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When should the majority rule?: Children's developing intuitions about majority rules voting

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ABSTRACT

Across many contexts, majority rule is used as a decision-making procedure to coordinate conflicts within groups. Despite the prevalence of majority rule procedures, it is unclear how children think about majority rule as a way to resolve group disagreements in early childhood, and how this develops across age. In four experiments, we explored 4- to 9-year-olds' early intuitions about majority rule voting ($N = 814$) in two countries: the United States and China. Specifically, we compared majority rule voting to two different ways of making decisions: a randomized decision (coin flip) and abiding by a single individual's preference. We found children preferred majority rule over letting a single individual decide by age 4, and over coin flip by age 6. We further demonstrated that children do not use majority rule indiscriminately. Instead, they clearly think majority rule is inappropriate in some circumstances: While they think majority rule can be used to resolve matters of preference for groups, they do not think an individual should obey what the majority wants when deciding for themselves. Furthermore, they do not think that the majority should rule, even for group decision making, when they recommend clearly immoral behavior. We discuss the implications of these findings for research on the development of procedural justice and group decision-making.

1. Introduction

While voting as a formal process is a relatively recent cultural invention, informal voting in the form of majority rule decision-making has a much longer history and is still used to resolve disagreements across many cultural contexts (for discussions, see Bor, Mazepus, Bokemper, & DeScioli, 2021; Sen, 1977). Although much research has explored the role of majorities on children's individual decisions via conformity or informational means, fairly little work has examined how children reason about it as a decision-making process. Given the importance of majority rule voting as a decision-making process in contemporary human life, it is important to understand the cognitive machinery that underlies this form of decision-making. The present studies investigate children's developing intuitions about the use of majority rule in group decision-making contexts. When in development do children endorse majority rule? Furthermore, is children's endorsement of majority rule merely about conformity, or do they understand that majority rule is appropriate in some contexts but not others? Across these studies, children are asked to decide whether majority rule should be used to resolve disagreements among peers regarding what the group should do (e.g., what they should eat as a snack). Probing the development of these intuitions can provide insight into the early building blocks of social decision-making and group coordination.

Developmental psychologists have long been interested in children's emerging understanding of social norms, decision-making, and coordination (e.g., Damon, 1977; Helwig, Arnold, Tan, & Boyd, 2003; Noyes & Dunham, 2017; Schmidt, Rakoczy, Mietzsch, & Tomasello, 2016). Although there has been limited developmental work on group decision-making, there is a wealth of developmental research on decision-making within dyads of children (Komolova & Wainryb, 2011; Murphy & Eisenberg, 2002; Warneken & Tomasello, 2007). Children are remarkable early cooperators. By around 2 to 3 years old, they can coordinate their actions with others by taking on and even reversing roles within certain problem-solving contexts with another child (Ashley &

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Tomasello, 1998; Brownell & Carriger, 1990), and are able to engage in joint commitments (Grafenhain, Behne, Carpenter, & Tomasello, 2009). Young children not only excel at coordinating, but they further understand how to use different strategies to resolve conflicts with a partner (e.g., Grueneisen & Tomasello, 2017; Komolova & Wainryb, 2011). For example, work by Rossano and colleagues (2015) demonstrates that by the age of 5, children are adept at both communicating their own claim to property and respecting the claim of absent others, effectively cooperating around the "social agreement" of property. These studies demonstrate that children can work together and resolve disagreements when they occur between themselves and another individual.

There is also extensive research examining how children evaluate the fairness of decisions when an individual is tasked with distributing resources between two parties who have different interests. The resource distribution literature is useful because it provides a tangible framework for how children conceptualize adjudicating between two different agents who have differing preferred outcomes, and how their beliefs regarding these procedures change across development. This research has found that children are initially averse toward inequality per se, but that later in development they will endorse inequality if it is arrived at in an impartial manner. Specifically, children aged 3 to 4 tend to favor equal resource distributions when allocating resources as a third party, even when there are sensible reasons to share unequally (e.g. Olson & Spelke, 2008). However, as they mature, they begin to use merit and other acceptable justifications (e.g., need, merit, impartial procedures) for inequality. For example, Schmidt, Svetlova, Johe, and Tomasello (2016) examined a number of justifications for creating inequality between others, including two previously found to be legitimate by past research—need and merit—along with one not particularly legitimate justification–demand ("I just want it more"). The authors examined how the aforementioned reasons guided 3-, 5-, and 8-year-olds' resource allocation between two recipients. They found that the youngest children preferred equal distributions over unequal distributions based on need, merit, or demand. Five-year-olds were more likely to create inequality using the different reasons (i.e., demand, merit, need, or rules) than younger children, but they were undiscerning, using all rules to excuse inequality at similar rates. It was not until age 8 that children began to strongly differentiate between legitimate justifications (need, merit) from less legitimate ones (demand).

Relatedly, Shaw and Olson (2014) tested a common impartial procedure (a randomization device: a wheel) to examine whether 5- to 8-year-old children will create inequalities between others if this can be achieved in an impartial manner. Children were given the opportunity to spin an impartial wheel (a wheel that gave everyone an equal chance to win an extra resource) or a partial wheel (a wheel that gave one person the resource no matter what) to give away an extra resource. Children used impartial wheels to create inequality (e.g., give the extra resource away to one person instead of discarding the extra resource) and believed that impartial wheels are more fair than partial wheels (see also Grocke, Rossano, & Tomasello, 2015). However, children's beliefs about these procedures became more nuanced as they matured —5- to 6-year-old children were much more likely to spin the partial wheel to create inequality than older children. Taken together, this research on resource allocation demonstrates that 5- to 6-years-olds do endorse some procedures for fairly allocating resources to others (e.g., demand, merit, need, or rules), but they do not seem to fully grasp precisely what feature of these procedures makes them fair. For older children, the above studies suggest that they readily use impartial randomized procedures to make decisions in the face of others' conflicting desires.

Adults use impartial random procedures to make decisions about who should get what is quite commonplace and considered fair. The literature suggests that the use of random systems has appeared as solutions for selecting public officials (Carson & Martin, 1999), conscripting military service (Perri, 2013), and even resolving elections (Foley, 2024). Indeed, research has demonstrated that people use random procedures to resolve interpersonal conflicts (Kimbrough, Sheremeta, & Shields, 2014) and that such procedures are generally perceived as fair or "equal" when used (Carson & Martin, 1999), suggesting that it is a procedure that can be used to adjudicate conflicts across several different contexts. The above literature supports the notion that randomized procedures may be considered *particularly* fair rules by adults and children alike.

However, in many cases randomized procedures such as coin flips may not be ideal, and procedures which utilize preference information may prove to be a better way to resolve group disagreements. While research suggests that procedures such as coin flip may be perceived as fair or equal in many contexts, there are certainly contexts where this is not the case. For example, Keren and Teigen (2010) demonstrate that adults do not think coin flips are appropriate decision-making tools when the outcomes at stake are serious (e.g., who should benefit from an organ donation). Furthermore, even beyond such serious decision-making, coin flips might also seem inappropriate or inefficient in many more mundane day-to-day decision-making contexts. For example, imagine you were trying to decide what restaurant to go to for dinner. If almost everybody wanted to eat Thai, except for one person who wanted to eat Italian, one could resolve this dispute by flipping a coin, but that does not appear to be the best way to make such a decision. Fifty percent of the time, all but one person will be disappointed with the kind of noodles they would be consuming that evening. In scenarios like these, in which there is a clear majority preference and clear minority preference, it seems obvious that there are better ways to optimize outcomes. Groups could use preference information to ensure that the most people get what they want rather than merely relying on a random procedure that is not at all tied to these preferences. One way that adults appear to aggregate such information about preferences into decision-making is through both formal and informal voting.

Although there is limited work probing young children's notions of majority rules voting, young children are not alien to the concept of using information from majorities to inform their decision-making and evaluations. For example, by age 4, children sometimes defer to majorities for accuracy-based judgments when they are unsure (Corriveau & Harris, 2010). Children also conform to peer majorities and adjust behavior when it comes to novel conventions (Schillaci & Kelemen, 2014) or public, but not private, expression (Haun & Tomasello, 2011). One particularly interesting and relevant paper is a recent set of studies by Li, Britvan, and Tomasello (2021) where they examine rates of conformity by whether a majority norm versus preference is appealed to. The authors find that preschoolers are more likely to conform when a majority norm is emphasized, as norms carry an implicit sense of obligation or shared values, compared to preferences, which are viewed as more subjective. This work demonstrates that children *are* sensitive to the types of majorities that are used in group contexts. It demonstrates that majority influence in the form of conformity can guide children's decision-making. Although this kind of majority influence is important, it is not the same thing as deciding a matter based on a procedural reason like a vote (which we will address in our current studies).

Despite its prevalence and importance as a decision-making procedure, there are only a few papers of which we are aware that examine if young children think that majority rule should be used as a decision-making tool. Much of the work in this area focuses on formal voting in contemporary political systems and has primarily focused on adolescents (e.g., Barrett & Pachi, 2019; Sherrod, Torney-Purta, & Flanagan, 2010). However, some work has investigated young children's more basic intuitions about majority rule decision-making, most notably by Helwig and colleagues. They conducted interviews probing 6- to 11-year-old children's evaluations of different rules one could use to make decisions for both governmental and day-to-day contexts (e.g., Helwig, 1998). For example, Helwig and Kim (1999) examined children from 1st to 6th grade and their beliefs about consensus-based, majority-based and authority-based decision rules in three different contexts: peer groups, family settings, and classrooms. They found that children differentiated what decision rules to use depending on the context.

Children preferred consensus for peer and family contexts, whereas they preferred authority-based procedures for school decisions.

It is not that surprising that children leaned toward consensus: When using preferences to make decisions, consensus or universal agreement may seem like a particularly good option for making decisions—everyone agreeing just seems better than making many happy at the expense of a few. However, it is not always plausible and often inefficient to reach consensus in the real world. Group members often have divergent preferences and consensus-requiring systems are quite taxing for their participants (Green & Taber, 1980). Indeed, the Articles of Confederation, one of the original governmental decision procedures in the United States, demanded consensus and thus made making decisions difficult. In situations where consensus is not possible, some people will get what they want, and others will not.

Thus, the current paper examines how children think about majority rule as a way to make group decisions in cases where consensus is not an option. While we wanted to exclude consensus, we still wanted to compare voting to another ostensibly fair procedure for resolving disputes where parties may disagree. We did this so that children's endorsement of voting would be meaningful in that they would be endorsing it over another fair procedure. As noted above, randomized procedures seem to fit the bill; we know that children consider impartial randomized devises as quite fair (e.g., Grocke et al., 2015; Shaw & Olson, 2014) and so this would provide a strong test case. DeScioli and Bokemper (2019) found that adults do favor majority rule voting over randomized procedures for making group decisions (and this preference has been demonstrated across multiple cultures, including in Denmark, Russia, India, and Hungary; see Bor et al., 2021). Here, we probe when in development children begin to show this preference.

Another goal of the current study was to examine the extent to which children's intuitions about majority rule voting are similar or different across cultures. There has been an important, recent push to expand research beyond WEIRD samples (e.g., Henrich, Heine, & Norenzayan, 2010). We chose to examine the United States and China, as these two cultures differ on several different dimensions that may influence children's intuitions about the use of majority rule. One potentially relevant dimension is that China is considered less "democratic" than the United States (see Democracy Index compiled by the EIU), which might suggest that we would see an earlier emergence of endorsing majority rule in American children. However, the U.S. and China also differ in some cultural aspects, such as orientations toward individualism. Societies with more individualistic orientations (like the United States) focus more on valuation of the self, whereas societies with more interdependent orientations (like China) focus more on the extended network and the group (for review, see Triandis & Suh, 2002). Thus, it would also be possible that children in China are more oriented toward thinking about what the group wants compared to children in the U.S., and thus more likely to endorse majority rule as this is a very effective procedure for executing a group's desires. However, given that our research explored more basic questions about majority rule voting in simple classroom decision-making, we did not have a strong expectation that children would respond in a drastically different fashion in these two cultures.

Of course, finding similarities in responding from children in these two cultures on this basic task would in no way indicate that one's culture does not influence children's intuitions about voting or democracy. However, it would suggest that the effects we observe in these basic scenarios may be robust to sizable differences in one's sociopolitical environment. Further, we acknowledge that finding an effect in these two cultures would not establish that children's responses, even in this basic scenario, are universal given that both populations of children we examined in the U.S. and China are from highly industrialized regions in these two societies. We return to this issue in the General Discussion, particularly in the limitations. Furthermore, while it would be informative to observe cross-cultural similarities in children's endorsement of majority rule, we would not take such data to suggest that humans or children are inherently democratic. These experiments nevertheless represent one of very few investigations of young children's intuitions about majority rule and we endeavored to conduct these experiments (at least our first two) in two different cultures.

1.1. *Current studies*

The current studies examined if and when children think that majority rule should be used instead of other (non-consensus based) decision-making procedures. To do this, 4- to 9-year-old children were told about different scenarios in which a classroom must make a decision. We asked children how the group should make such a decision: either going with majority rule or using another decision-making procedure (a fair procedure in Study 1 and an unfair procedure in Study 2 and 3). We also asked them whether or not one should be able to use a majority rule procedure at all (Study 4)—would children think it's better not to vote at all than vote with no consensus? We explored contexts in which adults would be likely to say that majority rule was the right thing to do (Studies 1a-3) as well as contexts in which they would be likely to say it was the wrong thing to do (Study 2a, 2b, Study 3, Study 4). Generally, we operationalized majority rule voting as going with what "most of the group wants to do."

We tested these questions in 4- to 9-year-old children which is an important age range for children's developing beliefs about fairness and procedures. For one thing, previous research finds developments in children's intuitions about fairness during this age period (Elenbaas, Kneeskern, & Ackerman, 2022; Kogut, 2012; Rizzo & Killen, 2020; Shaw, 2013). In particular, by age 7 or 8, children are much better at differentiating between legitimate and illegitimate reasons for creating inequality; children 5 years old and younger appear to have more difficulty differentiating between different kinds of fair procedures and often endorse both legitimate and illegitimate procedures (Schmidt, Rakoczy, et al., 2016; Shaw & Olson, 2014). Based on this previous research, it seems informative to explore 4- to 9-year-olds' intuitions about majority rule voting and compare it to other fair and unfair procedures. Indeed, one goal of the current research program was to explore young children's endorsement of majority rules decision making and their endorsement of these procedures might change throughout this developmental time window.

2. Studies 1a and 1b

Studies 1a and 1b examined children's endorsement of majority rule in comparison to another decision-procedure that should be both considered fair and commonly used in day-to-day life: coin flips. A randomization procedure (like a coin flip) seemed like a good option because it is a simple and fair procedure that is commonly used by adults (Choshen-Hillel, Shaw, & Caruso, 2015; Gordon-Hecker, Rosensaft-Eshel, Pittarello, Shalvi, & Bereby-Meyer, 2017; Keren & Teigen, 2010) and also by children (Dunham, Durkin and Tyler, 2018; Grocke et al., 2015; Shaw & Olson, 2014). Allowing children to select between using majority rule and flipping a coin allowed us to explore if there are circumstances in which children believe majority rule is a better decision-tool than another procedure that they are familiar with and regard as fair.

Here, children were told that a class was trying to decide what to have for a snack and were asked which procedure the class should use to make this decision: go with what most people would prefer (majority rule) or flip a coin. As noted above, although adults regard both voting and coin flips as fair, in many circumstances (e.g., when deciding what snack the group should have), they prefer to use voting rather than coin flips (e.g., Bor et al., 2021). We wanted to explore if children also showed this preference and if so, when in development. Given that children show strong developments in their ability to differentiate between fair and unfair procedures as they mature (e.g., Schmidt, Rakoczy, et al., 2016), we predicted that we would see a developmental increase in children's endorsement of majority rule as they grew older and that at

some point in development their intuitions would ultimately align with adults' choices in this context—that is, picking majority rule over a coin flip (Bor et al., 2021). We explored this research question in a sample of American children (Study 1a) and Chinese children (Study 1b) to examine whether or not our results would generalize across these two different cultural contexts.

3. Study 1a

3.1. Methods

3.1.1. Participants

Ninety 4- to 9-year-olds (M_{age} = 83.22 months, SD = 21.24 months, 38 female) were tested in the greater Chicago area for Study 1a. We recruited 30 participants per each 2-year age bracket: thirty 4- to 5-year-olds (M_{age} = 58.4 months, SD = 6.76 months, 12 female), thirty 6- to 7-year-olds (M_{age} = 83.8 months, SD = 8.04 months, 15 female), and thirty 8- to 9-year-olds (M_{age} = 107.28 months, SD = 6.84 months, 11 female). Data were collected at a science museum in the greater Chicago area. We did not collect specific demographic information beyond gender at the museum because of the fast-paced nature of data collection. However, our museum partner provided us with a summary of their own survey data of museum visitors between March 2018–2019, the approximate time frame in which these studies were run. The survey revealed that 68 % of museum visitors self-identified as White; 12 % as Hispanic, Latino, or of Spanish origin; 12 % as Asian; 8 % as Black or African American; 4 % as of another race or origin (6 % of visitors surveyed selected more than one category). Approximately 65 % of adults reported having completed a bachelor's degree or higher. We expect that our sample is, at least approximately, representative of this broader museum sample.

3.1.2. Procedure

Participants were told a story about a classroom that was deciding what snack to eat for snack time. Children were then asked which of two procedures the class should use to make the decision: voting or flipping a coin. Each procedure was accompanied by a definition. Participants read the following script alongside clip-art images on a tablet:

"Today, the class is going to decide whether to eat popcorn or chips for snack time. They have to figure out a way to decide between voting & flipping a coin. Voting means that everyone will decide by doing what most of the kids want to do. Flipping a coin means everyone will decide by whether the coin comes up heads or tails. What should they do? Should they vote to decide? Or should they flip a coin to decide?"

Participants were asked: "How should they decide?" and responses were a forced choice between flipping a coin or voting, coded as 0 and 1 respectively. The order in which the options (flipping a coin and voting) were introduced was counterbalanced across sequences. IThese studies were not preregistered. Methods and data are available to view at osf.io /vzm6g osf.io/vzm6g

3.2. Results

A logistic regression analysis was conducted to reveal whether children's choices between selecting coin flip or voting changed with age. Age was set as the continuous factor and decision rule choice (coin or vote) as the binary dependent variable. The analysis revealed a significant effect of age on choice, Wald $X^2(1, N = 90) = 8.44$, $p = .004$. We subsequently looked at each age group separately (4–5, 6–7, and 8–9) in order to examine whether their responses differed from chance. Binomial sign tests revealed that 4- to 5-year-olds were significantly below chance at choosing voting (8 out of 30, 27 %, $p = .016$), whereas 6- to 7-year-olds were significantly more likely to choose voting over chance (23 out 30, 76 %, $p = .005$), as were 8- to 9-year-olds (21 out of 30, 70 %, $p = .043$). See Fig. 1.

3.3. Discussion

Study 1a found that American children became more likely to endorse majority rule as they got older. Indeed, by the time children were 6- to 7-years-old, they strongly endorsed majority rule as a group decision procedure, favoring it over another procedure they regard as fair (i.e., a randomization device, Shaw & Olson, 2014). Children younger than six not only endorsed majority rule less strongly than older children, but actually preferred the coin flip to majority rule. These results document a systematic endorsement of majority rule in 6- to 9-year-old children's decision-making. We next tested a sample of children in an identical task in China in order to examine whether these effects would generalize to a country in which the state structure differs

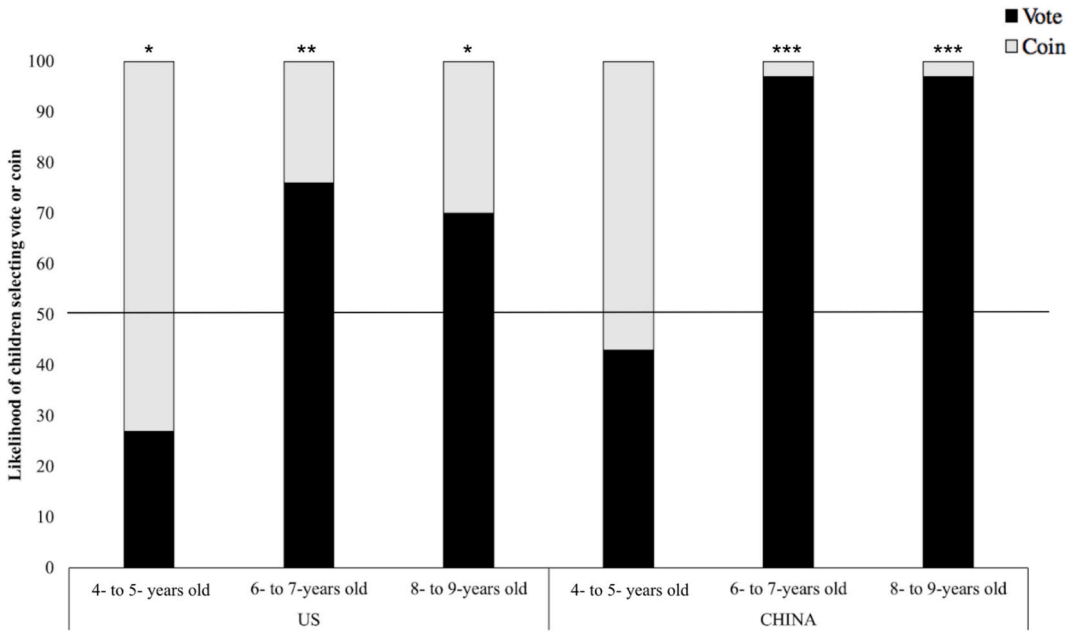

Fig. 1. Study 1a & 1b results. Mean percent of children from the U.S. and China selecting to go with voting or coin flip in how to make a group decision. Data were broken down by age group (4-to 5-years old, 6- to-7-years-old, and 8- to-9-years-old). (* = $p < .05$, ** = $p < .01$, *** = $p < .001$).

in its explicit use of democracy (which might tamp down endorsement of majority rule voting) and also is more collectivistic (which might strengthen endorsement of majority rule).

4. Study 1b

4.1. Methods

4.1.1. Participants

Ninety 4- to 9-year-olds (M_{age} = 83.16 months, SD = 19.86 months, 53 female) were tested in Study 1. We recruited 30 participants per each 2-year age bracket: thirty 4- to 5-year-olds (M_{age} = 62.15 months, SD = 6.98 months, 13 female), thirty 6- to 7-year-olds (M_{age} = 80.04 months, SD = 6.84 months, 15 female), and thirty 8- to 9-year-olds (M_{age} = 106.8 months, SD = 5.4 months, 25 female). Due to the SARS-CoV-2 pandemic, participants were recruited and tested via VooV Meeting video calls (a Chinese platform similar to Zoom). Online participants were from diverse urban areas of China. They predominantly came from middle to high SES families. Most of the parents hold a bachelor's degree or a higher degree. Children all spoke Mandarin Chinese as their native language and were of the Han ethnicity.

4.1.2. Procedure

Participants were told the same story as in Study 1a, but translated into Chinese by a native speaker, which was then translated back to ensure correspondence between the English and Chinese scripts. The children were shown the same story and pictures using Microsoft PowerPoint and the screen share function of VooV Meeting. These studies were not preregistered. Methods, data and analyses are available to view at osf.io/vzm6g

4.2. Results

Similarly to Study 1a, a logistic regression analysis was conducted to reveal whether children's choices between selecting coin flip or voting changed with age. Age was set as the continuous factor and decision rule choice (coin or vote) as the binary dependent variable. The analysis revealed a significant effect of age on choice, Wald $X^2(1, N = 90) = 13.79$, $p < .001$. We subsequently looked at each age group separately (4–5, 6–7, and 8–9) in order to examine whether their responses differed from chance. Binomial sign tests revealed that 4- to 5-year-olds did not select vote over coin at levels significantly different than chance (selecting vote 13 out of 30, 43 %, $p = .585$), whereas 6- to 7-year-olds were significantly more likely to choose vote over chance (29 out 30, 97 %, $p < .001$), as were 8- to 9-year-olds (29 out of 30, 97 %, $p < .001$). See Fig. 1.

4.2.1. Comparison between U.S. and Chinese samples

We further examined whether children's endorsement of majority rule voting varied by culture and age. We conducted a logistic regression analysis to explore whether children's choices were affected by culture and age, and if there was an interaction between the two. Culture was set as a binary factor (U.S. or China), age as a continuous factor, and choice (coin flip or majority rule voting) was set as the binary dependent variable. First, aligned with the main effect of age in each study) the analysis revealed a significant main effect of age, Wald $X^2(1, N = 180) = 16.44$, $p < .001$)—with children endorsing voting more as they matured. The analysis also revealed both a significant main effect of culture, Wald $X^2(1, N = 180) = 5.92$, $p = .015$) and also an interaction between culture and age, Wald $X^2(1, N = 180) = 5.79$, $p = .016$). Specifically, children were more likely to select voting in China (71 out of 90, 78 %) than in the United States (52 out of 90, 58 %), particularly younger children. However, both age groups were significantly likely to pick majority rule by age 6.

4.3. Discussion

Study 1b found that Chinese children, like American children, were more likely to endorse majority rule (over coin flip) with age. Again, by the time children were 6- to 7-years-old, they strongly endorsed voting as a group decision-making procedure, even preferring it over flipping a coin to make the decision. Younger children in this sample again were less likely to opt for voting than older children, opting for voting at chance levels. We found that both Chinese and American children increasingly preferred majority rule voting as a decision-making tool with age, particularly by 6- to-7-years-old.

One may wonder whether children's selection of voting in Study 1 and b may be driven by a preference for human decision-making (here, voting) over non-human decision-making (here, coin flip). We do not think this is likely. Previous work demonstrates that 5- to 8-year-old children will use random, fair procedures (e.g., spinning a wheel) rather than exercise their own sense of agency (e.g., Shaw & Olson, 2014), which suggests that children in this age range do not always prefer human decision-making to non-human decision-making. Therefore, the results, at least for our children older than 6- years-old, suggest that children endorse majority rule voting over another procedure that they think is quite fair, providing a stronger demonstration of their preference for this procedure.

Despite a general similarity in developmental patterns between Chinese and American children, we found that Chinese children selected majority rule more frequently than American children. This finding might be surprising when primarily considering that China has less federal voting systems set in place (Economic Intelligence Unit, 2024). However, when considering previous research in cultural psychology, particularly work on collectivistic versus individualistic cultures (Triandis, 1989; Markus & Kitayama, 1991)., this pattern of results seems less surprising. Growing up in a more collectivistic culture, it may be that Chinese children are more attuned to group desires than their U.S. counterparts, leading them to prefer majority rule, which could arguably better satisfy the desires of a larger number of people in the group compared to flipping a coin. However, given that we did not find consistent cultural difference in the subsequent studies, we caution against making any strong interpretation based solely on this finding.

Finally, it is worth noting that 4- to 5-year-old children in the United States and in China did not significantly favor voting over coin flipping (and in the United States they even preferred coin flipping to voting). Given that there has been no previous research on young children's endorsement of majority rule, it is unclear why 4- to 5-year-olds endorsed voting at such low rates. Does this mean that they have no intuitions about the fairness of majority rule voting? To examine younger children's more basic intuitions about voting, in our next study we asked if younger children would endorse majority rule voting over a less fair procedure: letting one individual decide for the group. Further, it remains unclear whether even older children's choices were driven by a belief in majority rule as a decision-making procedure, or by alternative influences such as conformity (e.g., peer pressure) or dominance (e.g., numerical superiority of the majority). To disentangle these possibilities, in Studies 2a and 2b we included a new control condition in which we asked children the same question, but about an individual's decision rather than a group's decision.

5. Study 2a and 2b

In Study 2a and 2b, we examined a simpler scenario in which children were not asked to evaluate majority rule as compared to another fair procedure (e.g., coin flip), but were instead asked to compare majority rule voting to an unfair decision rule. We, again, told participants a story about a group of children making a decision on what to have for snack time. This time, children were asked to decide how the group should make the decision: between picking what three people wanted (majority preference) or what one person wanted (dissenter preference).

We will refer to this as our group condition because the four boys are voting on what the group will have as a snack. If young children have no intuitions about voting (as might have been indicated by our previous result), then they may not differentiate between these two options. However, if children believe that using majorities are more appropriate than using the preference of a lone individual, then they should select the option that was favored by the majority significantly above chance.

However, opting for majority rule in this context does not need to convey that the children grasp majority rule voting and could instead be explained through recourse to dominance or conformity. Previous research demonstrates that children—and even infants—are sensitive to numerical superiority for dominance-related reasons, often expecting larger groups to prevail in conflicts or resource disputes (Hok, Vasquez, Barakzai, & Shaw, 2024; Pietraszewski & Shaw, 2015; Pun, Birch, & Baron, 2016). Similarly, children are known to conform to the majority for social or informational reasons (Corriveau & Harris, 2010; Haun & Tomasello, 2011). Given these possibilities, if one wants to know whether or not children are thinking about majority rule as a decision procedure, it is essential to show that children's preference for majority rule voting in group contexts cannot be solely explained by dominance or conformity.

Thus, in addition to the condition we explained above (the "group condition"), we also included an "individual condition" to rule out the possibility that children were merely deciding based on dominance or conformity. In this condition, children were again told about four children who were making a decision about what snack should be had, but the question was about what snack *one individual* (henceforth dissenter) should have. If children are merely giving an answer consistent with dominance or conformity, they should select the majority preference one gain. However, if children understand that using a majority rule vote is appropriate in some cases (e.g., where the decision affects all those involved) but not in other cases (e.g., where the vote affects only one person), then they should select the individual's preference (dissenter preference). We explored this research question in a sample of American children (Study 2a) and Chinese children (Study 2b).

6. Study 2a

6.1. Methods

6.1.1. Participants

One hundred and eighty-two 4- to 9-year-olds ($M_{age} = 81.96$ months, $SD = 19.75$ months, 95 female) from the greater Chicago area were tested for Study 2. We split participants into 2-year-age brackets of thirty per condition, therefore collecting sixty 4- to 5-year-olds ($M_{age} = 60.41$ months, $SD = 7.15$ months, 32 female), sixty-two 6- to 7-year-olds ($M_{age} = 79.92$ months, $SD = 6.62$ months, 33 female), and sixty 8- to 9-year-olds ($M_{age} = 105.84$ months, $SD = 6.36$ months, 30 female). In total, there were ninety-two participants in the Group condition ($M_{age} = 81.6$ months years, $SD = 19.68$ months, 53 female) and ninety participants in the Individual condition ($M_{age} = 82.44$ months, $SD = 19.92$ months, 42 female). Data were partially collected at the same science museum in Chicago as was Study 1a ($n = 161$) and were also partially collected over Zoom due to the SARS-CoV-2 pandemic ($n = 21$). However, the pattern of results does not change whether we exclude or include the data from the Zoom participants. Participants tested over Zoom were from diverse areas across the United States, as the platform made remote participation possible. Most of the families participating were of middle to high SES.

6.1.2. Procedure

Participants were randomly assigned to either the Group condition or the Individual condition. Across conditions, participants were told a story accompanied with clip-art pictures on a tablet. Children were read the following script:

Today, I'm going to tell you a short story about some kids in a classroom! It is snack time and these four boys need to get one big bag of snacks for lunch. They can either get popcorn or chips. They now need to decide what snack they are all going to share for lunch. These three boys think they should have popcorn, but this one boy thinks they should have chips. Remember, they need to pick one snack for everyone to eat. Do you think they should get popcorn like these three boys want? Or do you think they should get chips like this boy wants?

The Individual condition was similar to the script above, except that participants were told they were deciding on what the one individual who preferred chips would do (e.g., "It is snack time and these four boys each get their own snack for lunch. These three boys have already gotten their snacks and now this boy needs to pick the snack he is going to eat for lunch. He can either get popcorn or chips."). In both conditions, the primary dependent variable was whether they should go with what the majority or the individual wanted. Participant responses for both in person and online participation were a forced choice between selecting what three of the four kids wanted (majority preference) or what the individual wanted (dissenter preference) and were coded as 0 and 1. These studies were not pre-registered. Methods, data and analyses are available to view at osf.io/vzm6g

6.2. Results

A logistic regression analysis was conducted to reveal whether children's choices between selecting the majority or selecting the dissenter changed with condition (Group or Individual) and age. Condition was set as a categorical factor, age was set as a continuous factor, and decision rule choice (majority or dissenter) as the binary dependent variable. First, we ran an interaction between the two variables. The analysis revealed that there was no interaction between condition and age. Wald $X^2(1, N = 182) = 1.46$, $p = .227$. We then ran the model without the interaction. The analysis revealed an effect of condition on choice. Children in the Group condition were significantly more likely to select going with the majority's decision (75 out of 92, 81 %) than children in the Individual condition were (15 of 90, 16 %), Wald $X^2(1, N = 182) = 59.57$, $p < .001$. Age was not a significant predictor of choice, Wald $X^2(1, N = 182) = 0.29$, $p = .587$. However, we split children up by age (4–5, 6–7, 8–9), again, in order to assess their choice as compared to chance at each age group.

6.2.1. Group condition

Binomial sign tests demonstrated that children of all ages opted to go with the majority at above chance levels: 4- to 5-year-olds (22 out of 30, 73 %, $p = .016$), 6- to 7-year-olds (27 out 32, 84 %, $p < .001$), and 8- to 9-year-olds (24 out of 30, 80 %, $p = .001$).

6.2.2. Individual condition

Binomial sign tests demonstrated that children of all ages opted to go with the majority at below chance levels: 4- to 5-year-olds (7 out of 30, 23 %, $p = .005$), 6- to 7-year-olds (3 out 30, 10 %, $p < .001$), and 8- to 9-year-olds (5 out of 30, 16 %, $p < .001$). They instead opted to select the dissenting individual's preference. See Fig. 2.

6.3. Discussion

We found that children in the United States at all ages we tested thought that majority rule was preferable to the seemingly less fair option of letting one individual dissenter decide for the group. This was true even in our youngest children. Importantly, U.S. children of all ages also believed that majority rule is not *always* the more preferable procedure—they did not believe it was more preferable when deciding what an individual themself should do. There, they thought the lone dissenter should be able to make his own decision about what to have for snack. In Study 2b, we ran the same task in a Chinese sample in order to explore if

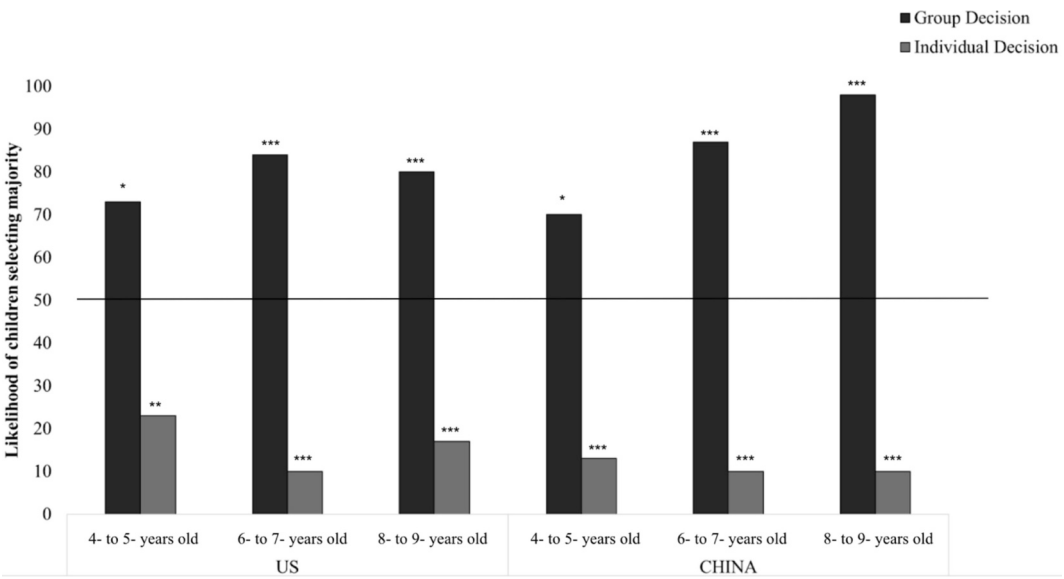

Fig. 2. Study 2a & 2b results. Mean percent of children from U.S. and China selecting to go with majorities in either a group decision (a decision that would affect the entire group) or an individual decision (a decision that would affect just an individual). Data were broken down by age group (4-to 5-years old, 6-to-7 years old, and 8-to-9 years old). (* = $p < .05$, ** = $p < .01$, *** = $p < .001$).

these results would generalize to a different culture.

7. Study 2b

7.1. Methods

7.1.1. Participants

One hundred eighty 4- to 9-year-olds (M_{age} = 83.76 months, SD = 21.09 months, 90 female) were tested in Study 2. We split participants into 2-year age brackets of 30 per condition, therefore collecting sixty 4- to 5-year-olds (M_{age} = 59.52 months, SD = 6.44 months, 30 female), sixty 6- to 7-year-olds (M_{age} = 83.40 months, SD = 7.33 months, 33 female), and sixty 8- to 9-year-olds (M_{age} = 108.48 months, SD = 6.02 months, 26 female). In total, there were ninety participants in the Group condition (M_{age} = 81.60 months years, SD = 19.64 months, 44 female) and ninety participants in the Individual condition (M_{age} = 83.52 months, SD = 20.52 months, 46 female). The Chinese participants who were tested in person (n = 110) were recruited from a middle-class SES public elementary school in the Henan Province, China. While the school was middle SES in China, the Chinese children might have been of lower SES than their U.S. counterparts. Due to the SARS-CoV-2 pandemic, some participants across conditions were collected online via VooV Meeting (n = 70). However, the pattern of results does not change whether we exclude or include the data from these participants. The Chinese children tested over VooV were recruited online from diverse urban areas of China. They predominantly came from middle to high SES families. Most of the parents hold a bachelor's degree or a higher degree. Children all spoke Mandarin Chinese as their native language and were of the Han ethnicity.

7.1.2. Procedure

Participants were told the same story as in Study 2a, but translated into Chinese by a native speaker, which was then translated back to ensure correspondence between the English and Chinese scripts. These studies were not pre-registered. Methods, data and analyses are available to view at osf.io/vzm6g

7.2. Results

A logistic regression analysis was conducted to reveal whether children's choices between selecting the majority or selecting the dissenter changed with condition (Group or Individual) and age. Condition was set as a categorical factor, age was set as a continuous factor, and decision rule choice (majority or dissenter) as the binary dependent variable. First, we ran an interaction between the two variables. The analysis revealed that there was no interaction between condition and age, Wald $X^2(1, N = 180) = 1.758$, $p = .185$. We then ran the regression without the interaction term. The analysis revealed an effect of condition on choice. Children in the Group condition were more likely to select going with the majority's decision (75 out of 90, 83 %) than children in the Individual condition were (10 of 90, 10 %), Wald $X^2(1, N = 180) = 67.44$, $p < .001$. Age was also a predictor of choice, Wald $X^2(1, N = 180) = 4.31$, $p = .038$, though it is important to note that (despite the lack of significant interaction) this was primarily driven by the fact that children in the Group condition were more likely to select going with the majority with age, see Fig. 2. We again split children up by age group (4–5, 6–7, 8–9) in order to assess their choice in comparison to chance at each age group.

Group condition. Binomial sign tests demonstrated that children at all ages opted to go with the majority at above chance levels: 4- to 5-year-olds (21 out of 30, 70 %, $p = .042$), 6- to 7-year-olds (26 out 30, 87 %, $p < .001$), and 8- to 9-year-olds (28 out of 30, 93 %, $p < .001$).

Individual condition. Binomial sign tests demonstrated that children at all ages opted to go with the majority at below chance levels: 4- to 5-year-olds (4 out of 30, 13 %, $p < .001$), 6- to 7-year-olds, (3 out 30, 10 %, $p < .001$), and 8- to 9-year-olds, (3 out of 30, 10 %, $p = .001$). They instead opted all to select the individual's preference. See Fig. 2.

7.2.1. Comparison between U.S. and Chinese samples

We further examined whether there was a main effect of culture or any interactions of culture, age, and condition in children's responses. We used a logistic regression analysis to reveal whether children's choices between selecting the majority or dissent were affected by culture or interactions between age and condition. Culture was set as a binary factor (U.S. or China), age as a continuous factor, and condition as a binary factor (Group or Individual), and choice was set as the binary dependent variable. The analysis revealed a marginal main effect of culture on choice ($\beta = 3.43$, $p = .057$) such that children in the U.S. were marginally more likely to endorse majority rule overall (the opposite of what we found in Studies 1a and 1b). There were no interactions

between culture and age ($\beta = 0.35$, $p = .996$) and culture and condition ($\beta = 1.4$, $p = .445$).

7.3. Discussion

In Study 2b, we found that Chinese children, like U.S. children, across all age groups selected to go with majorities significantly more than lone dissenters when it came to deciding for the group. Further, like children in the United States, children in China also chose not to side with the majority when it came to deciding for a single individual. Thus, it seems that children in both cultures have at least some intuitions about majority rule, with both believing that although majority rule is preferable to a lone dissenter deciding when it comes to group decision-making, it is not always preferable (e.g., when the decision only affects the lone dissenter). Unlike in Studies 1a and 1b, we did not find that children in China more strongly endorsed majority rule than children in the U.S. (we return to the issue of potential cultural differences in the General Discussion).

The data from Studies 2a and 2b rule out a simpler explanation for why children might have been endorsing majority rule over going with the lone dissenter in our tasks. If children were merely attending to majorities because of conformity or numerical dominance, we would have found that children believe the majority should get their way in *both* group and individual decision-making. Indeed, in both cases the lone dissenter was outnumbered by the three other children. However, the children considered who were affected by the decision being made; they thought the three individuals should get their way when the decision affected everyone involved (Group condition) but not when the decision only affected the lone dissenter (Individual condition).

That said, this was a fairly simple task that did not require children to reason about individuals modifying their own behavior for the group. A stronger test would be a case in which an individual yields to majority preference in a group decision context—that is, in a case where the individual could, if they wanted, easily disobey the majority. Having a more robust examination of majority rule constraints may require a scenario that explicitly involves a majority vote, and for an individual to alter their behavior in line with the majority. Thus, in the next study we run a stricter version of the present task. Note, the next two studies focus only on children in the U.S. Given the vast amount of overlap in children's responses in the U.S. and China in our previous studies, we did not believe that there would be large cultural differences in the tasks. However, we acknowledge that children in the U.S. and China might respond differently on these tasks. We return to the issue of cultural difference and speculate about some cases in which we might expect to see larger cultural differences in the General Discussion.

8. Study 3

Study 3 was a more stringent version of Study 2a and 2b in which we tested a similar paradigm examining whether children believe majority rule is preferable to following a dissenter's preference for group decisions versus individual decisions. While the previous study demonstrated that children endorse majority rule for group decisions, it did not show i) that an individual feels at all bound by these decisions because we did not provide children with a plausible mechanism for the dissenting children to disobey the group's verdict. Study 3 builds on the design of the previous study but refines the context to test the role of majority rule as a binding mechanism in group decision-making. The child with the dissenting opinion is the one who is tasked with actually doing what the group wants and so for the vote to be honored, the dissenting child must obey the majority's rule. Further, this paradigm continues to explore if children believe that majority rule should be scoped to decisions that affect the group, but not decisions that only affect one individual.

In this study, we presented children with a scenario involving a decision about what a boy should bring for a snack. In both conditions a group of boys votes on which snack, popcorn or chips, the boy will bring to school. The boy in orange, tasked with bringing the snack, must decide whether to follow the majority's decision or act on his personal preference. As in our previous study, the scenario emphasizes either that i) the decision affects the entire group, as the chosen snack will be shared among all (group condition); or ii) the decision affects only him because it is his snack, and the chosen snack will not be shared among all (individual condition). This design explicitly tests whether children endorse majority rule as an appropriate mechanism for group decision-making i) by making it clear that the decision affects *everyone* in the group condition and ii) making the choice ultimately up to an individual, and thus demonstrating that the majority's choice should constrain the individual's behavior. We predicted that in this new version we would replicate our previous results (certainly with our oldest children).

8.1. Methods

8.1.1. Participants

One hundred and eighty-one 4- to 9-year-olds ($M_{age} = 82.05$ months, $SD = 22.11$ months, 84 female) were tested for Study 3 on Zoom. We split participants into 2-year age brackets of thirty per condition, therefore collecting sixty-two 4- to 5-year-olds ($M_{age} = 58.31$ months, $SD = 7.25$ months, 29 female), sixty 6- to 7-year-olds ($M_{age} = 83.27$ months, $SD = 6.56$ months, 26 female), and sixty 8- to 9-year-olds ($M_{age} = 105.78$ months, $SD = 15.52$ months, 29 female). In total, there were ninety-one participants in the Group condition ($M_{age} = 82.93$ months years, $SD = 21.97$ months, 37 female) and ninety participants in the Individual condition ($M_{age} = 81.17$ months, $SD = 22.33$ months, 47 female). Participants were from diverse areas across the United States, as testing via Zoom made remote participation possible.

8.1.2. Procedure

Participants were randomly assigned to either the Group condition or the Individual condition. Across conditions, participants were told a story accompanied with clip-art pictures on a tablet. Children were read the following script:

> *"In this school, kids can bring snacks from home and eat them at school every week. They all bring snacks from home and they share the snack with everybody. They're deciding what to eat for snack-time tomorrow. Tomorrow, it's time for the boy in orange to bring a snack for the whole class. This boy in orange is deciding between bringing popcorn or chips for the whole class. All the other boys in class will not have another snack.*
>
> *They could do a vote to decide what the boy in orange could bring. Do you know what voting is? Voting is when you do what most of the group says they want to do. If most of the group says they'll eat chips, then they're going to eat chips. If most of the group says they'll eat popcorn, then they're going to eat popcorn.*
>
> *Now let's see what the kids vote. This kid says popcorn. This kid says popcorn. This kid says popcorn. This kid says chips. Well, most of these kids think popcorn.*
>
> *Let's say this kid in orange goes home now. When this kid in orange goes home, he thinks about what he should do. Should he bring chips or popcorn for the whole class tomorrow? Remember, these three boys voted that he should bring popcorn, but he voted that he wants chips. Also, remember that the snack is for the entire group to share and so the other boys will have to eat whatever he brings.*
>
> *What should he do? Should he just bring chips like he wants? Or should he go get popcorn like these three boys want?"*

The Individual condition was similar to the script above, except that participants were told they were deciding on what the one individual who preferred chips would do (e.g., "They all bring snacks from home and eat the snack by themselves. The kid in orange is deciding what to eat for snack tomorrow."). Note, here we made it clear that the boys

voted on what snack should be had in both conditions (in our previous study the boys merely stated which snack they wanted it to be). In both conditions, the primary dependent variable was whether the child bringing the snack should abide by what the majority or the dissenter voted for. Participant responses were a forced choice between selecting what three of the four kids wanted and voted for (majority preference) or what the individual wanted and voted for (dissenter preference) and were coded as 0 and 1. These studies were pre-registered. Methods, data and analyses are available to view at osf.io/vzm6g

8.2. Results

A logistic regression analysis was conducted to reveal whether children's choices between selecting the majority or selecting the dissenter changed with condition (Group or Individual) and age. Condition was set as a categorical factor, age was set as a continuous factor, and decision rule choice (majority or dissenter) as the binary dependent variable. First, we ran an interaction between the two variables. The analysis revealed a significant interaction between condition and age, Wald $\chi^2(1, N = 181) = 22.26$, $p < .001$, such that the difference between children's responses to the two conditions became larger as children got older. We did not specifically predict this interaction (given the results from Study 2),but we conducted follow up simple effects analysis for the three age groups. These analyses revealed that, the four to five year olds did not differentiate between the two conditions, Wald $\chi^2(1, N = 31)$ s = 0.002, $p = .964$, whereas both the 6- to 7-year-olds, Wald $\chi^2(1, N = 30) = 0.16.81$, $p < .001$ and 8- to 9-year-olds clearly did, Wald $\chi^2(1, N = 30) = 0.25.58$, $p < .001$. We applied a Holm-Bonferroni correction to account for multiple comparisons. The 6- to 7-year-old and 8- to 9-year-old effects remained significant (adjusted $p = .003$), while the 4- to 5-year-old comparison was unaffected ($p = .964$).

As per our pre-registration, we then ran the regression without the interaction term. The analysis revealed an effect of condition on choice. Children in the Group condition were more likely to select going with the majority's decision (66 out of 81, 81 %) than children in the Individual condition were (24 out of 81, 30 %), Wald $\chi^2(1, N = 181) = 34.87$, $p < .001$. Age was not a significant predictor of choice, Wald $\chi^2(1, N = 181) = 1.03$, $p = .310$. However, the interaction analysis indicates that the effect of condition varied with age, particularly in the Individual condition. We again split children up by age group (4–5, 6–7, 8–9) in order to assess their choice as compared to chance for each age group.

8.2.1. Group condition

Binomial sign tests demonstrated 4–to 5-year olds chose the majority at rates no different than chance (19 out of 31 chose the majority (61 %), $p = .281$), but that 6- to 7-year-olds, (23 out of 30 (77 %), $p = .005$) and 8- to 9-year-olds (27 out of 30 (90 %), $p < .001$) were significantly more likely to select that the majority will get their way than chance.

8.2.2. Individual condition

Binomial sign tests demonstrated 4–to 5-year-olds (17 out of 28 chose the majority (60 %), $p = .345$) chose the majority at rates no different than chance, but that 6–to 7-year-olds (6 out of 30 (20 %), $p = .001$) and 8–to 9-year-olds (3 out of 29 (10 %), $p < .001$) chose the majority at rates significantly below chance. Instead, these children predominantly chose to follow the individual's preference (See Fig. 3).

8.2.3. Discussion

By at least 6- to 7-years old, children demonstrated clear beliefs about when majority rule is appropriate, consistently choosing the majority's preference when the decision affected the entire group but rejecting the majority's preference when the decision affected only an individual. This pattern, consistent with our findings from Studies 2a and 2b, provides strong evidence that children apply majority rule selectively, using it as a normative decision-making mechanism in group contexts but not in individual contexts. Importantly, this preference

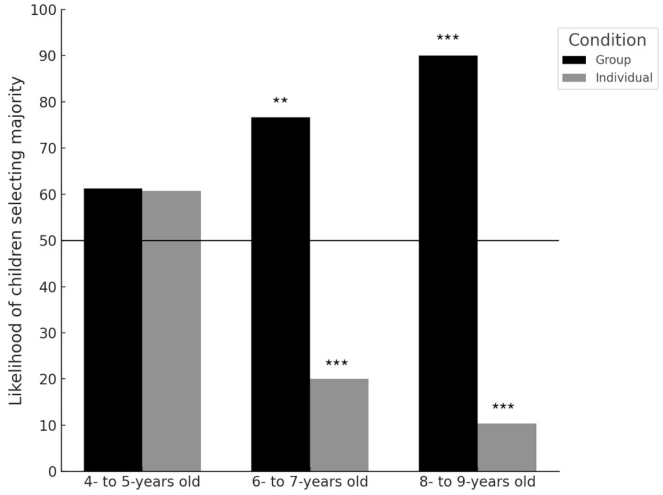

Fig. 3. Study 3 results. Mean percent of children from the U.S. selecting to go with majorities in either a group decision (a decision that would affect the entire group) or an individual decision (a decision that would affect just an individual). Data were broken down by age group (4-to 5-years old, 6-to-7 years old, and 8-to-9 years old). (* = $p < .05$, ** = $p < .01$, *** = $p < .001$).

persisted even in this more stringent version of the task, which explicitly required children to reason about how majority decisions can constrain individual behavior (the individual was the one actually bringing the snack in both cases, but they thought he should forgo his own preference when the majority voted for a different snack in the group decision-making context). Further we find that children's reasoning about majority rule is context-sensitive such that children attend to the scope of the decision being made (e.g., if it affects the group versus an individual), and also that group decisions, but not individual decisions, should curb an individual's preference. As stated previously, this differentiates our current work from previous research that has demonstrated children respond to majorities for conformity or dominance-based reasons.

The youngest children in our sample (4- to 5-year olds) failed this stricter test, responding differently than in the previous Studies 2a and 2b. Instead, their responses hovered around chance, suggesting that they struggled with this stricter version of the task. It could be that younger children's apparent success in Study 2 was due to a simpler task structure or different reasoning processes at play. It is also possible that, in line with Studies 1a and 1b, younger children may just have a less strong preference for obeying majority rule decision-making procedures.

9. Study 4

The results of Study 2a, 2b, and 3 show that by 6- to 7-years, children favor majority rule over "dissenter rules" decision-making. However, this relative preference for majority rule in group decisions does not tell us that children favor majority rule necessarily. It is also possible that children think that both procedures are *actually* inappropriate, and would say that one should not be able to vote *at all* in cases where people disagree. Given that we never gave children the option to say one should *not* be able to vote, it is possible that children were simply selecting between the 'least bad' way while thinking about are wholly inappropriate. We explore whether children think you should not be able to vote on matters of preference in Study 4 and compare this to other scenarios in which using voting as a group decision making procedure may in fact seem inappropriate. For example, previous work has demonstrated that adults do not always think majorities should rule; (e.g., avoiding harm, DeScioli & Bokemper, 2019). To examine this question, we picked two boundary conditions that would provide strong test cases: truth and morality. Would children forbid others from voting when they disagree, and do they differentiate between voting on matters of preference and

matters of morality or fact?

Social Domain Theory literature suggests that from a very young age (certainly by age 4), children view harm as a matter of morality rather than convention (Killen & Smetana, 2006). A key finding is that children believe moral rules, like avoiding harm, are authority-independent—rules that must be followed regardless of authority figures' opinions (e.g., Smetana & Braeges, 1990). This framework helps explain how children differentiate between moral, social-conventional, and personal decisions. While majority rule may be seen as appropriate for resolving conventional or preference-based conflicts, moral rules, such as prohibitions against harm, may be understood as universal and non-negotiable. Thus, children may oppose majority decisions that violate moral principles, such as causing harm to others, *even* when endorsed by a group. Relatedly, children may also resist using majority rule to settle truth claims. Some work suggests that although children are sensitive to the presence of majorities in making truth judgments (e.g., simple perceptual judgments, such as how long a line is), children will also resist listening to majorities when it contradicts their direct perceptual evidence (Corriveau & Harris, 2010). This body of work suggests that moral harms and truth are areas in which children *may* be resistant to using majority rule to make decisions. Study 4 explores this question: in what contexts do children believe that group decision-making should not be guided by majority rule?

To explore this question, in a participant design, we presented children with vignettes in which children are told that a group of four boys needs to make a decision about something by going with majority or dissenter preference. Here children were asked both whether the boys should be allowed to vote on the matter (Voteability) and then whether they should go with the majority or dissenter preference (endorsement). Critically, we varied the matter that they were voting on. In one case, it was a matter of preference, similar to our study 2 (here though deciding what to name a pet rabbit, Preference condition). Here, in line with our previous studies, we predicted that children, at least 6- to 9-year-olds, would endorse majority rule voting. If we obtained this result (particularly on the votability measure) it would demonstrate that children do not opt "not to vote" in cases of disagreement over preferences.

We contrasted this Preference condition with two other conditions in which we hypothesized that children might endorse voting less: when a majority favored something that was immoral (feeding a pet rabbit to a snake, Moral condition), or untrue (saying that rabbit was a hamster, Truth condition). If children are following a simple heuristic that majority rule is appropriate for all group decision-making, then they should say that one should be able to vote on these matters and again endorse majority rule voting. Alternatively, if children have a view of majority rule that incorporates other moral and epistemic principles, then they should be less likely to endorse majority rule in these conditions, saying that the characters should not be allowed to vote and that one should not listen to the majority's opinion. Here we test these possibilities and whether children's response to these questions changes as they grow older.

9.1. Methods

9.1.1. Participants

Ninety 4- to 9-year-olds (M_{age} = 83.16 months, SD = 19.92 months, 38 female) were tested in Study 4. We split participants into 2-year age brackets of thirty per cell, therefore collecting thirty 4- to 5-year-olds (M_{age} = 61.5 months, SD = 7.28 months, 14 female), thirty 6- to 7-year-olds (M_{age} = 81.12 months, SD = 6.12 months, 11 female), and thirty 8- to 9-year-olds (M_{age} = 107.04 months, SD = 7.32 months, 17 female). In total, there were ninety participants. Participants tested over Zoom were from diverse areas across the United States, as the platform made remote participation possible. Most of the families participating were of middle to high SES.

9.1.2. Procedure

Children were shown a picture of four boys via Zoom screen-sharing. Children were told that these four boys were going to vote to decide on different things, and that the children would be asked whether it was okay to vote to decide. In each case the children in the classroom were voting on something about a classroom pet. Within participants (with the order counterbalanced) children were shown three different trials that corresponded to our three conditions: Preference condition (deciding the name of the pet animal); Moral condition (deciding whether it was okay to feed the pet animal to a snake); and Truth condition (deciding whether the animal, a rabbit, was a rabbit or a hamster). Participants were read the following script alongside of clip-art images on a tablet:

> *"For this game, I'm going to tell you about some different things people can decide on, and I'm going to ask you if it's okay for people to vote on these things!*
> *Do you know what voting is? It's a way for some people to make decisions. When people vote to decide, they do what MOST of the group says they want to do.*
> *Now I'm going to tell you about some different things people can decide on, and I'm going to ask you if it's okay for people to vote on these things! You can say yes or no, okay?*
>
> *Should these boys be allowed to vote to decide X?"*

Participants made an evaluation for each of these items (e.g., "yes" or "no" for whether they thought one should be able to vote on it), henceforth called the Voteability DV. After responding to the Voteability DV, participants were told that they were now going to see what the class actually decided. In each of these cases, there was a majority (three individuals) favoring one choice and a dissenter (one individual) favoring the other choice, henceforth called the Endorsement DV. Participants were read:

> *"Now I'm going to show you what they actually voted on, okay? So I'll show you who wanted what! It looks like these three boys wanted X and this one boy wanted Y. Well, what do you think? Should it be X like these three boys want? Or Y like this one boy wants?*

For the Moral and Truth conditions, the majority was seen favoring the immoral or false choice. That is, for the Moral condition, the majority chose an immoral option (here, feeding the animal to the snake), whereas the dissenter chose a moral option (here, not feeding the animal to the snake). For the Truth condition, the majority chose the incorrect option (here, saying that a rabbit was a hamster), whereas the dissenter chose the correct option (here, saying the rabbit was a rabbit). Given that we expected there to be no inherently 'correct' decision for the preference case, we counterbalanced the choice of majority and dissenter (whether they preferred the name "Blossom" or "Buttons" for the rabbit). The order of conditions were counterbalanced between participants but the two DVs were asked in a fixed order with the Voteability DV first followed by the Endorsement DV (we thought it was important to assess whether they thought one should be able to vote before asking them if they would endorse the vote). IRB approval was received by UChicago IRB (Study Number: IRB19–1629, Study Title: Children's Social Judgments). These studies were preregistered. Methods and data are available to view at osf.io/vzm6g

9.2. Results

9.2.1. Voteability

A mixed logistic regression analysis was conducted to reveal whether children's choices between selecting voting changed with condition (Preference, Moral and Truth) and age. Condition was set as a categorical factor with Preference set as the baseline. Age was set as a continuous factor and decision rule choice (yes or no) as the binary dependent variable. A random effect of participant was included as a within-subject

variable. The analysis revealed an effect of condition on endorsement of voting with preference set as the reference. Children were significantly less likely to say one should be able to vote to decide in immoral cases (28 out of 90, 31 %), ($\beta = -2.58$, $p < .001$) and false cases (52 of 90, 58 %), ($\beta = -1.47$, $p < .001$) than preference cases (77 of 90, 86 %). Age was not a significant predictor of choice ($\beta = -0.08$, $p < .315$).

We again split children up by age groups (4–5, 6–7, 8–9) in order to assess their choice as compared to chance at each age using binomial sign tests. For preference decisions, 4- to 5-year-olds (22 of 30, 73 %, $p = .016$), 6- to 7-year-olds (27 of 30, 90 %, $p < .001$), and 8- to 9-year-olds (28 of 30, 93 %, $p < .001$) were above chance at agreeing that one should be able to vote on such matters. For moral decisions, 6- to 7-year-olds (8 of 30, 27 %, $p = .016$), and 8-to 9-year-olds (8 of 30, 27 %, $p = .016$) were below chance at agreeing that one should be able to vote on such matters, whereas 4- to 5-year-olds were at chance (12 of 30, 40 %, $p = .362$). Finally, for truth decisions, 4- to 5-year-olds (18 of 30, 60 %, $p = .362$) and 8-to 9-year-olds (18 of 30, 60 %, $p = .362$) were at chance whereas 6- to 7-year-olds were above chance at agreeing that one should be able to vote on such matters (22 of 30, 73 %, $p = .016$). See Fig. 4.

9.2.2. Endorsement

A mixed logistic regression analysis was conducted to reveal whether children's choice to go with the majority changes across condition (Preference, Moral, and Truth) and age. Condition was set as a categorical factor with Preference set as the baseline. Age was set as a continuous factor and decision rule choice (majority or dissenter choice) as the binary dependent variable. A random effect of participant was included as a within subject variable. The analysis revealed an effect of condition on endorsement of voting with preference set as the reference. Children were significantly less likely to endorse majority rule in the Moral case (9 out of 90, 10 %), ($\beta = -3.09$, $p < .001$) and Truth case (8 of 90, 9 %), ($\beta = -3.22$, $p < .001$) than the Preference case (64 of 90, 72 %). Age was not a significant predictor of choice ($\beta = -0.01$, $p < .916$).

We again split children up by age groups (4–5, 6–7, 8–9) in order to assess their choice as compared to chance at each age using a binomial sign test. For Preference decisions, 6- to 7-year-olds (21 of 30, 70 %, $p = .042$) and 8-to 9-year-olds (26 of 30, 87 %, $p < .001$) were significantly more likely than chance to go with the majority. Contrastingly, 4- to 5-year-olds were at chance (17 of 30, 56 %, $p = .584$). For Moral decisions, 4- to 5-year-olds (7 of 30, 23 %, $p = .005$), 6- to 7-year-olds (1 of 30, 3 %, $p < .001$), and 8- to 9-year-olds (1 of 30, 3 %, $p < .001$) were all significantly less likely than chance to go with the majority. Finally, for Truth decisions, 4- to 5-year-olds (4 of 30, 13 %, $p < .001$), 6- to 7-year-olds (2 of 30, 6 %, $p < .001$), and 8- to 9-year-olds (2 of 30, 6 %, $p < .001$) were all significantly less likely than chance to go with the majority.

It is interesting to note that younger children were not very high in their selection of majority rule for matters of preference. This fits in with the results found in Study 1 and 3, such that 4- to 5- year olds did not have a strong preference for the use of majority rule in decision-making procedures across these studies. See Fig. 5.

9.2.3. Discussion

In Study 4, we found that children differentiated between types of decisions for which majority rule should and should not be used. In line with our previous studies, children endorsed majority rule (over going with a lone dissenter) for preference claims: when the vote took place they said that the group should go with the majority (this latter result conceptually replicates the snack preference result from Studies 2 & 3). More importantly, before they even made that decision, children agreed that the matter could be voted on in the first place. (believing that children should not abstain from voting when there was a disagreement over preference). This result (children allowing voting to occur) is novel and, we argue, provides further support to our interpretation of our earlier results. It addresses a potential concern about whether children think about voting as wholly inappropriate in cases where disagreements exist. In this study they could have said not to allow the vote, but they instead said it was acceptable and appropriate to use it for resolving preference disagreements.

Further, we found that children do think some things should not be voted on—children, at least by age 6, were below chance in saying that one should be able to vote to do something immoral. Furthermore, children at all ages thought moral and truth claims were less "vote-able" than preference claims. Even when children said you should be able to vote on a matter of morality or truth, children at all ages did not tend to endorse the majority when they were advocating an immoral or false position—that is, most children who said you should be able to vote on a matter did not choose to go with incorrect majorities in moral and truth claims. These results fall in line with work in Social Domain Theory, which suggests children treat preference-based decisions as different than moral-based decisions (Killen & Smetana, 2006; Smetana & Braeges, 1990); as well as with previous research suggesting that children do not blindly defer to majority opinions, particularly in contexts where the majority's position conflicts with moral or factual correctness (Corriveau & Harris, 2010). Together, these results indicate that, by age 6, children are sophisticated decision-makers and can consider several aspects when thinking about majority-rules decision-making; that is, they have clear beliefs about when it is and is not inappropriate to use

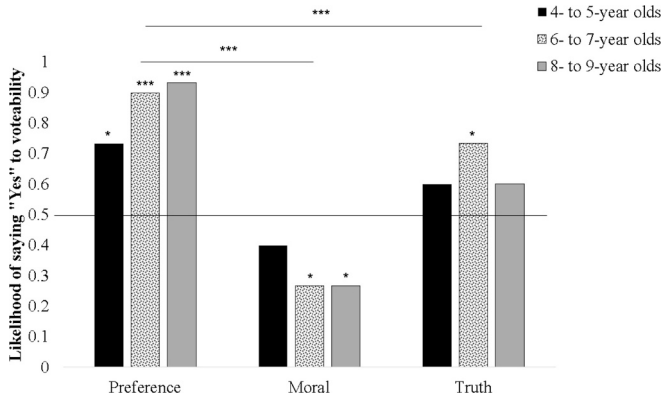

Fig. 4. Study 4 results for Voteability DV. Mean percent of US children selecting to "yes" when asked if the claim type should or should not be voted on in the three conditions–Preference condition (the name of a rabbit), the Moral condition (whether they should feed the rabbit to a snake) or a Truth condition (whether the rabbit was a hamster). Data were broken down by age group (4-to-5 years old, 6-to-7 years old, and 8-to-9 years old). (* = $p < .05$, ** = $p < .01$, *** = $p < .001$).

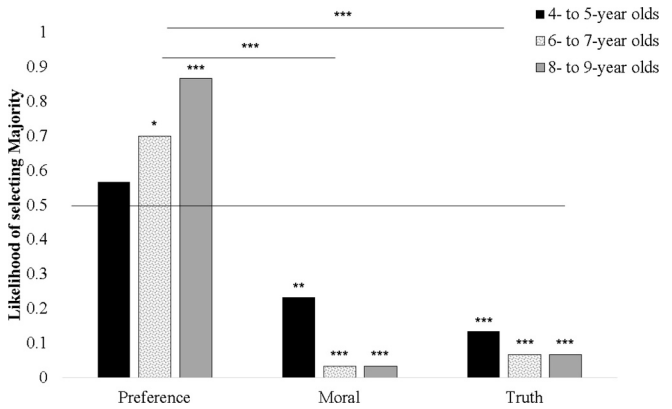

Fig. 5. Study 4 results for Endorsement DV. Mean percent of US children selecting to go with the majority in a Preference claim (the name of a rabbit), a Moral claim (whether they should feed the rabbit to a snake) or a Truth claim (whether the rabbit was a hamster). Data were broken down by age group (4-to-5 years old, 6-to-7 years old, and 8-to-9 years old). (* = $p < .05$, ** = $p < .01$, *** = $p < .001$).

majority rule to make decisions.

While these results were broadly in line with our hypotheses, we did find one unexpected result: children believed that truth claims were more "votable" than we had expected. As predicted, we found that children generally thought you should be able to vote on matters of preference and also go with the majority in such cases. Relatedly, they thought that you should not be able to vote on matters of morality and that you should not go with the majority for an immoral decision. However, the pattern was quite different when it came to matters of truth. Although very few children (9 %) thought you should endorse the false majority opinion, many of them (58 %) did believe that you can vote on matters of truth. This latter result is not something that we predicted and thus caution against interpreting this result too strongly. However, one could imagine that children may have thought that one can vote on truth claims because they did not expect the majority *would* give an incorrect answer. Future research should examine this further.

These results demonstrate an earlier competency in children's reasoning than has been previously demonstrated. Much existent research on children's intuitions about majority rule has focused on older age groups and does demonstrate development in children's explicit reasoning about majority rule voting all the way into adolescence (Mann, Radford, & Kanagawa, 1985; Moessinger, 1981). For example, Kinoshita (1989) examined the justifications that 7- to 16-year-olds offer for when one should and should not use majority rule across different contexts. Kinoshita suggested that it wasn't until around 5th grade (e.g., around 11 years old) that children were able to describe when majority rule was or was not appropriate and that younger children overused the rule. However, it is important to note that Kinoshita's studies seemed to require children to explicitly understand what "majority decision" meant, and therefore were not designed to capture quite young children's intuitions about majority rule. Thus, our results in no way challenge the previous findings of Kinoshita (1989), but our simplified studies demonstrate that young children do indeed have some intuitions about when majority rule is and is not appropriate.

Further, our work did not explore how voting or majority rule could be used to instantiate conventional or moral rules, which is something that could be explored by future research. Indeed, in the real-world adults vote on matters of policy that can impact people's moral judgments, such as whether to ban abortion or legalize drugs (Bregant, Caruso, & Shaw, 2020). Given that moral issues (or at least policies that have moral implications) *can* be voted on and *are* voted on in the real world, future work should aim to examine children's intuitions surrounding majority rule in instantiating such rules (this work may relate to recent calls for thinking about intuitive jurisprudence, Bregant, Shaw, & Kinzler, 2016).

10. General discussion

Together, these results provide an initial exploration of how children reason about majority rule decision-procedures in making preference-based decisions. First, we find that 6- to 9-year old children favor majority rule voting over another fair procedure (here, a randomized procedure like flipping a coin). Further, they differentiate between contexts in which majority rule is fair and is not fair. They believe that majorities should get their way over a lone dissenter when making a decision that affects the whole group (at least when it comes to matters of preference). Specifically, they believed that if three people (the majority) want one snack and a lone dissenter wants another snack, then one should go with what the majority wants (Study 2a and 2b). They even believe that an individual's behavior should be modified based on majority preference when the decision is being made for the group (Study 3). Importantly, children did not always prefer majority rule to a lone dissenter. When an individual was making a decision about what she herself should have for snack, children thought that one should go with what the individual wants, even if three others (the majority) disagree (Study 2 and 3). This distinction suggests that children's reasoning about majority rule extends beyond simple majority influence or conformity; *if* children were guided purely by conformity, they would have endorsed the majority in all cases. Furthermore, we demonstrate that children are discerning about what *types* of decisions should be made by using majority rule—while they thought it was acceptable to use majority rule to resolve debates in matters of preference for group decision-making, they thought it was more inappropriate to use majority rule to make decisions in cases of moral and truth cases (Study 4). Our findings are further bolstered by cross-cultural evidence in the first two studies. In both U.S. and Chinese samples, older children preferred majority rule over randomized procedures, with Chinese children showing an even stronger preference for majority rule. Despite these small cultural differences in strength of preference, the core patterns of reasoning about majority rule were similar in the two cultures, providing at the very least a replication of this pattern across two samples. Taken together, this package of studies reveals the nuanced ways in which children think about majority rule voting. These findings provide evidence that by age 6 to 9, children are not only able to differentiate between decision-making procedures, but are also developing nuanced beliefs about when and why majority rule should be applied.

Indeed, despite some sophistication in young children's intuitions here, we also found significant changes in children's endorsement of majorities rules as they got older. Specifically, when children were asked to decide between two ostensibly fair procedures—flipping a coin or voting—we found very different responses for younger and older children (Study 1a and 1b). Ultimately, 6- to 9-year-olds preferred voting over flipping a coin, but 4- to 5-year-olds showed no such preference (we found a similar age pattern in Study 3 with our stricter test for endorsement of majority preference). These results demonstrate that by the time children are 6 to 7 years old, they prefer majority rule over other fair procedures for resolving group decisions, which is in line with the responses given by adults in cross-cultural studies using similar dilemmas (Bor et al., 2021).

Further, we believe that this current work contributes a novel addition to the extant literature in that it introduces a method for distinguishing majority preference as a decision-making procedure from mere majority influence based on conformity (Study 2 & 3). A key question was whether children favor majority rule because they perceive it as a fair decision-making procedure or because they are simply endorsing conformity. In many cases, these explanations yield the same outcome, making it difficult to parse their contributions to the endorsement of those outcomes. Adding a control condition in which children do *not* choose to do what a majority wishes distinguishes when and why children were using majority rule to make decisions here (e.g., in cases where the group is deciding what an individual has for snack). This is a methodological contribution, providing a tool for future research to examine majority influence across diverse contexts.

Are we suggesting that children are naturally democratic? Certainly not, as historical and sociological work clearly demonstrates that formal democracies were a relatively recent cultural invention (e.g., Moore, 1966). However, we are arguing that certain features of majority rule voting seem to be an intuitive way to resolve group disagreement, which might help explain why such procedures are so commonly used. Not only is voting used frequently in modern industrialized democracies, but there is also evidence suggesting that procedures resembling majority rule voting are used in hunter-gatherer tribal societies (e.g., Boehm, 1999). Furthermore, theorists like Arrow (1951) and Sen (1977) have argued that one reason for the ubiquity of voting-like procedures seems to be that they are an efficient way to partially optimize outcomes of decision-making, by aggregating preference information of a group to resolve a conflict. Here we echo this logic and suggest that the use of majority preference might be a solution that people find intuitive.

Although this is speculative, we will briefly discuss two aspects of why majority rule may be an intuitive rule to learn. First, research suggests that young children (and even some non-human apes) are sensitive to the behavior of majorities – they attend to majorities

broadly, and majority beliefs and behaviors affect individual decision-making in individuals (e.g., conforming to majority behavior, and reconfiguring belief based on what majorities believe) (Haun, Rekers, & Tomasello, 2012). Even as early as infancy, children believe that larger numerical groups will win against smaller numerical groups (Pun et al., 2016) and 2-year-old children conform to their peers (Haun, Rekers, & Tomasello, 2013). That is, through several different avenues, attention to majority influences is present in children from a young age. We also know that when children are third parties (as they were in our task), they attempt to allocate resources in a way that the most people get what they want or what they need (Huppert, Shaw, & Decety, 2020; Rizzo, & Killen, 2016; Santhanagopalan, Keysar, & Kinzler, 2022). Given these tendencies to attend to majorities and to desire that resources are distributed efficiently, using majority rule may seem an intuitive way to achieve those ends. Scholars within political science and political theory, particularly social choice theorists, have argued that voting-like procedures that use majorities are pervasive because they efficiently aggregate group preferences to resolve conflicts and optimize decision-making outcomes (e.g., Arrow, 1951; Sen, 1977). Bayesian theorists have also suggested that majority influence provides crucial information to learners (e.g., Toelch & Dolan, 2015). Thus, while there is no inherent voting system in the human mind, the efficacy of deferring to majority rule in overcoming impasses caused by conflicting preferences may make voting an intuitive and sensible solution for addressing various group conflicts.

10.1. Children's developing intuitions about majority rule

One obvious question arises from these results: Why do 4- to 5-year-olds respond so differently from older children? There are several possible reasons. First, it could be that older children are better able to understand the vignette and therefore respond more in line with adult intuitions, i.e., younger children were just not able to follow the details of the story. However, given that younger children in subsequent studies responded similarly to older children on related questions about voting (e.g., endorsing voting when deciding for groups, but not for individuals), it does not seem likely that they were incapable of following the basics of the vignettes.

Second, children's preference for majority rule could emerge as a result of formal instruction in school. At about 6 to 7 years old, compulsory schooling begins in both societies, so it seems possible that children learn through schooling that voting is the better way to make decisions. However, we also do not think this by itself is a likely explanation. Although teachers may take votes in the classroom, we imagine that teachers also use myriad other procedures in the classroom, including flipping a coin, pulling names from hats, and unilaterally deciding what to do. It could be the case that schooling makes children more familiar with voting as a procedure, but it seems unlikely that teachers explicitly teach children that voting is better than coin flips, as both procedures are likely used in the classroom.

A third possibility is that children come to appreciate the value of majority rule voting as they have more exposure to group settings and have to resolve disagreements in groups. This is a different type of "school effect" that could similarly predict the age of onset we see here. Entering schooling may afford children with more experience making decisions within a group. For example, children might take note of the fact that the most people are appeased when a decision procedure that approximates majority rule voting is used (e.g., going with what most people want). If this account is correct, then one should expect that if young children regularly had social interactions with larger groups of children even before formal schooling, they too would come to endorse voting over coin flip as a procedure for resolving group disagreements. Such a prediction seems plausible and is in line with some theories about the development of children's intuitions about fairness and respect (Engelmann & Tomasello, 2019; Shaw, 2013). For example, Shaw (2016) argues that children may come to increasingly value fairness and impartiality based on having three or more person interactions in which one must resolve disputes between actors with varying interests.

Still, there is a lot to understand here and this learning process likely occurs within the framework of many theories of learning in developmental psychology, such as intuitive theories, which cover many aspects of how children think and learn about different domains of life, including number, language, animals, and social life (e.g., Carey & Gelman, 2014; Spelke & Kinzler, 2007; Sperber & Hirschfeld, 2004; Wellman & Gelman, 1998). It is also important to think more carefully about how this learning takes places within the extensive framework that has been established in Social Domain Theory, exploring how children navigate myriad different domains and spheres of influence, including the domains of personal, conventional, and moral choices (e.g., Mulvey, 2016; Richardson, Mulvey, & Killen, 2012; Smetana, Campione-Barr, & Metzger, 2006). Future work should explore how children's experiences with such group dynamics interact with their broader cognitive and moral understanding in driving their rejections or endorsement of majority rule procedures.

We also think it is important to note that this work does not contradict previous arguments about young children valuing consensus over majority rule (e.g., Helwig & Kim, 1999), but it does demonstrate new information about children's early intuitions about majority rule more generally. While consensus may be a highly attractive way to resolve group decisions—particularly in small group contexts—it is not always feasible. Given their similarities in process, consensus could be considered the most natural rival to majority rule. However, this paper focuses on situations where consensus is unavailable and examines children's preferences for alternative decision-making procedure—it is therefore mute on where consensus falls within this hierarchy of procedures. We ask, when consensus is not an option for the group, which types of decisions rules do children favor? Given that consensus is not always possible, we think it is important to explore children's intuitions about alternative decision procedures that can be used to resolve gridlocked conflict.

10.2. Cultural similarities and differences

Across the first two studies, we found similar developmental trajectories in endorsement of the majority among children in China and in the United States: They both endorse majority rules over dissenter preference at age 4 (Study 2), and both clearly endorse majority rules over another impartial procedure (i.e., coin flip) by age 6 (Study 1). Despite some cultural differences between these two countries, we still saw a strikingly similar developmental pattern. We think this is because the present tasks focused more on simple and basic intuitions of informal majority rules systems used to resolve daily group disagreements (e.g., what to eat for snack or name a rabbit). In line with our previous suggestion, children across both cultures likely experience group disagreements that they must be able to resolve and do so at similar points in development. Thus, it is perhaps unsurprising that we observed a similar developmental trajectory in these two cultures.

Despite these similarities, we note that we also found one cultural difference, that, at least in Studies 1a and 1b, children in China were *more* likely to endorse majority rule than children in the United States. We will note that we did not see the cultural difference in Study 2a and 2b and we thus urge caution in one's interpretation of this result. However, if one takes this result at face value, one might see this cultural difference as surprising, given that China has been considered "less debmocratic" than the United States (Economist Intelligence Unit, 2024). However, as stated in the introduction, previous research has demonstrated that people in the US and China differ in cultural values, especially in the relative importance they place on individuality versus interdependence (Markus & Kitayama, 1991). People growing up in the United States are thought to prioritize the self, whereas those in China prioritize group harmony, particularly in the case of known others (for a review, see Triandis & Suh, 2002). It is certainly possible that such

differences in cultural values may lead Chinese children to consider the desires of the group and endorse majorities to a greater extent than children in the U.S. However, future research will be needed to examine in what contexts these cultural values influence children's endorsement of majorities.

10.3. Limitations and future directions

One limitation of our studies is that we did not provide much information about the groups shown to participants. One might imagine that different aspects of groups (e.g., composition of groups, size of groups, or status differences between groups) greatly affects the way children think groups should make decisions. For example, research suggests that children are sensitive to mutual intentions of groups and individuals in determining group membership (Noyes & Dunham, 2017). In considering how groups and individuals may make decisions, the coherency and intentions of groups may be a central concern in *who* can vote or participate in decision-making. For example, should outgroup members be allowed to participate in voting on a decision? Future work should explore how children think about majority rule voting in contexts involving several different groups (for some initial work on how children think about the rights of immigrants, see, Santhanagopalan, & H., Shaw, A., & Kinzler, K. D., 2025). Furthermore, there may be interesting and different dynamics of voting when groups have competing and stable coalitions. Indeed, we know that children have many sophisticated intuitions about group relations and conflicts (DeJesus, Rhodes, & Kinzler, 2014; Dunham, Baron, & Carey, 2011; Rhodes & Brickman, 2011; Shutts, Roben, & Spelke, 2013). In cases involving such coalitions with competing interests, it might become clear that the larger coalition could use voting to exploit the other coalition, thus potentially making voting seem less fair (e.g., the "tyranny of the majority"). Future research should aim to examine how children's selection of procedures may change depending on the aspects of the groups and the complex dynamics that are involved in real-world decision-making.

In line with the above, group *size* in particular may be an interesting consideration in how and when majority rule decision-making is used. One major strength of majority rule voting is its relative speed and ease compared to something like consensus. Some recent research has demonstrated that children believe that group size and faction strength of groups (e.g., how many people agree or disagree with a proposal present) will affect how quickly groups can come to a decision (Richardson, Hok, Shaw, & Keil, 2023). Given that children have sophisticated understandings of how the composition of a group can affect how long it takes for groups to decide, future research could explore when children reason about the trade-offs between unanimous agreement and speed or coordination concerns. For example, although it seems likely that children prefer consensus to majority rule in many cases, it may be possible that older children understand that consensus can sometimes take too long and so may instead favor majority rule in those contexts. One could explore this by testing whether or not children believe that majority rule is more preferable to consensus in a group that is highly divided and unlikely to reach a consensus or in cases where time is of the essence.

Another interesting question for future research is whether one could find some preference for majority decision-making earlier in development with a non-verbal task. Indeed, although our current method simplified previous papers' more verbal tasks for older children and allowed for younger children's intuitions to be tested, these studies are still quite verbal in nature. Some previous work has found that infants can track group size using non-verbal tasks (e.g., that a group larger in size may win a conflict over a group smaller in size, Pun et al., 2016). However, these studies more explore majority *influence* (e.g., dominance or conformity), and not necessarily majority decision-making. Indeed, these are often difficult to pull apart with looking time measures—one may expect the majorities will get their way without endorsing that they should.

Another limitation of these studies is that we were only able to test two cultures, and primarily one demographic group (Han Chinese) among one of these cultures. Furthermore, both cultures were tested in urban settings. Although we found that children in these two different cultures both endorsed majority rule in our task, this does not mean that such responses are universal. If one was interested in demonstrating universality, it would be instructive to run our studies with children from small scale societies in which there is less market integration, as this variable appears to have a dramatic effect on people's basic intuitions and decision-making (Amir, Valeggia, Srinivasan, Sugiyama, & Dunham, 2019; Henrich et al., 2010). If we were to find that even children in these societies endorse majority rule voting, this would provide stronger evidence for the claim that majority rule voting is an intuitive tool for resolving group disputes.

One final and important question is how to interpret children's choice to use majority rule in our studies. Throughout this paper, we have interpreted children's endorsement of majority rule as a normative endorsement because they were asked what "should" be done, a phrasing that typically denotes a normative claim but can also reflect prudence (e.g., "I should go to the store before bed"). Much work on resource allocation assumes that children's endorsement of a decision-rule reflects their belief that the procedure is fair (Hook & Cook, 1979; Schmidt, Rakoczy, et al., 2016). In line with this prior work, we interpret children's selections of what "should" be done as an indication that they see majority rule as a reasonable or acceptable way to decide.

However, we acknowledge that these studies do not directly assess whether children view majority rule as the fairest or best decision-making process compared to alternatives. While our findings suggest that children prefer majority rule in some contexts, preference does not necessarily equate to a belief in its fairness, legitimacy, or superiority over other decision rules. Adults, for instance, can recognize something as fair but not necessarily socially desirable (Keren & Teigen, 2010), and it is possible that children also distinguish between what should be done and what is truly fair or ideal.

That being said, our studies do suggest that children find majority rule preferable to at least one decision-rule already established as fair, and that they do not indiscriminately apply majority rule across all contexts. This selectivity suggests that their reasoning about majority rule is not purely based on dominance or conformity (e.g., what descriptively would happen) but reflects some underlying principles about its appropriateness (e.g., what normatively should happen). Nonetheless, to fully address this concern, future work may more directly attempt to get at children's conceptions of the 'fairness' of the procedure.

11. Conclusion

This research provides a clear demonstration that 4- to 9-year-old children have intuitions about majority rule and demonstrates that they have some sophistication in their thinking about such procedures—children at all ages we tested believed that majority rule was inappropriate in some situations (aligned with previous research in adults). We also found important developments in children's intuitions about voting, with children increasingly endorsing majority rule voting as they got older. Indeed, 6- to 7-year-old children in both the U.S. and China not only endorsed majority rule voting over going with a lone dissenter but did so over another ostensibly fair procedure (flipping a coin). This result suggests that by age 6 children do regard majority rule as an appropriate procedure for group decision making. We hope that these studies will spark a host of new work exploring children's basic intuitions around majority rule and group decision making.

CRediT authorship contribution statement

Hannah Hok: Writing – review & editing, Writing – original draft,

Visualization, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Emily Gerdin:** Writing – review & editing, Data curation, Conceptualization. **Xin Zhao:** Writing – review & editing, Data curation. **Alex Shaw:** Writing – review & editing, Supervision, Resources, Funding acquisition, Conceptualization.

Declaration of competing interest

We have no known conflict of interest to disclose.

These studies were partially preregistered. Methods and data and pre-registrations are available to view at osf.io/vzm6g https://bit.ly/3xahvRT

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Data availability

A link to all data has been attached within the methods.

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