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## Young children consider individual authority and collective agreement when deciding who can change rules

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### ABSTRACT

Young children demonstrate awareness of normativity in various domains of social learning. It is unclear, however, whether children recognize that rules can be changed in certain contexts and by certain people or groups. Across three studies, we provided empirical evidence that children consider individual authority and collective agreement when reasoning about who can change rules. In Study 1, children aged 4–7 years watched videos of children playing simply sorting and stacking games in groups or alone. Across conditions, the group game was initiated (a) by one child, (b) by collaborative agreement, or (c) by an adult authority figure. In the group games with a rule initiated by one child, children attributed ability to change rules only to that individual and not his or her friends, and they mentioned ownership and authority in their explanations. When the rule was initiated collaboratively, older children said that no individual could change the rule, whereas younger children said that either individual could do so. When an adult initiated the rule, children stated that only the adult could change it. In contrast, children always endorsed a child's decision to change his or her own solitary rule and never endorsed any child's ability to change moral and conventional rules in daily life. Age differences corresponded to beliefs about friendship and agreement in peer play (Study 2) and disappeared when the decision process behind and normative force of collaboratively initiated rules were clarified (Study 3). These results show important connections

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between normativity and considerations of authority and collaboration during early childhood.

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## Introduction

The development of human societies has witnessed many examples of changes of rules; advances in human rights lead to changes in human laws, and advances in technology lead to changes in rules governing the technology world. Thus, our normative knowledge includes a recognition that rule following is important and an appreciation of cases in which rules can (and might need to) be changed. The development of the former type of knowledge has been investigated extensively in young children, but little attention has been paid to the latter type of knowledge. The aim of the current study was to investigate how children reason about changes of rules.

Interest in the origins of children's understanding of rules and norms dates back to Piaget (1932/1965), who interviewed children about how they view rules in marble games. Piaget identified the tension that children at some times treat rules as fixed and inalterable while at other times view rules as flexible and alterable based on mutual agreement. This "fixed versus flexible" tension can also be seen in the way children respond to social norms and rules in the current literature.

The idea that young children at times view rules as inalterable has empirical support from numerous studies showing the early emergence of norm sensitivity in young children's reasoning about artifact use, social norms, and moral rules (e.g., Casler & Kelemen, 2005; Diesendruck & Markson, 2011; Kalish & Shiverick, 2004; Schmidt, Rakoczy, & Tomasello, 2012; Smetana, 1981; Smetana & Braeges, 1990). For example, in observational studies of family interactions, toddlers talk about the permissibility of actions, use social rules to explain and justify their behaviors, and protest against others' rule violations in their interactions with parents and siblings (Dunn & Munn, 1985, 1987). Even in laboratory settings, children follow and enforce arbitrary rules immediately after being introduced to them (Rakoczy, 2008; Rakoczy, Brosche, Warneken, & Tomasello, 2009; Rakoczy, Warneken, & Tomasello, 2008; Wyman, Rakoczy, & Tomasello, 2009). In seminal work by Rakoczy and colleagues, after being taught by the experimenter how to play a game with a novel rule, 3-year-olds later spontaneously protested and criticized a new agent (a puppet) who joined and played the same game in a different way. Similar results were found even when the experimenter did not use any language (e.g., labeling: "this is daxing") or teaching behaviors (e.g., addressing the children) to indicate the presence of a rule (Schmidt, Butler, Heinz, & Tomasello, 2016).

These studies lend support to the idea that young children view rules as fixed and also perhaps suggest that they see rules as inalterable. However, it should be noted that all of these studies involve receiving information about rules from adult authority figures (e.g., parents, teachers, experimenters) where children have little authority over the rules. Indeed, young children distinguish between contexts where parents and teachers are legitimate authorities regulating rules (e.g., in the case of moral rules) and contexts where they have personal authority or autonomy to make their own decisions (Laupa & Turiel, 1993; Nucci & Weber, 1995). At around the same age, children can reason that even a child has authority over things he or she owns and that authority enables the child to make decisions about who can use an object (Friedman & Neary, 2008; Nancekivell, Van de Vondervoort, & Friedman, 2013). Thus, one of the aims of our study was to empirically investigate whether children consider issues of authority when deciding who can change rules.

A few previous studies have asked children questions about changes to rules (Davidson, Turiel, & Black, 1983; Hollos, Leis, & Turiel, 1986; Turiel, 1998). These studies focused on the distinction between moral rules, which pertain to violations of common good, justice, and others' well-being (e.g., harming, not sharing), and conventional rules, which are arbitrarily decided by social groups (e.g., what to wear, where to sit). These distinctions influence how young children judge rule violations in terms of seriousness, contingency, and generalizability; they rate conventional transgressions

as less serious, more contingent on the presence or absence of authority, and less generalizable across different contexts than moral transgressions. When asked in these contexts to evaluate acceptance of rule change in general (e.g., “Is it all right to change the rule?”), rule change by the authority figure (e.g., “Is it okay if the teacher wants to let the kids do something different from the rule?”), or rule change by group consensus (e.g., “Is it all right to abolish the rule by group consensus?”), children starting from 5 years of age were more likely to say that it is more okay to change conventional rules (e.g., sitting at a designated place, wearing a certain color of clothes) than to change moral rules (fairness or harm). However, when asked about children’s own authority to change rules (e.g., “Could the children get the rule changed?”), most children answered “no” to both conventional and moral rules.

These examples show that children can, in principle, reason about changes to rules. But because the rules in question were outside the scope of children’s authority (e.g., within the personal domain, in cases of child ownership), our question of whether children believe that a child ever has authority to change the rules remains open. To find the right scenarios—cases in which there is a clear need for rules, and not just a personal preference, and an opportunity for children to create these rules—we chose rules created for peer play.

In peer games, sometimes rules can be created (or initiated) by an individual child (i.e., a child “authority”), but also in many cases rules for peer play emerge from some collective agreement of all participating children. Research on children’s collaborative behaviors has shown that young children appreciate and honor joint commitments and collaboration, and they value the importance of collective agreement in establishing collaborative rules (e.g., Schmidt, Rakoczy, Mietzsch, & Tomasello, 2016; Warneken, Gräfenhain, & Tomasello, 2012). Recent studies have also investigated collaborative contexts without the presence of any traditional authority figures (Göckeritz, Schmidt, & Tomasello, 2014; Köymen et al., 2014). These studies found that 5-year-olds can spontaneously engage in collaborative rule creation and negotiation and that they honor their commitment to arbitrary rules created through this collaborative process. Studies have also revealed developmental changes in children’s experience and understanding of peer relationships during early and middle childhood (Canary, Cupach, & Messman, 1995; Shantz & Hartup, 1995). Thus, another aim of the current study was to investigate how children in this age range reason about who can change rules created by collective agreement.

In the current study, therefore, we specified and varied how rules were initiated and asked children to reason about who can change rules. We proposed that children consider individual authority and collective agreement in their reasoning about who has the authority to change rules. We chose to study 4- to 7-year-old children because this is the age range that many previous studies on authority, collaboration, peer relationship, and normative reasoning have studied, which allowed us to investigate origins and developmental changes of reasoning about changes of rules. Specifically, the studies reviewed above suggest three hypotheses. First, it is reasonable to expect that children do not believe they have the authority to change adult-initiated rules, arbitrary or otherwise. Second, because children participate in rule creation themselves and value individual authority, they may by extension reason that only children who are the creators of rules have the authority to change them. Finally, because children appreciate and honor joint commitment and agreement in collaborative contexts, perhaps they require consensus for rule changes, especially if rules are initiated by collaborative agreement.

In Study 1, we showed young children videos of a group of three children playing a sorting game with an arbitrary novel rule and asked them a series of questions geared toward investigating whether they thought the rules could change and who could change them. Our main comparisons of interest came from manipulating how rules were initiated. Our main conditions of interest were contexts in which children generated the rules themselves rather than being given rules by an adult authority figure. In one context (Child Rule condition), one individual child initiated the rule at the beginning of the game. In another context (Collaborative Rule condition), one child announced the rule but waited for other players to show agreement. Each time we asked whether the focal child could change the rule and whether one of the other players could change the rule.

As a contrasting case, we included a third condition where the rule was initiated by an adult authority figure (Mom Rule condition). Again, we asked whether any of the children could change the rule and whether the “mom” could change the rule. As an additional contrast between

child-initiated rules and rules initiated by authority figures, all children also heard a short series of vignettes at the end of the study about moral and conventional norms (school norm, moral norm, and artifact norm). These conditions resemble some of the cases in social domain research reviewed above (e.g., Davidson et al., 1983) where children do not typically have authority. We asked children whether the child featured in each vignette could change each of these rules. We expected, based on prior research, that children do not believe they have the authority to change these adult-initiated or preexisting rules.

One final contrast, again across all participants, was a solitary context in which one child was playing alone and initiating the game by himself or herself. This context resembles some cases in prior work where children face simple choice based on a personal preference (Chernyak & Kushnir, 2013; Chernyak, Kushnir, Sullivan, & Wang, 2013; Kushnir, Gopnik, Chernyak, Seiver, & Wellman, 2015; Nucci & Weber, 1995). So we expected children to treat the arbitrary game as a personal preference rather than a set of rules; thus, they should reason that the individual playing the game has the freedom to change the game at will. This condition also served as a check for potential “no” biases in responses.

## Study 1

In the first study, we investigated children’s reasoning about who can change rules of a peer game under various contexts. Our task began with children viewing videos of other children playing games. We varied the contexts and processes of how the rules of the games were initiated. Our focal conditions were the group games initiated (between participants) by an individual child, by collaborative agreement, or by an adult authority figure. Each participant also saw the solitary play video (Alone Video condition; order counterbalanced). The video task was followed by a questionnaire where we interviewed children regarding whether they believed children could change norms in daily life (school norm, moral norm, and artifact norm).

### Method

#### Participants

A total of 79 children aged 4–7 years ( $M = 5.74$  years,  $SD = 1.09$ , range = 4.00–7.82; 48 girls and 31 boys) participated. Participants were recruited from preschools, afterschool programs, or museums in a small university town and were predominantly middle- to high-SES (socioeconomic status) European Americans. An additional 2 children participated but were replaced because of experimenter error. All parents provided written informed consent.

#### Materials

The materials included eight videos showing children playing games and a questionnaire with three vignettes. The videos were filmed with children slightly older than the study participants (9- and 10-year-olds) chosen because they were able to act consistently across videos. Half of the videos featured boys, and the other half featured girls. Two videos were of a boy/girl playing a stacking game alone (*Alone Video*), and six videos showed three boys/girls playing a sorting game together (*Child Rule*, *Collaborative Rule*, or *Mom Rule*). The gender of the characters was counterbalanced across participants and evenly split by gender of the participant; if participants saw the girls together, they saw the boy alone, and vice versa. The Alone Videos were about 20 s each, and the Group Videos were about 34 s each.

#### Procedure

All children were interviewed in a quiet corner or a separate room at the local schools or the museum. The interview consisted of two parts: a video task and a questionnaire.<sup>1</sup> All participants completed the video task first, followed by the questionnaire.

<sup>1</sup> See online supplementary material for details of methods and results of the questionnaire task.

Each child was shown two videos (order counterbalanced). Children were randomly assigned to view one of the three Group Videos (Child Rule, Collaborative Rule, or Mom Rule) where three children were playing a sorting game (sorting balls with different colored stickers into different baskets) together. Each child also saw the Alone Video where one child was playing a stacking game (stacking blocks of a certain color into a tower and keeping blocks of the other color flat) alone. We used two distinct but similar games in the Alone Video and Group Videos to ensure that children would not get confused. In addition, the stacking game and the sorting game are quite similar in nature in that the rules of both games involve arbitrarily doing one thing for blocks/balls of one color and doing the other thing for the other color. The natures of the rule changing are also similar enough, both of which involve doing the opposite for each color (see details below).

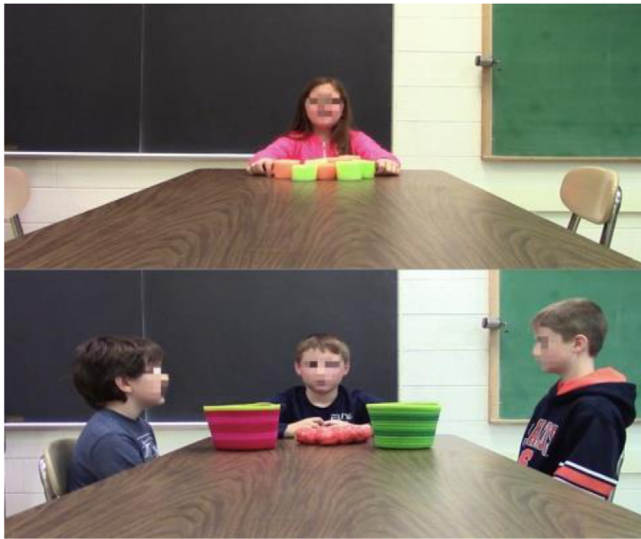
*Child rule.* Before showing the video, the female experimenter pointed to each of the characters in the video, introduced their names, and said, “They are friends and they are going to play a game together.” Then she pointed to the child in the middle and said, “John/Sophie has a rule for this game. Let’s see what rule John/Sophie has for this game.” Then the experimenter played the video. Fig. 1 shows screenshots of the videos. In the video the three characters sat in a triangle facing each other, and on the table there were balls labeled with either yellow or blue stickers. The child sitting in the middle said, “I have a rule for this game: blue stickers, here; yellow stickers, here. Let’s play together.” Then the three children played together according to the rule and finished sorting the balls.

*Collaborative rule.* The procedure was similar to the Child Rule condition except that the experimenter introduced the video by saying, “They are going to make up a rule for this game *together*.” In the video, the center child proposed the rule, “Let’s make up a rule for this game together: blue stickers, here; yellow stickers, here,” and then looked at the other two children for agreement. One at a time, each of the other two children made eye contact and nodded to the center child, indicating agreement, before they began the game. We used this type of silent “assent” rather than having all three children converse and decide collectively (e.g., Köymen et al., 2014) in order to keep the videos as similar as possible across conditions.

*Mom rule.* The participant was told, “John’s mom has a rule for this game.” In the video, a woman walked into the screen, made eye contact with the children, said “I have a rule for this game,” and then stated the same rule as in the other two conditions: “blue stickers, here; yellow stickers, here.” Immediately after the mom left, the children began playing in exactly the same way as the other two group conditions.

*Dependent measures.* After showing each video, the experimenter asked participants whether they remembered the rule mentioned in the video to make sure that they were paying attention and understood the video. If participants did not answer correctly, the video was shown again. Children correctly recalled the rule of the game 93.5% of the time after viewing the video the first time. The remaining participants correctly recalled the rule after viewing the video a second time. After that, participants were asked two critical questions (order counterbalanced). One question was about the center child (the one who had voiced the rule in both the Child Rule and Collaborative Rule conditions): “Now John/Sophie wants to change the rule of this game. He/She wants the rule to be that yellow stickers here and blue stickers here [switching the places to put the color of the stickers]. Can John/Sophie just change the rule?” The other question regarded one of the other two children seated to one of the sides of the table (non-center child): “Now Andy/Julia wants to change the rule of this game. Can he/she just change the rule?” In the Mom Rule condition, in addition to the two questions about the center child and one of the non-center children, the experimenter also asked whether the mom could change the rule if she wanted. Participants were also asked “why?” after the yes/no responses.

*Alone video.* Before showing the Alone Video, the experimenter said, “This is John/Sophie. John/Sophie is playing alone. He/She has a rule for this game. Let’s see what rule he/she has for this game.” In the video, there were red and green blocks on the table. The child said, “I have a rule for this game: red ones, make a tower; green ones, stay flat.” Then the child finished playing with the blocks according



**Fig. 1.** Screenshots of the videos used in the video task: Alone Video (top) and Group Video (bottom). The child seated in the middle (center child) voiced the rule in both the Child Rule and Collaborative Rule conditions and was the target of one rule-changing question. One of the children seated on the side (non-center child) was the target of the second rule-changing question (half of the participants were asked about the left non-center child and half were asked about the right non-center child).

to the rule. After viewing the video, participants were asked whether the child could change the rule if he or she wanted (the rule change was to stack the green blocks instead).

### Coding

For each question, participants were given a score of 0 if they answered “no” and “1” if they answered “yes”. The first author and a research assistant coded participants’ responses. Reliability between coders was 99.08%. The discrepancies were resolved through discussion by the first author and the research assistant.

Participants’ explanatory responses were coded as *Authority*, *Internal*, *Agreement*, or *Other*. The Authority category included any references to authority status (e.g., “she’s the boss”) or possession and ownership of the rule (e.g., “it’s her game”) that justified changing (or not changing) the rules. Internal answers referred to mental factors internal to the agent that justified the responses (e.g., “she wants to change it”). Agreement answers included any references to other players in the game (e.g., “she has to ask the friends”). Answers that did not fall into any of these categories were coded as Other. The first author and a research assistant coded by this coding scheme. Reliability between coders for qualitative explanations was 92.93%, kappa = .89. Discrepancies were resolved through discussion by the first author and the research assistant.

### Results

Fig. 2 shows the proportion of “yes” responses to each rule-changing question in each condition. We used an alpha level of .05 for all statistical tests. We first ran two analyses to check for effects of order, gender of participants, and correspondence between gender of participants and gender of the characters in the video (i.e., gender matching). First, for children’s responses to the rule-changing questions in the Group Videos, we performed a mixed-model logistic regression using a generalized estimating equation (GEE) predicting their yes/no responses to all questions with order of the video (Alone Video first or Group Video first), order of the questions (center child first or non-center

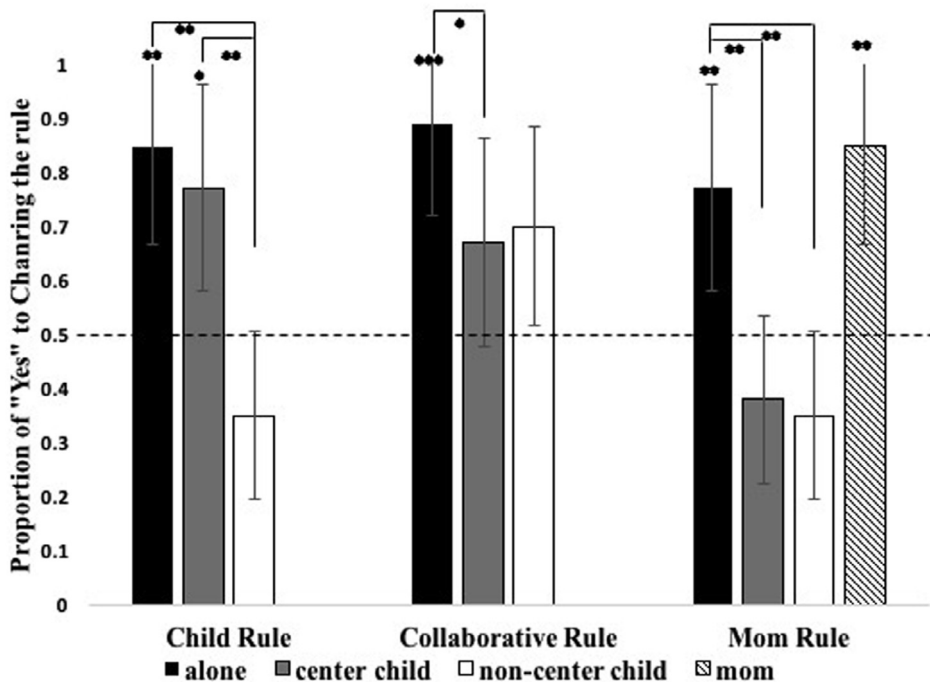


Fig. 2. Proportion of “yes” responses to the rule-changing questions in each condition. Bars represent 95% confidence intervals for each mean. Asterisks indicate a significant difference from chance using binomial tests: \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

child first), gender of participants, and gender matching (gender matches or not matches) as predictors. This analysis revealed no effects of any of the predictors ( $ps = ns$ ). Second, for children’s responses to the Alone Video, we performed a binomial logistic regression predicting their responses with order of the video (Alone Video first or Group Video first), gender of participants, and gender matching (gender matches or not matches) as predictors. This analysis revealed no effects of any of the predictors ( $ps = ns$ ). Thus, we combined the data of different orders and genders together in the following analyses.

To examine whether children’s responses to the rule-changing questions varied by condition of the Group Videos and target person of the rule-changing questions, a 3 (Condition: Child Rule, Collaborative Rule, or Mom Rule)  $\times$  4 (Target of Question: alone child, center child, non-center child, or mom) mixed-model logistic regression using GEE was performed, with condition being a between-participant factor, target of question being a within-participant factor, and age being a covariate. We found a marginal main effect of condition, Wald  $\chi^2(2, N = 79) = 5.85, p = .05$ , a significant main effect of target of question Wald  $\chi^2(3, N = 79) = 33.99, p < .001$ , and a significant Condition  $\times$  Target of Question interaction, Wald  $\chi^2(4, N = 79) = 14.69, p = .005$ .

To further examine the interaction, three separate GEE models predicting yes/no responses to rule-changing questions from target of question and age were run separately for each condition. In the Child Rule condition, there was a significant main effect of target of question, Wald  $\chi^2(2, N = 26) = 13.14, p = .001$ , and no significant age effect,  $p = ns$ . Follow-up binomial tests and comparison revealed that a significant majority (77%) of the children answered that the child who initiated the rule (center child) could change the rule (binomial  $p = .01$ ). Only 35% of the participants answered that the child who did not initiate the rule (non-center child) could change the rule, which was not significantly different from chance (binomial  $p = ns$ ). A McNemar’s test revealed that children were significantly more likely to say that the child who initiated the rule could change it than the child who did not initiate it ( $p = .003$ ). We compared this with their responses to the Alone Video. An overwhelming

majority (85%) of participants answered that the child playing alone could change the rule (binomial  $p = .001$ ). McNemar's tests revealed that children were significantly more likely to say that the child playing alone could change the rule than the child who did not initiate the rule in the group ( $p = .001$ ), but not significantly different from the child initiating the rule in the group ( $p = ns$ ). There was no age effect on any question in this condition ( $ps = ns$ ).

In the Collaborative Rule condition, the logistic GEE showed a significant main effect of target of question, Wald  $\chi^2(2, N = 27) = 6.21, p = .045$ , and a significant main effect of age, Wald  $\chi^2(1, N = 27) = 6.08, p = .014$ . Follow-up binomial tests and comparison revealed that 67% of the children answered that the center child could change the rule and that 70% of the children said that the non-center child could change the rule of the game, which were not significantly different from chance (binomial  $ps = ns$ ). A McNemar's test showed no significant difference between their responses to the center child and the non-center child ( $p = ns$ ). Then we compared participants' responses to the Collaborative Rule video with their responses to the Alone Video. A significant majority of the participants (89%) answered that the child playing alone could change the rule (binomial  $p < .001$ ). McNemar's tests showed that children were significantly more likely to say that the child playing alone could change the rule than the center child in the group ( $p = .031$ ) but not significantly different from the non-center child in the group ( $p = ns$ ). To further explore the age effect, we then ran correlations between age in months and children's responses to each of the two rule-changing questions in the Group Video and found that age in months was negatively correlated with each of them separately (center child:  $r = -.62, p = .001$ ; non-center child:  $r = -.27, p = .17$ ), but the correlation was significant only for the center child. This suggests that older children were less likely than younger children to say that any child could change the rule in the Collaborative Rule condition, especially regarding the center child.

In the Mom Rule condition, we found a significant main effect of target of question, Wald  $\chi^2(3, N = 26) = 20.20, p < .001$ , and no significant age effect. Follow-up binomial tests and comparison revealed that 38% of the participants answered that the center child could change the rule and that 35% answered that the non-center child could change the rule (binomial  $ps = ns$ ). A significant majority (85%) of the participants answered that the mom could change the rule (binomial  $p = .001$ ). McNemar's tests showed that children were more likely to say that the mom could change the rule than either the center child ( $p < .001$ ) or the non-center child ( $p < .001$ ), but there was no significant difference between their responses to questions about the center child and the non-center child ( $p = ns$ ). We also compared these responses with their responses to the Alone Video. A significant majority (77%) answered that the alone child could just change the rule (binomial  $p = .009$ ). McNemar's tests showed that children were significantly more likely to say that the child playing alone could change the rule than either the center child ( $p = .002$ ) or the non-center child ( $p = .001$ ) in the Mom Rule video. In addition, no age effect was found for any question in this condition ( $ps = ns$ ).

As another way to look at the Condition  $\times$  Target of Question interaction, we then compared children's responses to each rule-changing question across three conditions. Three separate binary logistic regressions predicting yes/no responses from condition and age were run separately for each target of question. As for the alone child, there was no significant effects of condition or age ( $ps = ns$ ). As for the center child, there was a significant main effect of condition, Wald  $\chi^2(2, N = 79) = 9.09, p = .011$ . Follow-up comparisons revealed that participants in the Child Rule condition were significantly more likely to say that the center child could change the rule than participants in the Mom Rule condition,  $\chi^2(1, N = 52) = 7.88, p = .005, d = 0.85$ , and participants in the Collaborative Rule condition were significantly more likely to say that the center child could change the rule than participants in the Mom Rule condition,  $\chi^2(1, N = 53) = 4.23, p = .04, d = 0.59$ . As for the non-center child, there was a significant main effect of condition, Wald  $\chi^2(2, N = 79) = 8.78, p = .01$ . Follow-up comparisons revealed that participants in the Collaborative Rule condition were significantly more likely to say that the non-center child could change the rule compared with participants in the Child Rule condition,  $\chi^2(1, N = 53) = 6.80, p = .009, d = 0.77$ , and the Mom Rule condition,  $\chi^2(1, N = 53) = 6.80, p = .009, d = 0.77$ .

We then looked at children's qualitative responses in each condition. In the Child Rule condition, the most frequent (40%) explanations children provided to justify that the center child could change the rule referred to the authority or possession of the rule (e.g., "she's/he's the boss of this game," "it's her/his game"). Around 20% referred to internal states (e.g., "she/he wants to"), and another 20% referred to agreement (e.g., "she can change if others are okay"). Similarly, the most frequent (50%)



explanations participants provided to justify that the non-center child could not change the rule referred to authority or ownership (e.g., “she/he didn’t make up the rule,” “she’s/he’s not the boss”), and no one referred to internal states or agreement. In the Collaborative Rule condition ( $n = 27$ ), out of all the explanatory responses, only 7% referred to authority or possession and 13% referred to internal states of the children. Intriguingly, 31% of the explanations referred to agreement among players in the game (e.g., “others might not agree”). We also found age effects in children’s qualitative responses in the Collaborative Rule condition that age positively predicted children’s references to agreement among players in the game ( $r = .66, p < .001$ ).<sup>2</sup> In the Mom Rule condition, the most frequent (54.5%) explanations participants provided to justify that children could not change the rule referred to authority or ownership, and none referred to internal states. Similarly, the most frequent (45%) explanations provided to justify that the mom could change the rule referred to authority or ownership (e.g., “mom is in charge,” “mom made up the rule”). Only 5% referred to internal states, and only 3% referred to agreement.

### Discussion

These results provide evidence that even preschoolers understand that children can change the rule created for peer play and that they consider the context in which the rule was initiated when deciding who can change it. When reasoning about groups of children playing together, 4- to 7-year-old children took into account how the rule was initiated even though all the other information (e.g., the content of the rule, the participants of the game) were kept constant across contexts. When the rule was initiated by the mom, children said that only the mom could change the rule of the game and not any of the children. When the rule was initiated by an individual child, children believed only that child could change the rule and not his or her playmates. This suggests that children consider individual authority when deciding who can change rules, believing that the initiator of rules also has the authority to change the rules.

Intriguingly, when the rule was made up by collaborative agreement, younger children were more likely than older children to say that any child (especially the child who proposed the rule) could change the rule. Older children also referred more to agreement among players in their explanations. Does this suggest that younger children do not care about agreement among peers when reasoning about changes of collaboratively initiated rules? Previous findings showed that even 3-year-olds value the importance of agreement in the establishment of arbitrary social norms and consider a norm as established only under unanimous agreement without any dissents (Schmidt et al., 2016). Therefore, a more likely possibility is that younger children also require agreement to change collaboratively initiated rules but that they are more likely to assume agreement in general than older children. This might be because as children get older they accumulate experiences where friends do not necessarily agree (Canary et al., 1995; Shantz & Hartup, 1995). In Study 2, we directly investigated this hypothesis by showing the same videos as before and asking children whether the child who proposed the rule would agree when one of the non-center children wanted to change the rule. We contrasted the Collaborative Rule condition (where agreement was central to rule creation) with the Child Rule condition (where the center child was the authority/rule initiator). Our prediction was that assumptions of agreement would change with age along the same lines as responses to the rule-changing question, namely that older children would be less likely than younger children to assume agreement in the Collaborative Rule condition.

### Study 2

The second study focused on the age difference in the Collaborative Rule condition we found in Study 1. We showed 4- to 7-year-old children either the Collaborative Rule video or the Child Rule video. The stimuli mirrored those of Study 1. Unlike Study 1, children were asked whether the center child would agree with the non-center child when the non-center child wanted to change the rule of the game. Because there was no age effect in the Child Rule condition in Study 1, we included the Child

<sup>2</sup> We did not find age effects on qualitative explanations in the Child Rule condition or the Mom Rule condition.

Rule condition as a control where we predicted no age difference also in their endorsement of agreement. We hypothesized that older children would be less likely to endorse agreement than younger children only in the Collaborative Rule condition but not in the Child Rule condition.

## Method

### Participants

A total of 52 4- to 7-year-old children ( $M = 5.64$  years,  $SD = 1.04$ , range = 4.01–7.83; 32 girls and 20 boys) who did not participate in Study 1 participated in Study 2. Participants were recruited from pre-schools or museums in a small university town and were predominantly middle to high-SES European Americans.

### Procedure

Similar to Study 1, each child completed a video task first, followed by a questionnaire.<sup>3</sup> In the video task, each child was randomly assigned to view either the Child Rule video or the Collaborative Rule video. The procedure was the same as in Study 1 except that we asked a different critical question. After being shown each video and asked the attention check question, the participants were asked, “Now Andy/Julia (one of the non-center children) wants to change the rule of this game. He/She wants the rule to be that yellow stickers here and blue stickers here [switching the places to put the color of the stickers]. Would John/Sophie [the center child] agree?”

## Results

### Video task

We scored children’s responses of “no”, “maybe”, and “yes” to the agreement question as 0, 1, and 2, respectively. We first performed an ordinal regression to examine whether scores were affected by gender of participants and gender matching. This analysis revealed no effect of gender of participants or gender matching on children’s responses ( $ps = ns$ ). Hence, we combined the data of different genders together in the following analyses.

To investigate whether children’s responses to the agreement question varied by condition and age, we conducted an ordinal regression predicting children’s scores from condition (Child Rule or Collaborative Rule), age, and the interaction. We found a marginal main effect of condition, Wald  $\chi^2(1, N = 52) = 3.79, p = .051$ , a significant main effect of age, Wald  $\chi^2(1, N = 52) = 5.17, p = .023$ , and a significant Age  $\times$  Condition interaction, Wald  $\chi^2(1, N = 52) = 4.52, p = .034$ . To explore the interaction, two ordinal regressions predicting children’s responses from age were performed separately for each condition. In the Collaborative Rule condition, we found a significant effect of age, Wald  $\chi^2(1, N = 26) = 4.34, p = .037$ . An increase in age was associated with an increase in the odds of answering “maybe” or “no”, with an odds ratio of 3.55, 95% confidence interval ( $CI$ ) = [1.08, 11.70]. In contrast, in the Child Rule condition, age had no significant effect on children’s responses ( $p = ns$ ).

## Discussion

Consistent with our hypothesis, when the rule was initiated through collaborative agreement, younger children were more likely than older children to say that the center child would agree when one of the non-center children wanted to change the rule. This may be one potential explanation of why younger children were more likely than older children to say that any player could change the rule created through collaborative agreement.

<sup>3</sup> See results of the questionnaire task in online supplementary material.

### Study 3

Our first two studies provided initial support for the prediction that children consider individual authority and collective agreement when reasoning about who can change rules. Although these findings are promising, they also raise several outstanding questions. First, in Study 1, many children in the Child Rule condition referred to ownership of the game (e.g., “it is his/her game”) in their explanations, which prompts the question of whether these children interpreted our setup in the condition as indicating property “rights” over the objects used in the game or authority over the rules. In addition, the language used when introducing the rule had a stronger connotation of ownership in the Child Rule condition (“I have a rule”) than in the Collaborative Rule condition (“let’s make up a rule”). In Study 3, we introduced the scenarios with a clear indication that the toys belonged to no one (e.g., “Sophie/John found these toys in the classroom”). We used the same language (“decide a rule”) across conditions to make a clear indication that the rule was created by the individual or group rather than learned or heard.

Another question remaining from Study 1 was whether children would still be willing to change a rule if there was a stronger indication that the game *should* be played a certain way. In Study 3, we used the deontic modal “*should*” when introducing the rule.

One final question concerned the robustness of the rules themselves. We investigated this with two follow-up questions. We asked whether another (new) group of children would also follow the rule created by the children in the video, and we asked whether the mom could change the rule that was decided by the children (either individually or collaboratively).

### Method

#### Participants

A total of 44 4- to 7-year-old children ( $M = 5.79$  years,  $SD = 1.10$ , range = 4.07–7.45; 20 girls and 24 boys) who did not participate in Study 1 or 2 participated in Study 3. Participants were recruited from preschools or museums in a small university town and were predominantly middle to high-SES European Americans. An additional 3 children participated but were replaced because of experimenter error.

#### Materials

The materials included the Child Rule video and the Collaborative Rule video we used in the first two studies. However, we cut the part of the videos where the center child announced, “I have a rule for this game” or “Let’s make up a rule for this game together.” Instead, we used a still picture of the children in the game with a speech bubble representing what the center child said (see “Procedure” section below for details). The genders of the children in the video were matched with the genders of the participants.

#### Procedure

Each child was randomly assigned to view either the Child Rule video or the Collaborative Rule video. The procedure was similar to that in Study 1 except for the above-mentioned modifications. Before showing the video, the experimenter showed a still picture of the three children, introduced the characters in the video, and said “They are friends and they are going to play together” in both conditions. Then she pointed to the child in the middle and said, “John/Sophie found these toys in the classroom.” In the Child Rule condition, the experimenter continued to say, “In this game, John/Sophie is going to *decide* a rule for this game. He/She is going to decide how the game *should* be played.” In the Collaborative Rule condition, the experimenter said, “In this game, they are going to *decide* a rule for this game together. They are going to decide how the game *should* be played together.” Then the experimenter said “Let’s see what John/Sophie says” and showed an animation where a speech bubble appeared right above center child saying “I’m going to *decide* a rule for this game. I’m going to decide how the game *should* be played” in the Child Rule condition or “Let’s *decide* a rule for this game together. Let’s decide how the game *should* be played together” in the Collaborative Rule

condition. The experimenter also read aloud the sentences in the speech box as if it were spoken by the center child in the video. Then the experimenter played the video where the center child decided the rule “Blue stickers, here; yellow stickers, here. Let’s play together” in the Child Rule condition or proposed the rule and looked at the two other children for agreement in the Collaborative Rule condition. In both videos, the three children took turns sorting the balls according to the rule. Similar to Study 1, after being shown each video and asked the attention check question, participants were asked two rule-changing questions (order counterbalanced): one about the center child and one about one of the non-center children. Then they were asked two additional questions. The first question measured whether the center child’s mom could change the rule if she wanted. The second question measured whether another group of children would play with the same rule as them. We showed participants a picture of another three children of the opposite gender and asked, “Here is another group of children. They are coming to play with the same toys. Do you think they are going to play with the toys the same way as them or some other way?”

## Results

Fig. 3 shows the proportion of “yes” responses to each rule-changing question in each condition. We performed a mixed-model logistic regression using GEE predicting participants’ yes/no responses to all questions with the order of the questions (center child first or non-center child first) and gender of participants as predictors. This analysis revealed no effects of any of the predictors ( $ps = ns$ ). So we combined the data of different genders together in the following analyses.

To examine the effect of condition and target of question on children’s responses to the rule-changing questions, a 2 (Condition: Child Rule or Collaborative Rule)  $\times$  2 (Target of Question: center child or non-center child) mixed-model logistic regression using GEE was performed with condition being a between-participant factor, target of question being a within-participant factor, and age being a covariate. There were significant main effects of condition, Wald  $\chi^2(1, N = 44) = 4.68, p = .031$ , a main effect of target of question, Wald  $\chi^2(1, N = 44) = 4.74, p = .03$ , and a significant Condition  $\times$  Target of Question interaction, Wald  $\chi^2(1, N = 44) = 4.80, p = .028$ . No significant age effects were found.

To further examine the interaction, two separate GEE models predicting yes/no responses to rule-changing questions from target of question and age were run separately for each condition. In the Child Rule condition ( $n = 22$ ), there was a significant effect of target of question, Wald  $\chi^2(1, N = 22) = 8.98, p = .003$ , and no age effects. Binomial tests showed that a majority of the participants (73%) answered that the child who decided the rule (center child) could change the rule (binomial  $p = .05$ ). In contrast, only 41% of the participants answered that the child who did not decide the rule (non-center child) could change the rule (binomial  $p = ns$ ). A McNemar’s test revealed that children were significantly more likely to say that the child who decided the rule could change it than the child who did not decide it ( $p = .02$ ). In the Collaborative Rule condition ( $n = 22$ ), a logistic GEE revealed no significant effect of target of question or age ( $ps = ns$ ). Of all the participants in this condition, 32% answered that the center child could change the rule and 32% answered that the non-center child could change the rule (binomial  $ps = ns$ ).

Then we looked at children’s qualitative responses in each condition. Replicating the main findings in Study 1, the most frequent (31%) explanations provided in the Child Rule condition referred to the center child’s authority, whereas the most frequent (43%) explanations provided in the Collaborative Rule condition referred to agreement among players.

Regarding whether the mom could change the rule, around half of the children—59% in the Child Rule condition and 59% in the Collaborative Rule condition—said that the mom could change the rule, which were not significantly different from chance (binomial  $ps = ns$ ). Regarding the scope of the rule, a significant majority (82%) of the children in the Child Rule condition said that the new group of kids would play by some other rule (binomial  $p = .004$ ), and 68% of the participating children in the Collaborative Rule condition said that the new group of kids would play by some other rule (binomial  $p = ns$ ). No age effects were found on any question in this study ( $ps = ns$ ).

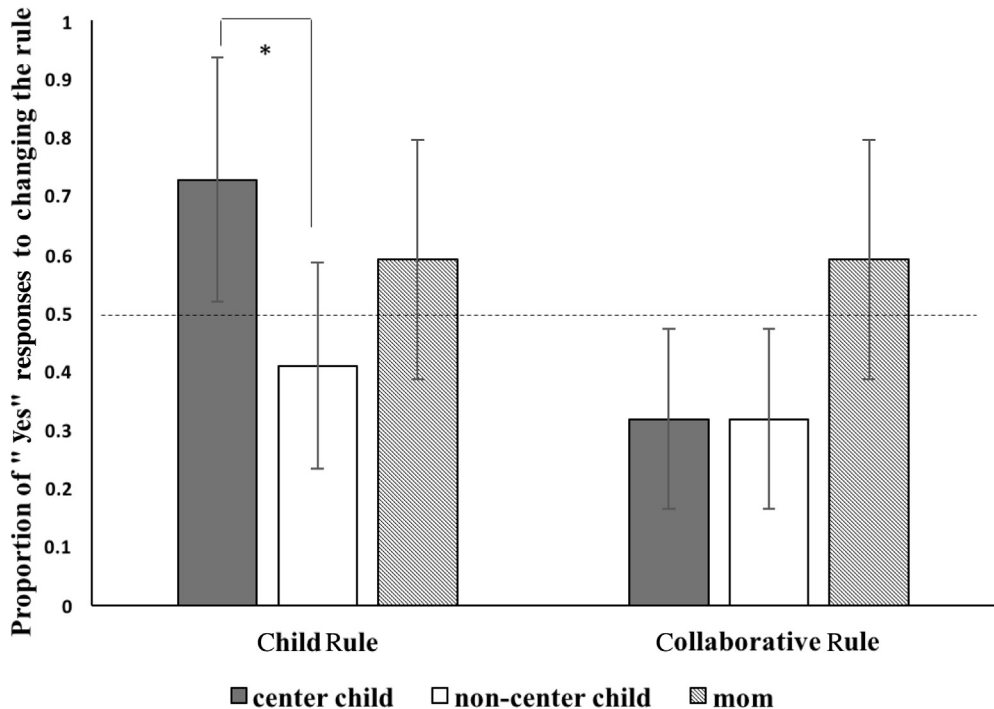


Fig. 3. Proportion of “yes” responses to the rule-changing questions in each condition. Bars represent 95% confidence intervals for each mean. Asterisk indicates a significant difference using McNemar’s test:  $p < .05$ .

## Discussion

Study 3 replicated the findings of Study 1 in that children again considered individual authority or collective agreement when reasoning about changes of rules for peer play. When the rule was decided by an individual child, they said that only this child could change the rule and not other players or the mom. When the rule was decided by collective agreement, unlike the age difference found in Study 1, younger and older children alike said that rules created collaboratively could not be changed by any child playing the game. We discuss several possibilities for the difference in the General Discussion below. Regarding the robustness and scope of the rule, children said that sometimes the mom could override rules decided by children and that other children would play with the toys by a different rule. These suggest the possibility that the children in our study viewed the rules specific to a group of people in a certain context rather than in general norms.

## General discussion

The current findings demonstrated early ontogeny and developmental changes in young children’s reasoning about changes of rules. When asked about changing a novel rule made for playing in a peer game, children as young as 4 years distinguished a rule decided for one single child and a rule decided for group play. More important, for group play they also distinguished a rule decided by a mom, a rule decided by an individual child, and a rule decided by collective agreement. When the rule was initiated by one of the players in the game, children believed that only this child could change the rule but not other players or the mom; when the rule was initiated through collective agreement among all players, children attributed equal authority of changing rules to each player. Children’s qualitative explanations lend further support to these findings. When the rule of the game was initiated

individually (by a child or an adult), children of all ages explained rule changing by making reference to authority (“the boss” or “his/her game”). Few, if any, explanations referred to authority in the Collaborative Rule condition. Instead, children, especially older ones, made explicit references to the need for agreement. In contrast, children viewed arbitrary rules created for a solitary play as changeable, whereas they viewed adult-initiated rules or preexisting norms (e.g., school and moral norms) as completely inalterable by children.

Our results complement prior work focused mainly on cases where children do not typically have authority over the rule by showing that children do think they themselves can change rules when provided with some authority to do so. The recognition of *who* has that authority aligns well with existing knowledge in several different areas of research, including children’s understanding of authority and ownership and of collaboration and peer friendships.

First, children’s belief that a rule initiated by a single child for group play can be changed only by that child is consistent with previous work on children’s understanding of ownership of objects (e.g., Neary & Friedman, 2014). Just like with objects, young children may develop awareness of authority of creation of rules; they think that the person who initiates or decides a rule has the authority to change it, whereas other people do not have that authority. This reveals that the individual authority over initiating rules warrants the authority to change the rules. Future studies can investigate whether the person who initiates the rule can grant authority to another player to change the rule. For example, if the rule creator (the mom or the center child) gives another person permission to change rules, can this person change the rule?

It is also noteworthy that identifying the individual authority initiating the rules seems to operate as a general principle; that is, it does not depend on whether the authority is a child or a more traditional authority figure (e.g., the mom). This is consistent with previous evidence that children accept the legitimacy of both adult authority and peer authority (e.g., teacher’s helper) in regulating rules (e.g., Laupa, 1994). However, we are not suggesting that there is no difference at all between rules initiated by an adult and rules initiated by an individual child. For example, when the mom (or another adult) and an individual child have conflicting rules, it would be reasonable to expect that children would abide by the mom’s rule.

Children’s response that any group member has equal authority to change a collaborative rule is consistent with prior work on children’s understanding of joint commitments and collaboration (e.g., Warneken et al., 2012). We found a shifting tendency, with age, to say that no child alone can change a collaboratively agreed-on rule. Findings of Study 2 provided one possible explanation for this developmental change, namely that older children may be less likely to assume agreement among friends. This change is consistent with developments in the advanced theory of mind across this age range. For example, it is not until middle childhood that children can both reason about conflicting beliefs among peers and use their social cognitive skills to resolve disagreements (e.g., Lagattuta, Sayfan, & Blattman, 2010; Lagattuta et al., 2015). This also suggests developmental changes in how children treat others; as children get older, they might be more likely to value others’ views as independent of their own but also understand that changing collaboratively initiated rules is interdependent and requires all players’ opinions.<sup>4</sup> It is important to further explore the experiences with peer negotiation, collaboration, and conflict resolution that give rise to these developmental changes and their potential influence on children’s normative reasoning and behaviors.

However, because we did not replicate the age effect in Study 3, we suggest caution in its interpretation. Results of follow-up questions indicate that most children believed that the rule was specific to the game context in the video (i.e., other children would play differently). This specificity is consistent with prior work showing that children in this age range view collaboratively initiated rules as joint commitments (e.g., Schmidt et al., 2016; Warneken et al., 2012) rather than general norms that translate to other contexts. Thus, it may be that modifications made in Study 3 to the language of the task made that commitment more salient, leading children to infer that players would need to collectively decide on changes to rules together. This raises interesting questions about what children would think if shown a richer context for how collaborative agreement can be reached (e.g., through conversation,

<sup>4</sup> We thank the anonymous reviewer for suggesting this point.

through discussion among peers), whether majority agreement is sufficient or whether all players need to agree, and similarly whether discussion or majority agreement could result in a change to a collaboratively initiated rule.

Our findings suggest that even very young children may consider the history of a rule's creation, as well as its purpose, when reasoning about its scope and flexibility. Consistent with Piaget's (1932/1965) initial discussion of children's normative knowledge, our results show that the extent to which children consider certain rules to be fixed or flexible depends in interesting ways on what they know about the relationships between those who created the rules and those who follow them. Thus, the consideration of individual or collective authority may operate, from a young age, as a general principle that factors into children's reasoning about changes of rules. Future studies can investigate the extent to which this principle holds above other considerations such as the relative social status of the authority, the efficiency of the rule, and the moral status of the rule.

In summary, our results demonstrate that young children understand the importance of following and enforcing rules and norms but at the same time can also reason about how rules can be changed. Critically, these studies show that children consider the issue of how rules are initiated in deciding whether rules can change and who can change them. Taken together, this study suggests that the important feature of human thinking—that we make rational and flexible inferences about human activities—is present in young children's developing normative knowledge.

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## Appendix A. Supplementary material

Supplementary data associated with this article can be found, in the online version, at <http://dx.doi.org/10.1016/j.jecp.2017.04.004>.

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