative cue (e.g. effort) is a precondition to distinguish whether somebody adheres to an equity or equality norm. Of course, this precondition has to be measurable, which we will demonstrate by using the strategy method. Thus, the measurement of the adherence to different normative cues allows to make statements about the degree of normative consensus in the population.

Finally, the *intensity* of norms can be measured by applying the strategy method. We can operationalize the intensity of norm adherence in the ultimatum game as the minimal acceptable offer of a responder. Consider a player who personally believes in the norm of equality. However, she might consent to accept also slightly less than the equal split. The knowledge of the functional form of her acceptance thresholds (i.e. equity or equality) and the deviation from the normative principle allows us to estimate both the underlying norm and the intensity of the player's belief.[2]

Whereas factorial surveys have the advantage to address sociological questions regarding conditionality and consensus of norms, they suffer from the disadvantage of their entirely hypothetical character, resulting in relatively poor proxies of behavior in real-world settings. Thus, the intensity of social norms is easily over-estimated. Compared to behavioral experiments in sociology or economics, altruistic and pro-social behavior reported in factorial surveys are "low-cost" statements (Diekmann and Preisendorfer, 1998; Diekmann and Preisendörfer, 2003; Rauhut and Krumpal, 2008), because answers in a survey are usually not associated with any consequences for the interviewee (Shepelak and Alwin, 1986; Eifler, 2007; Groß and Börensen, 2008; Nisic and Auspurg, 2008). Behavioral experiments avoid this problem of hypothetical results by relating the decisions in the experiment to monetary consequences for the participating subjects; usually, however, with the drawback of a simplistic conception of social norms.

## 3. An introduction to the strategy method

The measurement of social norms requires the investigation of interdependent decision-making of a group of actors. In these strategic interactions, which can be called games, the outcomes of one person depend on the own as well as on other subjects' decisions. These behaviors can be studied in game theoretical experiments. As a matter of course, the respective implementation differs in different experimental setups. In the "conventional" setup, henceforth referred to as the *response method*, each actor is asked to decide for one out of a number of alternatives. These decisions are matched with the respective decisions of their interaction partners to determine the actual outcome for the involved actors. For exemplification, consider a game with two players and two actions, "nice" and "nasty". One player decides for nice and the other for nasty with the result that the nasty player receives a comparably high outcome at the expense of her opponent's comparably low outcome.

The strategy method is an extension to the conventional response method. It was introduced by Selten (1967) in a game theoretical experiment on oligopolies. The unifying feature of the method is that subjects can condition their decision on every possible action of the other subject.[3] Every player therefore submits a complete strategy before the game, stating how she will react to the other player's actions. More specifically, the player is asked how she will react on every action the other player can – hypothetically and factually – perform. Consider again a game with two players and two actions, "nice" and "nasty": the strategy method allows players to condition their behavior on the strategy of the opponent by asking "How will you react, given the other player is nice?" or "given the other player is nasty?" Given the other player's decision to act nice (or nasty), the first player's choice is implemented by the computer. Once a complete strategy is submitted, the outcome of both players is determined by matching the respective strategies.[4]

The *strategy vector method* is a further extension, being applied to asymmetric games such as the ultimatum game. A game can be called asymmetric if the strategy sets of the players are not identical, be it because of different information sets or different experimental roles. In strategy vector method experiments, the players are ignorant of their position (say A or B) in the game. Before the start of the experimental game, the strategy vector method asks for every reaction of the player if she is in position A and has to respond to any possible decision of player B. Further, the reverse case is requested, asking for the reaction in role B to all possible decisions of player A. When entering the game, the actual roles are revealed and, like in the strategy method, the predefined strategies for the respective roles determine the outcomes of the game.

## 4. Method

### 4.1. Operationalization of conditionality, intensity, and consensus with the ultimatum game

For the measurement of conditionality, consensus, and intensity, we carefully extended the setup of the ultimatum game by introducing an element of effort. We operationalized the conditionality of a norm as the extent of how strong the offer and the acceptance depend on the effort of the participants. Offers and acceptance thresholds of a player adhering to the unconditional equality norm will not be affected by relative effort. Contrariwise, equity types should show a positive correlation between a responder's effort and the offer towards this player, respectively this responder's acceptance threshold. Further, intensity can be regarded as the deviation from the action prescribed by the norm one is adhering to. Thus, an acceptance threshold below the norm and a low offer can be operationalized as low normative intensity. Lastly, we operationalized consensus with the degree of heterogeneity regarding whether subjects adhere either to equity or equality norms.

[2] The measurement of the intensity would of course also be possible using traditional ultimatum games; but this comes at the expense of loosing information about the underlying principle.

[3] To simplify the issue, we will discuss the 2-person case, but it is generally possible to apply the strategy method to *n*-person experiments.

[4] The strategy method in real life can be found for example in stock options: The holder of a stock instructs her broker to sell the stock, if the value exceeds a pre-decided threshold. This advices becomes effective only if the stock exceeds the threshold, and remains counterfactual otherwise.

As a measure of effort, we introduced a knowledge quiz. The subjects received five days before the experiment a seven page long text of a *Wikipedia* entry on the Westminster Palace via email.[5] An accompanying letter informed the subjects that their preparation of the text will influence their possible earnings in the experiment. We chose a rather specific topic to ensure that everybody actually had to learn the text and nobody could benefit from her respective field of studies (such as mathematics or paleontology). In the first step of the experiment, the subjects had to answer respective knowledge questions. Therefore, their different investments of time and effort in the preparation of the quiz reflected effort.

### 4.2. Design of the strategy game

We applied the *strategy vector method* (Selten, 1967) to the standard ultimatum game. In contrast to the "classic" ultimatum game, the subjects did not have full information about the amount of money to be distributed and their respective roles. Although they knew how much they earned in the quiz, they were not told how much their opponent won. The roles were not revealed until everybody made all the decisions, so that each subject had to make the decisions for both roles respectively: If a player earned $x$ Euro in the quiz, the player was asked how much she would offer, if she and the opponent together earned $x$ Euro, if they together earned $x+1$ Euro, $\ldots$, $x+20$ Euro. Fig. 2 depicts an exemplary screenshot for the proposer. On the next screen, the subjects were asked for their acceptance threshold if they were in the role of the responder, given she and the opponent earned $x$, $x+1,\ldots,x+20$. The acceptance threshold denotes the minimum offer the responder is willing to accept. After completing the questions, the computer matched two players according to their results in the quiz. The roles of the proposer and the responder were assigned at random and the computer compared the proposer's offer for the actual size of the cake with the corresponding threshold of the responder. The money was paid, if the offer was as high or higher than the responders acceptance threshold; otherwise the money was lost.

### 4.3. Design of the response game

After completing the strategy game, but before learning about the outcome, the participants played the conventional ultimatum game, which we previously defined as the *response game*. The game was played with the same partner and in the same role as the previous one: if a player was randomly assigned to be a proposer in the strategy game, this player kept her role in the response game. This exclusion of learning effects is an important feature of the design, as it prevents that the subjects adjust their decisions to the decisions of their partner in the strategy game. We also did not change the partners to hold the relative effort levels constant and to yield high statistical power by allowing for within-subjects comparisons. Note that the subjects were once again endowed with the amount of money they earned in the quiz.

In the first stage of this game, the subjects learned about their roles. On the following screen, the proposer was once again informed about the own effort and, for the first time, about the responder's effort. The proposer was then asked for an offer regarding how to divide the money. This offer was transmitted to the responder, who was also informed about the respective efforts. If the responder accepted the offer, the money was divided accordingly; otherwise, the money from the response game was lost. It was clarified that the decision from the response game had no influence on the outcome of the preceding strategy game. Only now, both players were informed about the outcome of the response game and the strategy game. The subjects were paid at the end of both experiments.

### 4.4. Participants

The subjects were 92 undergraduate students of the University of Leipzig. Forty-seven subjects were male and 45 female, coming from a wide range of academic disciplines. The subjects were invited to register for the experiments via posters and flyers. The participants were randomly drawn from a subject pool with respect to a balanced sex ratio. To ensure anonymity among interacting subjects, the experiment was conducted in two separate PC-Labs. Subjects participated in the experiment in groups of two (one proposer and one responder). Proposers and responders were always assigned to separate rooms. Three of our experimental sessions consisted of ten groups, one of nine groups and one of seven groups.[6]

### 4.5. Procedure

The experiment was conducted using the computer programm *z-Tree*, developed by Fischbacher (2007). At the beginning of each session, the subjects were randomly assigned to one of the computer terminals. Some general instructions regarding the procedure were given on paper, informing the subjects about the consecutive quiz. The subjects had to answer twenty questions concerning the Wikipedia entry with the opportunity to earn up to 20 Euro (one Euro per question). The average earnings of the participants in the quiz were 12.30 Euro (min: 0, max: 18, sd: 3.60). This money was at stake twice, once in the strategy and once in the response game. The average return from these games were 12.15 Euro (min: 0, max: 23, sd: 4.11) in the response game and 8.03 Euro (min: 0, max: 19, sd: 6.57) in the strategy game. After completing the quiz, the

[5] Wikipedia contributors, "Westminster Palace," Wikipedia: the Free Encyclopedia, http://de.wikipedia.org/wiki/Palace_of_Westminster (accessed May 04, 2008, 14:40).

[6] In sessions 1 and 4, fewer subjects showed up than expected.

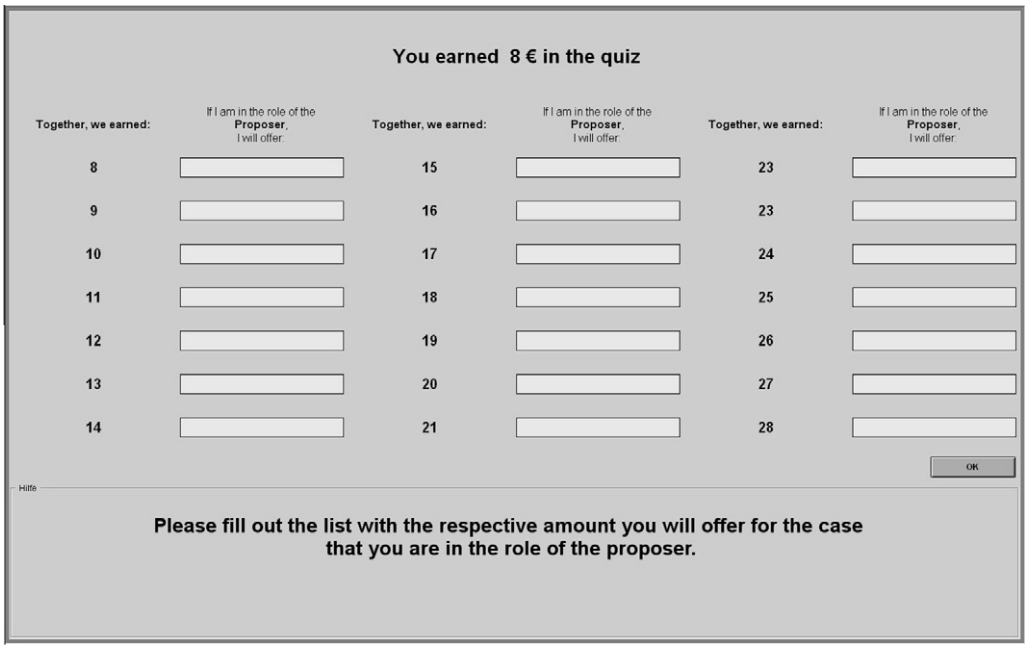


**Fig. 2.** Exemplary screenshot for a player in the role of a proposer in the strategy game.

subjects received the instructions for the strategy game. The understanding of the game was examined with control questions. The subjects were not informed about the existence of the subsequent response game until they made all the decisions in the strategy game. The experiment started when there were no further questions to the experimenter. Communication was prohibited from that point.

## 5. Empirical demonstration of measuring conditionality, intensity and consensus with the strategy method

We regard the major advantage of the strategy method in its capability to measure more complex dimensions of those norms which shape our decision-making. For illustration, consider the following situation in our response game: The proposer and the responder earned 8 Euro each in our quiz. The proposer offers 8 Euro to the responder, who accepts. What would the proposer have offered, if the responder had earned only 3 Euro? What if he or she had earned 16 Euro? Would the responder have accepted an offer of 7 Euro, or an offer of 2 Euro? To put it differently: Is the proposer's decision conditional or unconditional of effort? Or does the proposer generally believe that the division should be independent of who contributed what? The response game can not answer these questions in the situation of coincidental equivalence of inputs. The respective data are often ambiguous, as they show only a single decision for a very specific state within a game.

Fig. 3 depicts representative cases from our data. The proposers' decisions in the response game are almost indistinguishable (see the upper panel in Fig. 3a). Responder and proposer earned the same amount in the quiz, and the proposer offers to split the cake equally. If we only had this data at hand, we would probably presume that there is consensus about the applicable norm. But the data from the strategy game reveal a different picture. Player 3 in the left row offers half of the cake, if both contributed the same. If the contributions are different, player 3 divides according to the equity norm such that relative contributions equal relative outcomes. In this sense, the underlying norm of distributive justice is conditional on individual effort. In contrast, consider player 29 in the third column. This player also offers about 50% in the response game. But the behavior in the strategy game reveals a different underlying norm, as offers do not differ with differing relative contributions. Thus, player 29 does not respond to the criterion of effort and adheres to our definition of the (unconditional) equality norm. Furthermore, the strategy method can reveal the behavior of player 20 in the middle as violation of the normative imperative of consistent behavior. As a proposer, player 20 offers according to the equity norm as long as player 20's relative contributions are higher than the responder's contributions to the cake. However, this player switches to the equality norm, if the responder contributed more. Thus, player 20 picks the respective norm that fits his/her interests best.

Apart from the measurement of underlying norms, the strategy method is also capable to map the *intensity* of norm adherence. Player 73 on the very right shows more or less consistent behavior, but the low offer reveals a low normative intensity. The same flexibility can be seen in the reaction of responder 92 in the right column of the lowermost panel. Her willingness to accept even the lowest offer points in the direction of a very low identification with the norm. The low intensity could of course also be measured with a low offer in the response game, the underlying pattern would nevertheless stay uncertain.

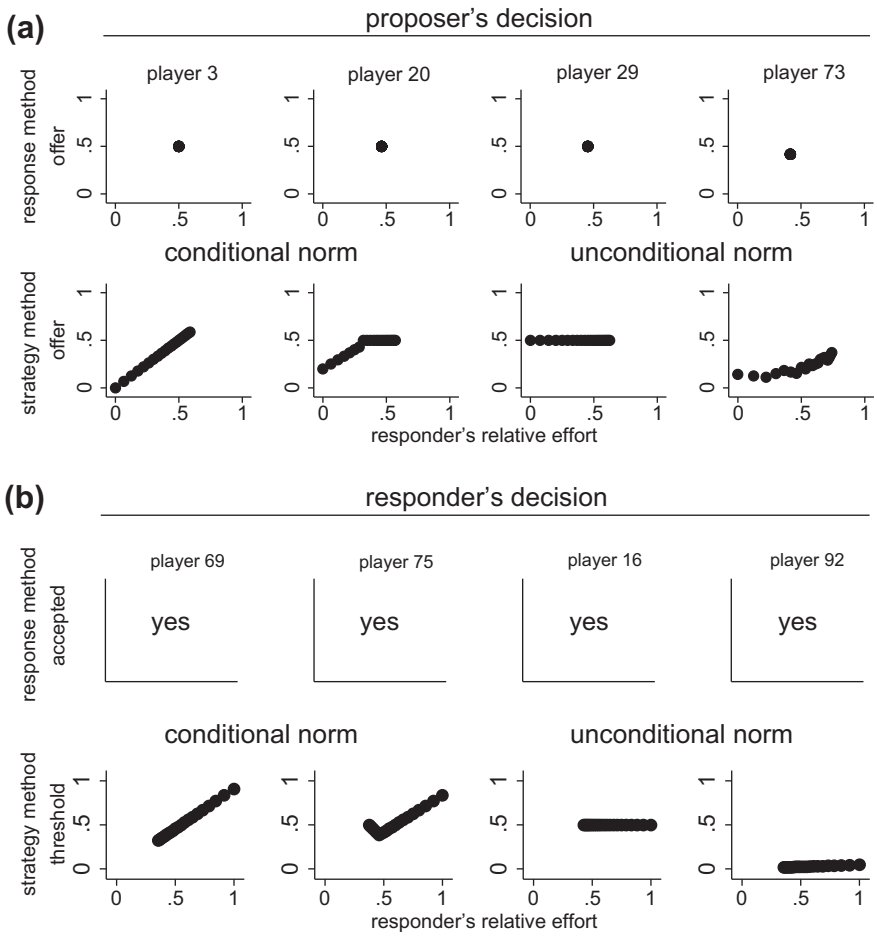


**Fig. 3.** Patterns of offers in the strategy game and the response game (a) and patterns of acceptance in the strategy game and the response game (b). The upper panel in (a) represents decisions from the response game, the lower panel decisions from the strategy game. One column refers to decisions of the same proposer or responder respectively. The abscissa depicts the responder's relative contribution to the cake, given by $C_R/(C_R + C_P)$ where $C_i$ describes the individual gain from the quiz and the index $i$ the respective role ($R$ = responder,$P$ = proposer). The ordinate describes the proposer's relative offer to the responder, given by $O/(C_R + C_P)$, with $O$ denoting the absolute offer. The upper panel in (b) describes whether the respective responder accepted the offer in the response game. The lower panel describes the acceptance threshold of the same responder, which is the smallest acceptable offer for a given relative effort of the proposer.

Finally, the different patterns observed in Fig. 3 give a first glance on the degree of consensus of the underlying norms. If the degree of consensus was higher, we should not observe a multiplicity of norms applied in the same situation. For a deeper analysis of normative consensus, we would have to analyze the distribution of types within our experimental population. As this is not in the scope of this study, we refer to Fig. 7a in the appendix, which gives an overview over all proposers' and responders' decisions in the strategy game and an impression of the frequencies of respective social norms.[7]

The situation is similar for the responders, as described in Fig. 3b. The response method only yields "yes/no"-decisions as a reaction to a unidimensional stimulus. Therefore, the response game only provides relatively crude information as to whether the offer was high enough in the case of acceptance, or too low in the case of rejection. Parallel to the proposers, the strategy method reveals the different patterns and more precise information. In conclusion, Fig. 3 illustrates the capability of measuring conditionality, consensus and intensity of social norms by means of the strategy method.

An additional difference between strategy and response game is their different time needed. The strategy game lasted for about one hour, while the response game was completed in 15 min on average (including instructions and control questions). Time is a crucial factor in experimental research, as the participants' payment is calibrated on their time in the lab. However, the advantage of the strategy method with its generation of a multiple of the data compared to response method experiments can outweigh the time-factor. To our experience, resources invested into strategy method experiments usually pay off in terms of the "data/money ratio".

[7] For further discussion of heterogeneous populations with regard to social norms see also (Winter et al., 2009).

## 6. The differences between measuring normative principles and their intensity

### 6.1. Derivation of hypotheses about differences between strategy and response game

So far, we demonstrated with explorative data analyses the usefulness of the strategy method for measuring social norms, in particular its capability to measure the sociologically relevant but fairly complex constructs of conditionality and consensus. For further evaluation of the strategy method for measuring social norms, we discuss in the following the differences in measuring social norms by means of the strategy method and the traditional response method. We will derive hypotheses about such differences and will test these by means of an experiment which can empirically adjudicate between them.

As we know from many examples in the social sciences, different measurement techniques elicit different responses and can represent different dimensions of the constructs in question. With regard to social norms, we can measure the normative principle people adhere to; however, we can also measure the intensity with which people actually adhere to their principles. For example, people may regard it as proper to consider the other person's effort for sharing a common resource; however, this normative principle may be largely abandoned if people receive the chance to distort their normative principles in favor of their egoistic motives (i.e. to offer and accept less in the ultimatum game). Thus, different measurements may frame the interview situation such that people either elicit their normative principles or their intensity (see Fig. 4).

From the strict perspective of rational-choice theory, the results from the strategy and the response method should not differ, because the level of information is similar in both treatments. However, we conjecture that both methods differ in some of their psychological features. The response method is often described as emotional or "hot", while the strategy method is considered to be more rational or "cold" (Brandts and Charness, 2000; Loewenstein, 1996). The argument goes that being confronted with a variety of related decisions generates different behavior compared to one single decision. One reason for this is that subjects may feel obliged to behave "consistently" (Oxoby and McLeish, 2004). In other words, normative expectations are often calling for consistency (Elster, 1989) so that the response to a whole set of questions may elicit principles instead of the level of compromises people would actually be willing to accept. Thus, answering a set of questions instead of only one may prompt subjects to elicit one single principle instead of evaluating for each (hypothetical) outcome their norm and their threshold below which they would prefer to receive nothing instead of committing a norm violation.

Previous studies support our conjecture about the differences in the strategy compared to the response method (Andrew et al., 1994; Güth et al., 2007). We agree with Roth (1995, p. 323), who points out that "having to submit entire strategies forces subjects to think about each information set in a different way than if they could primarily concentrate on those information sets that arise in the course of the game."

In our view, the strategy method yields measurements which refer to a "Rawlsian" perspective on social norms (Rawls, 1971). The strategy vector method simulates a "veil of ignorance", because subjects are confronted with "all" states of the world (Becker and Miller, 2009). Facilitated by the ignorance of the respective future position in "society", our design virtually puts the subjects behind the "Rawlsian veil". The elicitation of general principles instead of the willingness for compromises will therefore be stronger in the strategy game compared to the response game.

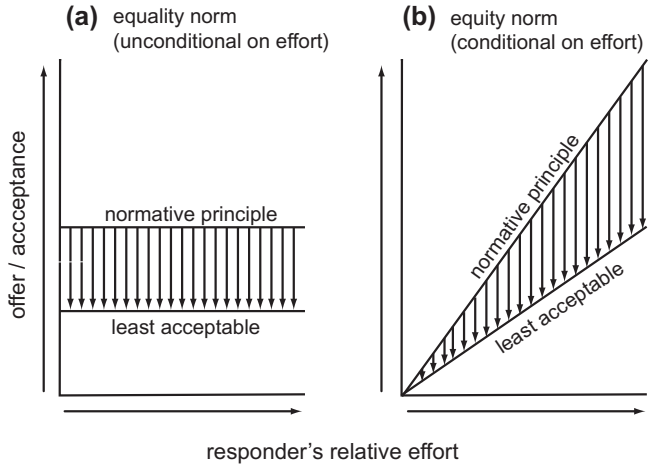


**Fig. 4.** Illustration of the difference between measuring normative principles and the intensity with which these are adhered to. Panel (a) represents a person who adheres to the equality norm, whose principle it is to offer half of the cake and to accept only half of the cake. This person's intensity of her norm adherence is, however, low so that she is ready to offer and to accept less than half of the cake. Panel (b) represents a person who adheres to the equity norm, whose principle it is to offer exactly the amount a person has contributed to the cake. Due to a low intensity, this person is ready to offer and accept less than what the principle prescribes. Different measures of norms may either elicit the normative principles or their intensity. In case of measuring the intensity, the measure should elicit the least acceptable offer beyond which proposers and responders preferred to receive nothing. The arrows denote the potential differences between measuring normative principles or their intensity.

We apply these considerations to derive hypotheses about differences between the strategy and response method experiments. We expect that the two methods have a different impact on offers than on acceptance decisions, which is reflected in the two hypotheses we derive in the following.

Offers in both the strategy and the response game are made without any knowledge of the opponent's characteristics. Thus, offers are made under uncertainty. For a "rational", reflected decision (be it selfish or norm adhering), the proposer has to consider her fairness principle and the acceptance threshold of her responder, i.e. the lowest offer the responder will be willing to accept. Thus, in both the strategy and the response game, the proposer has to form beliefs about an unknown distribution of acceptance thresholds in the population of responders. Hence, we expect no differences in offers between both methods, because both are identical in terms of revealing no information about the responders.

**Hypothesis 1.** There is no difference in offers between response and strategy game.

The acceptance decisions in the strategy game are structurally similar to offer decisions. Subjects do not receive any information about the opponents. This will frame the situation such that subjects will elicit their normative principles. However, for acceptance decisions in the response game, the situation is different. The responders do receive information about the offer. They do not have to elicit a principle for every hypothetical outcome but have to consider their decision for one concrete offer. The emphasis is not on what subjects would in principle do but rather as to whether they would be willing to accept one single, concrete offer. This specificity triggers to think rather in terms of their least acceptable offer than of their normative principle and whether they are "stubborn" enough to reject anything below their principle. Hence, we expect subjects to be more tolerant when confronted with concrete offers in the response game in contrast to the strategy game, in which we expect subjects to be driven more strongly by their normative principles, yielding to lower acceptance rates.

**Hypothesis 2.** The acceptance rate is higher in the response than in the strategy game.

### *6.2. Analysis of offers in strategy and response game*

In the following, we adjudicate offer behavior in the strategy and the response game. In order to achieve a robust comparison, we consider in the strategy game only those decisions that are payment-relevant; those decisions are excluded, which asked for behavior with counterfactual pie sizes. This means that from the 42 decisions of every subject in the strategy game, only one is considered in the remainder. Furthermore, the number of players per role reduces to 46, as every player plays either as proposer or as responder in the response game.

**Result 1.** Offers do not significantly differ between response and strategy game.

First, we analyze aggregate effects such as the median offer in both experiments and the respective variances. Fig. 5a indicates that the (aggregated) offers do not differ in both methods. A Wilcoxon signed rank test confirms this impression ($p = 0.17$).

We confirm these results with linear OLS regression models using treatment (strategy vs. response experiment) as the only predictor for the offer. Model (1) in Table 1 demonstrates that this effect is not significant ($b = 0.038$, $p > 0.05$). Moreover, we support the result of the null differences between the two experiments with an interaction effect concerning the effort. We added effort as a predictor and, more importantly, the interaction between treatment and effort. As with the sim-

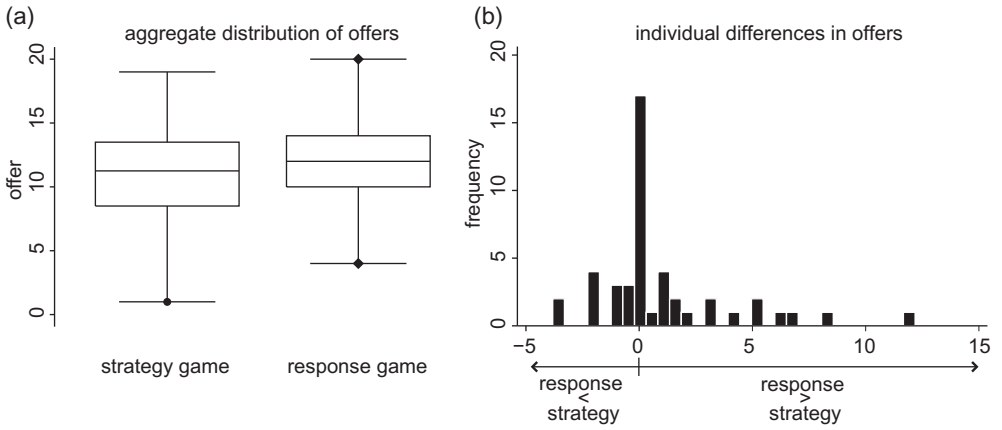


**Fig. 5.** Offers in the strategy game and the response game on the aggregate level (left) and differences in offers on the individual level (right). There are no statistically significant differences on the aggregate level, but only 17 out of 46 proposers offer exactly the same in both games. Twelve subjects offer less and 17 subjects offer more in the response game than in the strategy game.

**Table 1**
OLS regression estimating the differences in offers between strategy and response game experiment. The variable "Treatment" is a dummy variable, taking the value 1 if decisions are elicited in the response game and 0 for those in the strategy game. "Effort" is given by the relative contribution of the responder to the common pool. "Treatment × Effort" describes the interaction of both terms. The *p*-values regarding the simple treatment effect (model 1) and the importance of effort (model 2) are above the critical value of 0.05, yielding no significantly different offers in the two experiments.

| | (1) Offer b/p | (2) Offer b/p |
|---|---|---|
| Treatment (response = 1) | 0.038 | −0.012 |
| | (0.052) | (0.910) |
| Effort | | −0.013 |
| | | (0.934) |
| Treatment × Effort | | 0.106 |
| | | (0.625) |
| Constant | 0.434 | 0.440 |
| | (0.000) | (0.000) |
| Subjects | 46 | 46 |

*p*-Values in parentheses.

ple analysis, the experiments do not generate different proposer behavior with regard to effort, as can be seen from the interaction term in model (2) of Table 1 ($b = 0.106$, $p = 0.625$).

We proceed with decomposing the aggregate results into single decisions. Fig. 5b depicts the differences between a proposer's offer in the strategy game and the same person's offer in the response game. In 17 cases, proposers did not react differently in both games, while another 17 proposers offered more and 12 offered less in the response game than in the strategy game. The distribution is slightly right-skewed, as there are more people giving much less in the strategy game compared to the response game; however, the differences are small.

### 6.3. Analysis of acceptance decisions in strategy and response game

While there are little differences with respect to offers, we find large differences in the acceptance behavior of responders. About 40% of the responders rejected the offer in the strategy game (17 out of 46) but only one responder rejected it in the response game. A Pearson's $\chi^2$-test reveals that this difference is highly significant ($p < 0.001$). We confirm these results with logistic regressions testing the treatment effect. The results demonstrate highly significant differences (see the treatment effect in Table 2 with $b = 3.273$ and $p = 0.003$).

**Result 2.** The acceptance rate is significantly higher in the response game than in the strategy game.

The calculation of the interaction effect between treatment and effort, as we presented it for offers, is more difficult for acceptance behavior. In fact, the large differences in the two experiments cause such a reduced variance that we cannot properly test the interaction. Therefore, we do not report respective interaction effects between treatment and effort, because these would lead to biased and probably insignificant estimates due to little statistical power.

As with the offers, we confirm our results with decomposing the aggregate results of the acceptance behavior into single decisions (Fig. 6). The figure compares only those 17 offers which were rejected in the strategy game to the same responder's reaction in the response game. This decomposition supports that the response game elicits higher acceptance rates compared to the strategy game. It happens frequently that offers which are accepted in the response game are rejected in the

**Table 2**
Logistic regression estimating the effect of differences in acceptance of offers between strategy and response experiment. The variable "Treatment" is a dummy variable, taking the value of 1 if decisions are elicited in the response game and 0 for those of the strategy experiment. Model 1 demonstrates a significantly higher acceptance rate of offers in the response game. Hence, the response method does induce significantly higher probabilities of acceptance than the strategy method.

| | (1) Accepted b/p |
|---|---|
| Treatment (response = 1) | 3.273 |
| | (0.003) |
| Constant | 0.534 |
| | (0.084) |
| Subjects | 46 |

*p*-Values in parentheses.

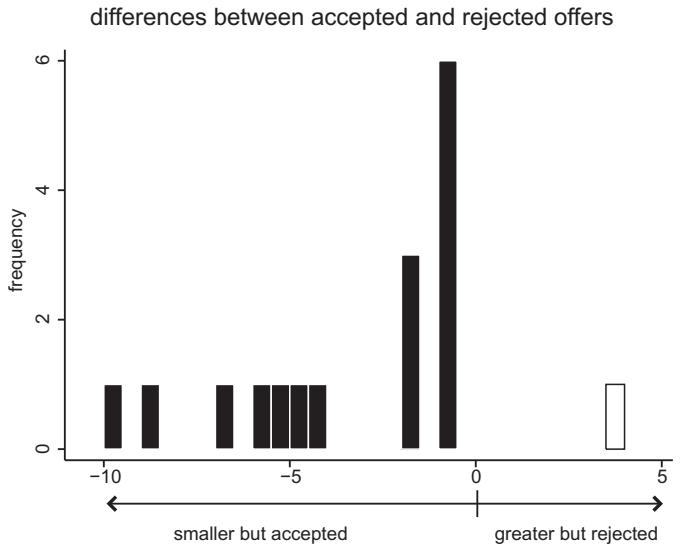


**Fig. 6.** Differences between accepted and rejected offers in the response game and the thresholds in the strategy game. All accepted offers in the response game were up to 10 Euro less than the responders' threshold in the strategy game. The only rejected offer was 4 Euro higher than the respective threshold in the strategy game.

strategy game. Fig. 6 illustrates in addition the magnitude of this effect. Even five or ten Euros less is accepted in the response game, while it is rejected in the strategy game. The only one rejected offer in the response game is an outlier in two respects. It is the only rejected offer in the response game and the offer in the response game was even higher than in the strategy game. In conclusion, the strategy method rather measures normative principles whereas the response method the intensity these principles are adhered to.

## 7. Discussion

Our study investigated the potential of behavioral experiments to measure social norms. We extended the ultimatum game by implementing the "strategy method" and therewith extended the analysis of social norms in experimental economics to a sociological one by measuring sociological concepts such as conditionality, intensity and consensus of social norms. The experiment started with a real effort task, determining the individual amount of the participants' bargaining money. Participants showed different levels of effort and had to contribute their respective money in a common pool. Then, bargaining decisions over this common pool were elicited using the strategy method, which allows for the measurement of distinct social norms regarding fair divisions of the common pool between proposer and responder. It could be shown that the strategy method allows for the measurement of conditional bargaining norms such that the proposed and requested amount of money was conditional on the individual effort. Second, it could be demonstrated that the strategy method enables the measurement of the level of normative consensus. The data shows that a variety of social norms coexist in the population. For example, some actors adhere to equity norms, which prescribe that the common money should be allocated according to the individual contribution, while others comply with equality norms, prescribing equal divisions irrespective of effort.

We evaluate the validity of our method for measuring social norms by a methodological experiment, comparing results from the first experiment with the strategy method with those from an additional, "conventional" ultimatum game experiment. In the second experiment, the same real effort task was employed, but bargaining behavior was elicited with the so-called "response" method. As predicted, the proposers' offer did not differ between both experiments, but more offers were accepted in the response game. We attribute this difference to the fact that both methods measure different concepts. The strategy method elicits the normative principles of the respondents, while the acceptance decision in the response game the intensity with which these principles are adhere to.

Beyond the relation with previous experimental studies in economics, our findings relate and confirm what is known from factorial surveys in sociology. First, the lack of normative consensus regarding equity and equality norms of distributive justice has been described by means of factorial surveys (Jasso and Wegener, 1999). Second, our findings from comparing the more "fictitious" strategy method with the more "observational" response method are similar to previous findings, comparing the "fictitious" factorial survey with "observational" field data. Recent comparisons regarding pro-social behavior demonstrate that factorial surveys rather elicit normative expectations and general rules whereas field studies evaluate whether subjects are actually willing to comply with these rules in specific situations (Shepelak and Alwin, 1986; Eifler, 2007; Groß and Börensen, 2008; Nisic and Auspurg, 2008). This finding that factorial surveys elicit higher rates of pro-social behavior

than those found in "the field", relates to our findings of higher rates of pro-social behavior in the strategy compared to the response experiment with regard to the punishment of norm violators by rejections of their offers.

In conclusion, the strategy method provides the social scientist with a reasonable measure of social norms using counterfactual questions, which are nevertheless associated with real, monetary consequences. Thus, controlled laboratory and field experiments should be considered as an additional tool in the triangulated assessment of social norms. Findings from the laboratory complement results from non-experimental studies, revealing a more realistic picture of norm-adhering behavior. The increased consideration of laboratory experiments in sociology would foster the understanding of the

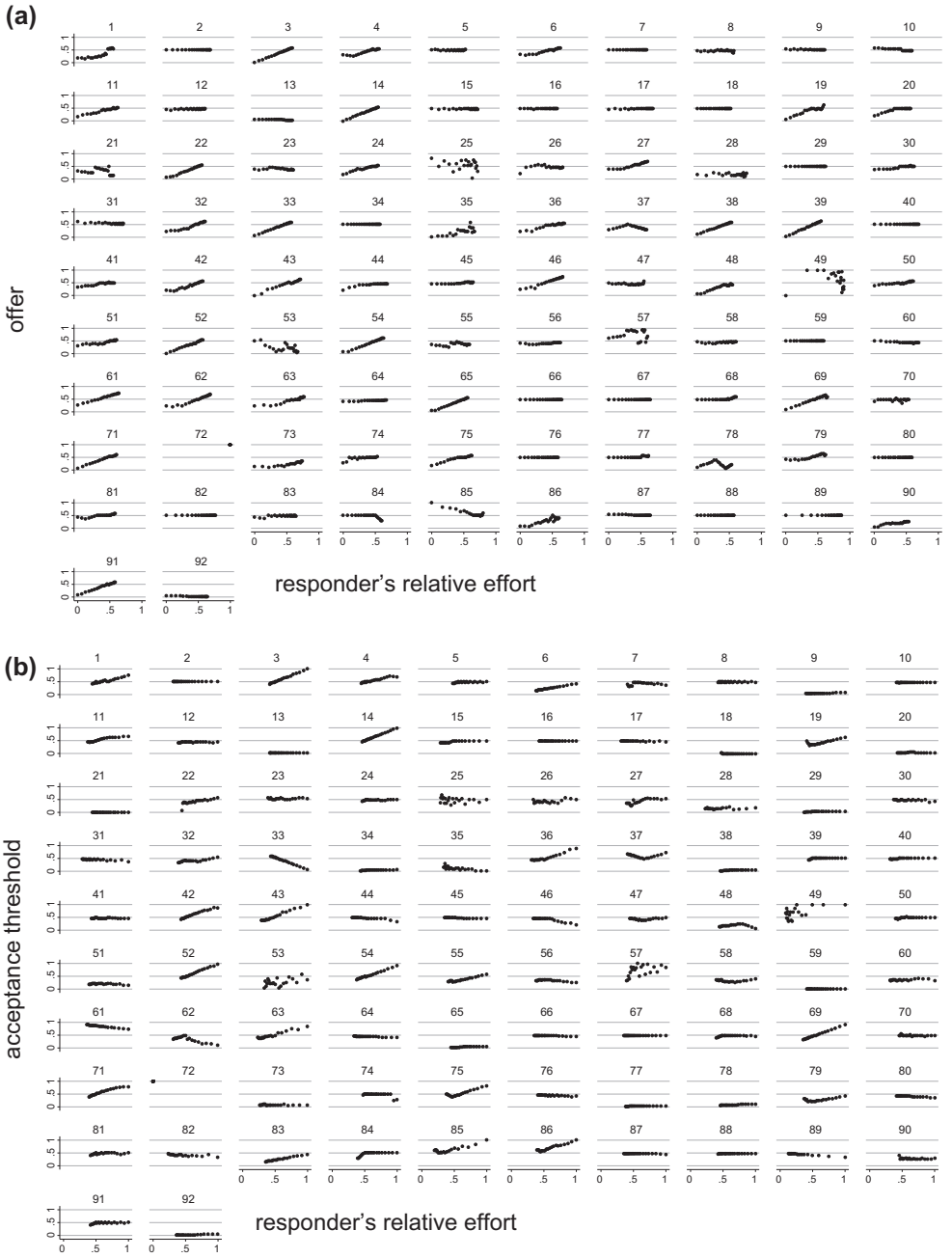


**Fig. 7.** Strategy profiles of all participants in the strategy game. The upper panel depicts the offers in the role of the proposer, the lower panel the acceptance threshold of the same player in the role of the responder. The abscissa depicts the responder's relative contribution to the cake, given by $C_R/(C_R + C_P)$, where $C_i$ describes the individual gain from the quiz and the index $i$ the respective role ($R$ = responder,$P$ = proposer). The ordinate describes the proposer's relative offer $O$ to the responder, given by $O/(C_R + C_P)$ (a) and the respective relative threshold $T$ as a responder, given by $T/(C_R + C_P)$. We can classify the behavior according to equity and equality norms. Adherence to equity norms is reflected by a diagonal line from the lower left to the upper right, i.e. the offer/threshold is strictly increasing in effort. Adherence to equality norms is reflected by a horizontal line, i.e. offer/threshold is independent of the effort.

micro-mechanisms generating societal macro-outcomes, whose properties are though measurable with conventional methods such as surveys, but hardly understandable without the fine-grained complement of laboratory research.

## Acknowledgments

This paper benefitted from comments made by Dirk Helbing regarding the design of the experiment, by Werner Güth for comments on an earlier version of the paper and by Dominik Morbitzer for comments on the revised version. Assistance of Jana Adler and Isabel Kuroczka in conducting the experiment is gratefully appreciated. We thank Thomas Voss and the University of Leipzig for providing the experimental infrastructure and the ETH Zürich Competence Center 'Coping with Crises in Complex Socio-Economic Systems' (CCSS) through ETH Research Grant CH1-01-08-2 and the ETH Foundation for partial support. The experimental work has been carried out when F.W. was affiliated with the University of Leipzig.

## Appendix A

See Fig. 7.

## References

Adams, J.S., 1965. Inequity in social exchange. Advances in Experimental Social Psychology 2, 267–269.
Andrew, S., Keith, W., Charles, W., 1994. A laboratory investigation of multiperson rationality and presentation effects. Games and Economic Behavior 6 (3), 445–468.
Beck, M., Opp, K.D., 2001. The factorial survey and the measurement of norms. Kölner Zeitschrift für Soziologie und Sozialpsychologie 53 (2), 283–306.
Becker, A., Miller, L., 2009. Promoting justice by treating people unequally: an experimental study. Experimental Economics 12 (4), 437–449.
Blau, P.M., 1964. Exchange and Power in Social Life. Transaction Publishers, New Brunswick, London.
Bonacich, P., Light, J., 1978. Laboratory experimentation in sociology. Annual Review of Sociology 4 (1), 145–170.
Brandts, J., Charness, G., 2000. Hot vs. cold: sequential responses and preference stability in experimental games. Experimental Economics 2 (3), 227–238.
Buskens, V., Weesie, J., 2000. An experiment on the effects of embeddedness in trust situations: buying a used car. Rationality and Society 12 (2), 227–253.
Cook, K.S., Emerson, R.M., 1978. Power, equity and commitment in exchange networks. American Sociological Review 43 (5), 721–739.
Cook, K.S., Hegtvedt, K.A., 1983. Distributive justice, equity, and equality. Annual Review of Sociology 9, 217–241.
Cox, J.C., Roberson, B., Smith, V.L., 1982. Theory and behavior of single object auctions. Research in Experimental Economics 2, 1–43.
Dahrendorf, R., 1958. Homo Sociologicus. Ein Versuch zur Geschichte, Bedeutung und Kritik der Kategorie der sozialen Rolle. Opladen, Westdeutscher Verlag.
Diekmann, A., 2004. The power of reciprocity: fairness, reciprocity, and stakes in variants of the dictator game. Journal of Conflict Resolution 48 (4), 487–505.
Diekmann, A., 2008. Soziologie und Ökonomie: Der Beitrag experimenteller Wirtschaftsforschung zur Sozialtheorie. Kölner Zeitschrift für Soziologie und Sozialpsychologie, 60.
Diekmann, A., Preisendorfer, P., 1998. Environmental consciousness and environmental behavior in low-cost and in high-cost situations. an empirical examination of the low-cost hypothesis. Zeitschrift für Soziologie 27 (6), 438–453.
Diekmann, A., Preisendörfer, P., 2003. The behavioral effects of environmental attitudes in low-cost and high-cost situations. Rationality and Society 15 (4), 441–472.
Durkheim, E., 1897/1997. Suicide. Free Press, New York.
Eckhoff, T., 1974. Justice : Its Determinants in Social Interaction. Rotterdam Press, Rotterdam.
Eifler, S., 2007. Evaluating the validity of self-reported deviant behavior using vignette analyses. Quality and Quantity 41 (2), 303–318.
Elster, J., 1989. The Cement of Society: A Study of Social Order. Cambridge University Press, Cambridge.
Fehr, E., Gächter, S., 2000. Fairness and Retaliation: The Economics of Reciprocity. Journal of Economic Perspectives 14 (3), 159–181.
Fehr, E., Gächter, S., 2002. Altruistic punishment in humans. Nature 415 (6868), 137–140.
Fischbacher, U., 2007. Ztree-Zurich toolbox for ready-made economic experiments. Experimental Economics 10 (2), 334–352.
Fischbacher, U., Gächter, S., Fehr, E., 2001. Are people conditionally cooperative? Evidence from a public goods experiment. Economics Letters 71 (3), 397–404.
Gintis, H., Smith, E.A., Bowles, S., 2001. Costly signaling and cooperation. Journal of Theoretical Biology 213 (1), 103–119.
Groß, J., Börensen, C., 2008. Wie valide sind Verhaltensmessungen mittels Vignetten? In: Kriwy, P., Gross, C. (Eds.), Klein aber fein! VS Verlag, Wiesbaden, pp. 149–178.
Güth, W., Schmidt, C., Sutter, M., 2007. Bargaining outside the lab – a newspaper experiment of a three-person ultimatum game. The Economic Journal 117 (518), 449–469.
Güth, W., Schmittberger, R., Schwarze, B., 1982. An experimental analysis of ultimatum bargaining. Journal of Economic Behavior and Organization 3 (4), 367–388.
Hedström, P., Swedberg, R., 1996. Social mechanisms. Acta Sociologica 39 (3), 281–308.
Henrich, J., Boyd, R., Bowles, S., Camerer, C., Fehr, E., Gintis, H., McElreath, R., 2001. In search of homo economics: behavioral experiments in 15 small-scale societies. The American Economic Review 91 (2), 73–78.
Henrich, J., Boyd, R., Bowles, S., Camerer, C.F., Fehr, E., Gintis, H. (Eds.), 2004. Foundations of Human Sociality: Economic Experiments and Ethnographic Evidence from Fifteen Small-Scale Societies. Oxford University Press.
Herrmann, B., Thöni, C., Gächter, S., 2008. Antisocial punishment across societies. Science 319 (5868), 1362–1367.
Herrmann, B., Thoeni, C., 2009. Measuring conditional cooperation: a replication study in russia. Experimental Economics 12 (1), 87–92.
Homans, G.C., 1961. Social Behavior. Harcourt, Brace and World, New York.
Jasso, G., 2006. Factorial survey methods for studying beliefs and judgments. Sociological Methods and Research 34 (3), 334.
Jasso, G., Opp, K.-D., 1997. Probing the character of norms: a factorial survey analysis of the norms of political action. American Sociological Review 62 (6), 947–964.
Jasso, G., Rossi, P.H., 1977. Distributive justice and earned income. American Sociological Review 42 (4), 639–651.
Jasso, G., Wegener, B., 1999. Gender and country differences in the sense of justice: justice evaluation, gender earnings gap, and earnings functions in thirteen countries. International Journal of Comparative Sociology 40 (1), 94–115.
Kahneman, D., Tversky, A., März, 1979. Prospect theory: an analysis of decision under risk. Econometrica 47 (2), 263–292.
Kollock, P., 1998. Social dilemmas: the anatomy of cooperation. Annual Review of Sociology 24 (1), 183–214.
Loewenstein, G., 1996. Out of control: visceral influences on behavior. Organizational Behavior and Human Decision Processes 65 (3), 272–292.

Nisic, N., Auspurg, K., 2008. Faktorieller Survey und klassische Bevölkerungsumfrage im Vergleich – Validität, Grenzen und Möglichkeiten beider Ansätze. In: Kriwy, P., Gross, C. (Eds.), Klein aber fein! VS Verlag, Wiesbaden, p. 211.
Ostrom, E., Walker, J., Gardner, R., 1992. Covenants with and without a sword: self-governance is possible. The American Political Science Review 86 (2), 404–417.
Oxoby, R.J., McLeish, K.N., 2004. Sequential decision and strategy vector methods in ultimatum bargaining: evidence on the strength of other-regarding behavior. Economics Letters 84 (3), 399–405.
Parsons, T., 1937. The Structure of Social Action: Marshall, Pareto, Durkheim. Free Press, New York.
Raub, W., Weesie, J., 1990. Reputation and efficiency in social interactions: an example of network effects. The American Journal of Sociology 96 (3), 626–654.
Rauhut, H., Krumpal, I., 2008. Die Durchsetzung sozialer Normen in Low-Cost und High-Cost Situationen. Zeitschrift für Soziologie 5, 380–402.
Rawls, J., 1971. A Theory of Justice. Cambridge.
Roth, A.E., 1995. Bargaining experiments. In: Kagel, J.H., Roth, A.E. (Eds.), The Handbook of Experimental Economics. Princeton University Press, pp. 253–348.
Selten, R., 1967. Die Strategiemethode zur Erforschung des eingeschränkt rationalen Verhaltens im Rahmen eines Oligopolexperimentes. In: Sauermann, H. (Ed.), Beiträge zur experimentellen Wirtschaftsforschung. J.C.B. Mohr (Paul Siebeck), Tübingen.
Shadish, W.R., Cook, T.D., Campbell, D.T., 2002. Experimental and Quasi-experimental Designs for Generalized Causal Inference. ASA.
Shepelak, N.J., Alwin, D.F., 1986. Beliefs about inequality and perceptions of distributive justice. American Sociological Review 51 (1), 30–46.
Smith, V.L., Suchanek, G.L., Williams, A.W., 1988. Bubbles, crashes, and endogenous expectations in experimental spot asset markets. Econometrica 56 (5), 1119–1151.
Wallander, L., 2009. 25 Years of factorial surveys in sociology: A review. Social Science Research 38 (3), 505–520.
Winter, F., Rauhut, H., Helbing, D., 2009. How norms can generate conflict. Jena Economic Research Papers 87, 1–31.
Wrong, D.H., 1961. The oversocialized conception of man in modern sociology. American Sociological Review 26 (2), 183–193.