Purely Procedural Preferences
- Beyond Procedural Equity and Reciprocity -

Nadine Chlaß* Werner Güth** Topi Miettinen‡

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Abstract

We study a new type of preference. We test whether parties hold preferences purely over the procedure which generates specific outcomes. In order to characterize procedures as independent of their outcome, we design procedures which yield the same expected outcomes or carry the same information on parties' intentions while they have different outcome-invariant properties. Experimentally, individuals show preferences over these properties. The preferences we report link to attributes of individuals' moral judgement. We also illustrate that individuals alter their behaviour under procedures which violate individuals' preferred moral principles.

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*Department of Economics, University of Turku, FI-20014, Finland. Email: nadine.chlass@utu.fi. *This research was carried out at the Max Planck Institute of Economics Jena, and the Friedrich-Schiller-University Jena, Germany.*

**Max Planck Institute of Economics, Jena, Germany.

‡Hanken School of Economics, P.O. Box 479, Helsinki Fi-00101, Finland. *This research was carried out at the Max Planck Institute of Economics, Jena, Germany, the SITE Stockholm School of Economics, Sweden, and the Hanken School of Economics.* Bernd Irlenbusch, Oliver Kirchkamp, James Konow, Robert Sugden, and anonymous referees gave valuable input on the paper. We thank Christoph Göring for programming the z-Tree code.

1 Introduction

In some areas of life, procedures may be vitally important 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 that the election violated some of the criteria mentioned before. Notably, such a concern may be independent of any potential outcome.

Since Thibault and Walker's (1975) seminal contribution, an impressive body of research in psychology – and more recently, also in economics – has studied the topic of procedural fairness. *Distributive justice* (Adams 1965) is concerned with unjust allocations and human reactions to these. *Procedural justice* explores the fairness of the principles and measures taken to reach such allocations, and the individual reactions to the application of these principles.

Procedural fairness is a necessary building block for economic prosperity and a stable society. A third party resolving a property rights dispute, for instance, needs legitimacy for its authority. This legitimacy springs ultimately from a shared perception between the dispute parties and outsiders about the fairness of the procedures employed (Lind 2001; Tyler 2004). Perceived process fairness also promotes compliance by the dispute parties to the verdicts of the authority (Lind 2001). Since the seminal work of Thibaut and Walker (1975), research in psychology (Lind 2001; Tyler 2004) and experimental and behavioural economics (Falk et al. 2003; Bolton et al. 2005; Brandts et al. 2006) have come to establish and support these views.

Psychological and economic research into procedural fairness employ different methods to strive for overlapping but different goals. Yet, both disciplines have sought to disentangle process fairness from distributive fairness. Cropanzano and Ambrose (2001, pp. 125) state that in psychology, distributive justice is operationalized as "individuals' reactions to economic or quasi-economic allocations", and procedural justice as "individuals' reactions to the allocation of socioemotional benefits". Economists resort to game theoretic models to clarify the difference between distributive (outcome-related) and procedural fairness: when the fairness value of an outcome depends on counterfactual paths of the process (or the game), then the process itself matters, not only the outcome. To classify the game-theoretic experimental studies into procedural fairness, a first strand of research studies whether and how individuals discriminate between fair and unfair explicit randomizations over outcomes (Karni and Safra 2002; Bolton et al. 2005; Karni et al. 2008; Trautmann 2009; Krawczyk 2011; Krawczyk and LeLec 2010; Kircher et al. 2009). A second strand of research explores how kind (economically generous) individuals deem another party's choice of a specific process[1] relative to other processes given individuals' subjective expectations about what would have happened in these other processes (Rabin 1993; Blount 1995; Dufwenberg and Kirchsteiger 2004; Falk and Fischbacher 2006; Brandts et al. 2006; Sebald 2010; Aldashev et al. 2010)[2]. It is evident that in both strands, individuals evaluate

[1] By 'process' we mean a 'path' in the extensive form of a game.

[2] In (Sebald 2010) and Aldashev et al. (2010) players may explicitly randomize when choosing between actions, and opponents can hold beliefs that actions were so chosen.

the fairness of a given process by their subjective expectations of the social and economic benefits which alternative processes would have generated.

Similar connections between distributional and process fairness have been admitted in psychological research. Cropanzano and Ambrose in a review article (2001, pp. 119-120) conclude that:

"the procedural justice and distributive justice are more similar than is generally believed... both procedural justice perceptions and distributive justice perceptions are, in some sense, derived from individuals' expectations about outcomes."

Thus, whether adopting economic or psychological notions, procedural and distributive fairness are argued to be inseparable after all: the former tends to be evaluated using yardsticks for the latter.

In this paper we show that this view does not have to hold true – we find that individuals entertain notions of process fairness which do not refer to the outcomes of that process, or the outcomes of alternative processes at all. Inspired by the game-theoretic research into procedural fairness, we present to our knowledge the first controlled experiment pointing out that procedures have value per se – value which is not derived from distributive fairness. We confront subjects with pairs of pie-splitting procedures. The procedures are designed such that all central social preference models predict that subjects' material and social payoffs must be equal in each of the two pie-splitting procedures per pair and thus subjects be indifferent between the procedures. We also elicit actual beliefs and behaviour to verify that subjects are indeed indifferent between procedures. Yet, even when actual beliefs and actions indicate indifference, subjects are willing to pay for having the allocation determined by one procedure and not the other. This is our first main finding.[3]

We also study the rationale behind *the observed choices of the procedures* and find that they are morally motivated. Relying upon Jean Piaget's (1948), Lawrence Kohlberg's (1969, 1984) and Georg Lind's (1978, 2000, 2008) work, we elicit in a standardized way each subject's typical mode of moral judgement, that is, her specific way to arrive at the conclusion that an action is right or wrong. We find that subjects who indicate a preference between our two alternative pie-splitting games, employ more strongly and more often a so-called 'principle-based' mode of moral argumentation that puts emphasis on individual rights and the democratic social contract than individuals who are procedurally indifferent. This association between the procedural choices we study and a specific type of moral argumentation is our second main result. It also shows that the first result is not driven by mistakes in decision making, or by outcome-related differences which we cannot measure, but that the economic preferences purely over procedures which we suggest are systematically associated with a moral argumentation that does neither implicate the outcomes of an interaction, nor their distribution, nor social norms, nor others' expectations.

Our experimental design is not intended to unequivocally identify which characteristics or properties of a pie-splitting game make it appealing to the subjects who prefer it. In the appendix of the paper,

[3]The type of procedural preference we study corresponds to Class I of procedural utility proposed by Benz and Stutzer (2003): preference from institutions per se. Yet, we do not elicit what kind of institutions/procedures subjects view as ideally fair. We merely elicit pairwise preference comparisons between two alternative procedures.

we discuss various aspects and offer evidence from a post-experimental questionnaire on those purely procedural aspects which might actually matter. We designed all pairs of pie-splitting games such that each side of the pair may be preferred to the other side along some purely procedural aspect[4]. Each pair therefore trades off purely procedural criteria.

To illustrate these trade-offs, take the following example. Individuals may prefer procedures which give every agent an option to (dis)agree on some proposal over other procedures which deny one or several agents their say. Moreover, individuals may prefer that every agent is properly informed about that proposal before she opts to agree or to disagree. Incorporating these aspects into a procedure will increase agents' participation and freedom of choice. At the same time, increasing agents' participation will increase the complexity of a procedure and the need for an expedient regulation of those instances where an agreement cannot be found. It is therefore important to test if individuals care to amend one procedural property, for instance, care to increase participation, at the cost of impairing another. In the real world, choices of institutions tend to involve such trade-offs. Therefore, we let subjects decide between alternatives rather than to elicit the frequency of a single concern. Our results indicate that subjects do trade off purely procedural properties.

This paper's research question is not merely of academic interest. Purely procedural preferences are economically and politically relevant. Survey studies suggest that fair procedures catalyze the smooth functioning of organizations and institutions. The more an institution or an organization is deemed to employ fair procedures, the higher are organizational engagement, performance, and cooperation (Tyler 2000; Sondak and Tyler 2007; De Cremer et al. 2005). Frey and Stutzer (2005) find that inhabitants of Swiss Cantons with greater democratic participatory rights are more satisfied with their lives. Thereby, life satisfaction does not only increase because participation is seen to improve the outcomes of political decision making – life satisfaction also increases in the right of proper participation itself. These surveys suggest that better insight into procedural fairness can also benefit institutional design.

Economists have indeed called for more economic and behavioural research into the relatively new field of procedural fairness (Rabin 1993; Rabin 2002; Konow 2003; Engelmann and Strobel 2004). Even experimental economics which has long taken intrinsic fairness concerns seriously, has only recently turned to analyze the effects of procedural aspects. Despite the fact, however, that the laboratory provides an ideal means of isolating preferences in outcome-invariant settings, the main effort of the discpline so far has been to understand and improve economic outcomes. Therefore perhaps,

[4]We discuss four purely procedural concerns which may capture the observed choices over procedures: (i) a concern for equal opportunities (freedom of choice), (ii) a concern to rule out unkind opportunities, or a concern for efficiency, (iii) a concern for symmetric information, and (iv) a concern for procedural simplicity. Procedural fairness research in organizational psychology enlists six properties that fair procedures should conform to: (i) consistency (with equal opportunity as an integral subproperty), (ii) freedom from bias, (iii) accuracy (all relevant information is available when decisions are taken), (iv) correctability, (v) representativeness (of the parties' interests , often coined as "voice"), (vi) compliance with prevailing ethical standards (Leventhal 1976; Cropanzano and Ambrose 2001). Sociologist Max Weber uses the first three aspects to define how much *power* a party holds. In (Weber 1921 I §16), power is about the number of opportunities 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 (Weber 1921, X §3). Weber's sources of power inspired the design of the experiment.

experimental studies invariably measure procedural preferences in terms of some operator, e.g. an expectation, over the outcomes of a procedure. An exception are Bartling et al. (forthcoming) who show in a study on control rights and delegation that individuals have intrinsic value for maintaining power and control. We, instead, find evidence for ethical concerns about the distribution of decision and information rights across parties, and a concern for procedural efficiency.

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 predicts procedurally invariant outcomes within each pair of procedures. Section 4 introduces our experimental design and the experimental test used to describe individuals' moral judgement. Section 5 presents our main results, Section 6 cross-checks some aspects of cleanliness of our design. Section 7 concludes and argues that the purely procedural preferences we report may resolve controversies about other preference types.

2 Allocation procedures

We design three simple procedures which generate the same outcomes, the same expected payoffs, and the same psychological payoffs according to a variety of social preference theories. This section describes the procedures we use, the next section discusses their outcome-invariance.

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. We introduce three procedures for sharing the 200 units in either way: a mini dictator game, a mini yes-no game (Gehrig et al. 2007), and a mini ultimatum game (Güth et al. 1982).

The first procedure, a dictator game (DG), leaves the responder R no option to choose in a payoff-relevant way. Whatever proposer P chooses is implemented. In our specific setting, the responder can agree or disagree with the proposal but her choice does not affect the outcome[5]. 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 choose. P proposes either (100,100) or (20,180) and R decides whether to accept without knowing the proposal made by P. Hence, R cannot condition her decision on P's proposal. If R agrees, the proposal is implemented. If she rejects, both parties earn zero payoffs. Therefore, the yes-no game is a two-player game with each player having 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 decides for each potential proposal whether to accept or to reject it. Again, a rejection leads to zero payoffs whereas acceptance implements the proposed sharing.

[5]To reduce the number of differences between procedures, we give responders a 'Voice' to keep the number of actions per path of play constant across procedures. The voiced preference is not communicated to the proposer, though.

We confront each subject with one pair of alternative procedures to choose from. Each subject chooses either between the yes-no game and the Ultimatum game, or between the Ultimatum game and the Dictator game. The details of the design are explained in Section 4.

3 Predictions within procedures

In this section we show that the games and the monetary payoffs in section 2 were chosen such that central preference theories predict the same equilibrium outcome, equilibrium behaviour, and the same equilibrium beliefs[6] in each allocation procedure. Table 1 summarizes the results. The reader may wish to skip the section at first reading.

			BEHAVIOURAL PREDICTIONS						
			make fair proposal DG	make fair proposal YNG	make fair proposal UG	accept in YNG	accept (100,100) UG	accept (180,20) UG	**same outcomes across procedures**
SOCIAL PREFERENCE MODELS	Outcome based	Self Interest	+	+	+	+	+	+ off eq.path	+
		Inequity Aversion	+	+	+	+	+	+ off eq.path	+
		Altruism	depends on degree of altruism	depends on degree of altruism	depends on degree of altruism	+	+	+	+
	Reciprocity based (PGT)	Falk & Fischbacher (2006)	+	+	+	+	+	+ off eq.path	+
		Dufwenberg& Kirchsteiger (2004)[7]	+	+	+	+	+	+ off eq.path	+
	Guilt based	Battigalli & Dufwenberg (2007)	depends on sensitivity to guilt	depends on sensitivity to guilt	depends on sensitivity to guilt	+	+	+	+
PROCEDURAL FAIRNESS MODELS	Inequity based	e.g. Bolton et al. (2005)	+	+	+	+	+	+	+
	Reciprocity based	Sebald (2010)	+	+	+	+	+	+	+

Table 1: **Predictions of central social preference theories.**

[6]Throughout, the solution concepts applied in table 1 postulate sequential rationality. Table 2 presents indifference conditions for off-equilibrium behaviour and beliefs.

[7]See appendix E.

Each player should be indifferent between the procedures given that behaviour is in equilibrium within each procedure. There are two interesting exceptions to equilibrium patterns which require special attention. First, individuals may not always comply with the predicted equilibrium behaviour and beliefs. For this case, we need to study under which conditions players may still be indifferent. This is true if off-equilibrium beliefs and behaviour coincide such that the distribution of material-outcome-based variables is identical across procedures.

Second, and relatedly, even when beliefs are identical across procedures but are not equilibrium beliefs, players with reciprocal preferences may not be indifferent across procedures. These are individuals who – when experiencing kindness (unkindness) – wish to be kind (unkind) in return. In the ultimatum game, a responder may learn about the proposer's kindness during play, and thus better reciprocate the proposer's actions in order to yield higher psychological payoffs[8]. This may be a reason to prefer the ultimatum over the yes-no game where parties cannot learn about others' kindness. However, this difference in psychological payoffs between the yes-no game and the ultimatum game does not occur when actions are expected with certainty and thus, parties do not expect to learn anything in the ultimatum game when choosing the procedure.

To control therefore whether participants in our experiment are indeed indifferent between two procedures, we elicit *actual actions* and *actual beliefs* in each procedure. We further control the outcome-independence of the *motivations* behind subjects' procedural choices in section 5.2. To summarize, this section illustrates that existing and ultimately outcome-based preference models have a hard time explaining procedural preferences in this paper's setting.

3.1 Distributive theories

Self-interested opportunism. If R is opportunistic, she only cares about her share of the 200 units of pie and never rejects any proposal. Anticipating R's opportunism, P selects the allocation (100,100) in all three games and R accepts whenever she has the opportunity.[9] The expected payoff in each procedure is 100 for each player. Self-interested players are therefore indifferent between all three allocation procedures. *Self-interested parties who for some reason, violate these predictions are still procedurally indifferent if their actual behaviour, and actual beliefs are the same in all procedures.*

Inequity aversion. Models of allocative fairness (Bolton 1991; Bolton and Ockenfels 2000; Fehr and Schmidt 1999) assume that a player's utility does not only increase in a player's private payoff, but also in the equality of payoffs. Fehr and Schmidt (1999) assume that each player's own payoff and her payoff from (in)equality are additively separable. That is, if a player earns x units and her opponent earns y units, then the player's utility is $x - a \times max\{(y-x), 0\} - b \times max\{(x-y), 0\}$ where a and b denote non-negative individual parameters. Further, the model assumes that players suffer more from disadvantageous than from advantageous inequality, that is, $a \geq b$. A player strictly

[8]Reciprocal models – unlike standard game theory – assume that payoffs are quadratic, and not linear in beliefs. This is necessary to allow for an emotional payoff term which is the product of players' kindness towards each other. Thus, the choice probabilities will be squared in the payoff expressions.

[9]These strategies are sequentially rational (Selten 1967).

prefers the allocation $(0,0)$ to (x,y) with favourable inequality $x > y$ iff $b > \frac{x}{(x-y)}$. A player strictly prefers $(0,0)$ to the allocation (x,y) with unfavourable inequality $x < y$ iff $a > \frac{x}{(y-x)}$. For our two allocations ($x = 100$, $y = 100$) and ($x = 180$, $y = 20$), inequity averse responder with $b < 1$ would accept all proposals. If so, inequity-averse proposers maximize their utility by proposing (100,100). The expected payoff is 100 for each player in each procedure. Thus, neither player should prefer one procedure over another. *Inequity-averse parties who for some reason, violate these predictions are still procedurally indifferent if their actual behaviour, and their actual beliefs are the same in all procedures.*

3.2 Psychological game theory

Reciprocity. If responders care for the kindness of the intention behind a proposal, they compare the actual proposal with other proposals that could have been made. The kindness of a proposal therefore depends on the set of possible proposals. The unrestricted set of proposals is a set where the pie can be split into any numerically possible way. On this set, the equal division is fair. If only two options are available, the equal split may be considered even fairer. Indeed, Falk et al (2003) hardly ever find responders who reject meager offers in mini-ultimatum games when only two proposals are possible – suggesting that even meager offers are more acceptable for the smaller set. Apart from restricting the set of proposals, our experimental design also has no proposal where the proposer earns more than the responder. Hence, both allocations: $(100,100)$, and $(20,180)$ should appear kind and be accepted. We next discuss reciprocal concerns in the frameworks of Falk and Fischbacher (2006), and Dufwenberg and Kirchsteiger (2004).[10]

Reciprocity – 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). In equilibrium, this second-order belief coincides with a player's actual behaviour. The term $\Delta_j(n, s_i'', s_i') = x_i(n, s_i'', s_i') - y_j(n, s_i'', s_i')$ expresses the perceived payoff difference, $\vartheta_j(n, s_i'', s_i') \in [0,1]$ measures the degree of intentionality in j 's choices. For negative Δ_j, player j is unkind to i whereas for positive Δ_j, player j is kind. For binary choices, a player is intentionally unkind if she gives her opponent a smaller share of the pie than she keeps herself when she might have offered the opponent the larger share. A player is unintentionally unkind to her opponent if she gives her opponent a smaller share of the pie than she keeps for herself but had no opportunity to give the same or the larger share. For all our procedures and all their outcomes, the difference between what the proposer gave and what she kept, i.e. Δ_j, remains non-negative. Therefore, the *proposer* cannot be unkind.

The *responder* ensures equal payoffs both if she accepts the fair offer, and if she rejects it. The fair proposal $(100,100)$ is not unkind and is therefore always accepted. The generous proposal $(20,180)$ is even kinder. If a responder accepts this generous offer, she is unkind – because this gives her

[10] Cox et al. (2007, 2008) formulate an alternative to the psychological game theory models of reciprocity discussed in the main text. In their model, a player's lost or gained payoff opportunities at earlier nodes of an extensive form game influence the subsequent marginal rate of substitution (MRS) between the player's own earnings and those of her opponent. The MRS remains constant across two games where the fair proposal is always proposed and each proposal is always accepted. Thus, also according to Cox et al. (2007, 2008) players are indifferent between this paper's protocols.

opponent less than herself. However, this unkindness is not deemed intentional, since rejecting the generous offer would give the proposer even less than the generous proposal does. Thus, the generous offer is accepted if purely distributional motives do not matter. If, however, an individual holds a high concern for equal outcomes *and* sufficiently strong reciprocal motives, Falk and Fischbacher (2006) can predict rejections of the generous offer in equilibrium. This reaction to the generous offer does, however, not matter, since the proposer in equilibrium prefers to propose the fair offer anyway. The fair proposal is accepted with certainty in every perfect equilibrium of both the mini ultimatum and the mini yes-no game. In the dictator game, the responder cannot be intentionally kind or unkind since she has no influence on any payoff. The proposer thus chooses the fair proposal. In summary, Falk and Fischbacher (2006) predict that the fair offer is always proposed and accepted with certainty in all procedures, and that each player earns 100. Since there are no payoff differences, the psychological payoffs are zero and the equilibrium payoffs identical in all procedures. No player should prefer one procedure over another.

Reciprocity – Dufwenberg and Kirchsteiger (2004). This model of reciprocity first identifies efficient strategies. The difference between the payoff a player gives her opponent with a specific strategy and the average payoff a player gives her opponent over all efficient strategies which are still available at a given node measures the kindness of a specific strategy (see Dufwenberg and Kirchsteiger, pp. 276). In every protocol of our setting, there is a single efficient responder strategy: the pure strategy which accepts every proposal. Thus, all responder strategies that put a positive probability on rejection are unkind, and the responder can only be neutral or unkind towards the proposer. This implies that the proposer always prefers the fair offer if the probabilities of acceptance of each offer are equal: there is no kindness she would need to reciprocate.

Knowing that the fair offer will be proposed for sure, the kindness of the responder who rejects with probability q equals $q \cdot 100$ for the yes-no game, and the ultimatum game. If the proposer believes that each offer is accepted with probability q, her kindness in proposing the fair offer is[11] $(q \cdot 100 - q \cdot (100 + 180)/2)$ in both games. Each player's equilibrium payoff is thus identical in the mini-ultimatum and the mini- yes-no game given her sensitivity to reciprocity. In equilibrium therefore, players are indifferent between these two procedures.

In the dictator game, each proposal is accepted with certainty. The responder has no influence on payoffs and for this reason, is always neutral towards the proposer. Therefore, psychological payoffs are zero, preferences coincide with rational self-interest, and the proposer chooses the fair proposal. As we saw above for the ultimatum and yes-no game, accepting both offers with certainty is efficient and expresses zero kindness towards the proposer. The psychological payoffs are zero as in the dictator game. Players who believe that every proposal is accepted with certainty in all games and who expect the fair proposal to be always proposed are indifferent between the dictator, ultimatum, and yes-no game. In appendix E, we characterize all equilibria of the games at hand under the constraint of equal acceptance probabilities across nodes and games (which is a necessary condition for procedural

[11] The difference between the expected responder payoff in the fair offer, i.e. $q \cdot 100$, and the expected average responder payoff over all efficient available strategies, i.e. $q \cdot (100 + 180)/2$.

indifference and a feature imposed by the empirical analysis).

General remark on psychological games. In psychological games, payoffs depend explicitly on beliefs and thus, expected payoffs do not have to be linear in probabilities (contrary to standard expected utility theory). Specifically, the psychological payoffs of the two theories of reciprocity are quadratic in beliefs. For instance, the responder's evaluation of the proposer's kindness depends explicitly and quadratically on how likely she deems the generous offer. We denote this probability by $1-p$. Since in the ultimatum game, the responder reacts to updated information about this probability, the expected payoff of the responder differs from his expected payoff in the yes-no game (where the responder does not receive an information update) whenever the ex-ante belief about the probability of the fair offer is $0 < p < 1$, even if ex ante beliefs are identical in the two games (by Jensen's inequality). The expected payoffs are yet equal in the two games if ex ante, the fair offer is either certain, i.e. $p = 1$, (as predicted by sequential reciprocity equilibrium if acceptance rates are equal, see appendix E) or impossible, i.e. $p = 0$.

Guilt aversion (Battigalli and Dufwenberg 2007; Charness and Dufwenberg 2006) is yet another other-regarding concern which can also be modelled via psychological game theory. In these theories, guilt matters only if a player harms the other and lets the other down (Bicchieri, 2006, pp. 52; Battigalli and Dufwenberg, 2007, pp. 171; Miettinen, 2013, pp. 71). If the responder expects the proposer to expect rejection, the responder does not harm the proposer by accepting instead and the responder's guilt payoff is zero. Thus, the responder's preferences coincide with rational self-interest and she always accepts. If the responder expected the proposer to put some weight on acceptance in her beliefs, rejecting would harm the proposer. The responder's guilt payoff will then only increase her incentive to accept. Therefore, the responder always accepts, and her guilt payoff is zero. A very guilt averse proposer who very much expects the responder to expect a generous offer might indeed offer $(20, 180)$. However, as long as actual actions and actual beliefs are the same for two procedures, guilt averse parties are indifferent between them. This differs from reciprocity, because in guilt aversion, psychological payoffs are linear in beliefs (Battigalli and Dufwenberg 2007), and not quadratic.

3.3 Economic models of procedural fairness

Recently, *economic approaches to procedural fairness* have been developed, some building upon inequity aversion (Bolton et al. 2005; Krawczyk 2011; Trautmann 2009), others upon reciprocity (Sebald 2010)[12]. Even these approaches predict indifference between the two pie-sharing games in each of the two pairs of games. Bolton and Ockenfels (2005) formulate that individuals are inequity-averse over expected payoffs and prefer lotteries with similar expected payoffs for both players to lotteries with dissimilar expected payoffs. Applying this – or the other two inequity based models of procedural preferences (Trautmann 2009; Krawczyk 2011) – to our setting, we find that participants who hold the same beliefs in two procedures will also expect the same payoffs in each procedure and therefore, be indifferent between the procedures.

Sebald (2010) allows the preference to be influenced by the kindness of a procedure, that is, the

[12]Sebald's model is based upon the reciprocity model of Dufwenberg and Kirchsteiger (2004).

kindness the opponent would have shown had she chosen that procedure. In Sebald's model – contrary to Dufwenberg and Kirchsteiger (2004) – the responder does not update her beliefs about the proposer's choice probabilities in the ultimatum game when she learns the proposal that has been made (if both proposals have a positive probability ex ante). Thus, if a player has procedurally invariant actions and beliefs, she is predicted to be indifferent between the mini yes-no game and the mini ultimatum game. Similarly, if each proposal is accepted for sure in the ultimatum game, the responder is neither kind nor unkind towards the proposer (recall that accepting is the only efficient strategy) and the psychological payoffs are always zero in the dictator, and the ultimatum game. Thus, if each proposal is proposed with equal probability in these games, players are indifferent. Table 2 reviews the conditions under which participants are procedurally indifferent.

				PLAYERS ARE PROCEDURALLY INDIFFERENT...		
					...off equilibrium...	
				...in perfect equilibrium.	when choosing analogous pure strategies.	when deeming outcomes equally likely.
SOCIAL PREFERENCE MODELS	OUTCOMES		Self interest	+	+	+
			Inequity Aversion	+	+	+
			Altruism	+	+	+
	INTENTIONS	Reciprocity	Falk & Fischbacher (2006)	+	+	–[13]
			Dufwenberg & Kirchsteiger (2004)	+	+	–[13]
		Other	Guilt	+	+	+
PROCEDURAL PREFERENCE MODELS		Inequity-based	Bolton et al. (2005) Trautmann (2009) Krawczyk (2011)	+	+	+
		Reciprocity-based	Sebald (2010)	+	+	+

Table 2: **When are players procedurally indifferent?**

[13]Players can also be procedurally indifferent in this off-equilibrium case, but only *if they do not expect to learn anything about the opponent's behaviour during the game*, that is, if beliefs put either zero probability, or 100% probability on a specific outcome. We will control for this condition in our experimental data using subjects' actual behaviour and beliefs.

3.4 Summary

In summary, economic approaches to procedural fairness are – just as their non-mathematical counterparts in organizational psychology (Cropanzano and Ambrose 2001) – based on distributive fairness. They predict players to be indifferent between the three allocation procedures since their outcome distributions coincide. Thus, if we still observe preferences for one allocation procedure over another, this would suggest a new type of procedural preference. In order to observe such novel preferences, (i) the procedures must vary in aspects which are meaningful to the subject, and (ii) behaviour and beliefs must be invariant in each of the two procedures. This is why (i) we constrain our interest to the mini-games with only a fair and a generous offer, (ii) why we elicit behaviour and beliefs in each procedure, and (iii) why we let each player make choices in both roles such that participants exert maximal cognitive effort to put themselves into the shoes of the other player to understand that fair proposals are likely, and that both offers are acceptable.

There may, of course, exist yet another psychological or other-regarding motive which we have not discussed. To shed light on this aspect, and to control yet a second time the outcome-invariance of the new preferences under study, we provide evidence on the motives behind the procedural choices we observe. We formalize a variety of outcome-invariant or *purely* procedural aspects (see Appendix D). Preferences over outcome-invariant aspects which are morally motivated should be the result of outcome-invariant moral ideals. Indeed, our econometric analysis shows that individuals who refer to individual rights of information and participation when making a moral judgement, are more likely to prefer one procedure over the other. The next section presents the experimental design in more detail.

4 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[14]. 186 of them participated in sessions which introduced the mini yes-no and the mini ultimatum game from section 2, another 166 participants in sessions which introduced the mini dictator and the mini ultimatum game. Participants were recruited using the ORSEE software (Greiner 2004). The experiment was programmed in z-Tree (Fischbacher 2007). At the beginning of each session, participants were randomly seated at visually isolated computer terminals where they received a hardcopy of the German instructions. Subsequently, participants answered a control questionnaire to ensure their understanding[15]. The experiment started after all participants had successfully completed the questionnaire. Each session introduced only one pair of procedures, either the ultimatum and the yes-no game, or the dictator and the ultimatum game from section 2. In each game, a pie of 200 units (6 Euros) was to be shared. We elicited subjects' choices by means of the

[14]We ran two pilots on an initial design which asked for more detailed and higher order beliefs than needed. Many participants could not complete these without help. We reduced the information elicited to what was necessary and excluded these pilots from the analysis. In the simplified version, all sessions ran very smoothly from the outset.

[15]See appendix A for an English translation of instructions and control questions. Further documentation and the z-Tree programme are available upon request.

vector strategy method (Selten 1967), that is, by asking subjects to decide in every decision node of either procedure, and for either role. We explicitly wished to exploit potential behavioural effects of the strategy vector method which familiarizes subjects with both roles and both procedures thus increasing the share of subjects who would deem the procedures outcome-invariant. Subsequently, each subject in a randomly formed pair of subjects, was randomly assigned the role of a proposer or a responder.

Informed about their actual role, subjects were given an ex ante unannounced option to influence the draw of the procedure. Subjects received additional instructions on their screens to explain the option and answered a further control question. Each subject then stated whether she preferred any procedure at all, and if so, which one. Subsequently, subjects could pay 15 (Euro)Cents to make their preferred procedure more likely to occur. Subjects knew that in the end of the experiment, one player in each pair would be randomly selected and her decision implemented. Subsequently, first-order beliefs were elicited. For every decision node of the opponent in either procedure, we asked a player how she believed the other player would decide. Subjects were asked how many out of four randomly drawn players of the other role they believed had made a specific choice[16]. Beliefs were incentivized such that subjects earned 100 additional units (3 Euros) for a correct answer and no additional units otherwise. Finally, the procedures were drawn. If the randomly selected player had stated a preference for a procedure and paid for it, then her preferred procedure was used. If she had not paid, each procedure was drawn with equal probability. The cost of influencing the procedure was subtracted. If a subject wanted to pay but was not drawn, she would not incur any cost. Only the choices that had been made in the procedure which was drawn became payoff-relevant. To assess the correctness of a player's beliefs, four subjects of the other role were randomly drawn to see whether their behaviour coincided with the player's beliefs.

At the end of each session, we handed out a standardized moral judgement test (M-J-T) by Georg Lind (1978, 2008) to elicit individuals' preferred ways of moral argumentation, e.g. (Kohlberg 1969; Kohlberg 1984). The test presents two stories and asks subjects whether they deem the respective protagonist's behaviour right or wrong. Subsequently, the test asks which arguments subjects would agree to use in order to judge the protagonist's behaviour. An inventory of arguments is listed and subjects can agree or disagree to use them on a nine-point scale. Thereby, the test presents arguments which refer to the outcome of the respective action (e.g. "the action was good because it had a good outcome"), or to the protagonist's intention and the social expectation (e.g. "the action was good because it was done with a good intention/was in line with the general expectation"), or *solely* to the way how the action came about (e.g. "the action was good, because when it was executed, others' rights of participation and information were respected"). Specifically this last type of argument does not refer in any way to an actual, expected, or intended outcome of the action in question – it is an argument which states that the *decision* to take an action should be made in line with specific outcome-independent principles, see section 5.2. The test uses an entirely different setting and expres-

[16]We wanted to obtain as precise a measure as possible but also avoid making the belief elicitation too complex as it had shown to be in a pilot session. We did not elicit subjects' beliefs about whether, and for which procedure, the other player in her pair would pay.

sion than the experiment, is constructed such that scores cannot be faked upward (Wasel 1994; Lind 2002)[17], varies the order in which arguments of a given type are listed, and the frames of its questions (argumentation *for* and *against* an action) – see Appendix B for an excerpt. Finally, we ask subjects to rank the procedures in terms of 'fairness' and 'simplicity'. Note, however, that we cannot know which fairness notions subjects apply when ranking procedures (e.g. fairness in terms of outcomes, expectations, or purely procedural terms, or all three) – therefore, we rely on the more implicit moral judgement test scores. There was also a section where subjects could state in an open form why they preferred a protocol.

In our analysis, we first focus on subjects who behave in line with the predictions of section 3, and who therefore deem the pair of procedures outcome-invariant (henceforth 'EQ'-subjects). These are responders who i) accept each proposal in each procedure and who ii) expect that the fair proposal is *always* proposed in both procedures. Proposers in turn need to i) *always* make the fair proposal and ii) think that responders *always* accept both proposals in both procedures (in the dictator game, this is satisfied by construction since responders cannot influence payoffs). We test whether these subjects still prefer one procedure over the other. If such an 'EQ'-subject still prefers one procedure over the other, we identify a *purely* procedural concern. In section 5.2, we check whether these concerns can indeed be explained by the extent to which subjects use moral arguments of an outcome-independent type in the moral judgement test.

If this is the case, we can, first of all, rule out that 'EQ'-subjects' procedural choices are mistakes. Second, we have double checked that we induced an outcome-invariant setting and that – in particular – our belief measure is precise enough to identify 'EQ'-subjects who are indifferent between the outcomes of two procedures. If 'EQ'-subjects show procedural preferences but do not care for outcome-independent moral arguments they might react to differences in behaviour and/or beliefs between these procedures. The specific moral motivation at hand also allows us to see whether we induced an *experimenter demand effect*. In this case, subjects' choices would be explained by the degree to which they desire to comply with others' (our own) expectations about their behaviour.

Third, we can classify subjects whose beliefs and actions *vary* across procedures and analyze their moral motivations in choosing a specific procedure. To that end, section 6.1 builds groups of subjects whose beliefs and actions differ similarly across procedures. All subjects *within* a group (those reporting that they prefer a procedure and those reporting that they do not) therefore perceive the same strategic outcome difference between the procedures. We can subsequently test whether subjects whose procedural choice is not in line with their strategic incentive have outcome-invariant moral reasons to do so compared to other subjects who comply with their strategic incentive. This way, we extend our analysis of outcome-invariant moral motivations to the full set of participants.

Fourth, we can test whether 'EQ'- subjects differ persistently from other subjects in those characteristics which explain 'EQ'-subjects' purely procedural choices, see section 6.2. If this were true, our results would be driven by a selection[18] effect. We start presenting our results for 'EQ'-subjects.

[17]We therefore expect no systematic carry-over effects from the experiment to the test results.

[18]A selection would exist if 'EQ'-subjects differed from subjects with procedurally *variant* actions and beliefs in a

5 Results & Discussion

5.1 How often do 'EQ'-subjects state a purely procedural concern?

We first concentrate on subjects who fulfill even the most restrictive conditions for procedural indifference from section 3, so-called 'EQ'-subjects who show actual behaviour and actual beliefs consistent with an equilibrium according to all social preference theories. 'EQ' proposers select the fair proposal in both procedures which they encounter and expect all proposals to be accepted with certainty in both procedures. 'EQ' responders accept all proposals (if the procedures allow to do so) and expect the fair proposal to be proposed with certainty in all procedures.[19]

59% of all 'EQ'-subjects *state* a purely procedural preference, i.e. state a preference for some procedure. The 99% confidence interval for this share of 59% has lower bound of 48% and upper bound of 70%. We denote these confidence intervals by square brackets, i.e. $]48\%, 70\%[$. 21% of all 'EQ'-subjects would also pay for their preferred procedure and thereby *reveal* a purely procedural preference. The share of subjects who would pay has a 99% confidence interval of $]13\%, 32\%[$.

RESULT 1. A significant share of EQ-subjects state and is willing to pay for a *purely* procedural preference.

Looking at 'EQ'-subjects who choose between a mini dictator and a mini ultimatum game, 65% state a preference for one procedure over another. This share has a 99% confidence interval of $]47\%, 80\%[$. More specifically, 58%, $]40\%, 75\%[$, of 'EQ'-subjects who choose between the dictator and the ultimatum game state a preference for the dictator game. 25%, $]12\%, 42\%[$, of them also pay for and thereby *reveal* this preference. Only 7% within $]1\%, 20\%[$ state to prefer the ultimatum game over the dictator game and nobody, i.e. 3%, $]0\%, 15\%[$, reveals this preference.

RESULT 2. A significant share of 'EQ'-subjects states to prefer the dictator over the ultimatum game and is willing to pay for this preference.

Table 3 reviews our results for subjects who choose between the mini ultimatum (UG) and the mini dictator game (DG) along with the absolute frequency of 'EQ'-proposers, 'EQ'-responders, their respective choices, and 99% confidence intervals for the frequency of these choices.

Looking at subjects who choose between a mini yes-no, and a mini ultimatum game, 55%, $]40\%, 70\%[$ state a preference for one procedure over the other, and 16%, $]7\%, 30\%[$ *reveal* such a preference. In this pair of procedures, 'EQ'-subjects most frequently prefer the yes-no game over the ultimatum game. A share of 34%, $]20\%, 49\%[$, states this preference, and a share of 14%, $]5\%, 27\%[$ *reveals*, i.e. would pay for it. A preference for the ultimatum game over the yes-no game in turn is less frequent;

latent characteristic which is *critical* for a purely procedural choice.

[19] Appendix C shows detailed descriptives on overall (not only 'EQ'-subjects') beliefs and behaviour for all procedures.

role	nr. of obs.	DG $\succ$ UG		UG $\succ$ DG	
		stated	revealed	stated	revealed
proposer	35	28 $]57\%, 94\%[$	10 $]11\%, 52\%[$	1 $[0\%, 20\%[$	0 $[0\%, 15\%[$
responder	25	7 $]8\%, 56\%[$	5 $]4\%, 47\%[$	3 $]1\%, 38\%[$	2 $]0\%, 33\%[$
all	60	35 (58%) $]40\%, 75\%[$	15 (25%) $]12\%, 42\%[$	4 (7%) $]1\%, 20\%[$	2 (3%) $]0\%, 15\%[$

Table 3: **How many 'EQ'-subjects state/would pay for a dictator or an ultimatum game?** [99% **confidence intervals in brackets].**

only 21%, $]10\%, 36\%[$ state such a preference and only 3%, $]0\%, 12\%[$, would pay for it.

RESULT 3. A significant share of 'EQ'-subjects states to prefer the yes-no over the ultimatum game and is willing to pay for the respective preference.

Table 4 reviews our results for subjects' choices between a mini yes-no, and a mini ultimatum game, i.e. the number of 'EQ'-proposers, 'EQ'-responders, their respective choices, and the 99% confidence intervals for the frequency of these choices. Note that responders and proposers differ in their procedural choices. If the purely procedural choices we observe were fairness-driven this pattern might be explained in terms of purely procedural equality: the moral ideal behind the choices may, for instance, be that the rules of the game should grant all parties the same rights of information, of participation, and so forth. If so, a person may well dislike all types of violation of this ideal: having more rights just as having less rights than her opponent. One can suspect, however, that she would feel her own disadvantage more keenly than her opponent's disadvantage and would thus also show a stronger preference to have her own disadvantage removed. Appendix D explores the distribution of rights across the games we use in more detail.

role	nr. of obs.	UG $\succ$ YNG		YNG $\succ$ UG	
		stated	revealed	stated	revealed
proposer	42	4 $]1\%, 28\%[$	2 $[0, 21\%[$	18 $]23\%, 64\%[$	8 $]6\%, 39\%[$
responder	38	13 $]16\%, 57\%[$	0 $[0\%, 14\%[$	9 $]8\%, 46\%[$	3 $]0\%, 0.27\%]$
all	80	17 (21%) $]10\%, 36\%[$	2 (3%) $]0\%, 12\%[$	27 (34%) $]20\%, 49\%[$	11 (14%) $]5\%, 27\%[$

Table 4: **How many 'EQ'-subjects state/would pay for a yes-no or an ultimatum game?** [99% **confidence intervals in brackets].**

The next section explores whether and how purely procedural choices relate to individuals' conception of fairness. As pointed out in section 4, we hope to find an outcome-invariant fairness conception behind subjects' choices to cross-check that our design actually induces outcome-invariance. Such a fairness conception could be one about individual rights in the outcome generating procedure.

5.2 What motivates 'EQ'-subjects' purely procedural choices?

Purely procedural preferences might reflect a desire that the rules of the game grant parties equal rights of information, and/or equal freedom of choice – we pursue this idea in more detail in appendix D. Such a claim for being treated equally by the rules of a game when outcomes are the same would be morally motivated ('it is unfair/immoral to favour one person over another by granting her more rights or greater privileges'). If true, an 'EQ' individual who has a purely procedural concern should put greater weight on *moral* arguments which refer to institutions and individual rights when she judges whether something is right or wrong than an 'EQ' individual who shows no purely procedural concern.

To test this, we first need a means to describe how individuals typically derive whether something is right or wrong – i.e. how they make a moral judgement – and which arguments they employ to do so. An individual typically feels comfortable to use only some of the many moral arguments which exist: each individual therefore has preferences over ways of moral argumentation (see e.g. Piaget 1948; Kohlberg 1984; Lind 2008). Kohlberg (1969, pp. 375) distinguishes three broad ways of moral argumentation (with two subclasses of argumentation each): a *preconventional*, a *conventional*, and a *postconventional* way.

An individual uses a *preconventional* argument if she argues that an action is morally right when it does not entail a punishment, or else, when that action is rewarded. Instead, an individual uses a *conventional* moral argument, if she argues that something is morally right because it is in line with a social norm, a social expectation or done with a good intention. Inequity aversion (Fehr and Schmidt 1999; Bolton and Ockenfels 2000; Bolton et al. 2005) and reciprocity (Dufwenberg and Kirchsteiger 2004; Falk and Fischbacher 2006) would therefore rely on conventional moral argumentation. An individual uses a *postconventional* argument if she argues that something is right because it is in line with the social contract. She may, for instance, argue that the rules of the game do not comply with the individual rights recorded in a constitution and violate the legislative principle that all individuals enjoy the same rights and that there be no discrimination (subclass 1). An individual also argues postconventionally if she deems something wrong because it violates a value or some general ethical principle which she considers universally valid, or because it infringes specific human rights *above* the social contract (subclass 2). Such a principle could be the consideration of another's will or her dignity, for instance. Specifically postconventional arguments do not refer to the outcome of an action or a process but rather, to the nature of the action or process itself. The same outcome may hence be judged very differently if generated by a dictator's decision, rather than by democratic consensus (Kohlberg 1969, p. 376).

Suppose now that the procedural choices in our experiment do indeed reflect moral preferences over the *rules of a game* rather than preferences over outcomes, intentions, or norms. If so, there should be a strong link between individuals' procedural choices and their sensitivity to *postconventional* moral arguments. We do indeed find such a link, specifically to the first subclass of postconventional reasoning (individual rights as recorded in a constitution/the social contract). Table 5 summarizes the postconventional type of argumentation and its subclasses once more.

argumentation	motivation for moral behaviour
postconventional	*subclass 1.* Social contract orientation, in which duties are defined in terms of the social contract and the respect for others' rights as recorded in that contract. Emphasis is upon equality and mutual obligation within a democratic order.
	subclass 2. The morality of individual principles of conscience such as the respect for the individual will, freedom of choice etc. Rightness of acts is determined by conscience in accord with comprehensive, universal and consistent ethical principles.

Table 5: **Kohlberg's two classes of postconventional (outcome-invariant) moral argumentation (Ishida 2006).**

a) EQ-subjects' preferences for the mini yes-no over the mini ultimatum game. Tables 6a) and 6b) show which ways of moral argumentation among those outlined above actually link to subjects' choices of the yes-no game. Throughout, *pre*, *con*, and *post* denote the extent to which subjects make use of preconventional, conventional, and postconventional argumentation, respectively. *postclass1* denotes the extent to which subjects make use of the first subclass of postconventional moral argumentation, see table 5. Throughout, we report the marginal effect of each explanatory variable averaged over all individuals within simple binary Logit models[20].

Table 6a). **Proposers, n=42, Count R^2=0.74**

variable	*effect*	*error*	*z-stat*	*p-val.*
(pre)	(-0.09)	(0.08)	(-1.18)	(0.24)
con · post	-0.22	0.08	-2.73	0.01
postclass1	0.22	0.08	2.80	0.01

Table 6b). **Responders, n=21, Count R^2=0.76**

variable	*effect*	*error*	*z-stat*	*p-val.*
(pre)	(-0.09)	(0.08)	(-1.13)	(0.26)
(con · post)	(-0.14)	(0.09)	(-1.56)	(0.12)
simpler	0.09	0.04	2.48	0.02

Tables 6: **'EQ'-subjects' preferences for the yes-no game link to outcome-invariant moral argumentation ('postclass 1' in table 5), and a simplicity argument.**

Overall, 'EQ'-subjects' use of preconventional argumentation *pre* does not significantly link to their choice of the yes-no game. Hence, we do not find evidence for an *outcome-based* motivation in terms of mere material payoffs. The effect *con · post* captures the interdependence between subjects' use of conventional and postconventional arguments. If this interaction is large, neither conventional, nor postconventional arguments have stand-alone value for a subject. The higher a subject scores on *con · post*, the *less likely* she prefers the yes-no game. Since the interaction does not increase the likelihood to prefer the ultimatum game in this pair of procedures – see *b)* below –, it shifts likelihood to being indifferent. Conventional (i.e. intention and norm-based) argumentation *con* which is at the heart of inequity-aversion and reciprocity, does not show any impact other than through this interaction effect and therefore promotes indifference between the procedures at hand.

[20]All models begin with a broad specification including all ways of moral argumentation, Georg Lind's measures for cognitive moral ability, and all possible two-way interactions between variables. These models are reduced step by step leaving out insignificant variables. Insignificant variables of theoretical interest are reported within brackets.

'EQ'-proposers and 'EQ'-responders seem to differ in their reasons to opt for the yes-no game. Proposals link to *postclass 1* arguments suggesting that proposers are purely concerned about parties' rights in each procedure[21]. Responders' choices of the yes-no game link to their simplicity ratings of the procedures[22] rather than their use of postconventional arguments. If a responder rates the yes-no game by one point (on a 7-point scale) simpler than the ultimatum game, she is an estimated 9% more likely to prefer the yes-no game, the average marginal effect being 0.09 ($z-stat:\ 2.48$, $p-value<0.02$), see table 6b). If, however, we contrast responders who prefer the yes-no game only with responders who are indifferent (and leave out responders who prefer the ultimatum game), this simplicity concern vanishes, and we also observe a positive marginal effect of *postclass 1* arguments on the likelihood that responders prefer the yes-no game, i.e. (0.72, $z-stat:\ 2.82$, $p-value<0.01$).

b) Preferences for the mini ultimatum over the mini yes-no game. There are mainly responders and very few proposers who state this preference. 'EQ'-proposers who prefer the ultimatum game make again more use of postconventional arguments than proposers who are indifferent – the marginal effect of *postclass 1* on preferring the ultimatum game is 0.31 ($z-stat:\ 2.18$, $p-value<0.03$). Preconventional argumentation and the interaction effect $con\cdot post$ do not show a significant impact at the 10% level. The same holds if we contrast proposers who prefer the ultimatum game with those who prefer the yes-no game: the more often proposers prefer the ultimatum to the yes-no game, the more they use *postclass 1* arguments, the effect being 0.35 ($z-stat:\ 2.11$, $p-value<0.04$). For 'EQ'-responders, we obtain similar results. The more often they use *postclass 1* arguments, the more likely they are to prefer the ultimatum game to being indifferent, the effect is: 0.89 ($z-stat:\ 4.36$, $p-value=0.00$). The interaction effect $con\cdot post$ reduces the likelihood of preferring the ultimatum game to being indifferent (effect: -1.13, $z-stat:\ -3.91$, $p-value=0.00$). Preconventional arguments – i.e. 'the ultimatum game provides an option to punish which might lead to higher offers' – are not significant at the 10% level (effect: 0.20, $z-stat:\ 1.64$, $p-value=0.11$). The belief conditions derived in section 3 (see table 2, and in particular the corresponding footnote 10) therefore seem to be sufficient to rule out any concerns that the procedures might entail different material and pychological outcomes. At the same time, it shows that the belief measure which we implement is precise enough to control these belief conditions.

c) Preferences for the dictator over the mini ultimatum game. Subjects' choice of the dictator game is not significantly linked to *any* way of moral argumentation – and does therefore also not reflect a desire on the proposer side to forego punishment (preconventional argumentation). We expect that subjects' choices are driven by a concern for *efficiency* – see appendix D. To back this claim, we classified subjects' answers from our open-form post experimental questionnaire. If a subject stated that she preferred the dictator game because '*neither* party could get a zero payoff', we classified her

[21]For payment data only, we observe a similar effect of postconventional arguments. Proposers are the more likely to report a purely procedural preference, the more they make use of *postclass 1* arguments. The estimated effect is 0.19 ($z-stat:\ 2.08$, $p-value<0.04$). Preconventional or conventional arguments do not show any impact.

[22]In a postexperimental questionnaire which we gave in half of the sessions to shed further insight, subjects were asked to rate the procedures relative to each other in terms of simplicity.

as efficiency concerned[23]. In other words, a procedure is efficient if *it does not allow for the loss of the pie*. In the dictator game, there are only efficient strategies since neither the responder nor the proposer has an inefficient strategy as defined in Dufwenberg and Kirchsteiger (2004, pp. 276). Overall, 'EQ'-proposers who state an efficiency concern are 17% more likely to prefer the dictator game (effect: 0.17, $z-stat: 2.17$, $p-value < 0.03$)[24], considering only proposers who are willing to pay, the effect becomes stronger (0.33, $z-stat: 1.97$, $p-value < 0.05$). For 'EQ'-responders, we obtain a similar result. Responders who state an efficiency concern are 33% more likely to prefer the dictator game (effect: 0.33, $z-stat: 3.13$, $p-value < 0.01$). For responders who are willing to pay, the efficiency concern perfectly explains the respective preference for the dictator game. 'EQ'-responders' efficiency concern nicely illustrates the purely procedural nature of the concern. 'EQ'-responders always accept and know for sure that the outcome is the same. Still, they choose the dictator game because the *procedure itself rules out inefficient outcomes.*

6 Robustness & Prevalence

6.1 Do these motives carry over to other sets of subjects?

As hoped, 'EQ'-subjects' procedural choices do indeed link to arguments about the rights which a procedure grants to each party (and a procedural efficiency concern). This reasoning clearly differs from reasoning in terms of expectations or intentions, as postulated by inequity aversion or reciprocity models. How about other subjects? Might even subjects with procedurally varying beliefs choose a specific procedure because they are concerned about individual rights or efficiency rather than about the (subjective) outcomes of that procedure? To test this, we cluster (group)[25] all non 'EQ'-subjects according to their actions and beliefs. Within each cluster, all subjects – those who do have a procedural preference, and those who are indifferent – have similar material, intention-, or norm-based incentives to choose one procedure over another.

We now analyze whether individuals who choose a procedure *and* have a strategic incentive to do so, respond to this strategic incentive, or whether – just as their 'EQ'-counterparts – they are concerned about individual rights (or efficiency) and just happen to believe that the procedures also generate different (subjective) outcomes. Similarly, we can test whether individuals who prefer not to pursue their strategic gain do so out of a concern about the distribution of rights, or a concern about procedural efficiency, respectively.

[23]Subjects who state an efficiency concern amongst several concerns are not classified to hold a concern for 'efficiency'.

[24]On the overall set of 'EQ' Proposers, preconventional argumentation also shows a weak effect (0.12, $z-stat$: 1.87, $p-value = 0.07$) which vanishes (0.15, $z-stat: 1.51$, $p-value = 0.13$) if we consider payment data only. Hence, proposers who merely state a preference for the dictator game acknowledge that the lack of responder veto might entail a material advantage – but not for this paper's payoffs – hence, they state to be indifferent.

[25]Clusters were obtained using Ward's method; cluster similarity was measured by Eucledian distance in five dimensions: i) proposers' offer in the yes-no game, and ii) in the ultimatum game, iii) proposers' belief about how many responders accept in the yes-no game, and iv) how many responders accept the equal split and v) the generous split in the ultimatum game, respectively. Initially, each procedure produced three clusters.

a) Proposers with procedurally variant actions and beliefs, yes-no vs. ultimatum game. The WARD-clustering procedure produced one cluster of #22, one of #9, and one of #20 observations. The second cluster being too small to be analyzed, we merged it with cluster 1[26]. On the merged cluster with #31 observations, proposers who make more use of *postclass 1* arguments are more likely to prefer the yes-no game over being indifferent (effect: 0.19, $z-stat: 3.94$, $p-value = 0.00$)[27]. Similarly, proposers who make more use of *postclass 1* arguments are significantly more likely to prefer the ultimatum game rather than being indifferent (effect: 0.23, $z-stat: 3.33$, $p-value < 0.01$). Altogether, 15/31 (68%) of all proposers in the merged cluster prefer the yes-no game, and 6/31 (19%) prefer the ultimatum game. In cluster 3, most proposers either prefer the yes-no game, or are indifferent. Proposers who prefer the yes-no game expect a material advantage in this game whereas most proposers who state to be indifferent expect a material advantage in the ultimatum game and decide *not to pursue* it. These proposers who state to be indifferent make more use of *postclass 1* arguments than those who prefer the yes-no game. If we exclude the only three proposers with yet another incentive structure, the effect turns from weak to intermediate significance (-0.23, $z-stat: -2.38$, $p-value < 0.017$). These proposers might not wish to obtain a material advantage from giving responders a right to be informed which proposal was made, or profit from amending the transparency of the game (see Appendix D).

b) Responders with procedurally variant actions and beliefs, yes-no vs. ultimatum game. The initial clusters contained #22, #21, and #12 observations, respectively. In cluster 1, responders mainly always accept all proposals and believe that they have a payoff advantage in the ultimatum game. Responders who nevertheless prefer the yes-no over the ultimatum game make more use of *postclass 1* arguments than those who prefer the ultimatum game (effect: 0.31, $z-stat: 2.96$, $p-value < 0.01$). These responders forego the strategic advantage they expect in the ultimatum game by voting for the yes-no game. Even responders who state to be indifferent and thus do not actively pursue their material advantage in the ultimatum game care weakly more for *postclass 1* arguments than responders who vote for the ultimatum game and are willing to exploit their strategic advantage (effect: $+0.18$, $z-stat: +1.75$, $p-value < 0.08$). Moving to cluster 2 and 3, we find that responders nearly unanimously believe to have a payoff advantage in the yes-no game. Responders who state to be indifferent – and thus prefer not to actively pursue this strategic advantage – make more use of *postclass 1* arguments than those who exploit their advantage and opt for the yes-no game. We merge both clusters to obtain a reliable sample size, and find a marginal effect of *postclass 1* arguments on the likelihood of being indifferent of 0.31 ($z-stat: 4.12$, $p-value = 0.00$). Note that we observed a similar pattern for proposers in cluster 2 who preferred not to amend the responder's situation when this causes the responder a material disadvantage.

c) Subjects with procedurally variant beliefs, dictator vs. ultimatum game. Similarly as on the set

[26]The results on cluster 1 before merging it with cluster 2 are essentially the same as those for the merged cluster.

[27]If proposers increase their use of *postclass 1* arguments by one unit when making a moral judgement, the likelihood of a preference for the yes-no game increases by 19%. As before, all explanatory variables are normalized subtracting the cluster mean and dividing by the cluster standard deviation.

of 'EQ'-subjects, stated efficiency concerns perfectly predict proposers' choice of the dictator game. #6 of #24 proposers choose the dictator game and state an efficiency concern in cluster 1, and #7 of #24 proposers do so in cluster 2. Altogether, these proposers account for 27% of all non 'EQ'-proposers. The 99% confidence interval for this share is $[12\%, 47\%]$. Turning to responders, stated efficiency concerns increase the likelihood of choosing the dictator game by 36% ($z-stat: 3.47$, $p-value < 0.01$) in cluster 1 where #6 out of #33 responders (18%) choose the dictator game and state an efficiency concern. In clusters 2 and 3, stated efficiency concerns perfectly predict the choice of the dictator game. #3 of #13 responders (23%) state such a concern and choose the dictator game in cluster 2; #2 of #12 (17%) do so in cluster 3. Altogether, these responders account for 19% of all non 'EQ'-responders. The 99% confidence interval for their share is $[8\%, 36\%]$).

Table 7 shows postestimation results for each of the clusters above. We identify the critical threshold of *postclass 1* arguments for which the predicted outcome in a given Logit model changes and report the number of participants who score above this critical threshold. We also count the number of participants who state an efficiency concern and opt for the dictator game in each cluster. Taken together, these represent the estimated share of non 'EQ' participants who change their behaviour due to the same outcome-invariant motivation as 'EQ'-subjects did. This way, we extend the analysis from sections 5.1 and 5.2 to the full set of participants.

role	nr. of obs.	UG vs. YNG	
proposer	cluster 1 (# 31)	17 (55%)	[31%, 77%]
	cluster 2 (# 20)	8[28] (36%)	[14%, 71%]
responder	cluster 1 (# 22)	3[28] (14%)	[2%, 42%]
	cluster 2 (# 33)	13 (39%)	[19%, 63%]
all	106	41 (38%)	[26%, 51%]

role	nr. of obs.	DG $\succ$ UG, DG vs. UG	
proposer	cluster 1 (# 24)	6 (25%)	[7%, 53%]
	cluster 2 (# 24)	7 (29%)	[9%, 58%]
responder	cluster 1 (# 33)	6 (25%)	[7%, 53%]
	cluster 2 (# 13)	3 (23%)	[3%, 62%]
	cluster 3 (# 12)	2 (17%)	]0%, 58%]
all	106	24 (23%)	[13%, 35%]

Tables 7: **How often are *postclass 1* arguments (left table) or efficiency arguments (right table) predicted to change the behaviour of non 'EQ'-subjects?** [99% **confidence intervals**]**.**

To sum up, we find outcome-invariant motivations on all sets of subjects with procedurally varying beliefs and behaviour. Many subjects still seem to choose a given procedure out of postconventional, i.e. outcome-invariant, moral arguments or out of an efficiency concern. Either, the differences in beliefs which we elicit are too small to crowd out subjects' purely procedural concerns, or our belief measure is a little too fine for these subjects. Subjects might also expect/display procedurally varying behaviour *because* they deem the procedures unjust. The considerable share of subjects willing to forego payoff advantages most often links to subjects' use of postconventional argumentation *postclass 1* – the same moral ideal behind the purely procedural preferences from section 5.2. Interestingly, the interaction effect $con \cdot post$ which *reduced* the likelihood of a purely procedural concern on the set of 'EQ'-subjects is never significant for non 'EQ'-subjects suggesting that purely procedural concerns might be *more* frequent among non 'EQ'- than among 'EQ'-subjects.

[28] We use only Logits where *postclass 1* arguments had a marginal effect with $p-value < 0.02$. If we also consider weaker significance levels, there are further 7 individuals in responder cluster 2 who – weakly explained by postconventional arguments – state to be indifferent rather than to prefer the ultimatum game.

6.2 Is there a selection effect?

Section 5 first concentrated on 'EQ'-subjects who should – even according to the most restrictive conditions from section 3 – be indifferent between procedures. These subjects should have no outcome-based, intention-based, or expectation-based motive to prefer one procedure over another. To understand the nature of 'EQ'-subjects' procedural choices, we studied whether and how these choices related to the moral ideals which subjects employed to determine whether a course of action is morally right or wrong. 'EQ'-subjects more likely preferred one procedure over another, the more often they argued in terms of individual rights (e.g of information and participation) as stipulated by a social contract when making such a moral judgement. There did, therefore, indeed seem to be a moral ideal at play which was outcome-independent as we require. We also observed purely procedural choices of 'EQ'-subjects which did not link to individuals' moral judgement but linked to subjects' simplicity rankings of the procedures, or to self-reported concerns for purely procedural efficiency.

Do the procedural choices which we reported for 'EQ'-subjects in section 5 result from a selection effect? A selection effect would imply that 'EQ'-subjects differ from all other subjects in some characteristic which is *critical* for a purely procedural choice, and that therefore, the new type of preference which we report is either significantly more, or less prevalent, in non 'EQ'- than in 'EQ'-subjects. To test for such an effect, we use the motivations behind 'EQ'-subjects' purely procedural choices – the characteristics which were *critical* for their purely procedural choices – and test whether these motivations are per se more relevant to 'EQ'-, than to non 'EQ'-subjects.[29]

Moral argumentation & simplicity. We could not confirm that 'EQ'-proposers or 'EQ'-responders differ from their non-'EQ' counterparts when making a moral judgement. Specifically, 'EQ'-proposers and 'EQ'-responders cannot be confirmed to make *more* use of those moral arguments – i.e. the first class of postconventional arguments *postclass1*, see section 5.2 – which were positively linked to the purely procedural choices we report (Wilcoxon Rank Sum tests, proposers: $p - value = 0.67$, responders: $p - value = 0.60$). Moreover, 'EQ'-proposers and 'EQ'-responders cannot be confirmed to score *lower* on variable $con \cdot post$ which was negatively linked to purely procedural choices and which therefore makes these choices *less* likely (Wilcoxon Rank Sum tests, proposers: $p - value = 0.62$, responders: $p - value = 0.40$). Comparing the simplicity rankings, 'EQ'-responders deem the yes-no game less often simpler than the ultimatum game than non-'EQ' responders (exact Wilcoxon Rank Sum test, $p - value < 0.05$). *A negative selection effect* might therefore have occurred in section 5.1 by underestimating the frequency of responders preferring the yes-no game.

For each motive, we also derive the critical 'strength' at which the binary logit models in section 5.2 start to predict a purely procedural choice, if all other explanatory variables take on their mean value and perform Fisher's exact test to see whether there are significantly more 'EQ'-, than non-'EQ'-subjects who score above this critical threshold. We did not find any significant difference for any explanatory variable in any type of procedural choice, or any role. 'EQ'- and non 'EQ'-responders

[29]The selection effect could also operate such that a link between these motivations and a purely procedural preference exists exclusively in 'EQ'-subjects. However, we have shown in the previous section that this is not the case.

do not even differ in their simplicity rankings of the procedures around the respective critical threshold. However, the 45% of proposers who care *most* for postconventional argumentation always have non-'EQ' beliefs and actions. Some proposers might choose procedurally variant actions or hold procedurally variant beliefs *because* they deem the procedures unjust.

Efficiency motive. Many 'EQ'-subjects preferring the dictator over the ultimatum game stated in an open form post experimental questionnaire that they did so because the dictator game prevents zero payoffs for *either* party. The purely procedural nature of this efficiency concern was particularly credible for 'EQ' responders: knowing that they would always accept in both games, and expecting the equal split for sure, they opted for the procedure where they had no influence at all. While 45% of all 'EQ'-subjects ('EQ'-proposers: 39%, 'EQ'-responders: 58%) stated this reason for their choice, also 33% of all non 'EQ'-subjects (proposers: 33%, responders: 33%) did so. This is surprising since for these belief conditions, one would have expected either self-interest, or an outcome based other-regarding concern to matter. Again, the efficiency motive is not reported significantly more often by either 'EQ'-proposers or 'EQ'-responders than by their non 'EQ'-counterparts.

7 Conclusion

We present evidence that agents care about procedures per se: they prefer certain procedures over others even when they do not expect these preferred procedures to generate more advantageous, more equal, or kinder outcomes.

Purely procedural preferences are new to date[30]. So far, economists interested in procedural concerns have focused on preferences for fair randomizations over unequal outcomes, e.g. (Bolton et al. 2005), or preferences for procedures which generate kind distributions of outcomes (Sebald 2010). In both approaches, procedural preferences are conceived as preferences over the outcomes which different procedures generate. Even research in organizational psychology – a field with a long-standing empirical interest in procedural justice – advocates the view that procedural preferences have an inevitable distributive foundation, see e.g. (Cropanzano and Ambrose 2001).

This need not be the case. We find evidence for preferences that a procedure itself should meet certain criteria which do not refer to the distribution of outcomes generated by this procedure.[31] We also report instances where this new aspect of individuals' fairness notions explains individuals' choice to forego strategic advantages in a given allocation procedure.

In two-player pie-sharing procedures which yield the same expected material and psychological/other-regarding *equilibrium* payoffs, we find that subjects who – according to all social preference theories known to date – should be indifferent *in and off equilibrium*, still show preferences over the procedures

[30]The idea that the rules of the game per se may affect utility, is not new, see e.g. (Benz and Stutzer 2003) and has been pursued by Frey and Stutzer (2005) who report in a survey study that self-reported happiness increases in citizens' democratic rights. This effect may yet be due to an improvement in citizens' life circumstances (the outcomes of the political process), as well as the right of participation (in the political process) itself. We study the existence of purely procedural preferences in a controlled setting and also find a concern for efficiency which may moderate concerns for increased participation.

[31]Appendix D discusses several procedural principles that may drive the preferences over our simple pie sharing games.

at hand. Subjects therefore seem to care for *purely procedural criteria* – or put differently, they seem to care for *the rules of the game* without any reference to outcomes.

We provide supporting evidence that there are outcome-invariant moral ideals behind these purely procedural concerns. Scores from a standardized moral judgement test (Lind 1978; Lind 2000; Lind 2008) measuring preferred ways of moral argumentation consistently predict subjects' preferences for a procedure.[32] The more subjects use arguments which refer to the respect for individual rights stipulated by the social contract when making a moral judgement, the higher is the estimated likelihood to prefer one pie-sharing procedure over the other (when behavioural theories claim that subjects should be indifferent). Using this result about the motivations of subjects who should be indifferent *in and off equilibrium*, we extend our analysis to the entire set of subjects: we find that many procedural choices by subjects who ignore or forego expected payoff advantages can be modelled by exactly the same outcome-invariant motivation as we observed on the set of indifferent subjects. Some subjects seemingly try to 'compensate' the rules of the game behaviourally. Altogether, estimated 30% (95 out of 352) of all subjects have such an outcome-invariant motivation.

Why care about purely procedural preferences? One might argue that the core interest of the economic discipline lies in observed choices and outcomes, and neither in the personal nor in the institutional decision making procedures behind these (Gul and Pesendorfer 2005). Yet, take the election example from the introduction again. More individuals may vote in a procedurally fair than in an unfair election, even if the same candidate is expected to win equally likely in both cases. High abstention rates may undermine a democratic process by reducing the legitimacy of the winning candidate and trigger institutional change in the long run. Moreover, voters who find that electoral rules violate their moral ideals – e.g. by giving some minority less rights to participate, or less information – may change their votes in the interest of that minority to compensate the infringement of the minority's rights. This would be one example how individuals who respect individual rights and the social contract may compensate the rules of the game by *altruistic* behaviour.

Consistent with this idea, Chlaß and Moffatt (2012) find that dictators' propensity to give in standard anonymous dictator games strongly increases in dictators' value of universal individual rights.[33] Notice that a dictator game is a procedure which denies the recipient any right to state her own will. There is also evidence that individuals show a distaste for discriminatory taxes, even when they are socially as efficient as non-discriminatory taxes and produce the same expected outcomes (Tyran and Sausgruber 2014). Purely procedural concerns may therefore also have implications for fiscal policy.

Similarly, purely procedural preferences could explain why, across simple pie-sharing games and across different roles in one game, the same individual shows behaviour which is largely inconsistent

[32]Sociologist Jean Piaget and psychologist Lawrence Kohlberg did the first early field work on the types of moral argumentation put forth by moral philosophers which individuals actually use when making a moral judgement. In Lind's (1978) test, subjects are asked to make a moral judgement about i) workers who break into a factory to steal evidence about a company's crime and ii) a doctor who medically assists suicide upon a patient's request. Once subjects have stated their opinion, they are presented with different arguments to either excuse, or accuse that protagonist's behaviour. Each argument belongs to a certain type of moral argumentation (Kohlberg 1969; Kohlberg 1984). The more willing subjects are to excuse or to accuse the protagonist in terms in terms of individual rights and the social contract, the more likely they are in our experiment to prefer one pie-sharing procedure over another.

[33]This finding is robust under different frames, and under real-effort conditions.

with stable inequity-averse preferences (Blanco et al. 2011). One can compensate an opponent for the unfair rules of one game by being altruistic, and behave fully selfishly under fairer rules without being inconsistent. Indeed, Shor (2009) finds that when proposers are first allowed to choose between a dictator and an ultimatum game, they rather choose the ultimatum game. Moreover, those who do choose the dictator game give more than those who choose the ultimatum game; they also give more than dictators who could not choose any procedure. Shor coins this an "innate preference for voice, a key component of procedural fairness." Our paper does yet also show that individuals have a competing need for procedural efficiency which will at times inevitably require that a player's freedom of choice must be reduced. Noteably, even players whose freedom of choice is reduced care for procedural efficiency[34].

[34]Neri and Rommelsdorfer (2014) suggest that individuals prefer procedures where nobody can interfere with their decisions. In our paper, even those individuals who might interfere prefer to remove this right. These subjects do therefore seem to care for procedural efficiency, rather than the non-interference of others. Dana et al. (2007) show, however, that individuals may try to prevent the opponent from learning the rules of the game – i.e. from knowing that a pie *can* actually be shared – knowledge which is crucial for the opponent to care about efficiency.

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Appendix

A.1) Instructions[35]& Control Questions

Instructions

Welcome and thank you for participating in this experiment. For 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 seat.

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. The exchange rate is: 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 their own and other participants' 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.

[35]Instructions of the experiment were written in German. The following chapter reproduces a translation into English for experimental sessions which introduced the Ultimatum and the Yes-no game. Emphases in bold or italic font are taken from the original text, **TEXT IN CAPITAL LETTERS WAS NOT PART OF THE ORIGINAL INSTRUCTIONS**. Instructions for other treatments are available from the authors.

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**. Both situations are initialized to occur 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.

Control Questions[36]

1. Assume that participants choose as follows:

   participant A:

situation 1	situation 2
X	X

   participant B:

situation 1	situation 2	
	if X	if Y
agrees	agrees	disagrees

   This means that in situation 1 and in situation 2, participant A chooses X. Participant B agrees in situation 1. In situation 2, he agrees if A chooses X, and he does not agree if A chooses Y. If situation 1 is chosen randomly, what is (in ECU)

   (a) participant A's payoff?

   (b) participant B's payoff?

   If situation 2 is chosen randomly, what is (in ECU)

   (a) participant A's payoff?

   (b) participant B's payoff?

2. Assume that A and B still choose as described in 1., with the exception that in situation 2, A now chooses Y.

[36] Control questions about the actions and situations in phase 1.

(a) What is participant B's payoff in situation 2?

Please press 'OK'.

3. What is the difference between situation 1 and 2? Please choose 'right' or 'wrong'.

   (a) In situation 2, B has two courses of action whereas in situation 1, he only has one.

   (b) Both in situation 1 and in situation 2, B knows which distribution of payoffs A has chosen.

   (c) In situation 2, B can actually react to A's choice whereas in situation 1, he can only make a decision.

Please press 'OK'.

INSTRUCTIONS – BIDDING PHASE

Now, one of either participant may influence which situation is drawn. This participant is determined by casting lots between participant A and participant B. Thereby, A and B have an equal chance to be drawn. If drawn by chance, a participant can pay the amount of 5 ECU to make occur the situation she prefers. If she does not pay, both situations occur as they have been initialized with 50 % probability. The decisions made for the situation that is actually drawn become payoff-relevant.

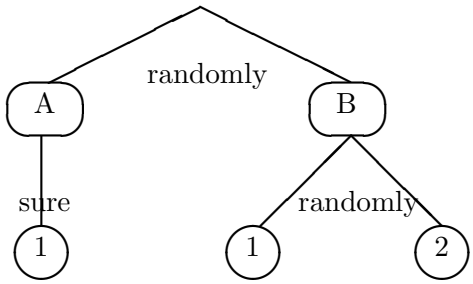
Payoffs are calculated as described in the instructions. If you may influence the draw of the situations and choose to do so, the cost of influencing the draw of the situations will be deducted from this payoff.

Control Questions[37]

Assume that A preferred situation 1 and paid 5 ECU for this situation. B preferred situation 2 but did not pay for this situation. Chance has not yet decided which participant's choice will actually be implemented. How likely is it that situation 1 occurs?

[37] About the instructions for phase 2, i.e. the bidding mechanism.

Some graphical help:



A has paid for situation 1. Situation 1 is certain.

B has not paid for situation 2. Both situations still occur randomly with probability 50 %.

Please choose 'right' or 'wrong':

1. Situation 1 is certain. right/wrong.
2. Situation 1 is more likely than situation 2 (but not certain). right/wrong.
3. Situation 1 is as likely as situation 2. right/wrong.
4. Situation 1 is less likely than situation 2 (but not impossible). right/wrong.
5. Situation 1 is impossible. right/wrong.

Please press 'OK'. *(SUBJECTS ALSO HAD THE POSSIBILITY TO GO BACK TO THE PREVIOUS SCREEN WHICH SHOWED THE INSTRUCTIONS FOR THE BIDDING PHASE – SEE ABOVE.)*

B. An Excerpt of the Moral Judgement Test by Georg Lind (1976, 2008)

Workers

Recently a company fired some people for unknown reasons. Some workers think that their bosses are listening in on their private conversations through cameras and microphones in the building and using the information against them. The bosses say they are not listening in	The workers cannot legally do anything until they can prove that their bosses are listening in on their conversations. Two workers then break into the main office and take the tapes that prove their bosses were listening in.

Would you agree or disagree with the workers' action ...

I strongly disagree — I strongly agree

-3	-2	-1	0	1	2	3

How acceptable do you find the following arguments *in favor* of the two workers' actions?
Suppose someone argued they were *right* for breaking in ...

...because most of the workers would approve of their actions and many would be happy about it

I strongly reject — I strongly accept

-4	-3	-2	-1	0	1	2	3	4

. . .

...because the two workers saw no legal ways of proving the company misused their trust by listening in and therefore chose what they considered the lesser of two evils

I strongly reject — I strongly accept

-4	-3	-2	-1	0	1	2	3	4

How acceptable do you find the following arguments *against* the two workers' actions?
Suppose someone argued they were *wrong* for breaking in ...

. . .

...because a person doesn't steal if he wants to be considered decent and honest

I strongly reject — I strongly accept

-4	-3	-2	-1	0	1	2	3	4

. . .

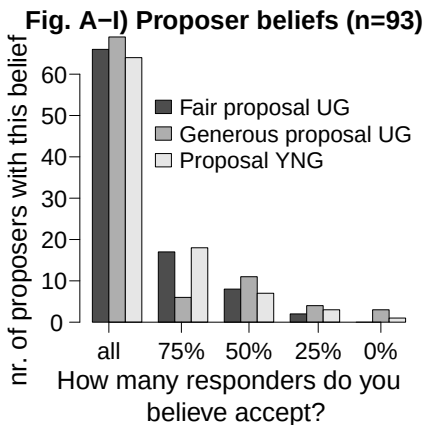
...because the two workers should have used all the legal ways available to them without breaking the law

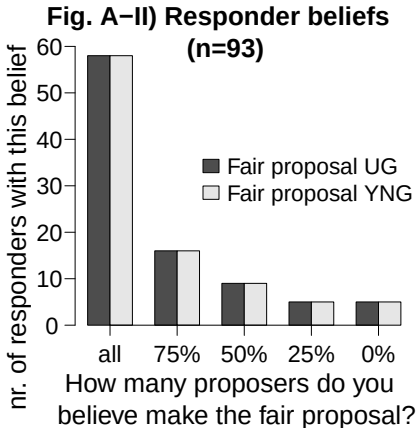
I strongly reject — I strongly accept

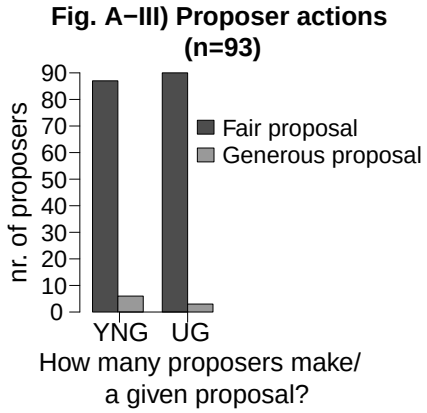
-4	-3	-2	-1	0	1	2	3	4

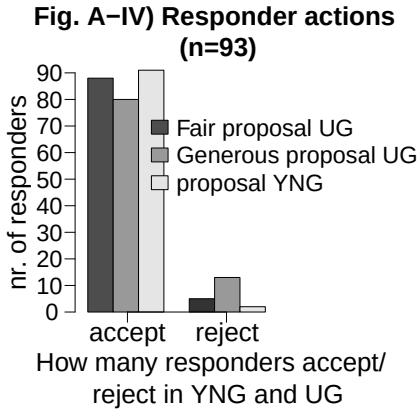
NOTE: This excerpt of the moral judgement test MJT is reprinted with kind permission by Georg Lind. It does not faithfully reproduce the formatting of the original test. For ease of readability, the original test numbers each item, and the alignment slightly differs from this excerpt. The dots represent items which have been left out. The full test cannot be published due to copyright issues.

C1. Overall behavior and beliefs across protocols - ultimatum vs. yes-no game

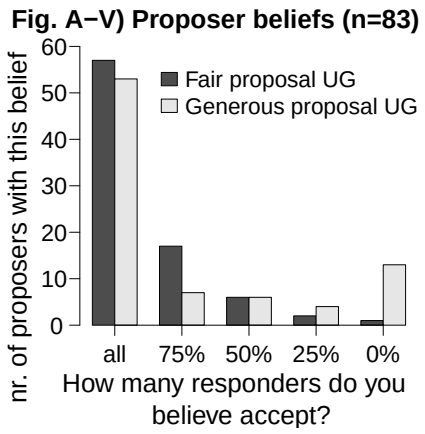


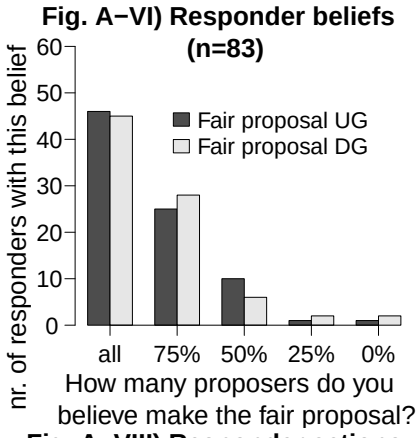


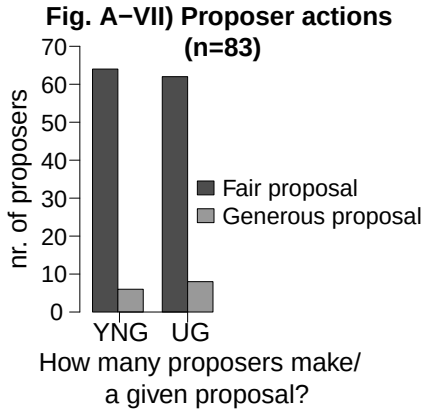


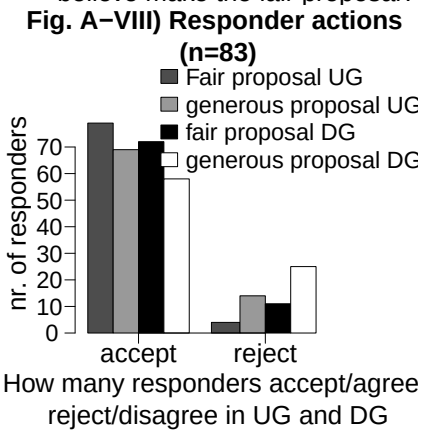


C2. Overall behavior and beliefs across protocols - dictator vs. ultimatum game









D. Purely procedural concerns

In this appendix we suggest some purely procedural aspects in which the two alternative procedures which subjects face in our procedural choice experiment differ. The purely procedural choices we observe might be preferences over some of these aspects.

Information and simplicity. Take the first pair of procedures, i.e. the mini yes-no and the mini ultimatum game. In the mini yes-no game, neither player knows how the other moves, that is, both players are equally well off in this respect. In the ultimatum game, the proposer does not know how the responder will decide whereas the responder knows which proposal was made. Therefore, in terms of information, the mini yes-no game treats both players more *equally*, or *fairly* than does the ultimatum game. In the ultimatum game, however, all previous moves are known at each decision node and it is always *transparent* how the game proceeded up to that node. Therefore, the ultimatum game may be argued to be more transparent than the yes-no game. Moreover, the procedures differ in *simplicity*. We express the simplicity of a procedure by the number of eventualities a player needs to think about. In the yes-no game, each player has to think about the two moves of her own, and the two moves of the other player. Therefore, each player in a yes-no game has to think about altogether only four possible combinations of moves ('pure strategies'). In the ultimatum game, each player has to think about the proposer's two moves, and the responder's two moves given each proposal. Altogether, each

player needs to think about six possible combinations of moves. In these terms, the yes-no game is *simpler* than the ultimatum game. We will test experimentally whether choices of the yes-no game link to a moral concern about players' rights (of information), or instead, to simplicity ratings of that game.

Freedom of choice. Take the second pair of procedures, i.e. the mini-dictator and the mini ultimatum game. In each game, each player has to reason about the two moves of the proposer, and the two moves of the responder before she comes to a conclusion about the outcome-relevance of these moves. Since both games require a player to reason about the same number of items, the two games can be claimed equally simple. Moreover, both games distribute information unequally between the players: the proposer does not know how the responder will decide but the responder knows how the proposer has decided. Yet, the two games grant players a different freedom of choice which we measure by the number of distinct/effective moves[38]. In the mini ultimatum game, each player has two such moves. In the mini dictator game, the proposer has two such moves but the responder only one which leaves him no freedom of choice (Sugden 1998). In terms of freedom to choose, the ultimatum game treats players more *equally*, or *fairly* than the dictator game.

Freedom of kind choice. The situation is different if one does not only compare the number, but also the nature of these effective moves. The proposer's freedom of choice is restricted to *kind* moves – she has zero unkind options and cannot harm or punish the responder. In the dictator game, the responder has no unkind option either while in the ultimatum game, she can act unkindly and exert her veto which destroys the pie. In terms of *unkind options*, the dictator game therefore treats players more equally than the ultimatum game. However, since the dictator game denies both players any unkind move and does not allow for the destruction of the pie, it is also the more efficient procedure. Individuals may like the idea of an efficient procedure which cannot destroy surplus that has been generated by kind actions. Again, we will test experimentally whether the dictator game is preferred to the ultimatum game out of moral concerns about individuals' rights, or not (efficiency). Fig. 1 summarizes our discussion of potential purely procedural differences between our allocation procedures. Next, we present our experimental design.

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[38]Two actions a and a' in an action set of a given node h are distinct, i.e. 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).

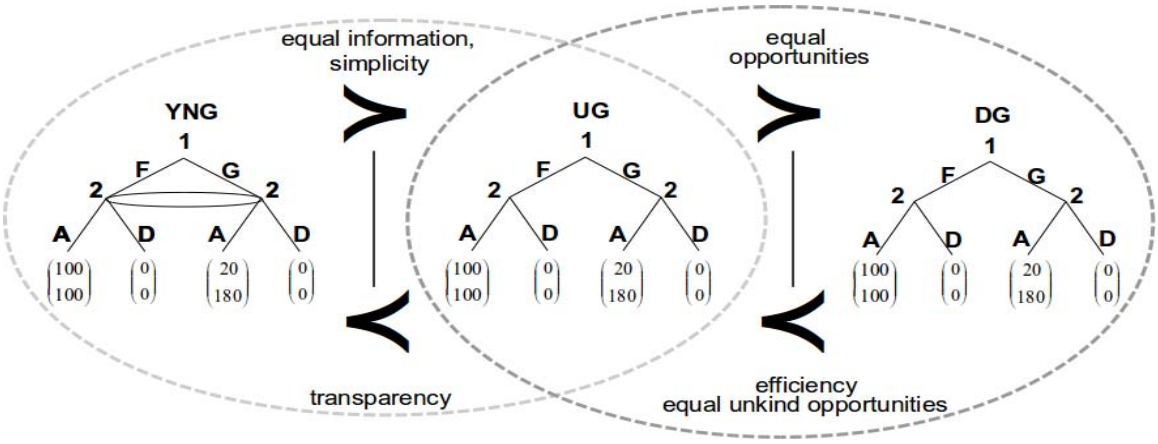

Figure 5: Purely procedural differences between our two pairs of games.

E. Predictions of the sequential reciprocity equilibrium, Dufwenberg and Kirchsteiger (2004)

Proposition (YNG). *There is a unique equilibrium. The proposer (all types) proposes F. A responder with sensitivity to reciprocity $Y_R \leq 1/40$ accepts with probability one, a responder with $Y_P > 1/40$ accepts with probability $q = \frac{1}{40Y_R}$.*

Proof. The responder has a single efficient strategy (see Dufwenberg and Kirchsteiger, 2004, pp. 276): to accept with probability one. Therefore, the responder R is commonly known to be unkind towards the proposer P. The responder's kindness towards the proposer is captured by variable κ_{RP} where kindness is associated with a positive value and unkindness associated with negative value. By the above argument, $\kappa_{RP} \leq 0$.

Given acceptance rate q, the proposer's pecuniary payoff for proposing F is $100q$ and that for proposing G is $20q$. The responder's respective payoffs are $100q$ and $180q$. The proposer proposes F if the payoff for doing so (on the left-hand side of the following inequality) is greater than the payoff of proposing G (on the right-hand side)

$$100q + Y_P\kappa_{RP}(100q - \frac{100q+180q}{2}) > 20q + Y_P\kappa_{RP}(180q - \frac{100q+180q}{2})$$

where the parameter Y_P is the proposer's sensitivity to reciprocity, $(100q - \frac{100q+180q}{2})$ and $(180q - \frac{100q+180q}{2})$ measure the proposer's kindness κ_{PR} of proposing F and G, respectively. Since κ_{RP} is non-positive, the responder maximizes her payoff by proposing F.

The responder accepts if the payoff of accepting (the left-hand side of the following inequality) is greater than that of rejecting (on the right hand side)

$$100 + Y_R \times 0 \times \kappa_{PR} > 0 + Y_R \times (-100) \times \kappa_{PR}$$

where $\kappa_{PR} = \frac{100q-180q}{2} < 0$. The inequality simplifies to$Y_R < \frac{1}{40q}$. If to the contrary $Y_R > \frac{1}{40q}$, then

the responder rejects the fair proposal. Notice that in equilibrium, the proposer must have correct beliefs about the rejection rate. Thus, in equilibrium the responder never rejects with probability one. The responder with sensitivity to reciprocity $Y_R \leq 1/40$ accepts with certainty and a responder of specific sensitivity $Y_R = \frac{1}{40q}$ is indifferent and accepts with probability $q = \frac{1}{40Y_R}$. *QED.*

Proposition (UG). *Under the restriction $q_F = q_G$, there is a unique equilibrium where $q_F = q_G = 1$. The proposer (all types) proposes F. A responder with sensitivity to reciprocity $Y_R \leq 1/40$ and accepts with probability one. (The proposer must expect $Y_R \leq 1/40$ with probability one).*

Proof. As in the yes-no game, the responder can only be neutral or unkind, $\kappa_{RP} \leq 0$. Given the acceptance rates q_F and q_G of the fair and the generous proposal respectively, the proposer's pecuniary payoff for proposing F is $100q_F$ and that for proposing G $20q_G$. The responder respective payoffs are $100q_F$ and $180q_G$. The proposer proposes F if $100q_F + Y_P\kappa_{RP}(100q_F - \frac{100q_F+180q_G}{2}) > 20q_G + Y_P\kappa_{RP}(180q_G - \frac{100q_F+180q_G}{2})$, i.e. if

$$100q_F - 20q_G > Y_P\kappa_{RP}[180q_G - 100q_F].$$

Three cases: (1) $q_G < 5/9q_F$. In this case, the proposer prefers F if

$$Y_P < \frac{100q_F - 20q_G}{\kappa_{RP}(180q_G - 100q_F)}.$$

(2) $5q_F \geq q_G \geq 5/9q_F$. (this includes the case $q_F = q_G$). In this case, the proposers of all sensitivities Y_P prefer F. (3) $5q_F < q_G$.In this case the proposer prefers F if $Y_P > \frac{100q_F-20q_G}{\kappa_{RP}(180q_G-100q_F)}$.

We are interested in predictions under the restriction that the responder is expected to accept both proposals with equal probability, $q_F = q_G$ (this is something we control for by eliciting beliefs). In this case the proposer always proposes F. The responder who expects that the fair proposal is proposed accepts if $Y_R < \frac{1}{40q_F}$. By the same argument as above, the responder accepts with certainty if $Y_R < \frac{1}{40q_F}$, i.e. in equilibrium where beliefs are correct $Y_R < \frac{1}{40}$. There is no pure strategy equilibrium where the responder rejects with certainty. Yet, given a commonly known sensitivity type Y_R, there is a mixed strategy equilibrium where the type $Y_R = \frac{1}{40q_F}$ is indifferent and accepts with probability $q_F = \frac{1}{40Y_R}$).

Let us finally verify that it is optimal to accept G with probability $q_G = q_F$. Acceptance is preferred if

$$180 + Y_R \times 0 \times \kappa_{PR} > 0 + Y_R \times (-20) \times \kappa_{PR}$$

where $\kappa_{PR} = \frac{180q-100q}{2} > 0$ and thus acceptance is always preferred. The unique equilibrium under our restriction $q_F = q_G = 1$ where responder is of type $Y_R \leq 1/40$. *QED.*

Proposition (Procedural indifference). *If $q_F = q_G = 1$, each player is indifferent between whether UG or YNG is used/played.*

Proof. If $q_F = q_G = 1$, the proposer proposes F and the responder accepts with certainty. Thus. the responder's equilibrium payoff equals $100 + Y_R \times \kappa_{RP} \times \kappa_{PR}$ where both in the YNG and in the

UG, $\kappa_{RP} = 0$ (the responder is neither kind or unkind). Thus the expected payoffs are equal in both games. It is easy to verify that the same argument implies that also the proposer payoffs are equal in the two games.

In the dictator game, the responder cannot influence the payoffs, so he can only be neutral $\kappa_{RP} = 0$. Thus the proposer receives the same payoff in the UG and in the DG, so does the responder. Therefore, there is procedural indifference between the two procedures if $q_F = q_G = 1$. *QED.*