Purely Procedural Preferences
- Beyond Procedural Equity and Reciprocity -

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Abstract

Most research in economics studies agents somehow motivated by outcomes. Here, we study 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 others' 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.

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1 Introduction

This paper studies agents motivated by 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. Little attention has been paid to whether agents do not also care about the procedure which generates these outcomes.[1] And yet, in some areas of life, procedures may prove vitally important, even when they do not have even a stochastic influence on outcomes. In an election, for instance, great care is taken to grant each individual an equal opportunity to vote, to make the voting simple, and to 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. To shed further light on the issue, we suggest four corresponding purely procedural concerns which may capture the observed choices over procedures: (i) a concern for equal effective opportunities, (ii) a concern for equal effective unkind opportunities, (iii) a concern for symmetric information, and (iv) a concern for procedural simplicity.[2] Our experimental test introduces pairs of two-player pie-splitting procedures, where each side of the pair may be preferred to the other along some procedural aspect. 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. By our design we test whether still procedural concerns exist such that a procedure outweighs

[1] Even if economists do study procedural preferences, they would invariably define them by some operator over 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 such a distribution (Brandts et al. 2006), (Sebald 2010). A review of earlier work on procedural fairness is provided in (Konow 2003). It hence appears that preferences over procedures per se have not been studied by economists.

[2] Weber discusses power from perspectives closely relating to the first three aspects. In (Weber 1925 I §16, X §3), power is about the opportunity to implement one's will, also against opposition. Moreover, it arises from the fact that information is kept asymmetrically to a small circle of people close to the decision maker.

another. Thereby, we underestimate the actual prevalence of a single concern.[3]

We subsequently try to understand the reasoning behind purely procedural preferences as formulated here. Relying upon Kohlberg's work (Kohlberg 1984), we elicit elements of individuals' moral judgment using a standardized experimental questionnaire by Lind (1978, 2000, 2008). Elements of individuals' moral judgment consistently discriminate between individuals who do hold procedural concerns and those who are procedurally indifferent.

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 four procedural preferences mentioned above and discusses how individuals' moral judgment may affect them. Section 5 describes our experimental design and the experimental test used to elicit individuals' moral judgment. Section 6 presents our main results. Section 7 concludes.

2 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 introduce 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 in any payoff-relevant way. Whatever the proposer chooses is implemented. In our setting, the responder may however voice her

[3] We cannot distinguish the case where two procedural concerns exist jointly and one is simply more relevant than the other from the case where only one procedural concern exists while the other does not. Neither can we disentangle subjects' indifference between two procedural aspects from the case where the two procedural concerns coexist at equal strength. The latter does not seem a big issue: In section 6.2, we find that procedural preferences and procedural indifference consistently differ in individuals' moral judgment.

(dis)agreement with the proposal.[4] Her reaction would yet not have any bearing on the outcome. The DG is thus a one person decision problem in a two-person environment.

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 not knowing the proposal made by P. Hence, R cannot condition her decision on P's proposal. Rejection results in zero payoffs for both whereas the proposal is implemented otherwise. YNG is thus a two-player game where each player has two options only.

A third procedure, the ultimatum game (UG), grants the responder a *conditional* opportunity to act. As in the yes-no game, P proposes one of the two allocations. R can decide for each potential proposal whether to accept or to reject it. Again, a rejection leads to zero payoffs whereas acceptance implements the proposed sharing. Since R can condition her choice on the proposal, she has four strategies.

3 Predictions within procedures

Let us now discuss strategy- and outcome-predictions of various preference models for these 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 and never rejects any proposal. Anticipating R's opportunism P will propose the allocation (100,100) in all three games and R accepts whenever she has the opportunity.[5] Neither player should prefer one procedure over the other.

Inequity aversion. Models of allocative fairness (Bolton 1991), (Bolton and Ockenfels 2000), (Fehr and Schmidt 1999) define utility to positively depend on the equality of payoffs and the players' private payoff rather than on the latter

[4] We want to avoid that individuals distinguish our allocation procedures emotionally which they might do, if one party could not express her opinion (Güth and Levati 2007). Besides, a voice guarantees that responders have the same number of actions per path of play in each procedure.

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

alone. Fehr and Schmidt, for instance, assume that the own payoff and inequality are additively separable. That is, if the player earns x units and her opponent earn y units, then the player's utility is $x - amax\{(y-x),0\} - bmax\{(x-y),0\}$ where a and b denote non-negative individual parameters. The last two terms capture the player's preferences for equal payoffs. To suffer more disutility from disadvantageous than from advantageous inequality, as imposed by the model, requires $a \geq b$. Such a player strictly prefers both players obtaining zero to the allocation (x, y) with $x > y$ iff $b > \frac{x}{(x-y)}$. She would prefer each obtaining nothing 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, the proposer 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 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 possible proposals. If the fairest allocation is ruled out by design, a proposal, otherwise deemed rather unkind, becomes less objectionable. In our design with two proposals, even the proposal which is most disadvantageous for the responder shares the pie equally. 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. Hence, both allocations should appear kind and therefore be accepted.[6] In summary, self-interested oppor-

[6]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 in j 's choices. 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. 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. 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.

tunism and fairness theories mostly predict the same allocation proposal in all three procedures. They moreover predict the responder R to always accept.

Recently formulated *economic approaches to procedural fairness* are based on inequity aversion (Bolton et al. 2005), and on reciprocity (Sebald 2010)[7]. The first formulates that people prefer fair to unfair lotteries when only unequal outcomes are available. Sebald (2010) instead expresses the fairness of a random choice procedure by the kindness a player exhibits in choosing that procedure. However, since behavior is invariably kind and fair across procedures, both approaches deem our three procedures equally fair. Thus, any preference for one of our three simple allocation procedures over another would suggest a new kind of procedural preference which is purely procedural. Before we present our experimental design, let us give an example how one might think about our procedures in purely procedural terms.

4 Beyond reciprocity- and inequity-based procedural concerns

Take the following two pairs of the protocols mentioned before: (a) the mini-dictator and the mini-ultimatum game, and (b) the mini-ultimatum and the mini-yes-no game. A subject expressing a preference for one protocol over another in any of the two pairs (while expecting the same outcome in both) would show a purely procedural preference.

There could in principle be many kinds of purely procedural preferences. To illustrate, we suggest four such concerns here, i.e. a preference for (i) *equal effective opportunities*, (ii) *equal effective unkind opportunities*, (iii) *symmetric information* and finally, (iv) *procedural simplicity*. We provide details on definitions and a discussion in appendix A.

If equal outcomes are expected, a preference for the ultimatum over the dictator game in the first pair might reflect a preference for equal opportunities

[7]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.

over equal unkind opportunities.[8] Preferring the dictator game over the ultimatum game instead could be due to the reverse preference. To see this, note that in the ultimatum game, each player has two effective alternatives to choose from along each path of play[9] whereas in the dictator game the responder has no effective choice whatsoever. Yet, in the ultimatum game the proposer can only make a fair or a kind proposal whereas the responder can be unkind by destroying the pie.

In the second pair, a preference for the ultimatum game over the yes-no game could reflect a preference for symmetric information over simplicity whereas preferring the yes-no game over the ultimatum game could be associated with the reverse procedural preference. If we measure simplicity by the overall number of pure strategies in a game, the yes-no game is simpler than the ultimatum game. In the yes-no game, however, the proposer has an information advantage while there is no way of hiding the proposal in the ultimatum game.

Notice that these purely procedural fairness aspects may not equally advantage responders and proposers.[10] Evidence on outcome-based preferences suggests that the disadvantaged party may have a stronger preference for fairness. For each relevant aspect in each pair of protocols, we should therefore assess which party is in an (dis)advantageous position. For the first pair of protocols, responders have fewer effective opportunities than proposers in the dictator game. The responders are hence in a disadvantageous position. The proposers on the other hand are disadvantaged in the ultimatum game since they have fewer unkind opportunities[11] than responders. Both sides are on equal terms regarding unkind opportunities in the dictator game and effective opportunities in the ultimatum game. For the second pair, the responder is disadvantaged regarding information in the yes-no game whereas in the ultimatum game, the information asymmetries level off. Since simplicity sums the number

[8] Note that the ultimatum game does not differ from the dictator game with voice in the number of pure strategies by which we measure simplicity.

[9] If instead of actions, players considered strategies as the relevant set of opportunities, the responder has more strategies than the proposer. Hence, the ultimatum game might be deemed as a situation where the proposer has fewer opportunities than the responder.

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

[11] They also have fewer strategies in the ultimatum game than the responders. Throughout the text however, we define opportunities in terms of potential actions, rather than strategies.

of all players' pure strategies, both players are always on par.
Having suggested one way to describe our allocation procedures in purely procedural terms, (a more detailed treatment of which is found in App. A), we next present our experimental design.

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[12]. 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 correspond to 6 Euros. Choices were elicited using the vector strategy method (Selten 1967) for all potential contingencies of both protocols and roles. Subsequently, pairs were formed and roles were assigned randomly.

The experiment then proceeded 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 then announced whether she preferred one protocol over the other, and if so, which one. Subsequently, participants were given the opportunity to pay 15 (Euro)Cents for making their preferred protocol more likely to occur.

A random draw then attributed one player in each pair with the chance to influence the draw of the protocol. If this player had stated a preference and

[12]See appendix B for an English translation. Further documentation is available upon request.

paid for it, her preferred protocol was drawn. In case she had not paid, each protocol was drawn with equal probability. If a player wanted to pay but was not drawn, she did not incur any cost.

Subsequently, each agent's first order beliefs about her counterpart's behavior were elicited.[13] We asked for the expected behavior at each node within the two protocols. Notice that at each node, the choice was binary. Subjects indicated how many out of four randomly drawn players of the other role they believed to make a given choice and earned 100 additional points, i.e. 3 Euros, if they correctly predicted the distribution of choices and no additional points otherwise.

Finally, protocols were chosen and only the choices within the drawn protocol became payoff-relevant. Four participants in the other role were randomly drawn to assess the correctness of the beliefs. The cost of influencing the protocols were subtracted from the resulting payoffs.

By our design we tried to induce procedurally invariant behaviour and beliefs permitting us to interpret protocol preferences in purely procedural terms. Hence, we restrict our analysis to subjects satisfying this requirement.[14] These are responders who (i) accept each proposal equally often across procedures[15], 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 qualify only when (i) choosing a procedurally invariant allocation and (ii) expecting this allocation to be accepted with equal likelihood across protocols.[16] If such proposers still preferred one procedure over another, they would reveal *purely* procedural concerns.

At the end of each session, we handed out the standardized moral judgment test by Lind (1978, 2008) to elicit elements of individual moral judgment which we associate to purely procedural choices in section 6.2.

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

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

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

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

6 Results

6.1 How frequent are purely procedural concerns?

In Sections 3-5 we argued that to detect a purely procedural preference in our setup, we must concentrate on participants whose actions and beliefs are invariant across procedures.[17] Only such allow us to rule out reciprocity and inequity based motives. In particular, responders must (i) accept each proposal equally often across procedures, and (ii) must expect the same proposal for both protocols. Similarly, proposers must (i) choose a procedurally invariant allocation and must (ii) expect this allocation to be accepted with equal likelihood across protocols.[18]

Subjects meeting these conditions *state* a purely procedural preference with probability 0.65 in a 99 % confidence interval $[0.54, 0.75]$. (Throughout, we report 99% confidence intervals.) 22% of them also *reveal* such a preference by their willingness to pay for influencing the protocol. The confidence interval for this revealed preference is given by $[0.14, 0.32]$.

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

Result 1 provides strong evidence that purely procedural preferences matter for economic decisions. Let us now classify these procedural choices using the terminology we suggested in section 4.

We defined a preference for *equal effective opportunities* in terms of the number of generic actions per path of play. There are equal opportunities if the number of generic actions is equal for the two players along each path of play.[19] Such a preference could manifest as a preference for the ultimatum game over the dictator game. Yet, the ultimatum game grants proposers and responders an unequal number of *unkind* effective opportunities. In the dictator game, these opportunities are equal for both parties. A subject who preferred *equal effective unkind opportunities*[20] over equal effective opportunities would prefer the

[17] Appendix D 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.

[19] See Section 4.1. and Appendix A for details.

[20] Alternatively, a subject might simply want to dispose of inefficient strategies.

dictator over the ultimatum game. In the end, the outcome-indifferent choices between the ultimatum and the dictator game yield the following evidence: Only negligible 9% ($[0.02, 0.22]$) of subjects state a preference for the ultimatum game. 68% ($[0.51, 0.81]$) of subjects announce the opposite preference and 25% of them even reveal it ($[0.12, 0.41]$).

> **RESULT 2.** Subjects rarely express and do not reveal a preference for equal effective opportunities over equal effective unkind opportunities.
> A significant share of subjects expresses and reveals a preference for equal effective unkind opportunities over equal effective opportunities.

As a third potential purely procedural preference, we suggested *the preference for symmetric information* which is a notion of transparency within the protocol. Unlike in the standard case where each player only cares about the information she has, other-regarding concerns about information require that she must know what another player knows even at nodes where she does not make a choice.[21] While in the ultimatum game, both players know which proposal was made, the proposal is only known to the proposer in the yes-no game. Thus, a preference for the ultimatum game over the yes-no game may be driven by the motivation for equalizing information about the proposal. On the other hand, the yes-no game is simpler than the ultimatum game since the former has only two strategies for the responder whereas the latter has four.

The evidence is as follows. 22% ($[0.12, 0.36]$) of the subjects state a purely procedural preference for the ultimatum game over the yes-no game whereas 35% ($[0.21, 0.49]$) of the subjects announce the opposite preference. Only 4% (within $]0, 0.12]$) reveal a preference for the ultimatum game whereas 14% ($[0.05, 0.26]$) reveal a preference for the yes-no game.

> **RESULT 3.** Subjects express but do not reveal a procedural preference for equal information over simplicity.
> A significant share of subjects expresses and reveals a preference for simplicity over the equality of information.

Tables 1 and 2 review our results. They provide estimates and confidence intervals for stated and revealed preferences of proposers and responders for both pairs of protocols. We retain that agents are heterogeneous in their procedural preferences. Critics may impute the observed heterogeneity to idiosyncratic

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

Table 1: **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	10	1	0
		$[0.57, 0.94]$	$[0.11, 0.52]$	$[0, 0.20]$	$[0, 0.15]$
r	33	18	7	5	2
		$[0.31, 0, 77]$	$[0.06, 0.45]$	$[0.03, 0.38]$	$]0, 0.26]$

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

mistakes of participants during an experiment. Yet, further below (See result 4), we show that procedural preferences are consistently associated with a well-established typology of individuals' moral judgment. This provides support for a systematic logic behind observed choices - applied moral preferences, rather than errors.

6.2 Do purely procedural concerns involve moral judgment?

As we pointed out, some purely procedural concerns may be fairness-driven and might hence result from a moral judgment of a purely procedural aspect. In this section, we show that the procedural choices summarized in the previous subsection are deeply rooted in individual moral judgement. We first review prominent psychological measures to characterize individual moral judgment. We proceed by presenting our empirical strategy to study the connection between moral judgement and the procedural choices, and finally state the result.

Moral judgment involves affective and cognitive elements (Lind 2000). To judge whether something is morally right or wrong, people typically have a certain number of different arguments at hand. Yet, each of us feels comfortable to use only some of these arguments. The arguments we feel comfortable to use

[21] See Appendix A for details.

are referred to as *moral attitudes* which have been studied by Piaget (1948), Kohlberg (1984) or Lind (2008).

Kohlberg (1969, pp. 375) distinguishes three classes of moral attitudes, a *preconventional*, a *conventional*, and a *postconventional* class of moral attitudes. Each of them stands for a certain class of arguments. An individual has a certain class of moral attitudes if she feels right about using a typical argument of that class. Individuals may apply arguments of different classes and feel some are more right than others and yet others are totally unacceptable. Hence, if we take the degree to which preconventional, conventional, and postconventional arguments matter to an individual, we may characterize her moral judgment. Developmental psychology would associate each class of moral attitudes with a certain level of moral development (Kohlberg 1969, pp. 374).

According to Kohlberg's classification, an individual shows preconventional moral attitudes if she feels right about judging what is morally right on the basis of whether it yields her the materially best outcome. Instead, an individual shows conventional moral attitudes if she feels it is right to comply with what others expect her to do. She would then feel right to follow behavioral rules or norms adopted by a major part of society. An individual shows postconventional attitudes, if she feels right to make a moral judgment on the basis of certain principles she considers universally valid. Such principles could be equality, freedom, or the consideration of another's will, for instance. Thereby, the outcome looses importance. Rather, a postconventional argumentation requires an outcome to be generated in accordance with these principles. A given outcome may hence be valuated differently if reached by dictatorial discretion rather than democratic consensus, for instance (Kohlberg 1969, p. 376). Table 3 summarizes the Kohlbergian modes of argumentation, or levels of moral development.

So far, we have presented affective elements of a moral judgment. However, a moral judgment also requires cognitive *moral abilities* (Lind 1978, 2000). These empower an individual to actually detect procedural differences of moral relevance. Moreover, moral abilities enable an individual to apply moral arguments in a consistent manner.

Levels	Motivation for moral behavior
I preconventional	*Stage 1.* Orientation to punishment and obedience, physical and material power. Rules are obeyed to avoid punishment. *Stage 2.* Naïve hedonistic orientation. The individual conforms to obtain rewards.
II conventional	*Stage 1.* "Good boy/girl" orientation to win approval and maintain expectations of one's immediate group. The individual conforms to avoid disapproval. One earns approval by being "nice". *Stage 2.* Orientation to authority, law, and duty, to maintain a fixed order. Right behavior consists of doing one's duty and abiding by the social order.
III postconventional	*Stage 1.* Social contract orientation in which duties are defined in terms of contract and the respect of other's rights. Emphasis is upon equality and mutual obligation within a democratic order. *Stage 2.* The morality of individual principles of conscience that have logical comprehensiveness and universality. Rightness of acts is determined by conscience in accord with ethical principles that appeal to comprehensiveness, universality, and consistency.

Table 3. **Kohlberg's classes of moral arguments (Ishida 2006).**

We elicit our subjects' moral attitudes and moral abilities using the moral judgment test (MJT) developed by Lind (1978, 2008).[22] The MJT introduces two moral dilemmas.[23] Subjects first state their opinion on whether the protagonists' behavior within a dilemma was right or wrong. Subsequently, subjects are asked to rank the importance of six arguments pro and six arguments contra this behavior on a scale from -4 to +4[24]. Every argument is representative for a certain *class of arguments* or *moral attitude*. For each dilemma, there is one argument pro, and one contra which belong to the same *class of arguments*. This way, the MJT checks whether subjects apply arguments of the same class in a consistent way. Altogether, the MJT elicits moral preferences in a 6 (arguments) x 2 (dilemma) x 2 (pro and con frame) factorial design.[25]

As mentioned earlier, for each procedural aspect apart from *simplicity* parties' relative positions vary across procedures. In particular, a party relatively disadvantaged in one procedure may prefer another procedure where parties'

[22] 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)

[23] 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.

[24] Scales may be and are individually adjusted here following (Kohlberg 1969). We take the minimal and maximal values used by an individual as delimiters of her individual scale.

[25] Appendix B provides an excerpt of the MJT in English with kind permission by Georg Lind.

relative positions are equal. A preference for 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 to even out the other party's procedural disadvantage may emerge from a very different moral argument. Hence, this difference should be taken into account by analyzing each type of procedural preference separately.

Throughout, we use simple binomial logit models. To nevertheless maintain a sufficiently large sample, we restrict the analysis to announced preferences. Appendix E shows that revealed preferences are associated the same way to moral judgment as announced preferences are. We denote a subject i not showing any *purely* procedural preference by $l_i = 0$. Subject i displaying a *purely* procedural preference is denoted by $l_i = 1$. To explain purely procedural choices, we use the average importance an individual attributes to preconventional *(a1)*, conventional *(a2)* and postconventional *(a3)* arguments, or her moral attitudes, and we also include the relative importance of postconventional arguments or *P-Score* (Rest 1974) which measures how often postconventional arguments are highly ranked. We started including all variables and their interactions, and then reduced the model to those variables which had a significant impact.

Tables four and five summarize the estimated marginal effects. Estimated marginal effects average coefficient of a respective predictor over all individuals. Thus, a positive marginal effect on one class l_i indicates that the respective predictor shifts probability mass toward that very class. A negative effect in turn would indicate the predictor to render that type of preference less likely.[26] All predictors were standardized to account for differences in scaling.

Evening out an own purely procedural disadvantage, n=67,Count R^2=0.67

x_i	l_i	$\partial y/\partial x_i$	σ	z	p
a1	*1*	0.15	0.08	1.75	0.08
a2·a3	*1*	-0.22	0.08	-2.63	0.01
Psc.	*1*	0.17	0.07	2.44	0.02

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_i^*	$\partial y^*/\partial x_i$	σ	z	p
a2·a3	*1*	-0.23	0.07	-3.44	0.01
Psc.	*1*	0.32	0.06	5.47	0.00

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

[26]Take table 4 and focus on *Psc.* An increase of *Psc.* by 1% shifts a probability mass of 0.17 away from procedural indifference $l_i = 0$. With only two classes l_i, this probability mass freed on $l_i = 0$ is by construction shifted toward $l_i = 1$. Hence, *Psc.* has a marginal effect of 0.17 on $l_i = 1$.

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, the importance a subject attributes to preconventional or self-centered moral arguments *a1* is positively yet insignificantly associated to this first type of procedural preferences. An interdependency between conventional and post-conventional arguments *a2·a3* entails stated procedural indifference. However, postconventional arguments on their own are strongly associated with this first type of procedural preferences. In particular, a higher P-Score, *Psc* links to the preference for evening out one's own procedural disadvantage.

Let us turn to subjects who stated to prefer equal relative procedural positions to being procedurally *advantaged*, i.e. $l_i^*=1$. 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. Preconventional arguments do not have any impact on the procedural preference to even out others' procedural disadvantage.[27] Yet, as before, subjects who attribute importance to both conventional and postconventional arguments as measured by *a2·a3*, would rather state procedural indifference. Postconventional arguments on their own (P-Score, *Psc.*) are strongly associated with procedural preferences of this second type.

In summary, our results strongly confirm postconventional moral argumentation to discriminate *purely procedural preferences* from *purely procedural indifference*.

RESULT 4. Elements of subjects' moral judgment are consistently associated with stated procedural preferences.

[27] In fact, if we consider *a1*, it has coefficient -0.01, and *p-value* 0.92.

7 Conclusion

So far, studies on positive procedural concerns have focused on either fair randomization over possibly unequal outcomes, or on procedural fairness as measured by reciprocal kindness. In both approaches, preferences are represented by utility functions with an operator on the outcomes as an argument.

Our experimental test introduces two pairs of procedures designed such that existing theories predict invariant expectations and behavior across them all. The procedures in question would hence differ in purely procedural criteria alone. Our test proceeds by eliciting subjects' preferences for these procedures where these are partly (non)incentivized. We conclude with strong evidence for revealed purely procedural preferences.

We suggest four procedural preferences independent of outcomes: 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. Considering revealed preferences only, our results are consistent with a preference for equal unkind opportunities over effective opportunities, and for simplicity over symmetry of information.

Subjects' procedural preferences are consistently tied to elements of their moral judgment (Kohlberg 1969), (Rest 1974), (Kohlberg 1984), (Lind 2000), (Lind 2008). Using a standardized experimental moral judgment test by Lind (1978, 2008), we show that so-called postconventional moral arguments are the essential element to discriminate between *purely* procedural preferences and purely procedural indifference. Procedural preferences for removing an own procedural disadvantage appear a little stronger than preferences for removing the other's disadvantage. In both cases, subjects who state purely procedural preferences distinctly value postconventional moral arguments.

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Appendix

A. Purely procedural preferences

In this appendix, we provide a somewhat more formal treatment of the purely procedural preferences we suggest. Let us begin with the preference for *equal effective opportunities*. Here, we build upon Sugden (1998) who defines an effective opportunity as a non-redundant or generic action.[28] We count the number of actions a player has in each decision node and sum the counts over each path of play. Equality of opportunities as we define it requires an equal number of thus counted non-generic actions for each player along each 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.[29] In the

[28] 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).

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

dictator game, the proposer has more effective opportunities than the responder. Equalizing their number would improve the responders' relative position.

As argued above, a responder's opportunity to veto may equalize players' available effective opportunities. Yet, vetoing would decline only kind offers.[30] Granting only 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 above, 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.[31] 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 is 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 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 more general criterion above, the notion of unkind opportunities concludes that responders are advantaged relative to proposers. Equalizing unkind opportunities would hence improve the proposers' relative position.

Within our protocols, procedural (a)symmetry in information can be captured by the (im)perfectness of information.[32] 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 ultimatum game over the yes-no game in the second

[30] See Footnote 4 in the main text.

[31] Generally, this may depend on the counterfactual choices but not in our protocols.

[32] 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.

pair of protocols. Within our setting, asymmetry of information advantages the proposer relative to the responder. Symmetrizing information would hence improve the responders' 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.

Our main purpose is to nail down evidence for purely procedural preferences. We also wish to suggest some ideas for what might be the driving factors. We admit that modelling purely procedural preferences poses very interesting further challenges. Symmetry of information, for instance, is a challenging issue to model since it is a contextual and an empirical issue which pieces of information parties want to keep transparently available to all sides. Our approach to equality of information builds upon the presumption that in this context the relevant information concerns the proposal. Similarly, one could define opportunities as strategies rather than as actions, though that might be an unnatural notion for someone not familiar with game theory. More general or alternative formalizations of these ideas are left for future work.

B. Instructions[33]

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.

[33]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.

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**.

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.[34]

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.

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

C. An Excerpt of the Moral Judgment Test by Georg Lind

Workers´ Dilemma

Recently a company fired some people for unknown reasons. Some workers think the managers are listening in on employees through an intercom system and using the information against them. The managers deny this charge. The union says it will only do something about it when there is proof. Two workers then break into the main office and take the tapes that prove the managers were listening in.	**I strongly *dis*agree** **I strongly agree**
15. Would you disagree or agree with the workers´ behavior?	-3 -2 -1 0 +1 +2 +3
How acceptable do you find the following arguments *in favor* of the two workers´ behavior? Suppose someone argued they were *right* . . .	**I strongly reject** **I strongly accept**
16. because they didn't cause much damage to the company.	-4 -3 -2 -1 0 +1 +2 +3 +4
17. because due to the company's disregard for the law, the means used by the two workers were permissible to restore law and order.	-4 -3 -2 -1 0 +1 +2 +3 +4
...	
How acceptable do you find the following arguments *against* the two workers´ behavior? Suppose someone argued they were *wrong* . . .	**I strongly reject** **I strongly accept**
22. because we would endanger law and order in society if everyone acted as the two workers did.	-4 -3 -2 -1 0 +1 +2 +3 +4
23. because one must not violate such a basic right as the right of property ownership and take the law into one's own hands, unless some universal moral principle justifies doing so.	-4 -3 -2 -1 0 +1 +2 +3 +4

D. Overall behavior and beliefs across protocols

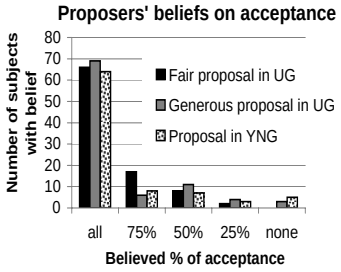

Figure 1: Proposers' beliefs about the acceptance of proposals UG/YNG.

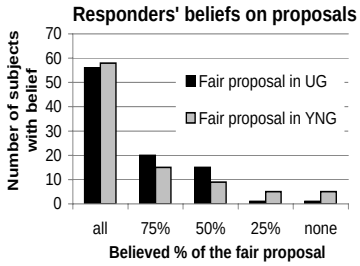

Figure 2: Responders' beliefs about proposals UG/YNG.

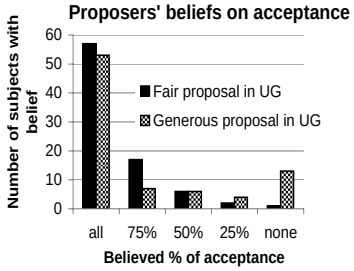

Figure 3: Proposers' beliefs about the acceptance of proposals DG/UG.

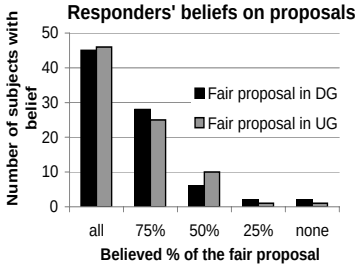

Figure 4: Responders' beliefs about proposals DG/UG.

E. Moral Determinants of Revealed Preferences Only

Evening out an own purely procedural disadvantage[35], n=35,Count R^2=0.74

x_i	l	$\partial y/\partial x_i$	σ	z	p
a2·a3	*1*	-0.23	0.09	-2.53	0.02
Psc.	*1*	0.21	0.07	2.86	0.01

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

Evening out others' purely procedural disadvantage, n=39, Count R^2=0.72

x_i	l*	$\partial y^*/\partial x_i$	σ	z	p
a2·a3	*1*	-0.17	0.08	-2.21	0.03
Psc.	*1*	0.18	0.08	2.24	0.03

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

[35]While *Psc.* and *a1* are not even weakly significantly correlated, adding *a1* to the specification turns 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.