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Sharing the Fruit of Labor: Flexible Application of Justice Principles in an Ultimatum Game with Joint-Production

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Abstract Individuals often need to negotiate how to distribute jointly produced goods—equally (e.g., 50:50) or equitably (e.g., proportionally to their contributions). We examined whether people have stable preferences, or whether they switch between equality and equity in different situations. Pairs of anonymous participants first produced a common pie, and then distributed it in an ultimatum game. Results suggest that individuals apply different justice principles depending on their contribution. When they produced less than 50%, proposers divided the pie equally. However, when they produced more than 50%, their offers fell between equality and equity. Responders' ratings of fairness and satisfaction varied similarly; with low production, equality was preferred, whereas with high production, equity was preferred. Nevertheless, equal and equitable offers were generally accepted, and only outright unfair offers were rejected. This suggests that individuals are relatively flexible about *which* justice principle should be applied, but punish proposers whose offers violate both principles.

Keywords Entitlement · Equality · Equity · Joint-production · Justice principles · Ultimatum game

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Introduction

Alex and Sam were young, dynamic, and optimistic when they started a company together. They quickly established the right contacts in the market and developed a high-quality, successful product. When after a few years a buyer offered a good price for their company, the two friends were happy to make the deal. However, when Alex proposed to share the pie 60/40, things quickly turned sour. What do individuals consider fair in a situation where both contribute to a shared good, and both have a say in its distribution?

Several justice principles may be applied to this kind of situation, in particular, equality or equity (Homans, 1961; Adams, 1965; Deutsch, 1975). With equality, goods are distributed evenly, and with equity, goods are distributed according to individuals' inputs. These principles generate expectations about the fair distribution of goods. However, there may be considerable variation in what is considered fair, because different justice principles can be applied to the same situation. This is because individuals may consider different inputs as sources of entitlement when judging the fairness of their own situation or between others, such as the efforts invested in the production of a good, contributions to the effective productivity, transaction histories between individuals, positions, ownership, property rights, and laws (Kahneman, Knetsch, & Thaler, 1986b). These sources of entitlement can be called upon to apply different justice principles. For example, in a situation where individuals of similar status invested different amounts of effort, Sam may focus on status and distribute goods equally, whereas Alex may focus on effort and distribute goods equitably.

A discrepancy between an individual's expectation and what he or she is offered results in perceptions of injustice (Greenberg & Cohen, 1982). This has dramatic emotional and behavioral consequences. For example, perceived injustice is a primary source of anger and other negative emotions towards individuals and companies (Mikula, Scherer, & Athenstaedt, 1998; Szymanski & Henard, 2001). It also leads individuals to decrease their effort (Gächter & Thöni, 2010) and to punish responsible others (Fehr, Goette, & Zehnder, 2009). In contrast, experiencing fairness increases subjective happiness and activates reward regions in the brain (Singer, Kiebel, Winston, Dolan, & Frith, 2004; Tabibnia & Lieberman, 2007). Given the impact of fairness perceptions on emotions, motivation, and behavior, it is fundamental to better understand how individuals utilize justice principles, and what they perceive as fair.

A situation with conflicting entitlements and joint decision-making power may be approached in several ways. It may be sufficient for a proposed distribution to correspond to any justice principle to be considered fair, allowing one party to select the justice principle that best fits his/her interests in any particular situation. Or, individuals may be wed to a particular justice principle (e.g., equality), and show similar behaviors regardless of the particular situation. Existing research cannot tell us which possibility is more likely. In particular, some studies on behavior in the ultimatum game (UG; Guth, Schmittberger, & Schwarze, 1982) and its variant, the dictator game (DG; Kahneman, Knetsch, & Thaler, 1986a; Forsythe, Horowitz, Savin, & Sefton, 1994) suggest that justice principles may vary across individuals,

while others suggest that justice principles vary across situations. After a brief review of this research, we describe the current study, in which we analyze the application of justice principles with repeated UGs and varying entitlements based on the invested effort in creating a joint pie.

Entitlements and Justice Principles in the DG and the UG

The UG and the DG have been extensively used to study individuals' perception of fairness. In both games, one of the players (dictator or proposer) is endowed an amount of money to split between herself and another player. In the DG, the other player (receiver) is passive. In the UG, however, the other player (responder) can accept or reject the proposed distribution. In case of a rejection, neither player receives goods.

Unlike dictators in the DG, proposers in the UG must anticipate the entitlements of the responder who has the power to reject an offer that is viewed as unfair (Bolton & Zwick, 1995). In other words, both players have decision-making power that can affect both partners' outcomes. Offers in the UG are generally higher than in the DG (for a review, see Camerer, 2003), indicating that proposers take into account that responders feel entitled to a certain share of the pie. Responders' emotions and their decisions to reject an offer depend on the offer itself (Pillutla & Murnighan, 1996; van't Wout, Kahn, Sanfey, & Aleman, 2006), and on additional factors, such as attributions of intentionality (Blount, 1995).

In the classical version of the games, there is no clear manipulation of entitlements to justify an unequal distribution, and, across cultures, individuals show an aversion to inequality (Henrich et al., 2006). Inequality aversion is also prevalent in children (Almas, Cappelen, Sorensen, & Tungodden, 2010) and has been observed in other species (Brosnan & De Waal, 2003; Range, Horn, Viranyi, & Huber, 2009). The ability to distinguish between sources of entitlement seems to emerge later in adolescence (Almas et al., 2010). It is also observed in a few primate species, suggesting that the sensitivity to entitlements and injustice has evolutionary roots (Scherer, 1992; Glimcher, Camerer, Poldrack, & Fehr, 2009).

The importance of entitlements for individual's expectations about fairness becomes evident, firstly, in research with a systematic manipulation of dictators'/proposers' entitlements. For example, dictators and proposers take more of the pie when they have earned it (e.g., through performance in a quiz), when they earned the right to be in their position, and when they have property rights over the pie (Hoffman, Mccabe, Shachat, & Smith, 1994; Hoffman, Mccabe, & Smith, 1996; Cherry, Frykblom, & Shogren, 2002; Leliveld, Van Dijk, & Van Beest, 2008; Oxoby and Spraggon, 2008).

Secondly, studies varying the entitlements of the recipient/responder show that individuals are sensitive to others' entitlements. For example, dictators take bigger pie shares when they play with recipients who won a large pie by chance compared to when they play with skilled recipients who earned a large pie by performance, suggesting that they consider effort and skills as appropriate sources of entitlement, but not luck (Ruffle, 1998;Oxoby & Spraggon, 2008). The importance of taking into

account others' entitlements is also evident in studies on the social distance between players. For example, in the DG, dictators take more when awareness of the other player is reduced due to anonymity (e.g., playing with an individual in a different room, no knowledge of others' names; e.g., (Bohnet & Frey, 1999; Charness & Gneezy, 2008) or due to a lack of realism (e.g., subjects' doubts about the presence of another person; (Frohlich, Oppenheimer, & Kurki, 2004). The importance of others' entitlements is also evident in research on coalition formation where the mean division of a resource reflects a compromise between different justice principles (see review in Komorita & Chertkof, 1973).

While entitlements have been examined for both the UG and the DG, research on the variability of preferences for justice principles has primarily focused on the DG. In a study on individual differences (Cappelen, Hole, Sorensen, & Tungodden, 2007), the authors describe three groups of subjects characterized by different behaviors (see also Almas et al., 2010). Egalitarian individuals believe that all inequalities are unfair. In contrast, libertarian and meritocratic individuals deem some inequalities justified. For meritocratic individuals, only inequalities that arise from factors under individual control (e.g., efficiency, achievements) are acceptable, whereas libertarian individuals judge that factors determined by chance also represent legitimate sources of entitlement, and thus inequalities. In the study by Cappelen et al. (2007), individuals showed little variation across situations, but there were only two rounds of the game, which may not have been sufficient to capture variability across situations.

Other DG research has found that the application of justice principles varies across situations. A common finding from the DG is that individuals appear to have a selfish bias when distributing earned goods to people they do not know; individuals who perform poorly apply an equality principle, and individuals who perform well apply an equity principle (Frohlich et al., 2004; Rodriguez-Lara & Moreno-Garrido, 2010). This is consistent with the idea that individuals have an egocentric bias in judgments of fairness (Messick & Sentis, 1979; Thompson & Loewenstein, 1992; Loewenstein, Issacharoff, Camerer, & Babcock, 1993; Babcock, Loewenstein, Issacharoff, & Camerer, 1995), and that individuals approach coalition formation problems with a self-serving bias based on the strength of their position (Komorita & Chertkof, 1973). In contrast, the existence of a social bond between players may reverse the selfish bias. In a face to face interaction, individuals may aim to appear humble and polite by suggesting equal splits when they perform well, and equitable splits when they perform poorly (Mikula, 1980; Schwinger, 1980). Similar tendencies may occur when future interactions are expected between players (Shapiro, 1975).

The reviewed research demonstrates that individuals may be biased in which justice principle they select, but the nature of this bias is not entirely clear, because most studies employed only one-shot games in between-subject designs. Individuals may continue to apply a particular justice principle once selected, suggesting that the bias is only an initial process that increases the salience of a particular justice principle that is later maintained (e.g., to maintain personal integrity across situations). Alternatively, individuals may flexibly switch back and forth between justice principles to achieve an advantageous outcome in each situation. To examine the flexible application of justice principles, a within-subject design with several

rounds of the game is required. Also, in previous studies, the entitlement of only one player was varied (e.g., Ruffle, 1998), or only one player had decision-making power (e.g., Frohlich et al. 2004). It has not been examined how players negotiate the conflict between their perceived entitlements in a situation where both players make different contributions to a shared pie, and both have decision-making power in the distribution of this jointly produced good. This scenario is particularly relevant to real-life situations, as illustrated in the example above. Hence, the present study was designed to investigate this question.

Present Study

In the current study, we examine which justice principle individuals select to solve the conflict between perceived entitlements in joint decision-making situations. Similar to previous studies (Ruffle, 1998; Gantner, Guth, & Konigstein, 2001; Frohlich et al., 2004; Cappelen et al., 2007; Oxoby & Spraggon, 2008), production-based entitlements were created through a joint-production phase preceding the UG. Ostensibly, pairs of participants performed a math quiz in which cumulative performance determined the size of the pie that was later distributed between the players in the UG. In reality, each participant played with a computer. In a within-subjects design, we programmed the computer's production to be lower than that of the participant in four trials, and higher than that of the participant in four different trials. Following the production and for each of the low and high production conditions, participants were assigned to be in one trial the proposer or in three trials the responder. Proposers were asked to offer a split. Responders were asked to accept or reject three different splits: an equitable split (i.e., proportional to productions), an equal split (i.e., 50:50), or an unfair and unfavorable split (i.e., 90:10). In addition to accept/reject decision, participants also judged the fairness of and their satisfaction with the three types of splits. This resulted in a 2 (production: low, high) by 4 (proposer, responder equity, responder equality, responder unfair) within-subjects design (Table 1). The order of the eight trials was determined at random for each participant.

Several types of proposer behavior can be hypothesized. First, in case of a selfish bias (Frohlich et al., 2004; Rodriguez-Lara & Moreno-Garrido, 2010), proposers would apply an equality norm and divide the pie equally when they contribute less

Table 1 Experimental design

Position (offer): (% of the pie)	Distribution			
	Proposer	Responder (Equality)	Responder (Unfair)	Responder (Equity)
Production				
Low (<50%)	$N = 34$	$N = 36$	$N = 37$	$N = 36$
High (>50%)	$N = 28$	$N = 25$	$N = 25$	$N = 25$

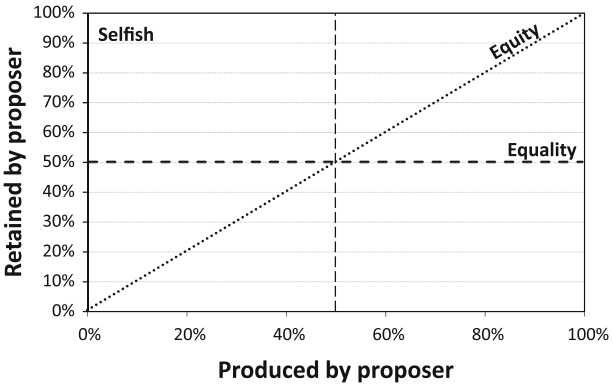

Fig. 1 Schematic representation of proposers' behavior in relation to different justice principles

than the other player, and they would apply an equity norm and divide the pie proportionally to productions when they contribute more.

Alternatively, individuals may show stable preferences for particular justice principles (Cappelen et al., 2007). The preference may be due to individual differences (e.g., stable preference for equal splits regardless of the particular entitlements), or due to the maintenance of an initially advantageous principle (e.g., stable preference for equal splits following low performance in the first round). In Fig. 1, equitable splits are represented by a dotted line and equal splits are represented by a dashed line, whereas selfish offers are indicated by offers above both lines.

Two types of responder behavior can be expected. First, participants may show a similar selfish bias as proposers and prefer the most advantageous justice principle in each situation. This would result in participants accepting equal splits and rejecting equitable splits in the low production, but accepting equitable and rejecting equal splits in the high production condition. Second, participants may accept offers that conform to one of the justice principles (equality or equity) and only reject outright unfair offers that violate all justice principles. This would result in participants accepting equal and equitable splits irrespective of the production condition.

Method

Subjects

Thirty-one students (16 men, mean age 24, range 19–29) from the University of Geneva participated in this study in return for payment. Of an initial sample of 33, data from two subjects could not be recorded and analyzed due to computer failure.

Procedure

Groups of 16 and 17 participants were recruited. On arrival, participants received detailed information about the study before signing consent forms. They were then

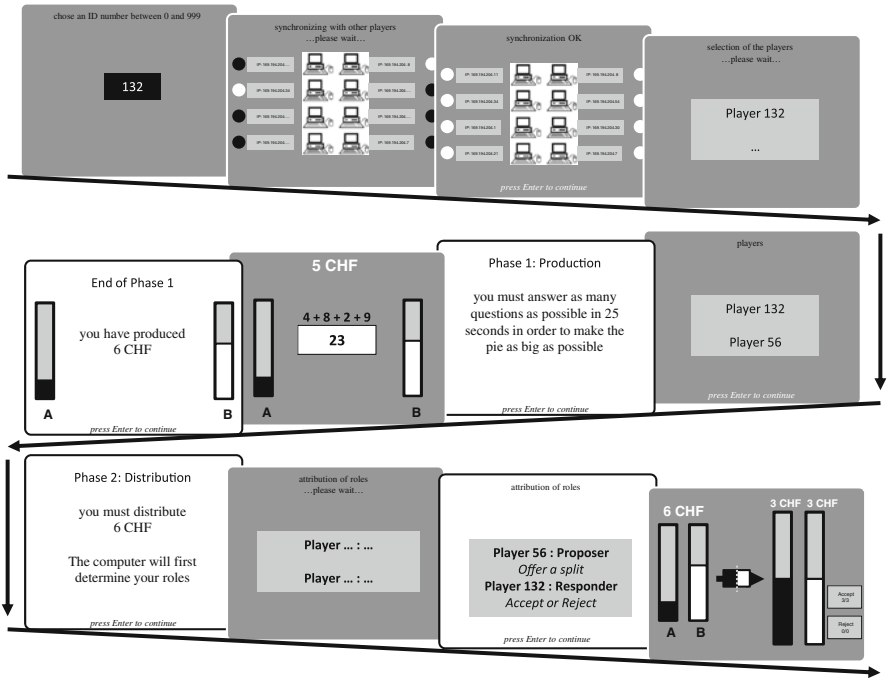

Fig. 2 Participants' screens for a round of the task (i.e., production and distribution). Participants first choose a number that will identify them throughout the experiment. Then, they go through a series of "synchronization" animations aimed at increasing the realism of our random matching with different anonymous players located in the other room. Thus, the first screen is shown only once per participant, whereas the other screens are presented in each of the eight rounds. Each round comprises five steps: (i) matching and synchronization with other players; (ii) random matching with a specific partner; (iii) production; (iv) random allocation of roles; (v) distribution

divided in two groups and directed to different rooms to preserve anonymity and realism about the study (e.g., Hoffman et al., 1994; Frohlich et al., 2004). Participants were told that they would play eight rounds of a two-phase interactive game with different partners, all situated in the other room. To reduce subjects' doubts about the interactions with other players, we used an animation depicting the connection process of the computers' interaction (Fig. 2). The production and distribution phases of the game were carefully explained, as well as the monetary reward structure.

Measures

Production Phase

Each participant and his or her presumed partner were asked to solve as many simple mathematical operations as possible in 25 s. For each correct answer of either the participant or his or her presumed partner, 2 CHF were added to the pair's common pot. However, in case of an incorrect answer, or if no answer had been

given within 5 s, 2 CHF were removed from the common pot. Throughout the production phase, continuous feedback indicated the precise size of the joint-production in CHF (i.e., the sum of CHF earned by both players, constituting the shared pie to be split in a subsequent UG), while each player's performance/production was represented via a colored graphical display. In other words, at each moment of the production phase, participants knew exactly how much money was in the shared pie, but they could only get a rough estimate of whether they performed better or worse than the other player, and thereby of their absolute (in CHF) or relative (in %) contribution to the joint pie.

To manipulate the Production condition, we programmed the computer representing the presumed partner to perform better than the participant in the four low production trials, and worse in the four high production trials respectively, with a random trial order. The two performance/production conditions were created by adjusting the presumed partner's performance online using a self-made algorithm. After each math operation, the computer's performance was adjusted by adding or subtracting a number of points (pseudorandom between 0 and 3) to the actual participant's performance. Presuming that participants' performance would not change drastically throughout the 25 s math quiz, adding points to the computer results in a low performance condition for the participant, and subtracting points from the computer in a high performance condition for the participant.

Distribution Phase (UG)

On proposer trials, participants indicated their offers on a slider that they could move freely between zero and the total amount of the pie. On responder trials, the computer was programmed to make one of three offers in random order: an equal offer (50:50 split of the pie), an equitable offer (i.e., production-based split of the pie) and an unfair offer (10 and 90% of the pie for the participant and his or her presumed partner, respectively). Responders' reactions to different offers were assessed with three indicators. First, we asked participants to accept or reject the offer. After their choice, they were then asked to rate the perceived satisfaction with the proposed split on a scale from 0 (not at all) to 10 (very much). Half of the participants made satisfaction ratings, and the other half made both fairness and satisfaction ratings.[1] Although outcome fairness and favorability are often correlated (Cohen-Charash & Spector, 2001), differences in people's judgments of fairness and satisfaction suggest that they may actually reflect distinguishable psychological constructs (van den Bos, Wilke, Lind, & Vermunt, 1998; Skitka, Winquist, & Hutchinson, 2003). In particular, fairness judgments appear to be governed by an expectation matching proposition, whereas satisfaction judgments are determined by the value of the actual outcome to the individual (Cherry, Ordonez, & Gilliland, 2003).

[1] There was no difference between the first and the second half of participants with regards to proposers' offers and responders' decisions and satisfaction ratings (all T's < 1). Hence, this additional rating did not affect behavior.

Results

Preliminary Considerations

Out of 248 observations, 18 trials had to be re-assigned from the high to the low production condition, because participants' performance during the math quiz declined more strongly than the algorithm used to reduce the computer's performance, and to thereby generate a high production condition for the participant. Similarly, two trials did not correspond to any condition because participant and computer performance did not differ, which means that participant produced exactly 50% of the pie, such that equality and equity could not be dissociated. As a result, the sample sizes in different conditions varied between 25 and 37 (Table 1).

On average, the common pie was CHF 4.4 ± 2.0. A repeated measures ANOVA showed that there was a main effect of production condition (low vs. high), $F(1,27) = 354$, $p < .001$), but no effect of role (proposer vs. responder), and no interaction. The common pie was smaller in the high (CHF 3.0) compared to the low (CHF 5.5) production condition, $F(1,27) = 354$, $p < .001$. To control for differences in pie size, further analyses were conducted on the percentages of the pie. Participants' production was higher in the high (66%) compared to the low (31%) production condition, $F(1,27) = 456.42$, $p < .001$, but there was no effect of role and no production × role interaction. Importantly, participants' production differed from 50% of the pie in both the low and the high production conditions, $t(30) = 11.61$, $p < .001$, and $t(30) = 8.82$, $p < .001$.

Proposer Behavior

Across performance conditions, participants proposed on average a split that left them with 53% (± 12) of the pie with a modal offer of 50%, in line with previous studies (for a review, see Camerer, 2003). As predicted, offers were affected by production. The proportion of the pie that proposers wanted to keep correlated positively with their production, $r = .32$; $p = .014$ (Fig. 3a). Put differently, proposers retained less in the low (49%) compared to high (57%) production condition, $t(27) = 3.53$, $p < .01$.

To examine whether offers differed significantly from equality, we compared offers to 50%. To test whether offers differed from equity, we calculated the difference between the percentage of the pie produced and the percentage retained, and compared this value to zero. Differences across production conditions at the group level would indicate a flexible application of justice principles. In contrast, the absence of this effect would indicate stable preferences, which could then be further analyzed for whether they reflect the maintenance of an initially advantageous justice principle, or individual differences that are entirely independent of performance condition.

In the low production condition, offers did not differ from equality, $t < 1$, ns, but deviated from equitable splits, $t(27) = 6.3$, $p < .001$: proposers retained more than they had produced. Results were rather different in the high production condition,

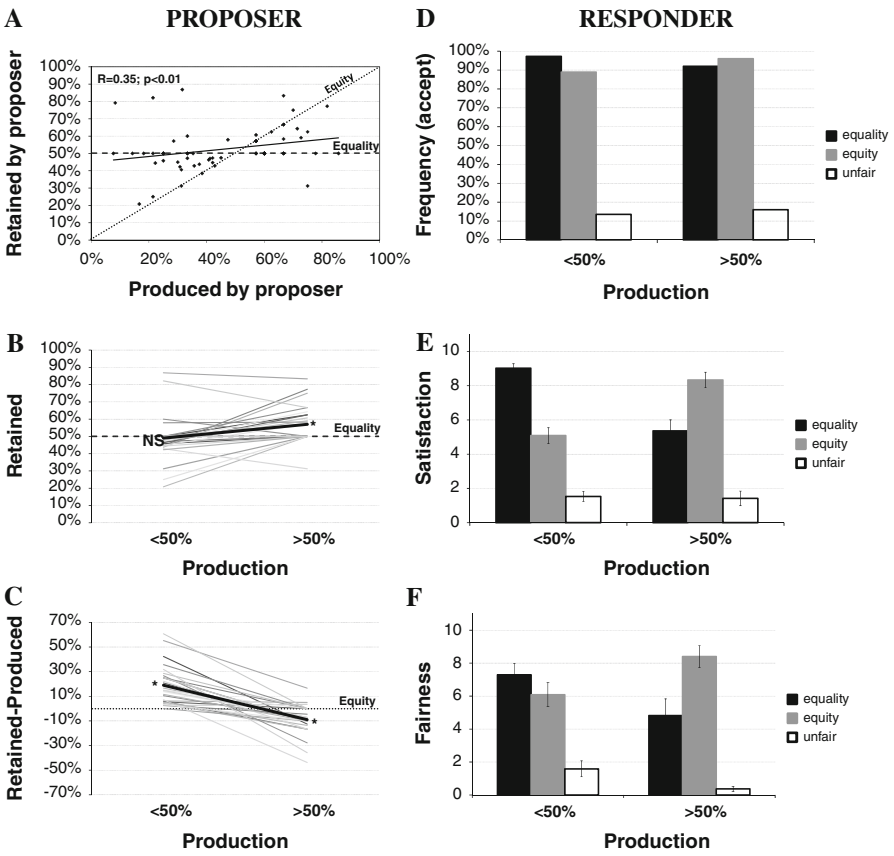

Fig. 3 Results. Proposers' behavior: Proportion of the pie retained relative to the proportion produced (**a**). Individuals' offers (% retained) in the low and in the high production conditions relative to the equality line (**b**). Individuals' offers (% retained minus % produced) in the low and in the high production conditions relative to the equity line (**c**). Responders' behavior: Frequency of "accept" decisions (**d**), and ratings of satisfaction (**e**) and fairness (**f**) for the three types of offers in the low and in the high production conditions. For satisfaction (**e**) and fairness (**f**), *error bars* represent standard errors

where offers differed from both equality, $t(27) = 3.36$, $p < .01$, and from equity, $t(27) = 3.9$; $p < .001$: participants retained more than 50% of the pie, but relatively less than their production (Fig. 3b, c).

Further analyses showed that offers diverged less from equality in the low than in the high production condition (−.01, .07), $t(30) = 3.49$, $p = .002$. In contrast, differences from the equity principle were bigger in the low (.19) than in the high production condition (−.09), $t(30) = 7.92$, $p < .001$.

Responder Behavior

A main effect of offer showed that participants rejected offers that were disadvantageous and objectively unfair more often (85%) than equitable (8%) and

equal offers (5%), $F(2,181) = 109.88$, $p < .001$ (Fig. 3d). There was no effect of production on responders' acceptance decisions, and no offer × production interaction. Ratings of satisfaction and fairness with a proposed split were strongly correlated ($r = .94$, $p < .001$).

A main effect of offer, $F(2, 32) = 101.58$, $p < .001$, showed that satisfaction was higher for equal (7.3) and equitable (6.7) offers than for unfair offers (1.5), $t(24) = 7.7$, $p < .001$, and $t(23) = 11.5$, $p < .001$, whereas the difference between equal and equitable offers was not significant, $t(23) = .7$, $p = .49$. Follow-up analyses on a significant production × offer interaction, $F(2, 32) = 21.67$, $p < .001$ (Fig. 3e), revealed a selfish bias similar to the proposer. Specifically, in the low production condition, satisfaction with equal offers was higher (9.0) than with equitable offers (5.0), $t(29) = 9.11$, $p < .001$, or compared to satisfaction with equal offers the high production condition (5.4), $t(24) = 4.88$, $p < .001$. In contrast, in the high production condition, satisfaction with equitable offers was higher (8.3) than with equal offers (5.4), $t(19) = 3.56$, $p = .002$, or compared to satisfaction to equitable offers in the low production condition (5.1), $t(23) = 4.29$, $p < .001$. There was no difference in satisfaction with unfair offers in the low (1.5) and high (1.4) production conditions, $t(23) = .41$, $p = .682$.

Ratings of fairness showed a similar pattern (Fig. 3f), but perceived fairness of equitable splits in the low production condition was relatively higher (6.1). As a result, in the low production condition, perceived fairness of equal offers was not rated higher (7.3) than of equitable offers, $Z(11) = 1.18$, $p = .239$, but the difference compared to equal offers in the high production condition (4.8) was significant, $Z(10) = 1.96$, $p = .050$. In contrast, in the high production condition, fairness of equitable offers was higher (8.4) than of equal offers, $Z(8) = 2.39$, $p = .017$, and marginally higher compared to fairness of equitable offers in the low production condition, $Z(9) = 1.83$, $p = .067$. Additionally, unfair offers were rated as more unfair in the high (1.6) compared to the low (.4) production condition, $Z(10) = 2.41$, $p = .016$.

Discussion

In the current paper, we examined how individuals negotiate the conflict between their perceived entitlements in a situation where both parties contribute to a shared pie and both have decision-making power. With a repeated UG with joint-production, we examined whether individuals show stable tendencies to select a particular justice principle, or whether they select different justice principles in different situations. In support of the latter, we found that individuals apply justice principles flexibly depending on their relative contributions. When they performed worse than their (presumed) partner, participants proposed an equal split of the pie, and when they performed better, they proposed a split that would leave them with significantly more than the equal share. This indicates a selfish bias, consistent with findings from the DG with anonymous players (Frohlich et al., 2004; Rodriguez-Lara & Moreno-Garrido, 2010).

While offers in the high production condition differed significantly from equality, they also differed from the equity principle. This result may be explained by the need of the proposer to anticipate the responders' reaction. The responder in an UG may either go along with the justice principle suggested by the proposer, or may have a similar selfish bias. In the latter case, the proposer may need to adjust his/her offer to accommodate the responder's heightened expectations. The resulting offers thus represent a compromise between the conflicting entitlements of the proposer and responder. Such compromise may be necessary in order for the proposer to avoid rejection, which may be the only way for players to reach an agreement (Komorita & Chertkof, 1973). Our paper further contributes to the literature by examining the conditions in which a compromise between equality and equity is more likely to occur. Proposers may be aware of responders expectations particularly in situations where responders performed poorly, such that an equitable split would leave the responder with very little in spite of the effort invested in the production of the pie. Consistent with research on production-based entitlement (Ruffle, 1998), proposers were more generous in the UG when an equity rule would have resulted in a particularly low offer that could be rejected. From our data, it is not clear whether such behavior is due to a selfish strategic adjustment to avoid rejection (Van Dijk, De Cremer, & Handgraaf, 2004), or whether it reflects a truly generous consideration of the other's entitlement.

For a proposer, an equitable split would result in disadvantageous inequality in the low production condition, and in advantageous inequality in the high production condition. The fact that offers differed more from equity in the low than in the high production condition is consistent with the idea that individuals dislike disadvantageous inequalities more than advantageous ones (Fehr & Schmidt, 1999).

Because it is less sensitive to strategic thinking, as there is no need to take into account the other party's response, responders' behavior provides a complementary source of information about the motives underlying decisions in the UG. Similar to previous research (Cohen-Charash & Spector, 2001), satisfaction and fairness ratings were highly correlated in our study. Also, similar patterns of results were observed for the two ratings. When responders performed worse than the other player, satisfaction and fairness ratings were particularly high with equal splits, but when they performed better than the other player, satisfaction and fairness ratings were particularly high with equitable splits, consistent with a selfish bias. Nevertheless, responders accepted all offers that complied to an equity or equality norm, regardless of whether these offers were advantageous or disadvantageous to them. In contrast, they rejected outright unfair offers that violated both justice principles.

The difference for satisfaction/fairness ratings on the one hand and acceptance rates on the other hand may have various reasons. First, it may reflect a higher sensitivity of the former measure. This could be due to scale properties (continuous vs. dichotomous). In future research, a continuous measure of responders' behavior may provide a more sensitive measure. For example, the minimum acceptable offer (MAO) could be used. However, participants sometimes accept offers that are below their MAO, suggesting that they may be more demanding when stating hypothetical MAOs than when actually deciding (for example, see (Blount &

Larrick, 2000; Camerer, 2003; Brandts & Charness, 2011). Instead of measures using hypothetical decisions, continuous behavioral measures may be more appropriate, such as continuous measure of approach and avoidance using joystick methodology (Rinck & Becker, 2007). Future research is needed to examine whether a more sensitive measure of behavior would lead to similar results as the fairness/satisfaction ratings did in the current study, including different reactions to equitable and equal offers in high and low production conditions.

Second, differences between satisfaction/fairness ratings and acceptance rates may also reflect more profound differences between attitudes and different types of behaviors. One's satisfaction with an offer may not be reflected in a one-shot decision to accept or reject the offer, but may influence one's willingness to interact again with, trust, or cooperate with the same individual (Curhan, Elfenbein, & Xu, 2006). Including additional behavioral measures (e.g., a choice whether to interact with the same partner or not in future UGs) may result in a closer correspondence between satisfaction/fairness ratings and behaviors.

Third, the emotionally driven tendency to reject offers that are disadvantageous but comply with a justice principle may not be strong enough to counter the financial incentive to accept that offer. Reducing the motivating force of the distributed resource by varying the resource type may lead to a closer correspondence between fairness/reject ratings and accept decisions.

Finally, the dissociation observed here between responders' fairness/satisfaction ratings and their acceptance decisions may be a result of the pie sizes used in our study. Although there is evidence that large variations in pie size (e.g., from $10 up to $100, see Hoffman et al., 1996) do not affect behavior in the UG, to the best of our knowledge, no study to date has explored the impact of pie size on responders' ratings of fairness and satisfaction. In our study, pie size was significantly greater in the low compared to the high performance condition, because of the comparatively higher performance of the computer. One consequence is that on average, an equal offer was worth more money (in absolute CHF amount) in the low than in the high performance condition (50% of 7 CHF is more than 50% of 3 CHF), which could explain why equal splits were preferred in the low performance condition. The opposite was true for equitable offers, which differed in relative (%) but not necessarily in absolute (CHF) amount, such that equitable splits were not always economically more advantageous, and thus rated higher on satisfaction and fairness, in the high (e.g., 70% of 3 CHF) than in the low performance condition (e.g., 30% of 7 CHF). Although we partly controlled for differences in stakes by using fractions as a dependent measure in the analysis of proposer's offers, it was not possible to include pie size as a covariate in the ANOVAs examining the impact of offers and performances responders' ratings, because pie size varied across trials within individuals. Further studies are needed to address whether individuals' fairness/satisfaction ratings are affected by the absolute (CHF) and/or relative (%) amount associated with each type of offer, and whether this is influenced by production.

In our study with anonymous players, we find that the application of justice principles is flexible and selfish. Previous research suggests that when interaction partners are non anonymous, or when they expect future interactions, individuals may, instead of a selfish bias, show a generous bias (Shapiro, 1975; Mikula, 1980;

Schwinger, 1980). Further research is needed to examine whether generous behavior is stable or flexible across different situations. Further studies could also address the generalizability of the present results to non student samples, and also across ages and cultures, as well as in real interactions.

Conclusions

In this paper, we used an UG with joint-productions to examine how individuals apply equality and equity justice principles in a situation where both parties contribute to a shared good and both have decision-making power in the distribution of this good. Our results show, using a within-subject design, that individuals show flexible behavior and preferences for equality and equity, depending on their relative production. They selfishly select the most advantageous justice principle in any situation: equality when their production is low, but not when their production is high. In cases where an equitable split would lead to a particularly disadvantageous outcome for the other party, individuals adjust their offers generously: they trade-off equal and equitable splits. Despite the incongruent views of proposers and responders due to similar selfish biases, it seems that proposers adjust their offers to responders' expectations. Responders show a similar selfish bias as proposers in their judgments of satisfaction and fairness but not in their acceptance decisions. They prefer equal splits when their production is low, but equitable splits when their production is high. Nevertheless, they accept all offers that comply with an equality or equity principle, and only reject outright unfair offers that violate both justice principles. This shows that individuals are flexible about *which* justice principle is applied, but inflexible in their demand for (some type of) justice.

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