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Beyond Procedural Fairness and Reciprocity

Nadine Chlaß, Werner Güth, and Topi Miettinen

Stockholm Institute of Transition Economics
Stockholm School of Economics
Sveavägen 65, P.O. Box 6501
SE – 113 83 Stockholm
Sweden
http://www.hhs.se/SITE/

Beyond Procedural Equity and Reciprocity

Nadine Chlaß* Werner Güth** Topi Miettinen‡

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Abstract

Most research in economics models agents somehow motivated by outcomes. Here, we model agents motivated by procedures instead, where procedures are defined independently of an outcome. To that end, we design procedures which yield the same expected outcomes or carry the same information on other's intentions while they have different outcome-invariant properties. Agents are experimentally confirmed to exhibit preferences over these which link to psychological attributes of their moral judgment.

JEL Classification: C78, D63, Z13

Key words: procedural preferences, experiment, procedural fairness

*Friedrich Schiller University Jena, Germany. Email: nadine.chlass@uni-jena.de

**Max Planck Institute of Economics, Jena, Germany

‡SITE Stockholm School of Economics, Sweden. We thank Christoph Göring for programming the z-tree code, and Oliver Kirchkamp for valuable comments on this paper.

1 Introduction

This paper studies procedures. Most research in economics in contrast models agents motivated by economic outcomes. Outcomes typically include monetary payoffs, allocations of consumption bundles, costs of effort, or expectations over these. Meanwhile, little attention has been paid to whether agents do not also care about the procedure which generates these outcomes.[1] In some areas of life, procedures may prove vitally important. In an election, for instance, great care is taken to grant each individual an equal opportunity to vote, to make the voting simple and elect a candidate in a transparent way. Ultimately, the victory of one's preferred candidate may be satisfactory. Yet, one may plainly refuse to acknowledge her victory if it is learned the election violated some of the criteria mentioned before. Notably, such a concern may be independent of any potential outcome.

Here, we present to our knowledge the first controlled laboratory experiment pointing out that procedures have value per se. We formulate four purely procedural concerns: (i) a concern for procedural simplicity, (ii) a concern for symmetric information, (iii) for equal effective opportunities, and (iv) a concern for equal effective unkind opportunities. Our experimental test introduces pairs of two-player pie-splitting procedures, where each side of the pair captures one procedural aspect in comparison to the other. Procedures are designed such that a row of dominant theories, including many which allow for other-regarding and reciprocity concerns, would predict expected outcomes and intentions to be procedurally invariant. Yet, we find evidence for procedural preferences.

We subsequently try to understand the reasoning behind purely procedural preferences as formulated here. Relying upon Kohlberg's work on individual moral conceptions (Kohlberg 1984), we elicit elements of individuals' moral judgment via a standardized experimental questionnaire first published in Lind (1978). These elements enable us to consistently discriminate between the newly

[1] Even when economists do study procedural preferences, they would invariably define them by some operator on an outcome. Such operators include an expectation over a distribution of outcomes (Bolton et al. 2005), (Karni and Safra 2002), (Karni et al. 2008) or the kindness perception in choosing such a distribution (Brandts et al. 2006), (Sebald 2007). A review of earlier work is provided in (Konow 2003). It hence appears that preferences over procedures per se have not been studied by economists.

introduced preferences.

The following section describes the two-player pie-division procedures we use. Section 3 reviews dominant preference models and theories of fairness and verifies that each of them generates procedurally invariant outcomes across our pairs of procedures. Section 4 introduces the above mentioned four procedural preferences and discusses how individuals' moral conception may affect them. Section 5 describes our experimental design and the experimental test used to elicit individuals' moral conception. Section 6 presents our main results. Section 7 concludes.

2 Some simple allocation procedures

Let 200 units be shared among two parties. One party, the proposer (P), has more allocation power than the other, the responder (R). Two divisions of the pie are possible; a fair one, where both the proposer and the responder obtain 100 units and an unfair one where the proposer obtains 20 units and the responder 180 units. Thus, the unfair allocation favors the less powerful responder rather than the proposer. We consider three procedures for sharing the 200 units in either way: a mini dictator game, a mini-yes-or-no game (Gehrig et al. 2007), and a mini ultimatum game (Güth et al. 1982).

A first procedure, the dictator game (DG), leaves the responder without any opportunity to act. Whatever the proposer chooses is implemented. In our setting, the responder may however voice her (dis)agreement with the proposal. Her reaction would yet not have any bearing on the outcome.

A second procedure, the yes-no game (YNG), grants the responder an *unconditional* opportunity to act. P proposes either (100,100) or (20,180) and R decides whether to accept. Yet, R must decide whether to reject or not without knowing the proposal made by P. Rejection results in zero payoffs for both whereas the proposal is implemented otherwise.

A third procedure, the ultimatum game (UG), grants the responder a *conditional* opportunity to act. As in the yes-no game, P first proposes one of the two allocations. Subsequently, R is informed about which proposal was made and then decides whether to accept or to reject it. Again, a rejection leads to zero payoffs whereas acceptance implements the proposed sharing.

3 Predictions within procedures

Let us now consider strategy- and outcome-predictions of various theories for our allocation procedures. We start out with the benchmark of self-interested opportunism.

Self-interested opportunism. If R is opportunistic, she only cares about her share of the 200 units pie. Thus, she will never reject any proposal since this would result in zero payoff. If P anticipates R's opportunism, P will propose the allocation (100,100) in all three games and R in turn will accept whenever she has the opportunity. Neither player should prefer one procedure over the other.

Inequity aversion. Theories of allocative fairness (Bolton 1991), (Bolton and Ockenfels 2000), (Fehr and Schmidt 1999) suggest preferences to depend on both equality in payoffs and a player's private payoff rather than on the latter alone. Let the player earn x units and her opponent earn y units. Assume a linear trade-off relation between the player's own and the other's payoff. A functional form for such a preference writes $x - amax\{(y-x), 0\} - bmax\{(x-y), 0\}$ where a and b denote non-negative individual parameters (Fehr and Schmidt 1999). The last two terms capture the player's preferences for equal payoffs. The model restricts her to derive more disutility from disadvantageous than from advantageous inequality, i.e. $a \geq b$. Such a player would strictly prefer both players obtaining zero to the allocation (x, y) with $x > y$ iff $b > \frac{x}{(x-y)}$. She would prefer neither obtaining anything to the allocation (x, y) with $x < y$ iff $a > \frac{x}{(y-x)}$. For our two allocations ($x = 100$, $y = 100$) and ($x = 180$, $y = 20$), both an opportunistic and any inequity averse responder with $b < 1$ as required by Fehr and Schmidt would accept all proposals. If so, a proposer exhibiting nonnegative a and b as required afore chooses the allocation (100,100). Again, behavior turns out the same across procedures.

Intentionality. Responders minding proposers' intentions have even less reason to reject any offer. Falk et al. (2003) hardly ever find responders rejecting meager offers in mini-ultimatum games. If instead, proposers choose a meager

[1] These strategies are sequentially rational (Selten 1965), (Selten 1975), (Kreps and Wilson 1982).

offer from a richer set of alternatives, responders tend to reject more often. In essence, the assessment of intentions behind a proposal may depend on the set of alternative proposals. If the fairest allocation is ruled out by design, a proposal otherwise deemed rather unkind becomes less objectionable. We design even the most disadvantageous of the two proposals for the responder to equally share the pie. Such a proposal should already have been considered fair given an unrestricted set of alternatives. It is even more likely considered a fair proposal when other options are ruled out. In summary, both allocations in our setting should appear kind and therefore be accepted.

Let us discuss this more formally in the framework of Falk and Fischbacher (2006). The kindness of player j towards i at node n is defined as $\varphi_j(n, s_i'', s_i') := \vartheta_j(n, s_i'', s_i')\Delta_j(n, s_i'', s_i')$ where s_i' represents i's first-order belief about the strategy of j and s_i'' is i's second-order belief (the belief about the first-order belief of j). The term $\Delta_j(n, s_i'', s_i') = x_i(n, s_i'', s_i') - y_j(n, s_i'', s_i')$ reflects the perceived payoff difference and $\vartheta_j(n, s_i'', s_i') \in [0, 1]$ measures the degree of intentionality[2] in j's choices. For negative Δ_j j is unkind to i whereas for positive Δ_j, j is kind. Since for all our procedures, Δ_j remains non-negative, the proposer cannot be unkind. Thus, the intentionality term $\vartheta_j(n, s_i'', s_i') \in [0, 1]$ does not matter. Hence, both proposals are always accepted.[3] In summary, self-interested opportunism and predominant fairness theories mostly predict the same allocation proposal in all three procedures. They moreover predict the responder R to always accept it.

Recent *economic approaches to procedural fairness* have emerged, a first building upon inequity aversion (Bolton et al. 2005), and a second, building upon reciprocity (Sebald 2007)[4]. The first formulates that people prefer fair

[2]In binary randomized choice, intentionality can be associated with the probability of choosing an action. Non-intentionality would correspond to choosing each action with equal probability, intentional kindness to choosing the higher payoff action with probability one, for instance.

[3]Surprisingly, the model of Dufwenberg and Kirchsteiger (2004) can predict rejections of the (100,100) proposal since it may classify the (100,100) proposal as unkind and the (20,180) proposal as kind. This holds if the latter only or both proposals are accepted. Yet, with sufficiently strong reciprocity concerns, the proposal (100,100) may be proposed and rejected in equilibrium.

[4]Sebald's model is based upon the reciprocity model of Dufwenberg and Kirchsteiger (2004). If the alternative reciprocity model (Falk and Fischbacher 2006) was used, measuring procedural fairness by letting an agent make a hypothetical choice between random draws would yield an equity-based measure of procedural fairness.

to unfair lotteries when only unequal outcomes are available. Sebald (2007) instead expresses the fairness of a random choice procedure by the kindness a player exhibits in choosing that procedure. However, both approaches deem our three procedures equally fair.

4 Beyond reciprocity- and inequity-based procedural concerns

4.1 Purely procedural concerns

Here, we formulate procedural concerns beyond the aforementioned reciprocity- and inequity-based concepts. The forecited protocols allow us to capture four such concerns, i.e. (i) a preference for *symmetric information*, (ii) a preference for *equal effective opportunities*, (iii) a preference for *equal effective unkind opportunities*, and finally, (iv) a preference for *procedural simplicity*. Note all but the latter to be fairness-driven and note furthermore a potential trade-off between *procedural simplicity* and *procedural fairness* as formulated here. Since all four procedural aspects may discriminate between procedures under invariant outcomes, we call them *purely* procedural concerns. Yet, purely procedural aspects may not equally advantage responders and proposers.[5] We will hence assess for each aspect whom it advantages relative to the other party.

Within our protocols, we express procedural (a)symmetry in information by whether a procedure has perfect or imperfect information.[6] In the yes-no game, the responder does not know which proposal she decides to accept or reject whereas the proposer does. In the dictator and ultimatum game, all information is available to both players at all nodes. A player preferring equally partitioned information would thus prefer both the dictator and ultimatum game over the yes-no game. Within our setting, asymmetry of information advantages

[5] Consequently, each measure provided here may be embedded in any inequity setting, e.g. (Fehr and Schmidt 1999).

[6] A more elaborate and general way is to look at the *difference in information partition cardinalities* of the two players. Let H be the set of decision nodes and $\{I_k^i\}_{k \in K}$ be the information partition with each of the disjoint sets being non-empty, i.e., decision nodes; $\bigcup_{k=K} I_k = H$ with $I_i \cap I_j = \emptyset$. These partitions contain both a player's own and the other player's decision nodes. A player may thus care about what the other knows, similarly as an inequity averse player may care about the payoff of the other.

the proposer relative to the responder. Symmetrizing information would hence improve responders' relative position.

Yet, procedural fairness might be expressed differently still, i.e. in terms of *equal effective opportunities*. An effective opportunity hereby is understood as a non-redundant or generic action.[7] A players' set of non-generic actions along a path of play would include her action set in each decision node along that path of play. Equality of effective opportunities defined such would require an equal number of non-generic actions available to each player per path of play. In the dictator game, the proposer faces two generic actions along each path of play. The responder in turn has no opportunity to choose at all. In the ultimatum and the yes-no game instead both proposers and responders choose from an action set containing two generic actions per path of play. In sum, both responders and proposers concerned with *equal effective opportunities* would prefer the yes-no and the ultimatum game over the dictator game.[8] Procedural inequality of effective opportunities advantages the proposer relative to the responder. Equalizing their number would improve responders' relative position.

As argued above, a responders' opportunity to veto may equalize players' available effective opportunities. Yet, vetoing would decline only kind offers here. Granting but one player with an opportunity to act unkindly may be considered unfair. A refined measure of procedural fairness would hence count players' *effective unkind opportunities* along each path of play. Adopting the same line of reasoning as afore, we identify each player's set of non-generic unkind actions per path of play. Equality of effective unkind opportunities defined such would require an equal number of non-generic unkind actions for each player per path of play. Throughout our protocols, the proposer's set of unkind actions is empty along all paths of play. In the dictator game, a responder's set of unkind actions proves empty as well. In both the yes-no and the ultimatum game she may yet reject kind offers resulting in a nonempty set of generic unkind actions. Our protocols thus grant responders with either equal or

[7] Two actions a and a' in an action set of a given node h are non-generic, if they entail non-generic payoff consequences for all histories with subhistories (h,a) and (h,a'). See, for instance, Jehiel and Moldovanu (1995).

[8] Sugden (1998) requires preferences over opportunities to satisfy three axioms: strict monotonicity, independence, and addition of ineligible options. Note the latter to be essential for discretion in the dictator game.

more opportunities than proposers to act unkindly. In sum, both proposers and responders concerned with *equal effective unkind opportunities* would prefer the dictator over both the yes-no and the ultimatum game. In contrast to the coarser criterion above, the refined notion finds the responders advantaged relative to the proposer. Equalizing unkind opportunities would hence improve proposers' relative position.

Finally, *simplicity of a procedure* for a given player i may be defined by the *cardinality of the (pure) strategy sets*, $\#S_P + \#S_R$. The larger this cardinality, the more complex the procedure. Amongst our procedures, the yes-no game has lowest cardinality of four. Both the ultimatum and the dictator game have cardinality six. Players concerned with *procedural simplicity* would hence prefer the yes-no game over both the dictator and the ultimatum game. Within our definition, no player is relatively advantaged compared to the other.

4.2 Purely procedural concerns and moral conceptions

Here, we reflect on how procedural concerns may relate to an individual's moral conception. The latter is argued to comprise interacting affective and cognitive elements (Lind 2000). Affective elements, i.e. *moral attitudes* have been widely investigated both empirically and theoretically as substantiated in Kohlberg (1984) or Lind (2008). Kohlberg (1969, pp. 375) describes three different classes of moral attitudes, namely a *preconventional*, a *conventional*, and a *postconventional* class. Each of them expresses the extent to which an individual identifies with a certain mode of moral argumentation. Taken together, they allow to classify individual conceptions of what is morally desirable. Evolutionary psychology would associate each mode of moral argumentation with a certain level of moral development (Kohlberg 1969, pp. 374).

Preconventionally, moral value solely resides in the use or benefit of outcomes for the self. Instead, a conventional moral argument would assess the overall concordance with expectations of the social surroundings. Such would for instance require compliance with behavioural rules or norms adopted throughout a major part of society. Postconventionally, moral value resides in certain values considered to be of universal validity, i.e. equality, freedom, or the consideration

of another's will. Thereby, their validity would not depend on any social authority. The consideration of procedures is one particular aspect of postconventional argumentation. Instead of focusing on the outcome, a postconventional argumentation inquires how these outcomes have come about. A given outcome may hence be valuated differently if reached by dictatorial discretion rather than democratic consensus, for instance (Kohlberg 1969, p. 376). We point out such procedural aspects to solely matter for postconventional argumentation. Table 3 summarizes the Kohlbergian modes of argumentation, or levels of moral development.

Levels	Basis of Moral Judgment
I preconventional	Moral value resides in external events, bad acts, or needs rather than in persons and standards (Obedience and punishment orientation. Egocentric deference to superior power or prestige, or trouble avoiding. Naively egoistic orientation.)
II conventional	Moral value resides in performing good or right roles, in maintaining the conventional order and others' expectations (Orientation to approval and to pleasing others. Conformity to stereotypical images of a majority and judgment by intentions. Orientation towards a maintenance of the social order for its own sake, doing one's duty.)
III postconventional	Moral value resides in conformity to shared standards, rights, or duties. (Duty defined in terms of contract, general avoidance of violation of others' will and rights, reasoning in terms of majority will and welfare. Conscience or principle orientation. Orientation to logically universal and consistent principles of choice.)

Table 1. **A summary of Kohlberg's three modes of argumentation. (Kohlberg 1969, p. 376)**

While a moral decision involves moral attitudes, it may also require cognitive *moral abilities* (Lind 1978, 2000). These would empower an individual to actually detect procedural differences or arguments of moral relevance. Given a perceived aspect of moral relevance, a moral attitude may subsequently determine to what extent the aspect matters. Here, we assess an individual's moral attitudes and her moral abilities. We subsequently try to consistently associate them with *purely* individual procedural preferences as defined in section 4.1.

5 Experimental setup

The computerized experiment was conducted in the laboratory of the Max Planck Institute of Economics in Jena. Participants were 352 undergraduates from the university of Jena, randomly drawn from different fields of study. Participants were recruited using the ORSEE software (Greiner 2004) and the experiment was programmed with the z-Tree software (Fischbacher 2007).

At the beginning of each session, participants were seated at visually isolated computer terminals where they received a hardcopy of the German instructions[9]. Subsequently, participants would answer a control questionnaire to ensure their understanding. The experiment started after all participants had successfully completed the questionnaire.

Each session introduced one pair of protocols, either a mini-ultimatum and a mini-yes-no game; or a dictator and an ultimatum game. The 200 units to be shared here would correspond to 6 Euros. Choices were elicited using the vector strategy method (Selten 1967) for all potential contingencies of both protocols and roles. Subsequently, proposer and responder roles were attributed randomly within randomly formed pairs.

The experiment would now proceed by giving players an ex ante unannounced option to influence the draw of the protocol. They received additional instructions explaining the option, and answered a further control question ensuring their understanding. Each participant would then announce if she had a preference, and if so, her preferred protocol. Subsequently, participants were given the opportunity to pay 15 (Euro)Cents for making their preferred protocol more likely to occur.

A random draw would then attribute one player in each pair with the chance to influence the draw of the protocol. If this player had stated a preference and paid for it, her preferred protocol would be drawn. In case she had not paid, each protocol would be drawn with equal probability. If a player wanted to pay but was not drawn, she would not incur any cost.

[9] See appendix A for an English translation. Further documentation is available upon request.

Subsequently, each agent's first order beliefs about her counterpart's behavior were elicited.[10] We asked for the expected behavior at each node within the two protocols. At each node, the choice was binary. Subjects would indicate how many out of four randomly drawn players of the other role they believed to make a given choice. Subjects would earn 100 additional points, i.e. 3 Euros, if they correctly predicted the distribution of choices and no additional points otherwise.

Finally, protocols would be chosen as detailed before. Participants' choices within the drawn protocol would become payoff-relevant. Four participants of the other role would be randomly drawn to assess the correctness of the beliefs and add potential 100 points. The cost of influencing the protocols were subtracted.

By our design we tried to induce procedurally invariant behaviour and beliefs. Only such would permit us to interpret subject's preferences in purely procedural terms. Hence, we restrict our analysis to subjects satisfying this requirement.[11] These are responders who (i) accept each proposal equally often across procedures, [12] and who (ii) deem each proposal equally likely for both protocols. If such responders preferred one procedure over another, their preference would neither be opportunistic, inequity-based nor reciprocity-based, and hence *purely* procedural. Proposers in turn allow for unconfounded inference when (i) choosing a procedurally invariant allocation and (ii) expecting this allocation to be accepted with equal likelihood across protocols.[13] If such proposers still preferred one procedure over another, they would reveal *purely* procedural concerns.

At the end of each session, we handed out questionnaires. Agents completed the standardized moral judgment test developed by Lind (1978, 2008).[14] The

[10] We did not elicit beliefs pertaining to the choice of the procedure.

[11] Other subjects may of course also display purely procedural concerns. An unconfounded inference is yet not possible for them.

[12] When the dictator game is one of the procedures, this obviously requires a responder to accept all proposals in the other procedure.

[13] Naturally, when one of the procedures was the dictator game, proposers must expect all proposals to be accepted with certainty.

[14] While not the only available, the MJT provides the only standardized experimental test. Its design prevents subjects from faking their scores while others, i.e. the DIT by Rest (1974) don't. (Barnett et al. 1995), (Lind 2000)

MJT introduces two moral dilemmas[15]. Subjects first state their opinion on whether the protagonists' behavior within this dilemma was right or wrong. Subsequently, they are asked to rate several arguments for and against this behavior. Subjects thereby rank the importance of each argument on a scale from -4 to +4[16]. Each item represents a certain *mode of argumentation* or *moral attitude*. Three measures were obtained from these answers. First, the average importance attributed to each class of moral argumentation. Second, the relative share of highly ranked *postconventional arguments* or so-called *P-Score* (Rest 1974). Given their presumed relevance, we use the *P-Score* to measure subjects' ability to actually apply postconventional arguments. Third and last, we measure cognitive moral abilities by Lind's (1978) *C-Score* which studies the variability in rating arguments of different modes.

6 Results

6.1 Procedural concerns

Let us now concentrate on participants whose actions and beliefs are invariant across procedures.[17] Only such allow us to rule out reciprocity and inequity based motives.

On the one hand, these are responders who (i) accept each proposal equally often across procedures, and who (ii) expect the same proposal for both protocols. On the other hand, these are proposers (i) choosing a procedurally invariant allocation and (ii) expecting this allocation to be accepted with equal likelihood across protocols.[18]

Subjects meeting these conditions *state* a purely procedural preference with probability 0.65 within $[0.54, 0.75]_{0.99}$. 22% also *reveal* such a preference by their willingness to pay for influencing the protocol within $[0.14, 0.32]_{0.99}$. Thus,

[15] A moral dilemma thereby features a two-party-situation involving two conflicting moral norms. A dilemma as understood here is not a formally defined game.

[16] Which may be and are individually adjusted here following (Kohlberg 1969) taking the maximal values used by an individual as delimiters of her individual scale

[17] Appendix B provides detailed descriptives on overall beliefs and behavior within protocols.

[18] For the dictator game, proposers of interest would always propose the equal split and expect it to be always accepted. Responders would always accept the equal split and always expect the equal split to be proposed.

a significant share of subjects both announce and reveal a *purely* procedural preference.

> **RESULT 1.** A significant share of subjects expresses and reveals a *purely* procedural preference.

Let us now categorize these preferences. We defined the *asymmetry of information* by the *difference in players' information partition cardinalities*. These partitions are equal for the ultimatum, but not for the yes-no game. *Purely* procedural preferences for symmetric information are announced with probability 0.22 within $[0.12, 0.36]_{0.99}$. Only 4% of subjects reveal such a preference within error margins of $]0, 0.12]_{0.99}$. Further increasing the likelihood of the confidence interval makes this fraction disappear. We conclude:

> **RESULT 2.** Subjects express yet do not reveal a procedural preference for equal information.

We defined a preference for *equal effective opportunities* as an equal number of generic actions per paths of play. Within our experimental test, such a preference could manifest as a preference for the ultimatum game over the dictator game. 9% of subjects state such a preference within $[0.02, 0.22]_{0.99}$. Yet, their share seems negligible.

> **RESULT 3.** Subjects rarely express and do not reveal a preference for equal effective opportunities.

While the opportunity to veto equalizes the number of effective opportunities above, a veto may by design decline only kind offers. Granting only one player with an opportunity to act unkindly may be considered unfair. We named such a preference for *equal effective unkind opportunities* which could manifest as a preference for the dictator over the ultimatum game. Subjects announce the latter with probability 0.68 within $[0.51, 0.81]_{0.99}$ and reveal it with probability 0.25 within $[0.12, 0.41]_{0.99}$. Hence:

> **RESULT 4.** A significant share of subjects expresses and reveals a preference for equal effective unkind opportunities.

Finally, the *simplicity* of the procedure for a given player i, was described by the (sum) *cardinality of the strategy sets*, $\#S_P + \#S_R$. The larger the sum cardinality, the more complex the procedure. Each player encounters sum cardinality

four in the yes-no game and sum cardinality six in the ultimatum game. A player concerned with simplicity should prefer the yes-no over the ultimatum game. 35% of our subjects announce such a preference within error margins of $[0.21, 0.49]_{0.99}$ whereas 14% reveal it within $[0.05, 0.26]_{0.99}$ respectively.

RESULT 5. A significant share of subjects expresses and reveals a preference for simplicity.

Tables 2 and 3 review our results for both pairs of protocols displaying estimates and confidence intervals for announced and revealed preferences of proposers and responders.

role	n	UG $\succ$ YNG		UG $\prec$ YNG	
		stated	revealed	stated	revealed
p	42	4 $[0.02, 0.27]$	2 $]0, 0.20]$	18 $[0.24, 0.63]$	8 $[0.06, 0.39]$
r	45	15 $[0.17, 0.54]$	1 $[0, 0.15]$	12 $[0.12, 0.47]$	4 $[0.02, 0.25]$

Table 2: **Purely procedural preferences for admissible subjects in YNG-UG pair of protocols.**

role	n	DG $\succ$ UG		DG $\prec$ UG	
		stated	revealed	stated	revealed
p	35	28 $[0.57, 0.94]$	10 $[0.11, 0.52]$	1 $[0, 0.20]$	0 $[0, 0.15]$
r	33	18 $[0.31, 0, 77]$	7 $[0.06, 0.45]$	5 $[0.03, 0.38]$	2 $]0, 0.26]$

Table 3: **Purely procedural preferences for admissible subjects in DG-UG pair of protocols.**

We retain that agents are heterogeneous in their procedural preferences. Critics may impute the observed heterogeneity to idiosyncratic mistakes of participants during an experiment. Yet, further below (See Result 6), we show procedural preferences to be consistently associated with a well-established typification of individuals' moral conception as presented in section 4. This provides support for a systematic logic behind observed choices - moral preferences, rather than errors.

6.2 Purely procedural concerns and moral conceptions

Let us hence try to classify individuals' purely procedural preferences by elements of their individual moral conception. Thereby, we specify an individual's

moral conception as follows. First, by Kohlberg's moral attitudes toward preconventional *(a1)*, conventional *(a2)* and postconventional *(a3)* modes of argumentation as represented by their average importance reported by a given subject. Second, by the relative frequency of postconventional argumentation or *P-Score* (Rest 1974). Third, by a subject's moral cognitive abilities as measured by the *C-score* (Lind 1978).

As mentioned earlier, for each procedural aspect aside *simplicity* parties' positions relative to each other vary across procedures. In particular, a party relatively disadvantaged in one procedure may prefer another instead wherein parties' relative positions are equal. Evening out her own disadvantage may origin from a self-centered moral argument. Instead, imagine the same party to be either advantaged or procedurally on par with another party. Preferring equal relative positions and to even out the other party's procedural disadvantage may emerge from a very different moral argument. We hence divide preferences correspondingly. To nevertheless maintain a sufficiently large sample, we restrict the analysis to announced preferences[19] Subsequently, *purely* procedural preferences of either kind were modeled using a simple logit model. Herein, subject i not showing any *purely* procedural preference would write $l = 0$. Subject i displaying a *purely* procedural preference writes $l = 1$.

In tables four and five we restrict the presentation of our results to estimated marginal effects. The latter report the average coefficient of a predictor over all individuals. Thereby, a positive marginal effect on one class l indicates a predictor to shift probability mass toward that very class. A negative in turn would indicate a predictor to render that type of preference less likely[20]. Predictors were standardized to account for differences in scaling.

[19] Appendix C demonstrates revealed preferences to be morally determined the same way. Yet, we refer to the safer statistical inference on the larger sample of announced preferences in the text. Such is done to ensure large sample properties of our logit model to hold.

[20] Take table 4 and focus on $a3 \cdot Psc.$ An increase of $a3 \cdot Psc.$ by 1% shifts a probability mass of 0.22 away from $l = 0$. With only two classes l, this probability mass freed on $l = 0$ is by construction shifted toward $l = 1$. Hence, $a3 \cdot Psc.$ has a marginal effect of 0.22 on $l = 1$.

Evening out an own purely procedural disadvantage, n=67,Count R^2=0.76

x_i	l	$\partial y/\partial x_i$	σ	z	p
a1	*0*	-0.09	0.05	-1.81	0.07
	1	0.09	0.05	1.81	0.07
a2·a3	*0*	0.30	0.06	4.80	0.00
	1	-0.30	0.06	-4.80	0.00
a3·Psc.	*0*	-0.22	0.08	-2.74	0.01
	1	0.22	0.08	2.74	0.01

Table 4. **Moral determinants of evening out an own procedural disadvantage.**

Evening out others' purely procedural disadvantage, n=52, Count R^2=0.71

x_i	l^*	$\partial y^*/\partial x_i$	σ	z	p
a1	*0*	0.05	0.12	0.43	0.67
	1	-0.05	0.12	-0.43	0.67
a2·a3	*0*	0.42	0.13	-3.01	0.00
	1	-0.42	0.13	-3.01	0.00
a3· Psc.	*0*	-0.35	0.09	-3.80	0.00
	1	0.35	0.09	3.80	0.00

Table 5. **Moral determinants of evening out others' procedural disadvantage**

Let us first focus on subjects who stated to prefer equal relative positions to being procedurally *disadvantaged*. On the one hand, these are responders who state to prefer *symmetry of information* when choosing between the yes-no and the ultimatum game. On the other hand, these are proposers who state to prefer *equal unkind opportunities* when choosing between the dictator and the ultimatum game.

Indeed, preconventional or self-centered moral arguments *a1* are positively yet insignificantly associated to this first type of procedural preferences. Meanwhile, combining conventional and postconventional arguments *a2·a3* would entail stated procedural indifference. Yet, postconventional arguments on their own are strongly associated with this first type of procedural preferences. Thereby, postconventional arguments impact via an interaction of their average importance and the relative frequency at which they are applied, i.e. *a3·Psc.*

Let us turn to subjects who stated to prefer equal relative procedural positions to being procedurally *advantaged*, i.e. $l^*=1$. On the one hand, these are proposers who state to prefer *symmetry of information* when choosing between the yes-no and the ultimatum game. On the other hand, these are responders who state to prefer *equal unkind opportunities* when choosing between the dictator and the ultimatum game. Here, we find no significant self-centered argument. Similar as before, subjects combining both conventional and postconventional arguments *a2·a3* would rather state procedural indifference. Postconventional arguments on their own are strongly associated with procedural preferences of the second type as well, again via *a3·Psc.*

In summary, our results strongly confirm Kohlberg's postconventional mode of moral argumentation to discriminate *purely procedural preferences* from *purely*

procedural indifference.

RESULT 6. Subjects' moral conceptions are consistently associated with stated procedural preferences.

7 Conclusion

So far, studies on positive procedural concerns have focused on either fair randomization over possibly unequal outcomes, or procedural fairness as measured by reciprocal kindness. Both approaches define preferences over a procedure by an operator on its outcomes. We define procedural preferences independently of outcomes and test four such outcome-invariant procedural concerns. These are a preference for the symmetry of information, a preference for the equality of effective opportunities, a preference for the equality of effective unkind opportunities, and one for procedural simplicity.

The experimental test introduces different procedures designed such that existing theories predict invariant expectations and behavior across them all. Procedures in question would hence differ in purely procedural criteria alone. The test proceeds by eliciting subjects' preferences for these procedures where these are partly (non)incentivized.

Considering revealed preferences only, we confirm preferences for equal unkind opportunities, and for simplicity. A concern for symmetric information manifests very weakly while we find no convincing request for equal effective opportunities. Subjects rather prefer to remove responders' effective opportunities in the ultimatum game since an opportunity to veto would only "punish" kind behavior.

Subjects' procedural preferences are consistently tied to their moral conceptions as classified in (Kohlberg 1984). We elicit the latter using a standardized experimental test by Lind (1978, 2000). Thereby, so-called postconventional arguments prove the essential element to discriminate between *purely* procedural concerns. For each of our procedures and each procedural aspect we may define parties' relative positions to each other. Thereby, procedural preferences for removing an own procedural disadvantage appear a little stronger than preferences for removing others' disadvantage. In both cases, subjects who state

purely procedural preferences distinctly valuate postconventional moral arguments.

In summary, we reveal two empirically important procedural preferences beyond the previously highlighted preferences for fair randomization and procedural kindness. These are first, a concern for simplicity, and second, a concern for equal unkind effective opportunities. Unlike previously, these preferences refer to procedures alone and are independent of the monetary outcomes they yield.

References

Barnett, R., Evens, J., Rest, J. (1995), Faking Moral Judgment on the Defining Issues Test, British Journal of Social Psychology, 34, 267-278.

Bolton, G. (1991), A Comparative Model of Bargaining: Theory and Evidence, American Economic Review, 81, 1096-1136.

Bolton, G., Ockenfels A. (2004), ERC - A Theory of Equity, Reciprocity and Competition, American Economic Review, 90(1), 166-193.

Bolton, G., Brandts, J., Ockenfels A. (2005), Fair Procedures: Evidence From Games Involving Lotteries, Economic Journal, 115, 1054-1076.

Brandts, J., Güth, W., Stiehler, A. (2006), I want YOU! – An Experiment Studying the Selection Effect When Assigning Distributive Power, Labor Economics, 13(1), 1-17.

Dufwenberg, M., Kirchsteiger, G. (2004), A Theory of Sequential Reciprocity Games and Economic Behavior, 47, 268-98.

Falk, A., Fischbacher, U. (2006), A Theory of Reciprocity, Games and Economic Behavior, 54(2), 293-315.

Falk, A., Fehr, E., Fischbacher, U. (2003), On the Nature of Fair Behaviour, Economic Inquiry, 41(1), 20-26.

Fehr, E., Schmidt, G. (1999), A Theory of Fairness, Competition and Cooperation, Quarterly Journal of Economics, 114, 817-868.

Fischbacher, U. (2007), z-Tree: Zurich Toolbox for Ready-made Economic Experiments, Experimental Economics, 10(2), 171-178.

Gehrig, T., Güth, W., Levati, V., Levinsky, R., Ockenfels, A., Uske, T., Weiland, T. (2007), Buying a Pig in a Poke: An Experimental Study of Unconditional Veto Power, Journal of Economic Psychology, 28(6), 692-703.

Greiner, B. (2004), An Online Recruitment System for Economic Experiments, in: Kremer, K., Macho, V. (Eds.) (2004), Forschung und wissenschaftliches Rechnen 2003, GWDG Bericht 63, Ges. f. Wiss. Datenverarbeitung, Göttingen.

Güth, W., Schmittberger, R., Schwarz, B. (1982), An Experimental Analysis of Ultimatum Bargaining, Journal of Economic Behavior and Organization, 1982(3), 367-388.

Jehiel, P., Moldovanu, B. (1995), Negative Externalities May Cause Delay in Negotiation, Econometrica, 63(6), 1321-1335.

Karni, E., Safra, Z. (2002), Individual Sense of Justice: A Utility Representation, Econometrica, 70(1), 263-284.

Karni, E., Salmon, T., Sopher, B. (2008), Individual Sense of Fairness: An Experimental Study, Experimental Economics, 11(2), 174-189.

Kohlberg, L. (1969), Stage and Sequence: the Cognitive-Developmental Approach to Socialization, Goslin, D.A. (ed.), Handbook of Socialization and Endash; Theory and research. Chicago: McNally.

Kohlberg, L. (1984), The Psychology of Moral Development. San Francisco: Harper & Row.

Konow, J. (2003), Which is the Fairest One of All? A Positive Analysis of Justice Theories, Journal of Economic Literature, 41, 1188-1239.

Kreps, D.M., Wilson, R. (1982), Sequential Equilibria, Econometrica, 50, 863-894.

Lind, G. (1978), Wie misst man moralisches Urteil? Probleme und alternative Möglichkeiten der Messung eines komplexen Konstrukts, Portele, G. (ed.), Sozialisation und Moral, 171-201, Weinheim: Beltz, 1215-1259.

Lind, G. (2000), The Importance of Role-Taking Opportunities for Self-Sustaining Moral Development, Journal of Research in Education, 10, 9-15.

Lind, G. (2008), The Meaning and Measurement of Moral Judgment Competence Revisited - A Dual-Aspect Model, in: Fasko, D., W. Willis (eds.), Contemporary Philosophical and Psychological Perspectives on Moral Development and Education. Cresskill. NJ: Hampton Press, 185 - 220.

Lind, E.A., Tyler, T.R. (1988) The Social Psychology of Procedural Justice. Plenum Press, NY.

Rest, J. (1974), The Cognitive Developmental Approach to Morality: the State of the Art, Counselling and Values, 18(3), 64-78.

Sebald, A. (2007), Procedural Concerns in Psychological Games, ECORE Discussion Paper 2007-062.

Selten, R. (1965), Spieltheoretische Behandlung eines Oligopolmodells mit Nachfrageträgheit, Zeitschrift für die gesamte Staatswissenschaft, 12, 201-324.

Selten, R. (1967), Die Strategiemethode zur Erforschung des eingeschränkt rationalen Verhaltens im Rahmen eines Oligopolexperiments, Sauermann, H. (Ed.), Beiträge zur experimentellen Wirtschaftsforschung, J.C.B. Mohr (Paul Siebeck), Tübingen, pp. 136-168.

Selten, R. (1975), Re-examination of the Perfectness Concept for Equilibrium Points in Extensive Games, International Journal of Game Theory, 4, 25-55.

Sugden, R. (1998), The Metric of Opportunity, Economics and Philosophy, 14(1998), 307-337.

Tyler, L. (2000), Social Justice: Outcome and Procedure, International Journal of Psychology, 35,117-125.

Appendix

A. Instructions[21]

Instructions

Welcome and thank you very much for participating in this experiment. For your showing up on time you receive €2.50. Please read the following instructions carefully. Instructions are identical for all participants. Communication with other participants must cease from now on. Please switch off your mobile phones.

If you have any questions, please raise your hand - we are going to answer them individually at your place.

During the experiment all amounts will be indicated in ECU (Experimental Currency Units). The sum of your payoffs generated throughout all rounds will be disbursed to you in cash at the end of the experiment according to the exchange rate: 1 ECU=0.03 €. You are endowed with 20 ECU.

Information regarding the experiment

Participants take on different roles **A** and **B**. You do not know your role in the beginning and will at first make decisions for both roles. You are then randomly assigned either role and will be informed accordingly. From then on, roles remain the same throughout the experiment.

You will be randomly matched with other anonymous participants. Via their decisions, participants affect both their own and another participant's payoffs.

The experiment introduces two different situations. They are characterized by the following rules:

Situation 1. There are **200 ECU**. Participant **A** chooses between two alternatives **X** and **Y** to divide these 200 ECU between herself and participant **B**.

[21] Instructions of the experiment were written in German. The following chapter reproduces a translation for experimental sessions involving Ultimatum and Yes-no games into English. Emphases like, e.g., bold font, are taken from the original text. Instructions were identical for all subjects. Instructions for other treatments are available from the authors upon request.

X: She allocates **100 ECU** to herself and **100 ECU** to participant **B**.

Y: She allocates **20 ECU** to herself and **180 ECU** to participant **B**.

Participant **B does not learn about A's choice**. B decides between **U** and **V**:

U: Participant **B** agrees with the allocation unknown to her. Consequently, the allocation corresponds to the payoffs in ECU.

V: Participant **B** does not agree with the **allocation unknown to her**. Consequently, both participants obtain a payoff of **0 ECU**.

Situation 2. Participant **A** chooses again between options **X** and **Y** to allocate the 200 ECU.

X: She allocates **100 ECU** to herself and **100 ECU** to participant **B**.

Y: She allocates **20 ECU** to herself and **180 ECU** to participant **B**.

Participant **B learns about A's choice** and decides between **U** and **V**.

U: **B** agrees with the **allocation known to her**. Consequently, the allocation corresponds to the payoffs in ECU.

V: Participant **B** does not agree with the **allocation known to her**. Consequently, both participants obtain a payoff of **0 ECU**.

Participants **A** and **B** now make their decisions for each of the two situations. Participant **A** indicates which allocation (**X** or **Y**) she chooses in situation 1 and 2. Participant **B** decides for each situation between **U** and **V**. In their natural state, both situations would occur randomly with equal probability 0.50 (50%). Decisions made for the situation drawn become payoff relevant. Payoffs are calculated as described above.

We ask for your patience until the experiment starts. Please stay calm. If you have any questions, raise your hand. Before the experiment starts, please answer the following control questions.

Bidding phase.[22]

Now, one of either participant randomly assigned to each other may influence which situation is drawn.

This participant is chosen by casting lots within each pair. Thereby, each participant within a pair has an equal chance to be drawn. If drawn by chance, a participant may pay the amount of 5 ECU to make occur the situation she prefers. If she does not wish to pay, both situations occur again with an equal 50 % probability. The decisions made for the situation that is actually drawn become valid.

B. Overall behavior and beliefs across protocols

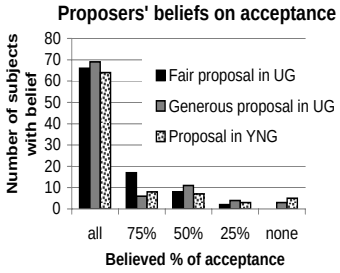

Figure 1: Proposers' beliefs about the acceptance of proposals UG/YNG.

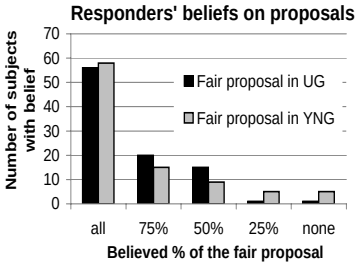

Figure 2: Responders' beliefs about proposals UG/YNG.

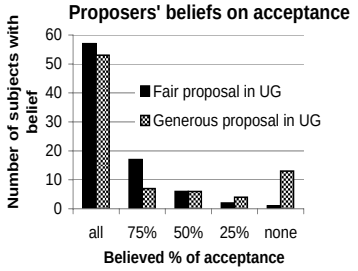

Figure 3: Proposers' beliefs about the acceptance of proposals DG/UG.

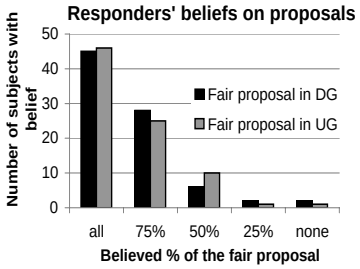

Figure 4: Responders' beliefs about proposals DG/UG.

[22]Parts in italic font were not part of the original instructions.

C. Moral Determinants of Revealed Preferences Only

Evening out an own purely procedural disadvantage[23], n=35,Count R^2=0.77

x_i	l	$\partial y/\partial x_i$	σ	z	p
a2·a3	*0*	0.34	0.07	5.06	0.00
	1	-0.34	0.07	-5.06	0.00
a3·Psc.	*0*	-0.16	0.09	-1.88	0.06
	1	0.16	0.09	1.88	0.06

Table 6. **Moral determinants of paying for evening out an own procedural disadvantage.**

Evening out others' purely procedural disadvantage, n=39, Count R^2=0.82

x_i	l^*	$\partial y^*/\partial x_i$	σ	z	p
a1	*0*	0.14	0.15	0.89	0.37
	1	-0.14	0.15	-0.89	0.37
a2·a3	*0*	0.31	0.18	1.76	0.08
	1	-0.31	0.18	-1.76	0.08
a3· Psc.	*0*	-0.36	0.12	-3.01	0.01
	1	0.36	0.12	3.01	0.01

Table 7. **Moral determinants of paying for evening out others' procedural disadvantage**

[23]While *a3·Psc.* and *a1* are not even weakly significantly correlated, inserting *a1* additionally here lets turn *a3·Psc.* insignificant. Being uncorrelated, this must be due to the small sample size. Retain this to be our smallest sample with the largest number of significant regressors. Variables do yet always show the same kind of influence.