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# Procedural justice in children: Preschoolers accept unequal resource distributions if the procedure provides equal opportunities

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ABSTRACT

When it is not possible to distribute resources equitably to everyone, people look for an equitable or just procedure. In the current study, we investigated young children's sense of procedural justice. We tested 32 triads of 5-year-olds in a new resource allocation game. Triads were confronted with three unequal reward packages and then agreed on a procedure to allocate them among themselves. To allocate the rewards, they needed to use a "wheel of fortune." Half of the groups played with a fair wheel (where each child had an equal chance of obtaining each reward package), and the other half played with an unfair wheel. We analyzed children's interactions when using the wheel and conducted an interview with each child after the game was over. Children using the unfair wheel often decided to change the rules of the game, and they also rated it as an unfair procedure in the interview. In contrast, children who played with the fair wheel were mostly accepting of both the outcome and the procedure. Overall, we found that children as young as preschool age are already sensitive not only to distributive justice but to procedural justice as well.



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## Introduction

Living and cooperating in a social group requires some agreement on how resources should be distributed. Justice and fairness in resource distribution can be achieved in two basic ways: distributive justice in allocating to each individual exactly what he or she deserves and procedural justice in allocating to each individual the opportunity to access resources that he or she deserves. An allocation procedure is fair if no one is disadvantaged or advantaged by it. This simple principle is the basis of many of the rules and norms we follow in our daily lives.

### *Distributive justice*

Children seem to care for distributive justice from very early on (Schmidt & Sommerville, 2011). However, their behavior is influenced by two crucial factors: self-affectedness and the presence of another individual. Self-affectedness can be investigated by comparing children's judgments and behaviors when they themselves can profit from a certain decision (first-party situations) with such situations where they decide for someone else or judge another individual's behavior (third-party situations). In the latter case, for example, Geraci and Surian (2011) found that toddlers prefer to see two recipients obtaining equal outcomes rather than unequal ones and prefer fair distributors who do not favor one recipient over the other. Interestingly, if children themselves are a recipient and asked to share, they report that they should share a resource equally already at 3 years of age but fail to act accordingly until 7 or 8 years of age (Smith, Blake, & Harris, 2013). The same pattern has been observed in another type of studies where children do not need to distribute a resource but can accept or reject a certain distribution. They reject unequal offers favoring another recipient but are fine with offers favoring themselves until 8 years of age (Blake & McAuliffe, 2011). There seems to be a norm of equality that is known by children from very early on. However, they fail to act accordingly until early school age.

A second variable that affects children's fairness behavior is the presence of another individual. Looking at the social influences on rejection of unequal distributions, McAuliffe, Blake, Kim, Wrangham, and Warneken (2013) found that children almost exclusively rejected the advantageous offer if the other receiver (the disadvantaged child) was present. Similarly, Shaw and Olson (2012) showed that already 6-year-olds overcome their self-serving bias and would throw a surplus resource away rather than keeping it for themselves if the experimenter is present and aware of the children's decision. Here the most likely motivation for their behavior seems to be reputation management. It is known that even younger children share more when another person is watching than when they are alone (Engelmann, Herrmann, & Tomasello, 2012). However, McAuliffe and colleagues (2013) pointed out that this is only one possible motivation that could not exclusively account for the behavior that the children showed in their studies. Paulus and Moore (2015), for example, suggested that children share resources because they anticipate the partner's negative emotions in case of an unequal share.

### *Procedural justice*

However, often we need to face situations in which simple distribution principles cannot be deployed because the "resource" cannot be split up (e.g., kickoff in sports), it is too scarce (e.g., more demand than tickets for a concert), or no equal split is possible. In these situations, fairness can also be reached by providing equality of opportunity. This can be achieved by using a procedure that provides everyone with the same chance (Rawls, 1971). Procedural justice of this type has been studied intensely in adults following the classic work by Thibaut and Walker (1975). Most studies have been conducted in the laboratory simulating legal dispute settings. Subsequent interviews with participants revealed a positive relation between their perception of procedural justice and satisfaction with outcomes. An undesirable outcome is more likely to be accepted if it is the result of a fair procedure. Since then, this "fair procedure effect" has been replicated many times (for a review, see Brockner & Wiesenfeld, 1996).

The focus of procedural justice research and the explanations concerning why and how it influences people's judgment and behavior have changed over the past decades (for an overview, see Tyler & Blader, 2003). A traditional account of distributive justice proposed that procedures were valued because they affected the outcomes associated with them. This view was shaken when later studies found non-instrumental factors influencing people's fairness judgments (Tyler, Rasinski, & Spodick, 1985). One common operationalization of procedural justice consisted in giving the participants voice in a decision process compared with a situation in which a decision was made without asking the people affected by it about their opinion. Lind, Kanfer, and Earley (1990) found that people rated a procedure to be fairer even when the opportunity for voice came after the decision was made and, hence, could not affect the potential outcome. The focus of procedural justice research turned to the more social features of procedures such as their interpersonal and "value-expressive" worth (Tyler, 1989). If a decision is made by an authority or a group and an individual is disadvantaged by a certain procedure, that individual would judge that procedure to be unfair. This is not only because of an unfavorable outcome but also, in the first place, because the individual was not treated with respect and as an equally entitled group member (Lind & Tyler, 1992). Tyler and Blader (2003) claimed in their group engagement model that the appreciation communicated by fair treatment also influences individuals' identification with a group and their willingness to cooperate.

Surprisingly, procedural justice has barely been studied in children. Recently, Shaw and Olson (2014) tested 6- and 8-year-olds in a third-party distribution task. In this task, children did not need to distribute a resource but rather needed to choose among distribution procedures (i.e., using a fair spinning wheel, using a biased wheel, or throwing the surplus resource away). They found that the older age group clearly preferred the fair wheel and rejected the unfair one. However, the younger groups showed this preference only in direct comparison—choosing between fair and unfair procedures—and did not reject the unfair wheel by throwing the resource away if these were the two options available. The authors suggested that all children understand the use of procedures to avoid unfairness if an equal split is impossible but that only older ones understand that a procedure needs to provide equality of opportunity to be fair and sensible.

Taking the perspective of social domain theory (Turiel, 1983), decision procedures have a conventional component (if an equal split is impossible, we use a procedure, e.g., the wheel of fortune) and a moral core (no one shall be disadvantaged). The younger children in Shaw and colleagues' (2014) study acted as if they knew the convention but did not know the moral purpose. However, we know from studies on moral development that preschoolers can distinguish between conventional and moral norms (Schmidt, Rakoczy, & Tomasello, 2012) and protest against moral transgressions (Vaish, Missana, & Tomasello, 2011).

It is possible that the norm that no one shall be disadvantaged is too abstract for preschoolers or they cannot link it to the concrete situation. One possibility to make it more salient is to put the children in a first-party situation in which their own outcome is at stake. It might be that they are more motivated to consider the features of a procedure that is disadvantageous for them under those circumstances. According to previous research on distributive justice, the prediction would be that young children would be likely to act selfishly and use the procedure for their own sake if possible. Shaw and colleagues (2014) confirmed this hypothesis in a study where they showed that school-age children are able to use a procedure to appear fair to an authority. Children in this study had the option to flip a coin to decide whether they themselves or another child would get the nicer one of two prizes. In the younger age group (6- to 8-year-olds), 37% of the children used this option. The majority, however, took the better prize for themselves without deploying any procedure to allocate the resources. In line with distributive justice results, most children chose the selfish option and did not even try to seem fair in the eyes of the authority of the experimenter. However, in this study children were confronted with an adult who was not affected by the children's choice. It is likely that they behave differently toward a peer who would be disadvantaged by an unfair procedure.

We expect procedural justice to be particularly salient in a social situation where several equal parties need to find a solution and there is a conflict of interest. Research on procedural justice in adults suggests that the effect is driven by the respect and appreciation communicated by a certain procedure—a component that is missing in the two described studies because the child is only a mediating

third party using the procedure and also is not an affected participant who needs to deal with the social and emotional consequences of unfairness.

In the current study, we formed groups of three children to create a situation that was complex enough to justify the use of a procedure. Compared with a dyad in which a disadvantaged agent can negotiate only with the advantaged one (in case of unequal distribution), in a group there is at least one more agent. This changes the social dynamic of the situation because coalitions can be built and the interaction does not collapse just because one member refuses to cooperate (Moreland, 2010). Recent work on sharing situations has shown that at 5 years of age, children are already able to involve a third party when they decide whether to share their resources (Paulus, Gillis, Li, & Moore, 2013). Conflicts about resource distributions are quite common among preschoolers, and young children are able to solve them without adult intervention (Killen & Turiel, 1991). In case of conflict, preschoolers resort to negotiation and cooperation to solve it (Iskandar, Laursen, Finkelstein, & Fredrickson, 1995).

In this study, we used a new approach to investigate children's perception of fairness aimed at unveiling whether preschoolers already are sensitive to procedural justice and whether they can use it to avoid or solve conflicts of interest within a group. If they do, they should accept a fair procedure even if it results in an unequal resource distribution. Confronted with an unfair procedure, they should reject either the procedure (by changing it) or the distribution (by redistributing the resources more fairly). To measure the reactions to our test situation, we created a rule change scale ranging from passive acceptance of the situation by the participants over attempts to change the situation to active rule changing as a solution that the whole group agreed to. To gain further information about how the children perceived the situation, we conducted interviews asking whether it was unfair or okay to use the wheel for a distribution decision. Again, if children have a sense of procedural justice, they should be able to recognize and report whether a certain decision procedure is unfair or not.

## Method

### *Participants*

Participants ($N = 96$) were randomly grouped into 32 same-sex triads ($M_{age} = 5$ years 6 months, $SD = 3$ months; 48 girls). Children came from mixed socioeconomic backgrounds and were recruited via urban day-care centers (where testing also took place). An additional 9 triads were tested but excluded because they either did not follow the instructions given ($n = 1$) or did not use the procedure they had been primed to use ($n = 8$). Among the latter, 5 groups were not interested in the stickers and played other games (e.g., hide-and-seek) instead, and 3 groups argued extensively without finding a solution and so the experimenter needed to end the test to resolve the situation.

### *Piloting*

In the pilot phase, we gave the children the option of rolling dice to decide who would get the bigger part of an unequally distributed resource. This is a procedure most of the children had experience with from other games, so it did not need much explanation. While piloting the manipulation of the procedure, it became apparent that the rigged die (advantaging one of the players) that we used to create an unfair procedure was not recognized as such by the children. For the actual study reported here, we let the children use a spinning wheel for the distribution, which needed more explanation at the beginning. This procedure was as readily accepted as the dice in the fair condition, and the inequality of chances of the unfair wheel was much more obvious, meaning that we could be certain that every child in the group recognized it.

We also piloted the procedure (spinning the wheel) with triads of 4-year-olds. Their behavior showed that they could not control the impulse to grab the desired sticker box long enough to first run a procedure like the wheel or the dice. We decided to proceed by testing only the 5-year-olds because impulse control is a crucial factor for solving social situations with conflicting interests (see Steinbeis, Bernhardt, & Singer, 2012).

*Material and procedure*

All groups went through a testing procedure with three phases (see Table 1). They started with an introductory phase in order to get to know the later decision procedure (wheel of fortune) together with the experimenter. In this phase, the children learned how to spin the wheel—that they needed to wait until it stopped moving and how to interpret the numbers and colors on it. The receivers of the resource distributed by the wheel were not yet the children themselves but rather little paper monsters, and the decision was only about which of them was first and not about unequal amounts of resources.

This was followed by a pretest phase in which the children needed to use the new procedure to distribute three reward packages among themselves. The children used the wheel to decide the order in which they would take the reward packages out of a box. Each of these contained two stickers, so no conflict of interest about the amount of resources occurred. In this phase, we wanted to see whether the children transferred their knowledge about the wheel from the previous game to a first-party situation in which they themselves were the receivers of the resource.

In the pretest phase, each package contained two stickers. For the following test phase, the children were confronted with an unequal distribution (three reward packages, two reward packages, and one reward package) to elicit a conflict of interest given that one child was advantaged by getting three stickers, one child was disadvantaged by getting only one sticker, and one child was in a neutral position by getting two stickers. In the introductory and pretest phases, all groups used a fair wheel of fortune. In the test phase, the decision procedure was manipulated by exchanging the fair wheel with an unfair one after the pretest.

*Introductory phase*

First, we played a priming game with the children in order to familiarize them with the procedure that we hoped they would choose for the test situation. We showed them three differently colored little paper monsters (blue, green, and yellow) and told them that the monsters were hungry and needed to be fed with marbles. The children would play six trials altogether, and in each of the six trials three marbles were taken out of the monster food box. A spinning wheel was used to decide the order of feeding. This wheel was divided into three same-size parts. Each part showed three colored fields of different sizes with numbers in it (big field = 1, middle field = 2, small field = 3). Every color was represented once in a big field, once in a middle field, and once in a small field, so each order of colors was equally likely (see Fig. 1). After spinning the wheel, the children would feed the first marble to the monster with the color of Field 1, feed the second marble to the monster with the color of Field 2, and so on.

*Pretest phase*

To establish the later test situation, the experimenter randomly assigned each child to a colored cushion that he or she could sit on. The colors of the three cushions corresponded to the three colors present on the spinning wheel. A treasure chest containing three transparent boxes was then introduced, with the following instructions: "Look, this is the treasure chest. There are three boxes inside, and you can take them out one by one on this side. But look, they are still empty. I will go out now and fill them with some stickers, and later the three of you can open one box each. But before you have to find a way to decide who gets the first, the second, and the third box. How can you decide this?"

**Table 1**
Overview of the phases of the experiment with regard to crucial features.

| | Experimenter | Receiver | Resource distribution | Procedure | |
|---|---|---|---|---|---|
| Introductory phase | Present | Paper monsters | Equal | Fair wheel | |
| Pretest phase | Not present | Children | Equal | Fair wheel | |
| Test phase | Not present | Children | Unequal | Fair condition: | Fair wheel |
| | | | | Unfair condition: | Unfair wheel |

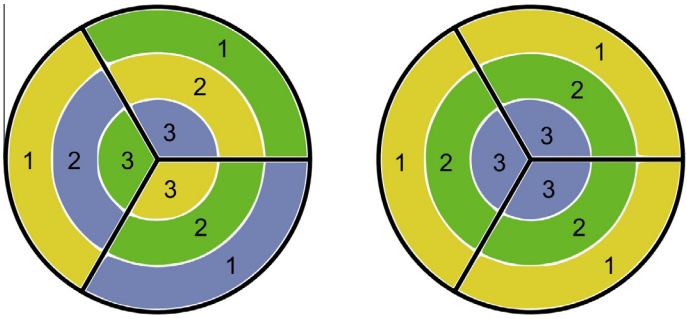


**Fig. 1.** Left: Fair wheel used in the priming game and the fair condition. Right: Unfair wheel used in the unfair condition.

After those instructions, the experimenter left the room to let the children discuss how to play the game. Agreeing to use the spinning wheel to allocate the rewards was a precondition for including the group in the experiment. In this phase, the experimenter could observe the children via a monitor outside the test room. When the children stopped talking about the procedure, the experimenter reentered the room bringing along the boxes, now filled with stickers. She put the boxes on the table, and before leaving again she told the children to call her when each of them had a box. In this phase, each box contained two stickers, so the children needed only to decide in which order to take the boxes out of the treasure chest. Because the distribution of resources was equal, no conflict of interest between the children occurred. Children then spun the wheel, took their boxes out in the order determined by the wheel, and called the experimenter.

Choosing to use the wheel for the decision already in the first trial was a prerequisite for a group to be included in the sample because we wanted to make sure that the children understood how to use the wheel and were able to transfer it to the new situation. If the children stopped using the wheel after the first trial of the pretest phase, they remained in the sample because this was a change of rules and found its expression in the measurement.

When the children had all taken the boxes out of the treasure chest, the experimenter came back into the room again and helped the children to take their stickers out of the boxes and put them into envelopes labeled with the children's names.

All groups played two trials in the pretest phase, with an equal distribution of stickers (two for each) and a fair wheel providing every child with the same chance to take the first box out of the treasure chest. Then the game was paused for a few minutes to conduct the interviews (see "Interviews" section) and switch to the changed conditions of the test phase.

*Test phase*

The pretest phase was followed by four test trials with an unequal distribution of stickers (three stickers in the first box, two stickers in the second box, and one sticker in the last box) for all groups. One half of the groups used the same fair wheel as in the pretest phase. For the other half, an unfair wheel replaced the fair one. The arrangement of the colors on that wheel would always give the first box (three stickers) to the child on the yellow cushion, the second box (two stickers) to the child on the blue cushion, and the last box (one sticker) to the child on the green cushion (see Fig. 1). In both conditions, after the break, the experimenter brought into the room the refilled treasure chest and either the fair wheel or the unfair wheel and said, "Now you can play another round! And here is the wheel." The experimenter did not comment on the changed distribution of stickers in the box or on the fact that the wheel was different from the one that children had previously played with (in the condition with the unfair wheel). The experimenter also did not remind the children to use the wheel to avoid influencing them in their reaction to the new situation.

The children were left alone in both the pretest and the actual test phase to make sure that they felt free to accept or reject the distribution and procedure of the game and to stress the need for finding a solution on their own without consulting an adult. The option to reject was not explicitly mentioned

to the children in order to create an open situation in which children could manifest their natural capability to solve such a conflict of interests without being influenced by an authority.

*Interviews*

To gain further information about how children perceived the fairness of the situations, we interviewed each child separately after the pretest phase with equal rewards and a second time after the test phase. For that purpose, the main experimenter stayed in the room with one child at a time, starting a conversation about the game they had previously played. She asked, "How did you decide who can pick which box? She added, "Why?" After the child answered, the experimenter asked the actual test question, "Was it unfair or was it okay for you to use the wheel to decide?" Again she added, "Why was it unfair/fair?" depending on the child's answer. All children received all four questions in the same order and with the same wording.

The majority of the children did not answer the "why" questions, reported to not know, or gave answers not related to the game such as "Because we are in the kindergarten" (61.4% on the question "Why did/didn't you use the wheel?" and 62.5% on the question "Why was it unfair/fair?"). Hence, we decided not to analyze the results of that measure.

*Measurement and coding*

All sessions were videotaped and coded by the first author. In the pilot phase, we observed eight different kinds of reactions to the test situation and assigned them to four scores of rule change (see Table 2) ranging from passive acceptance of the single individuals to active rule changing as a solution that the whole group agreed to. Every group of children got a score based on this scale for each trial the group played.

A group was assigned a score of 0 if the children accepted the current situation without showing any disappointment or outrage. A group was assigned a score of 1 if the children complained about the situation but did not attempt to change it. A group was assigned a score of 2 if a child within the group tried to change his or her actual situation by challenging a group member for his or her sticker box either verbally ("Give it to me!") or physically (grabbing the box). This entails only the failed attempt of an individual to change his or her situation. If the addressed play partner agreed and shared his or her stickers, the group got the highest score because then the advantaged child gave up his or her advantage for the purpose of solving the group conflict. A group was assigned a score of 3 if the children addressed an authority (the experimenter), asking her to change either the distribution of stickers or the procedure. A group was assigned a score of 4 if the children found a solution for their conflict as a group and agreed on changing the rules of the game. This was achieved by equalizing the sticker distribution in the boxes before they were assigned to the group members or, afterward, if the

**Table 2**
Scores on rule change scale depending on type of behavior shown.

| Score | Type | Example |
|---|---|---|
| 0 | No reaction | |
| 1 | Disappointment/outrage | "That is mean/unfair!" |
| 2 | Requesting reward of a play partner verbally | "I wanted that box!"<br>"Give it to me!" |
| | Grabbing reward of a play partner | |
| 3 | Asking adult to change or supervise the procedure | "Can you stay inside?"<br>"Can we have a different wheel?" |
| | Asking adult to change distribution of stickers | "Can you put two stickers in every box?" |
| 4 | Changing resource distribution before decision | Distribution 3-2-1 changed to 2-2-2 |
| | Advantaged child offering to share one sticker with disadvantaged child | "You can have one of mine." |
| | Changing procedure of the game | Taking turns sitting on the yellow cushion |

advantaged child with three stickers offered to share one sticker with the disadvantaged child. Another way of changing the rules was to take turns in getting the advantageous sticker box over trials. The behaviors for a score of 4 were no longer just displays of egocentric spontaneous reactions to the situation (e.g., just grabbing the boxes) but rather establishments of new rules that guaranteed the group's conflict-free interaction in the future. Indeed, taking turns does not immediately dissolve the conflict arising from the unequal distribution but requires trust in the persistence of the new agreement.

For every trial, we coded each behavior observed. A trial began when the experimenter left the room and ended when the children called her back. One quarter (25%) of the video-recordings were coded a second time by an assistant blind to the research hypothesis (weighted $\kappa = .878$ for the coded behavior and $\kappa = .913$ for the answers given in the interview) by following written instructions explaining the coding.

## Results

The experiment provided a behavioral measure (see rule change scale in Table 2) and a verbal measure (answers to the interview). The behavior was analyzed on the group level with regard to the effect of the distribution (equal in the pretest phase vs. unequal in the test phase) and procedure (fair wheel vs. unfair wheel). Because the test situation allowed the children to freely choose how to solve the problem, we also looked at the different kinds of behavior on an individual level with regard to their frequency and the position of the child initiating the rule change concerning the reward (advantaged child vs. neutral child vs. disadvantaged child). The answers given in the interview were analyzed on an individual level in terms of the effect of the procedure used in the test phase and the effect of the amount of stickers the child won in relation to his or her play partners.

### *Behavioral measure (rule change score)*

We coded the behavior of each group in every single trial. Thus, we obtained two rule change scores per group in the pretest phase and four in the actual test phase, which served as our dependent variable. We were interested in the effect that the procedure used by the children had on their rule changing behavior. In our analysis, we also considered the effect of the changing distribution of stickers between the pretest and the test phase.

We ran a generalized linear mixed model (Baayen, 2008) in which we included sticker distribution (equal vs. unequal), procedure (fair vs. unfair), and gender as fixed effects. Furthermore, we included the interaction of distribution and procedure and controlled for trial. Overall, the full model was clearly significant (likelihood ratio test: $\chi^2 = 52.992$, $df = 3$, $p < .001$) in comparison with a null model comprising only gender (variance explained by the model: $R^2 = .723$; variance explained by the fixed effects: $R^2 = .617$). More specifically, we found a significant interaction between distribution and procedure, $Z = 3.023$, $p < .001$ (see Fig. 2), with higher rule change scores in the test for children playing with the unfair wheel compared with the pretest and with the groups playing with the fair wheel. For proportional distribution of groups to the scores, see Fig. 3. In the groups playing with the fair wheel, there was no difference between the pretest phase and the test phase. There was no effect of gender ($Z = 0.645$, $p = .519$).

One possible explanation for the difference in children's behavior between conditions is that the unfair wheel also leads to more distributive unfairness than the fair one when all four trials are considered. This explanation could be labeled as "accumulated distributive unfairness" and would become apparent in a significant interaction of condition (fair wheel vs. unfair wheel) and trial (1 vs. 2 vs. 3 vs. 4) because of an increased rule changing score in the later trials of the unfair condition rather than in the fair condition. To rule this out, we ran a generalized linear mixed model (Baayen, 2008) on only the four test trials in which we included procedure (fair vs. unfair), trial (1 vs. 2 vs. 3 vs. 4), and gender as fixed effects (variance explained by the model: $R^2 = .56$; variance explained by the fixed effects: $R^2 = .385$). Overall, the full model was clearly significant (likelihood ratio test: $\chi^2 = 23.53$, $df = 3$, $p < .001$) in comparison with a null model comprising only gender. The interaction

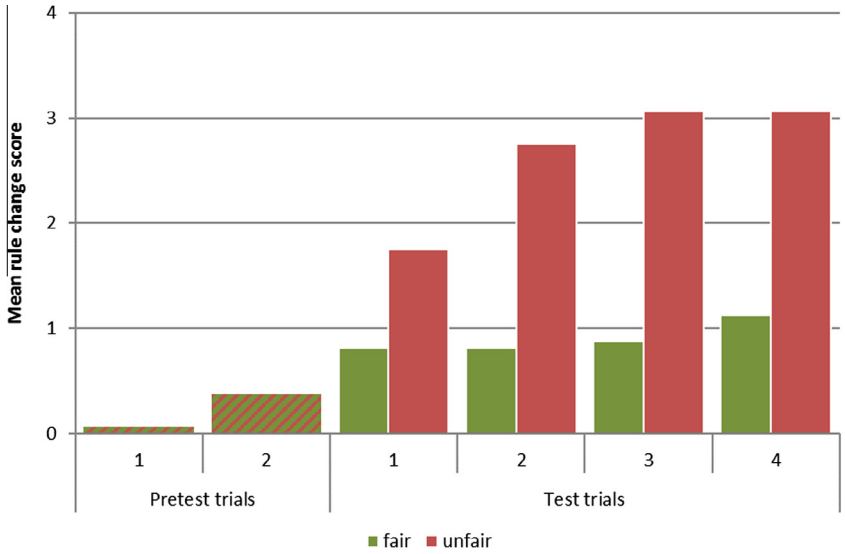


**Fig. 2.** Mean rule change score for the pretest trials (fair wheel for all groups) in comparison with the test trials for the two conditions fair and unfair (manipulation of the procedure). Higher scores mean higher degrees of rule changing behavior and less acceptance of the procedure.

of procedure and trial was initially included in the model but was not significant ($Z = 0.312$, $p = .755$) and, hence, was excluded. In the reduced model, there was a main effect of trial ($Z = 2.364$, $p = .018$) and a main effect for condition ($Z = 4.333$, $p < .001$). There was no effect of gender ($Z = 0.688$, $p = .492$).

*Observations of individuals' behaviors within the groups*

Because a rule change score of 4 represents the ultimate evidence that children cared about procedural justice, we now zoom in on the actual behaviors that the individual children within a group displayed and how they solved the procedural justice problem. Redistribution of the stickers occurred in 6 of the 32 groups. This behavior could be initiated either by the disadvantaged child through a request to share or by the advantaged child through offering one sticker. In 3 of these 6 cases, the child with the three stickers offered to share his or her stickers with the child with only one sticker spontaneously and without being asked to do so. Taking turns to get the three-sticker box is the other way to change the rules on a group level; this occurred in 11 of the 32 groups. For the unfair condition (8 turn-taking groups), one could look at the position of the child initiating the rule change by suggesting to take turns because with the unfair wheel the children knew before spinning it whether they would get the box with three stickers, two stickers, or only one sticker inside. In 2 of the 8 turn-taking groups the disadvantaged child suggested taking turns, in 3 cases the suggestion came first from the middle child, and in 3 cases the advantaged child made the suggestion to take turns. In 2 of the 3 cases in which the advantaged child suggested taking turns, the child did so spontaneously without another group member complaining about the resource distribution or asking to share beforehand.

*Interview measure (fairness judgment)*

Following the test, in 75% of the groups whose members played with the unfair wheel (12 of the 16 groups), at least one of the children reported that he or she perceived the procedure to be unfair. Only 19% of the fair wheel groups (3 of the 16 groups) complained about the unfairness of the procedure. In the following statistical analysis, children were analyzed as individuals and not lumped together as groups in order to control for outcome effects. The binomial dependent variable was the children's

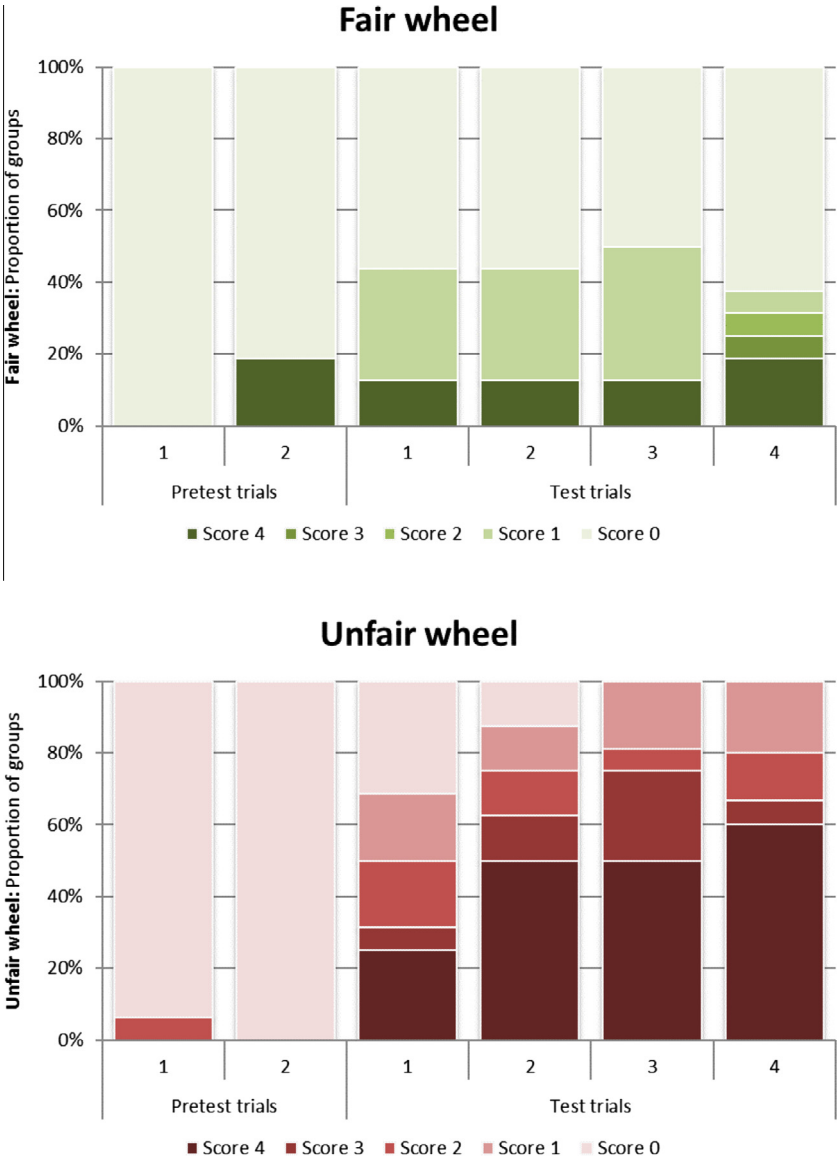


**Fig. 3.** Proportional distribution of groups to the rule change scores for the single trials. A total of 16 groups played with the fair wheel (upper diagram), and another 16 groups played with the unfair wheel (lower diagram).

answer to the interview question, "Was it unfair or was it okay to use the wheel for the decision?" To test whether the judgments given in the interviews after the test were influenced by the procedure or additional variables, we used a generalized linear mixed model in which we included procedure and gender as fixed effects and group as a random effect. To rule out the possibility that the children who judged the procedure to be unfair were the ones mostly disadvantaged in the sticker distribution, we included the deviation of the actual outcome from an equal one as a covariate. Overall, the full model was clearly significant (likelihood ratio test: $\chi^2 = 11.874$, $df = 1$, $p < .001$) in comparison with a null model comprising only deviation from equal outcome, gender, and the random effect (variance

explained by the model: $R^2 = .284$; variance explained by the fixed effects: $R^2 = .283$). More specifically, we found that the procedure had a clearly significant effect ($Z = 3.301$, $p = .001$), with probability of judging the procedure as unfair being higher in children playing with the unfair wheel. There was no effect of the amount of stickers a child received during the test ($Z = -.413$, $p = .68$) and no effect of gender ($Z = 1.734$, $p = .083$).

## Discussion

We created a novel procedure in a triadic setting to investigate whether preschoolers show the fair procedure effect previously found in adults. In this setting, children were confronted with an unequal resource distribution and offered a fair spinning wheel in one condition or an unfair one in the other condition to allocate the resources. We found that preschoolers do accept unequal resource distributions if a fair procedure is used to allocate the splits (16 groups playing with the fair wheel). When an unfair procedure was deployed (16 groups playing with the unfair wheel), however, the unequal resource distribution was clearly rejected. This shows that children do not uncritically accept any procedure but rather use only the one that guarantees equality of opportunity. Furthermore, they are able to negotiate alternative strategies meeting this standard when confronted with an unfair procedure.

One possible explanation for the difference in children's behavior between conditions is that the unfair wheel also leads to more distributive unfairness than the fair one when all four trials are considered. This explanation, labeled as "accumulated distributive unfairness," could be ruled out because we found no interaction effect of condition and trial influencing the rule change scores in the test phase. In most groups, the clearest increase of the rule changing score in the unfair condition already occurred between the first and second trials. At this point, all of the children had noticed that the sticker distribution was not as equal as it had been in the pretest trials (in the first test trial, several groups did not notice the unequal distribution until they took the stickers out of the boxes). The effect of an unfair procedure was already apparent at this early stage of the experiment before distributive unfairness could accumulate. Slight increases of the score over the following trials could be observed in both conditions when taken together. One reason for this might be that accumulated distributive unfairness (less likely with the fair wheel than with the unfair wheel but still possible) made the need to change the rules more salient for the few groups whose members did not recognize the procedural unfairness of the wheel. Alternatively, it is possible that children needed more trials to figure out and negotiate another solution for their conflict or that they were just bored by playing the same game four times in a row.

Given the predetermined outcome of spinning the wheel, children might have considered it a needless and boring action, and this might explain why some children did not use the wheel. However, Shaw and colleagues (2014) compared a partial wheel creating fairness (by giving a reward to a recipient who had less than the other recipient) and the same wheel creating unfairness (by giving a reward to a recipient who had more than the other recipient) and showed that children do use the partial wheel under the condition that it creates fairness. Furthermore, this explanation cannot account for the difference between conditions in the interview measure.

In our experimental setting, children agree on a procedure that they are going to use before they started playing. This procedure guarantees equality of opportunity for the three parties involved. The agreement is based on this feature of the procedure. The children in the study acknowledged this fact not only for themselves but also by assuming it for their play partners. This is the reason why the advantaged children also agree on changing the rules if the fair wheel is replaced by an unfair one. The fair procedure enables the winner (advantaged child who gets three stickers) to justify his or her outcome by way of the group's agreement. The unfair procedure, on the other hand, cannot serve as a similar justification because the foundation of equality of opportunity is violated. In three of the six cases in which groups redistributed the stickers, the advantaged child not only agreed on the new strategy but even initiated it without another group member complaining or asking the advantaged child to share beforehand. Among the groups taking turns to avoid unfairness, in three of the eight cases the advantaged child suggested the new strategy, and two of these suggestions were spontaneous. Being directly confronted with the negative emotions of a play partner whose loss is caused by the gain of the advantaged child is a very uncomfortable situation. A recent study by Paulus and Moore

(2015) showed that preschoolers are able to anticipate the emotional reaction of a prospective recipient when not being shared with, and their sharing behavior is influenced by that. This might have prompted the advantaged child to suggest a rule change in the cases where no other group member complained about the distribution or asked the advantaged child to do so. In the other cases, the advantaged child was confronted with two other group members demanding a change, and being the minority might have caused the advantaged child to conform to the others' suggestions (Haun & Tomasello, 2011).

The loser (disadvantaged child who gets only one sticker) has two options concerning how to react to the outcome: follow the obligation coming from the agreement with the group or refuse to go on playing the game, which would lead to a loss for all players. We observed several children threatening the others with refusal to play, showing that they were quite aware of their option to sabotage the game. However, either they did not do so in the fair condition or the play partners did not play along.

The middle position (child who gets two stickers) might be the most interesting one because in a conflict between the winner and loser the one in between has the possibility of turning the scales. In the unfair condition, the middle child might form a coalition with the winner. In doing so, the child avoids becoming the loser but also renounces the option of becoming the winner. If the middle child sides with the loser, this could improve or worsen his or her situation depending on the new procedure. If the new procedure is to take turns or to equalize the outcome (which were the alternative strategies used by the majority of the groups), the middle child's situation would remain unchanged. Under these circumstances (and if the loser does not push too hard in favor of quitting the game), the merit of changing the procedure is nothing more than justice for everyone, and this cannot be explained by selfish motives. In the groups using turn taking as an alternative strategy, this was indeed initiated by the middle child in three of the eight cases. Whether this was driven by such elaborate considerations would require further empirical evidence. It might well be that especially the middle child with two stickers just saw his or her chance to get three stickers in the next trial and did not consider the possibility of getting fewer stickers. Still, changing the rules of a game requires the agreement of the whole group, which group members can easily deny by referring to a fair procedure.

The results from the interview point in the same direction. Only a few children judged the fair wheel as an unfair procedure, but many more did so for the unfair wheel. The difference in the amount of stickers received in comparison with the children's play partners did not influence their opinion of the procedure. This shows that children not only consider their own perspective when judging a decision procedure that might happen to favor them but also consider the view of others who are disadvantaged by it.

We aimed at creating a social situation that would feel rather natural for the children in order to investigate the dynamics emerging in a group confronted with a conflict of interest. For future research, it might be of interest to control the positions (advantaged, neutral, and disadvantaged) within the group, for example, by testing only one target child with two experimenters or children who are instructed not to influence the behavior of the target child. The open situation also required a certain degree of impulse control to first run a procedure before getting the rewards. In a different setting with a more intuitive procedure, and no option to skip that procedure, it might be possible to study even younger children than our age group in order to investigate when in ontogeny sensitivity for procedural justice emerges. One possible constraint when testing younger children in groups might be their conflict resolution abilities. Baumgartner and Strayer (2008) suggested a developmental model in which displaying emotions as social signals is the first step toward solving a social conflict. This is followed by seeking adult help to mediate peer conflict. In the sample of preschoolers they observed during free play in the kindergarten, the more advanced behavior of effective interpersonal negotiation was rare compared with our sample in which many groups reached such a solution without outside help. One reason for this might be that the children were alone in the room. No adult was present, and they were told to find a way to distribute the boxes on their own. This is an important difference compared with a free play situation in which adults are available and might even intervene before the children can solve the conflict themselves (Killen & Turiel, 1991). Still, it remains an empirical question whether children younger than 5 years would be able to solve such a conflict of interest by themselves.

Future studies on procedural justice should investigate the role that friendship plays in children's decisions. We know from previous research on distributive justice in young children that friendship has an impact on sharing behavior (Moore, 2009). We did not consider the children's relationships when creating the random groups, but we asked the teachers after the test about the children's frequency of interaction and assigned them to the categories "all friends," "two friends," and "no friends/strangers." The distribution was rather unbalanced, so we refrained from taking that measure into the analysis. But it was conspicuous that all of the groups whose members changed the rules in the fair condition consisted of three friends. This was not the focus of our study, but it seems that in future research it would be worth specifically manipulating the relationship of tested individuals so as to be able to make justified claims about friends being the exception with regard to the procedural justice effect.

We compared two wheels, one of which was just and the other of which was clearly unjust without any possibility to justify its use, which might be a reason for the high rejection rates in the unfair condition. In a study with adults by DeScioli, Massenkoff, Shaw, Petersen, and Kurzban (2014), individuals switched between the principles of equality and equity depending on their self-interest. Both can be judged as being fair depending on the circumstances. It would be an interesting question for future research to investigate whether children would also find a way to satisfy their egoistic tendencies within the limits of fair procedures that they could use for justification.

The goal of our study was to broaden the scope of justice research in children. Individuals do not care only about their outcome when it comes to distributing a resource. We were able to show that preschoolers are already sensitive not only to unfair distributions but also to unfair procedures and, thus, the social aspects of such a conflictual situation.

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