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Is the majority always right? Young children's normative interpretations of majority and dissenting peer behavior

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Abstract

The present study investigates the social-cognitive under-pinnings of young children's bias to follow the majority. More specifically, we focus on the question of whether children not only copy the behavior of a majority of peers, but whether they also understand this majority behavior as a social norm that everyone needs to follow. Additionally, we investigated whether seeing a unanimous majority or a majority and dissenting peer makes a difference for children's norma-tive understanding. Participants included 180 preschool-age children (4-to-5 years old) who engaged in a conformity paradigm, where they either saw the behavior of a unan-imous majority of peers, or additionally the behavior of a single dissenting peer, or only the behavior of two individ-ual peers behaving differently (Control). Afterward, children mostly copied the unanimous majority and protested against others, when they deviated from this majority, thus indeed interpreting the behavior of a unanimous majority as a norm that others need to follow. However, when they had seen a majority as well as a dissenter, children's protest and copying in favor of the majority dropped. Overall, our findings show that preschool children interpret the behav-ior of a unanimous majority as normative. However, when

children additionally see a dissenter's behavior, this normative interpretation is weakened.

KEYWORDS
conformity, dissenter, majority, normativity, preschoolers, social norms

1 | INTRODUCTION

Much like adults, preschool-age children have been shown to conform to the behavior of a majority of peers, even against better judgment (Corriveau & Harris, 2010; Haun et al., 2012; Haun & Tomasello, 2011). Evidence of this majority bias in young children has been revealed in a variety of contexts, such as object labeling (Bernard, Proust et al., 2015; Chen et al., 2013; Corriveau et al., 2009), opinions on arts and music (Boseovski et al., 2016), and copying of irrelevant and relevant actions on objects (Evans et al., 2018; Schillaci & Kelemen, 2014; Wilks et al., 2015). Preschoolers are influenced strongly by information provided by a unanimous majority. However, from around 5 to 6 years of age they may begin to overcome this majority bias as they rely more on their own perceptions (Bernard, Harris et al., 2015), information about reliability (Bernard, Proust et al., 2015), success (Wilks et al., 2015) and privileged knowledge of others (Einav, 2014). Thus, it should be noted that children do not copy the majority behavior inflexibly. Rather, the literature shows that children flexibly adjust their behavior and deviate from a majority, for example, when they can gain higher value rewards by not following a majority (Burdett et al., 2022), or when they believe an expert knows better than a majority does (Burdett et al., 2016). In fact, a growing body of research has begun to explore the mechanisms and motivational underpinnings of the majority bias in children. Based on Deutsch and Gerard (1955), it has been suggested that, like adults, children are driven by both normative and informational social influences when conforming to a majority (Haun & Tomasello, 2011; Sibilsky et al., 2021). Normative social influence is conceptualized as the motivation to meet others' expectations whereas informational social influence is based on the belief that the behavior of the majority carries reliable information about reality. The relative strength of these influences on a particular behavior is susceptible to manipulations of whether the response occurs publicly or privately (e.g., Asch, 1956). For example, Haun and Tomasello (2011) found that 4-year-old children showed higher conformity rates when making a public decision as compared to a private anonymous decision. Private responses are supposed to reflect mostly informational social influence, whereas public responses may reflect both. These different motivations even might take different developmental trajectories (Sibilsky et al., 2021).

Adding to these lines of research, the present study investigates the social-cognitive underpinnings of children's conformity and targets children's normative understanding of the behavior of a majority. More specifically, this study investigates whether children not only want to conform to a majority themselves, but whether they think that the majority behavior is a social norm and everyone else should conform to it as well. This notion relates to Deutsch and Gerard's (1955) general theoretical idea of a social-normative motivation to conform to a majority, but it adds the aspect of agent-neutrality which has been proposed as essential for social normativity (e.g., Nagel, 1970). That means not just the children themselves would want to conform to meet others' expectations, but that they believe others should also meet these expectations.

Prior research suggests that preschool children have a strong tendency to interpret the behavior of others normatively, as shown by their tendency to protest deviations from behavior previously observed in an adult (e.g., Butler et al., 2015; Casler et al., 2009; Schmidt et al., 2016, 2011; Schmidt & Tomasello, 2012). This enforcement via protest expresses children's belief that deviating from a certain behavior is wrong, as well as their agent-neutral expectation that everyone should conform to this behavior. Thus, enforcement via protest shows that children understand the behavior as a social norm. Children also will imitate an adult's behavior readily and enforce it on others

even when the adult has not used any pedagogical cues, (normative) instructions, or ostensive communication, and even if the adult obviously invents the behavior on the spot with objects retrieved from a trash bag (Schmidt et al., 2016, 2011). This remarkable tendency for young children to jump from "is" to "ought" (cf. Roberts et al., 2017) has been termed "promiscuous normativity" (Schmidt et al., 2016). However, most previous studies on children's normative inferences of others' behavior have looked at behavior modeled by adults and not peers (Rakoczy et al., 2009, 2008). However, one previous study included peer models, in addition to adult models, to measure children's preferences in copying these models as well as their normative interpretation of the behavior copied (Rakoczy et al., 2010). The results of this study showed that 3- to 4-year-old children copied and enforced the behavior of the adult model much more than that of the peer model, thus learning novel rules rather from adults than from peers when forced to choose between them. However, a recent study comparing 3- to 4-year-old children's normative protest against puppets, peers, and adults found no significant difference in children's protest rates between these actors (Stengelin et al., 2023). These findings, however, remain inconclusive regarding the question of whether children interpret the behavior of (a majority of) peers as normative in the absence of information provided by adult models.

Thus, the present study investigated whether children interpret the behavior of a unanimous majority of peers as normative, operationalized as protest against any deviations from this majority behavior, and whether children teach the modeled behavior to third parties (cf. Köymen et al., 2015). In other words, will children protest against actors who deviate from the behavior of a unanimous majority of peers and teach the majority behavior to these actors? Based on previous research, particularly on children's "promiscuous normativity" and their tendency to conform to a majority of peers, we hypothesized that children would interpret the behavior of a unanimous majority of peers as normative, protest against deviations from it, and teach it to third parties.

Additionally, we focused on the novel question of whether children's normative interpretation of the behavior of a unanimous majority of peers changes if they also are presented with an alternative behavior of a single dissenting peer. Previous studies investigating how children's copying of the majority changes when they additionally see a dissenter have shown that children's majority bias is reduced by about 10% when also presented with a dissenter (Evans et al., 2018). However, when the dissenter shows an unnecessary behavior, children's majority bias remains stable, suggesting that children "optimize" their copying (Evans et al., 2018). Interestingly, children's copying of an irrelevant action performed by a majority is increased strongly, however, when this behavior is approved of by others while the dissenter's efficient behavior is disapproved of (Evans et al., 2021). This finding might suggest that children respond flexibly to social-normative information in their copying. Nevertheless, from these studies, it remains unclear how children's copying tendencies might translate into children's normative inferences about majority behavior. One study on children's normative inferences based on a single demonstrator shows that the strength of children's normative inference erodes with an increasing number of deviations from dissenters (Butler et al., 2015). However, it is not clear how children initially draw normative inferences about an action depending on whether they are presented with either a unanimous majority or a majority and a dissenter.

Therefore, we regard this as an open question, and two plausible hypotheses can be deduced:

1. Children's normative interpretation of the majority remains high with or without additional information about an alternative dissenting behavior.
2. Children's normative interpretation of the majority decreases when they additionally have information about an alternative behavior of a dissenter.

Based on previous research (e.g., Evans et al., 2018), the second hypothesis might be somewhat more supported, but because there is no direct evidence for our specific question on whether children acquire the normative content of an action differently from a unanimous majority or a majority and a dissenter, we present both alternatives as plausible.

To address these questions, we conducted an experimental study with 4-5-year-old children in a simple choice task during which a ball had to be dropped into one of three differently colored tubes on a box. Beforehand, children

watched videos of other children making different choices on the colored tubes. Throughout the videos, children either were presented only with information about the behavior of a unanimous majority of peers or additionally with information about the alternative behavior of a dissenting peer, or they only received information about two individual peers making different choices. The latter condition served as a control condition, in order to see whether children's normative interpretation differs between a majority of peers and individual peers. After the videos, the children observed three puppet actors each making a different choice by putting a ball in one out of the three tubes. Afterward, we measured whether children protested against the puppet's choice, taught the puppet the "correct" choice, and which choice the children themselves opted for eventually (i.e., whom they copied).

2 | METHOD

2.1 | Participants

Overall, 180 children (89 female, 91 male) participated in this study. Ages ranged from 4 to 5 years (48 to 71 months, $M = 60.26$, $SD = 6.67$), and testing was conducted in children's daycare centers. One additional child was tested but excluded due to experimenter error. Children were recruited via the database of the Leipzig Research Center for Early Child Development which includes children from mixed socioeconomic backgrounds within a mid-sized German city. Parents had provided general consent for their children to participate in studies conducted through the Research Center. Children received a small reward (sticker) after their participation.

2.2 | Materials

2.2.1 | Conformity box

A wooden box (20 × 30 × 30 cm) was used with three separate tubes on top, each 20 cm long, leading into the box (see Figure 1). Each tube and the corresponding part of the box were colored either blue, yellow, or red. A ball can be put in each of the tubes and retrieved through the back of the box (not visible to the participant). The box has been used in previous paradigms (e.g., Haun et al., 2012), however, in contrast to previous versions, we did not use the reward release mechanism of the box. Instead, the reward release mechanism (i.e., opening in the front of the box) was covered with a gray, wooden door that prevented automatic reward release from the conformity box (i.e., children were not rewarded directly by the apparatus for putting a ball in one of the tubes).

2.2.2 | Video stimuli

During the manipulation phase, children saw a demonstration video of different same-age children interacting with the conformity box. "These videos were muted, 40–60 s long, and were presented on an 11.6" laptop screen. In the videos, the conformity box was visible in the center and placed on a table. Various children (gender matched to participants), one by one, walked toward the conformity box, picked up a ball, and placed it in one of the tubes. Depending on the condition, children saw three different versions of the video (see Table 1). The videos were selected such that each demonstrator child would appear in all conditions. Children in the videos were not confounded with condition; whether the majority or dissenting option was demonstrated first and which color they corresponded to was fully counterbalanced. Note that for the dissenting and individual presentations, the number of demonstrations was matched to the majority, that is, a dissenting and an individual demonstration would show one child placing a ball three times in a row into the same tube to match the number of demonstrations that were shown in the majority

FIGURE 1 Illustration of the conformity box.

TABLE 1 Overview of demonstrations in video stimuli in the different conditions.

	Majority demonstration	Individual demonstration
Majority condition	Three children place one ball each into the same tube (e.g., the blue tube)	n/a
Majority-dissenter condition	Three children place one ball each into the same tube (e.g., the blue tube)	A different child places three balls into a different tube (e.g., the yellow tube)
Control condition	n/a	One child places three balls into the same tube (e.g., the red tube)
		A different child places three balls into a different tube (e.g., the blue tube)

Note: In the Majority-Dissenter condition the order of presentation of majority and dissenter demonstration was counterbalanced.

demonstration in which three children place one ball each into the same tube. This method has been used in a variety of previous studies (e.g., Burdett et al., 2022; Evans et al., 2018; Haun et al., 2012; Sibilsky et al., 2022; van Leeuwen et al., 2018; Wilks et al., 2015) and controls for the possibility that children do not copy the majority based on a majority-bias but that they might use alternative strategies, such as copying the most frequently demonstrated tube or copying randomly. If children saw a majority of multiple individuals each drop one ball and a dissenter who also only dropped one ball, it would not be possible to tease apart whether their copying of the majority is due to conformity or frequency of demonstrations. They might be showing a true bias to copy the majority, however, their apparent conformity also might be due to one of two alternative strategies: One, they simply might copy a random instance of behavior they observed (and it would be more likely to copy a majority action randomly if it was performed more times than the dissenter option). Or two, they might choose the tube they saw most frequently, as the multiple demonstrations might enhance recall of the performed action. In all of these cases, the behavior of children would look the same (more children copy the majority option) but it remains unclear whether the mechanism behind it is a majority bias or simply random copying or frequency-based copying.

2.2.3 | Puppets

For the duration of the experiment, experimenter 2 (E2) used three different animal hand puppets (height ca. 30 cm): tiger, frog, and monkey. They were placed on wooden stands on the table throughout the warm-up, and E2 took them off the stands when interacting with the child. Additionally, for the warm-up, a wooden puzzle was used with a board and 24 pieces suitable for children 3 years and older. The reason for using puppets instead of peers or adults was mainly that we could standardize their behavior much easier as they are under the control of one experimenter. This standardization would be very difficult to do with peer interaction partners. A recent study has found that there is no systematic difference in children's protest behavior against puppets, peers, and adults (Stengelin et al., 2023), which indicates that we should receive valid protest responses from children interacting with puppets.

2.3 | Design

Children were assigned randomly to one of three conditions (between subjects) and received the respective video stimulus during the manipulation phase: Majority condition, Majority-Dissenter condition, or Control condition.

2.4 | Procedure

The study was conducted by two experimenters following a standardized procedure. After setting up the materials in a separate room in the daycare center, experimenter 1 (E1) went into the children's group to ask the respective child whether they wanted to participate in a game. When E1 and the child returned to the testing room, E2 was seated behind the table and only interacted with the child through the hand puppets which were put up on the table.

2.4.1 | Warm-up

E1 presented the wooden puzzle and asked the children and the hand puppets to play together. Children were asked if they wanted to start first. When children refused to start first, then E1 or the puppet started the game. The child and the three puppets took turns, and the game continued repeatedly until the puzzle was finished. During the warm-up, each puppet picked up a puzzle piece and struggled to put it into an incorrect slot on the puzzle board for approximately 3 s before stating: "Mmmh, that doesn't fit!" After another 3 s of trying to fit the incorrect piece, the puppet said: "Why doesn't that fit?" Each puppet went through three of these incorrect trials during which E1 was turned away from the table pretending to write something down, thus encouraging the child to intervene and help the puppets. If the child did not intervene spontaneously, E1 turned back to the table and prompted the child: "Do you want to help the tiger/frog/monkey?" These mistakes were intended to portray the puppets as sometimes clumsy, making errors, and in need of help rather than adult-like superior agents and give the children the opportunity to interact with and correct them.

2.4.2 | Manipulation phase

After the warm-up, the puppets stated that they were all tired and went to sleep under the table, to signal their naivety to the upcoming demonstration, while E2 sat down in a corner of the testing room out of the child's eyeshot pretending to read. E1 then put the conformity box and the laptop with the video stimuli on the table and presented them as another game they could play while the puppets were sleeping. Children were told that they would now see a video of other children playing with the box and they needed to pay attention because they and the puppets would be able to play the game themselves afterward, and if they played it correctly, they would win a surprise. While the videos were shown, E1 narrated to make sure children kept track of either the same children or different children in the video using the same- or different-colored tubes (e.g., "Here comes the first boy and he places the ball into the yellow tube. Now comes another boy and he also places the ball into the yellow tube. The third boy also places his ball into the yellow tube. And now the fourth boy places his ball into the blue tube." etc.).

2.4.3 | Test phase

After the video was finished, E1 removed the laptop, and E2 picked up the first puppet and asked if it could play the new game. E1 then gave a ball to the puppet and said: "Here is the ball and you have to place it into the box. And if all of you put it into the correct color, you will get a surprise at the end." E1 then said they had to leave the room for a bit and handed the ball to the puppet and told the child: "You know how the game works." Thus, children were left alone in the room with the puppet to encourage them to interact with the puppet. When E1 had left, the puppet announced in which tube it would place the ball and waited 10 s to allow the child to intervene and protest and then threw the ball into the tube. After another 5 s, E1 came back into the room at which point the puppet said goodbye and the

second puppet woke up, and the test was repeated in the same way for the second and finally, for the third puppet. For each puppet, E1 left the room claiming they had forgotten something outside. Each puppet chose a different tube (order counterbalanced according to which tube was presented as the majority/dissenter/undemonstrated option in the video), such that each child saw each tube being used once by a puppet. Finally, after the last puppet had left, E1 handed the child a ball to place into the box and reminded them again, that they could only place it once and that they would get a surprise if they threw it into the correct color. We recorded which tube the children chose. After the experiment ended, children received a sticker for their participation and were accompanied by E1 back to their group.

2.4.4 | Coding

All trials were videotaped and coded from video. One of the experimenters transcribed children's verbal utterances during the test phase and coded the three main dependent measures: protest, teaching, and conformity.

2.4.5 | Protest

Beginning with each puppet's announcement in which tube it will place its ball until E1 returned to the room, children's utterances were coded for any kind of protest against the puppet's choice. Protest indicates that children disapprove of the puppet's choice in some form. Each child provided three data points, one for each of the three puppets. Coding was based on previous studies (e.g., Schmidt et al., 2016) sorting children's actions and utterances into four hierarchical categories: normative protest, imperative protest, hints of protest, and no protest (see Table 2 for details). These codes were collapsed subsequently into an overall protest variable that indicated whether a child protested at all (normative, imperative, hints) or not. Based on this collapsed variable, we were able to analyze whether protest rates differed according to condition.

2.4.6 | Teaching

Additionally, children's actions and utterances that were aimed at teaching/instructing the puppet to either choose one or several specific options or to avoid them were coded beginning from when E1 handed the ball to the puppet until E1 returned to the testing room. Like protest, teaching could occur in four hierarchical categories: normative teaching, imperative teaching, hints of teaching, and no teaching (see Table 2 for details). Analogous to protest, these codes were collapsed into an overall teaching variable that indicated whether a child taught at all or not. Additionally, we coded whether children taught in favor of specific tubes or against specific tubes to understand which options children endorsed.

2.4.7 | Conformity

Finally, at the end of the trial, children's choices of which tube they put the ball were coded and either could correspond to the majority tube, the dissenter tube, or the undemonstrated tube. Note for all of these measures that in the Majority condition there were two undemonstrated tubes (referred to as "undemo1" and "undemo2" depending on the order in which puppets chose these tubes in the test); furthermore, there were two individual tubes in the Control condition (referred to as "individual1" for the first presented individual in the video demonstration and "individual2" for the second). A second coder naïve to conditions and study hypotheses coded 20% (108 trials) of the videos for reliability. Interrater reliability (Cohen's Kappa) was good for protest ($\kappa = .78$) and very good for teaching ($\kappa = .82$).

TABLE 2 Coding categories for protest and teaching.

Category	Protest Description	Protest Examples	Teaching Description	Teaching Examples
Normative	Verbal disapproval of the puppet's choice using normative language (i.e., "must," "should," "right/wrong," "the ball goes/belongs in blue," "good/bad")	No, you must put the ball in red. You're doing it wrong! This wasn't good/right. That's not how it goes. No, the ball doesn't belong in blue!	Verbal instructions for the puppet using normative language (i.e., "must," "should," "right/wrong," "the ball goes/belongs in blue," "good/bad")	You must put the ball in red. The ball belongs in blue. It goes in the yellow tube. Red is the right one.
Imperative	Protest without normative language but imperatives to **not** act in a certain way	Not there! Don't put it in yellow! No, in red!	Verbal instructions with imperatives to choose a specific tube	In here! Red! Put it in blue!
Hints	Verbal hints using suspicions or similar related to disapproving the puppet's choiceNonverbal hints like head shaking, closing tubes with hands, or correcting the puppet's choice by removing the ball	I thought it wasn't yellow What are you doing? I would rather put it in blue	Verbal hints to direct the puppet's choiceNonverbal hints like pointing to a tube or holding a tube	I think it's the red one. I believe now in blue.
None	No disapproval of the puppet's color choice		No teaching regarding the colors of the box	

3 | RESULTS

All analyses were done in R (version 4.0.3), using lme4 (Bates et al., 2015) for the generalized linear mixed models (GLMMs).

3.1 | Protest

Overall, 42 children (23.33%) protested at least once, and there were 62 trials (11.48%) with protest. Split by condition, 16 children protested in the Majority condition, 18 in the Majority-Dissenter condition, and 8 in the Control condition. Out of all protest occurrences, 40.32% ($n = 25$) were normative protests, 45.16% ($n = 28$) imperative protests and 14.52% ($n = 9$) hints of protest. Figure 2 shows the number of trials in which protest occurred split up by condition, puppet choice, and type of protest. The protest was coded as a binary variable per trial indicating whether any kind of protest occurred or not and analyzed using GLMMs with a binomial error structure. As the fixed effect, we created a new variable combining condition and puppet's choice to analyze potential interaction effects (factor condition_puppet choice with seven levels, e.g., Majority_undemo). Note that we could not enter the interaction of condition and puppet's choice as the simple product of both variables because depending on condition, the puppet had different choices (e.g., in the Majority condition, the puppet could choose the majority tube or one of two undemonstrated tubes whereas in the Control condition, the puppet could choose an undemonstrated tube or one out of two individual tubes), and thus there would have been missing cells. Additionally, we entered sex, age, and trial order as fixed effects
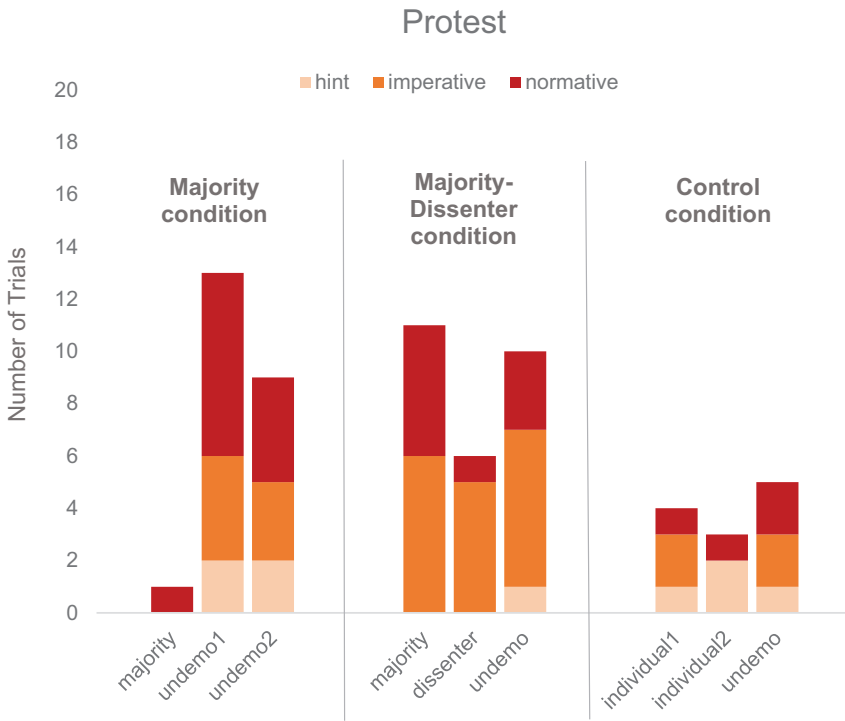
FIGURE 2 Number of trials with protest against respective choices by the puppet depending on condition and protest category.

to control for these variables, and the child as a random effect (because each child provided data from three trials). We computed a full model including all of these variables and compared it to a null model without the condition_puppet choice variable using a likelihood ratio test.

The full null model comparison was significant ($\chi^2(6) = 40.41, p < .001$), and thus we ran an additional comparison of the full model and a reduced model including condition and puppet choice as fixed effects without their interaction to test their interaction effect. This interaction effect of condition and puppet choice on children's protest also was significant ($\chi^2(2) = 23.75, p < .001$). Comparing the estimates of the different condition and puppet choice combinations, revealed that within the Majority condition, children protested significantly more against the puppet choosing the undemonstrated tube as compared to the majority tube. Within the Majority-Dissenter condition, children protested significantly more against the puppet choosing the majority tube compared to the dissenter tube. There also was a trend ($p = .075$) for children in the Majority-Dissenter condition to protest more against the undemonstrated choice compared to the dissenter choice. Additionally, children's protest against the majority option was significantly higher in the Majority-Dissenter condition compared to the Majority condition (see Table 3). For the full model, we calculated an R^2-like effect size using the function r.squaredGLMM of the package MuMIn (version 1.47.1; Bartón, 2022) which revealed a marginal $R^2 = .087$ revealing the variance explained by all of the fixed effects combined and a conditional $R^2 = .944$ revealing the variance explained by the fixed and random effects together. To help understand better the differences in protest against deviations from the majority option, we ran an additional GLMM on a subset of the data excluding the Control condition (as it did not have a majority) and only looked at trials containing protest, thus excluding trials without any protest. We created a variable that indicated whether children protested against the majority or against any deviation from the majority (i.e., the undemonstrated option in the Majority condition and the dissenter and undemonstrated options In the Majority-Dissenter condition). The full model included condition, sex, age, and trial order as fixed effects and child as a random effect. It was compared to a reduced model without condition and the

TABLE 3 Results of the GLMM on protest.

| Fixed effects	Estimate (b)	Lower CI	Upper CI	SE	z	p
(Intercept)	-9.56	-27.60	-10.88	1.61	-5.95	<.001
Control_individual vs. Control_undemo	.66	-5.52	7.53	1.13	.59	.557
Control_individual vs. MaDi_dissenter	-.20	-14.64	3.79	1.60	-.12	.902
Majority_majority vs. Majority_undemo	7.27	6.62	24.28	1.85	3.93	<.001
Majority_majority vs. MaDi_majority	7.25	3.79	23.18	2.19	3.31	<.001
Majority_undemo vs. MaDi_undemo	.30	-2.09	7.96	1.25	.24	.812
Majority_undemo vs. Control_undemo	-1.31	-6.59	2.96	1.44	-.91	.362
MaDi_majority vs. MaDi_dissenter	-2.15	-17.05	1.17	1.09	-1.97	.049
MaDi_majority vs. MaDi_undemo	-.28	-7.98	5.81	.89	-.31	.755
MaDi_dissenter vs. MaDi_undemo	1.88	-2.45	13.76	1.05	1.78	.075
MaDi_undemo vs. Control_undemo	1.02	-2.09	7.96	1.51	.67	.501
Sex_female	-.16	-1.28	1.33	.99	-.16	.870
Age	.26	-.64	.79	.51	.51	.609
Order	-1.56	-9.33	-1.43	.38	-4.12	<.001

Note. MaDi is abbreviated for the Majority-Dissenter condition.

likelihood ratio test revealed a significant effect ($\chi^2(1) = 9.96$, $p < .01$) revealing that children protested more against deviations from the majority in the Majority condition compared to the Majority-Dissenter condition ($b = -2.69$, $SE = 1.10$; marginal $R^2 = .264$).

3.2 | Teaching

We found that teaching occurred in 53.33% ($n = 288$) of all trials and 55% ($n = 99$) of children used teaching in at least one trial. Out of all teaching occurrences, 56.25% ($n = 162$) were imperative, 20.83% ($n = 60$) were hints of teaching, and 19.79% ($n = 57$) were normative. Additionally, we plotted which tubes children endorsed in the different conditions using which kind of teaching (see Figure 3). Figure 3 shows that in the Majority condition, children mostly taught the majority option, where in the Majority-Dissenter condition, most children taught the dissenter option, and some children taught either the majority option or the majority and dissenter as equally acceptable options.

We used a GLMM with a binomial error structure to analyze teaching as a binary variable to indicate whether the occurrence of overall teaching in a given trial differed between conditions. We compared a full model comprising condition, sex, age, and trial order as fixed effects and individual child as a random effect with a null model without condition. Note that we did not include puppet choice as a fixed effect because teaching often occurred before the puppets made their choice. The likelihood ratio test showed no significant difference between the models and thus
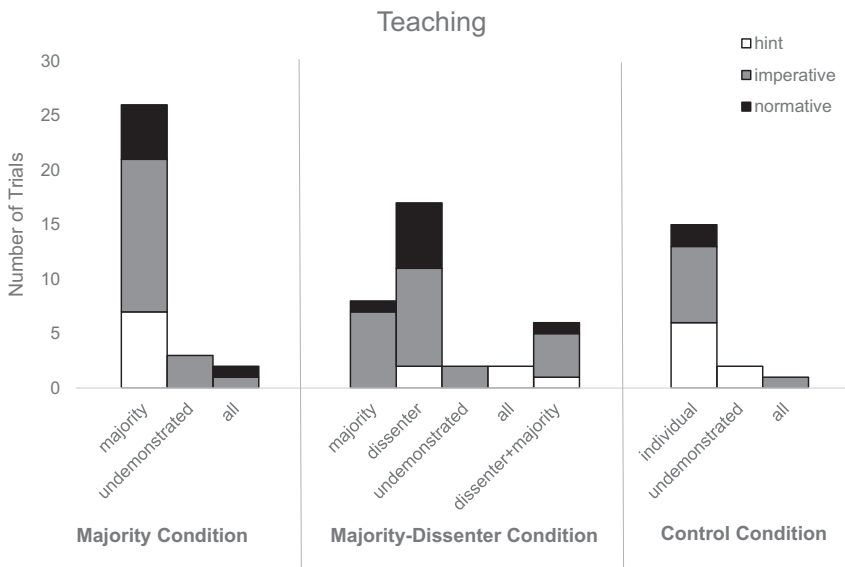
FIGURE 3 Number of trials with teaching according to teaching categories, condition, and choices taught by the children. Note: Teaching categories are represented by the stacked bars, Condition is indicated by the grouped bars, and the choices/tubes that were taught by the children are noted below the bars on the x-axis. In addition to single options, some children taught that it was ok to use all tubes or the dissenter as well as the majority tube in the Majority-Dissenter Condition.

no significant effect of condition on the overall occurrence of teaching ($\chi^2(2) = .56$, $p = .758$). Additionally, we only analyzed the children who taught the puppet and investigated whether the frequency of teaching the majority tube differed between the Majority and the Majority-Dissenter Condition. A GLMM on a subset of the data excluding the Control Condition and all trials without teaching was run on a binary variable indicating whether children specifically taught the majority tube compared to any other tube (or combination of tubes). The full model included condition, sex, age, and trial order as fixed effects and child as a random effect. It was compared to a reduced model without condition and the likelihood ratio test revealed a significant effect ($\chi^2(1) = 22.45$, $p < .001$), indicating that children taught the majority tube significantly more often in the Majority condition compared to the Majority-Dissenter condition ($b = -4.04$, $SE = 1.49$, marginal $R^2 = .400$, conditional $R^2 = .612$).

Finally, using the same approach we also analyzed whether children taught the dissenter tube in the Majority-Dissenter condition differently as compared to the individual tubes in the Control condition. The full null model comparison revealed no effect of condition on teaching the dissenter/individual option ($\chi^2(1) = 3.24$, $p = .072$).

3.3 | Conformity

Finally, we investigated which option children chose themselves, depending on condition ($n = 60$ children per condition) and found that in the Majority condition, 78.33% ($n = 47$) of children chose the majority tube, whereas 21.67% ($n = 13$) chose one of the undemonstrated tubes (undemonstrated tube 1: $n = 7$, undemonstrated tube 2: $n = 6$). In the Majority-Dissenter condition, 48.33% ($n = 29$) of children chose the dissenter tube, 38.33% ($n = 23$) chose the majority tube, and 13.33% ($n = 8$) chose the undemonstrated tube. In the Control condition, 83.33% ($n = 50$) of children chose one of the two individual tubes (individual tube 1: $n = 38$, individual tube 2: $n = 12$) and 16.67% ($n = 10$) chose the undemonstrated tube.

Furthermore, we investigated whether children's tendency to copy the majority was different in the Majority condition as compared to the Majority-Dissenter condition using a GLM excluding the children in the Control condition as there was no majority option to copy. We entered condition (Majority vs. Majority-Dissenter) as a fixed effect as well as age and sex as control variables. We ran a comparison of the full model with a null model not including condition which revealed a significant effect of condition ($\chi^2(1) = 20.12$, $p < .001$, Nagelkerke's $R^2 = .037$) such that children copied the majority more often in the Majority condition as compared to the Majority-Dissenter condition.

3.4 | Descriptive results on the individual level

In addition to looking at the different behavioral domains of protest, teaching, and conformity individually, it was also of interest how these behavioral domains were interrelated for each child. Below, we present descriptive data on the frequencies of different pathways that children took during the experiment, that is, which option they protested, what they taught, and which option they chose themselves. These pathways are shown in Appendices A through C, showing that different patterns of children's behavior emerge and that they reveal different routes of children's normative understanding of the demonstrated behaviors.

We found children who showed a clear pattern in their whole behavior such that protest, teaching, and their own choice aligned meaningfully (e.g., children in the Majority-Dissenter condition protest against the majority, teach the dissenter, and chose the dissenter option). Additionally, there were children with an indicative pattern, for whom two of their behaviors aligned and the third was inconclusive (e.g., children protest against the dissenter, do not teach anything, and chose the majority option). For most children, the pattern remained inconclusive due to insufficient information (i.e., there was no teaching or protest), and some children showed inconsistent patterns (e.g., protesting against an option that they chose themselves). When looking at children with clear and indicative patterns, we found the following:

In the Majority condition, we found 18 children who clearly interpreted the majority as normative (i.e., protesting against undemonstrated options and/or teaching the majority option and choosing the majority option).

In the Control condition, five children interpreted one of the individual options as normative, and three children interpreted both individual options as correct. Overall, in this condition, there were fewer children with a clear normative interpretation of an option as compared to the other conditions.

Most interestingly, children in the Majority-Dissenter condition showed individual interpretations of the situation: seven children interpreted the dissenter as correct and the majority as incorrect (i.e., they protested against the majority and/or taught the dissenter option and chose the dissenter option themselves). Four children interpreted the majority as correct and the dissenter as incorrect (i.e., they protested against the dissenter and/or taught the majority option and chose the majority option). And another three children understood the dissenter as well as the majority option as equally correct, that is, they explicitly taught both as correct (and protested against the undemonstrated option). Based on these patterns, it is evident that children are split in their normative interpretation of this condition.

3.5 | Teaching and protest

Finally, we investigated a combined measure of teaching and protest as an indication of normative understanding by creating a new binary variable indicating whether children protested and/or taught in a given trial or not (see Figure 4). A GLMM was fit to analyze the occurrence of teaching and/or protest with the interaction of condition and puppet choice (cf. GLMM on protest), sex, age, and trial order as fixed effects, and child as a random effect. The likelihood ratio test comparing the full model to a null model without condition and puppet choice indicated no significant effect of these predictors ($\chi^2(6) = 9.56$, $p = .145$).
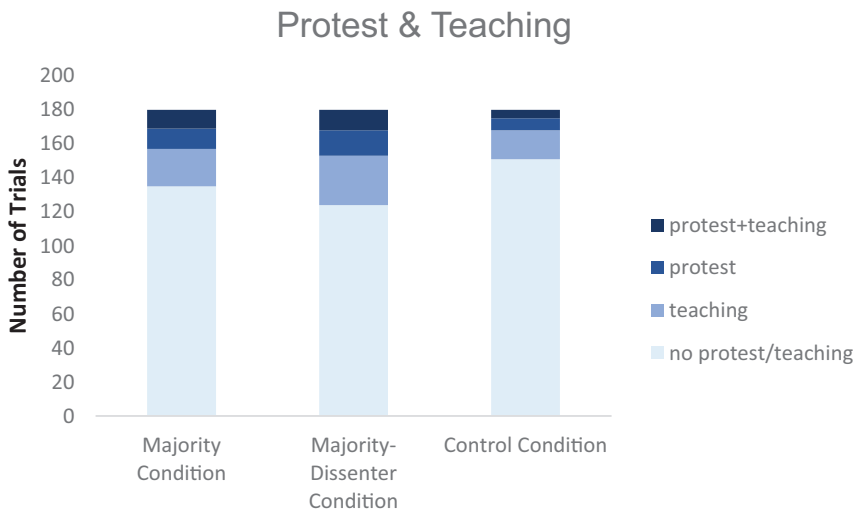
FIGURE 4 Number of trials with occurrences of either protest, teaching, both, or none.

4 | DISCUSSION

The present study investigated to what extent children understand the behavior of a unanimous majority of peers as normative, that is, "the right thing to do" and whether this normative interpretation changes if children additionally see the behavior of a single dissenting peer. To that end, we presented children with a choice task for which they had either only the information of the majority's behavior, or additionally also the behavior of a dissenter, or only the information of two individual peers.

Our study revealed that children's protest against deviations from the majority, their teaching to do what the majority does, and their conformity to the majority (78%) was highest when children saw the unanimous behavior of a majority. This finding shows that children do not only copy the majority, but they interpret a unanimous majority's behavior as "the right thing to do" that others should follow as well. Interestingly, when children see a majority and additionally a dissenter, their protest against deviations from that majority, their teaching of the majority, and their conformity to the majority (38%) dropped. Thus, children's normative interpretation of the majority behavior is reduced, and fewer children seem convinced that everyone should do what the majority does when they have seen a dissenter as well.

Following up on children's individual response patterns, we found that, in fact, among the children who provided sufficiently coherent response patterns, most children in this condition understood the majority as incorrect and the dissenter as correct. Other children were majority-oriented and viewed the majority as correct and the dissenter as incorrect and another group of children viewed both options, the majority and the dissenter option, as correct. Thus, we see groupings of different normative inferences of this situation. Although some children seem majority-oriented and uphold the normativity of the majority, others actually see the majority proven wrong by a dissenter and for others, this even means that the majority and the dissenter are both behaving correctly. Unfortunately, most children were not identifiable through their action patterns either because they did not protest or teach ($n = 43$), or because we found inconsistent patterns ($n = 3$). Nonetheless, these patterns show that there are at least three pathways for interpreting the simultaneously presented behavior of a majority and a dissenter.

These findings underline the main finding once more, showing that if children see a unanimous majority, their interpretation of this majority's behavior as normative is comparably strong. However, when children additionally

see the behavior of a dissenter, their normative interpretation of the majority decreases and competing normative interpretations in favor of the dissenter or both, the majority and the dissenter, arise.

These findings might be in line with previous observations which showed that when children saw one competent adult model and a majority of three adult models (without information on their competence), they pursued two different strategies in their copying behavior (Burdett et al., 2016): some children exhibited a competency bias and preferably copied the competent model over the majority, whereas other children exhibited a majority bias and preferred copying the majority over the competent model. Thus, pitting competence against a majority in adult models revealed that children are split into two roughly equally sized groups, the expert followers, and the majority followers.

Potentially, children in our study might have interpreted the dissenting child as an expert considering that they made the same choice three times in a row, thus showing strong determination which is typical of a competent expert. Following previous work on minority influence, minorities who show consistency are particularly influential (e.g., Wood et al., 1994) as they are attributed with certainty, competence and commitment (see also the supporting information from Sibilsky et al., 2022). In line with Burdett et al.'s (2016) findings, children in our study might be torn in their normative interpretation of who is correct and assume that either the majority is correct or the dissenter. Even though competence did not play an explicit role in the present study, we found that roughly 48% of the children copied the dissenter and 38% copied the majority when presented with information from both. This specific finding might mirror Burdett et al.'s (2016) findings and translate into children's normative interpretation of the situation. However, our study cannot address the question of whether children understood the dissenter as an expert, and this interpretation remains speculative. Alternatively, children might have concluded from seeing a majority and a dissenter that any demonstrated behavior is correct, so this remains an open question for future lines of research, but we believe the approach to follow children's individual interpretive pathways might gain exciting insights.

In comparison to other studies using a similar setup and sample (e.g., Haun et al., 2012; van Leeuwen et al., 2018), our study showed lower rates of copying the majority and higher rates of copying the dissenter in the Majority-dissenter condition. However, there is an important methodological difference between the previous studies and the current study. As previous studies have focused on measuring children's majority bias in copying behavior, they have shown children the majority and dissenter demonstrations and have measured children's own conformity directly after the demonstrations using multiple trials. In the current study, our focus was not on children's copying but on their normative understanding of majority and dissenter demonstrations. Therefore, children were presented with the demonstrations and directly after observed other actors performing different actions (choosing the majority, the dissenter, and the undemonstrated option) for which we measured protest. Only after children observed these additional demonstrations, were they able to make a single choice for which we measured whether they decided to copy the majority, the dissenter, or neither. These additional demonstrations may have influenced children's own copying behavior and might possibly have had a decreasing effect on children's majority bias. Because children tend to copy a demonstrated behavior over an undemonstrated behavior (Sibilsky et al., 2022), we believe this might explain a shift toward copying the dissenter more frequently as compared to previous studies. This notion is somewhat supported by looking at our Majority condition. When comparing the copying rates in our Majority condition with similar setups in other studies using unanimous presentations of an action, they show higher rates of copying a unanimous majority behavior (e.g., 92% in Evans et al., 2018) than the children in our study (76%). In sum, due to the methodological difference, the copying rates of the current study and previous studies are not directly comparable.

Finally, in our control condition, when children only saw two individual options presented, they mostly copied one of these presented options (83%) but interestingly, their protest and teaching rates were lowest as compared to the other conditions, thus indicating that they mostly did not interpret the behavior of these two individuals as a norm that everyone should follow. Potentially, seeing these individuals making different choices elicited the interpretation that the game might be played according to individual preferences and that any choice was correct. This result also might indicate that normative inferences need specific scaffoldings to be initiated and upheld. For example, in the study by Burdett et al. (2022), the approval of others of a majority behavior led to more copying of the majority even if the

dissenter showed a more efficient behavior. Thus, approval by others as well as the existence of a majority as such might be crucial factors that elicit and sustain normative interpretations.

Descriptively, there were consistently fewer children in the Control condition showing protest ($n = 8$) and teaching ($n = 12$) as compared to children in the Majority condition (protest: $n = 16$; teaching: $n = 20$) and the Majority-Dissenter condition (protest: $n = 18$; teaching: $n = 18$). The analyses showed no significant differences between the number of trials with protest or teaching per condition, so we interpreted these numbers tentatively. Nevertheless, they might hint that children's normative understanding when only seeing the behavior of two peer individuals might be lower compared to when children see the behavior of a majority. Future studies should examine whether the strength of normative inference depends on the absolute number and proportions of (peer) individuals that children see in a majority and a dissenter or minority. As previous research has shown, 3-4-year-old children mostly will abandon their own judgment and conform to a unanimous majority whereas older children will adapt their judgment by following small majorities (Morgan et al., 2015).

4.1 | Limitations

The rates of protest and teaching we observed are comparable to similar studies (e.g., Hardecker et al., 2016). Nevertheless, protest and teaching rates were relatively low which might be a reason why we failed to detect some differences between conditions (e.g., general protest rates in the Control condition compared to the Majority and Majority-Dissenter conditions). Another consequence of low protest and teaching rates is that the normative interpretation of many children in this study remains unclear, and future studies would benefit from finding ways to investigate children's normative understanding beyond protesting (e.g., by interviewing children using explicit normative questions such as, "Is it correct to do it like this?").

Considering that our sample consisted of children coming from a mid-sized German city, our results cannot be generalized to other populations, especially because recent findings suggest that the extent of conformity behavior is subject to variation across cultures and age (Morgan et al., 2015; Sibilsky et al., 2022; van Leeuwen et al., 2018) and presumably with it its normative interpretation.

Finally, our instructions to the children included the phrasing that they needed to find out the correct way to play the game and by that framed the task normatively. This procedure might overestimate children's overall spontaneous normative inferences. We decided to take this approach as protest rates are usually rather low, so we wanted to make sure children were motivated to pay attention to the videos and play the game. Nevertheless, even if this procedure might have elevated the general levels of protest, it would not easily explain the different levels of protest between conditions and why children protested much less in the Control condition as compared to the Majority condition.

4.2 | Future directions

More research is needed to disentangle whether children conform to the majority out of a normative social influence or an informational social influence (Deutsch & Gerard, 1955), that is whether they think that this behavior is "how it ought to be done" or if it is the most sensible and the objectively correct thing to do and will lead to a successful outcome. We intentionally excluded a clearly visible successful outcome in the demonstration videos and when the puppets made their choices in order to allow for instrumental uncertainty of the actions and to give more room for socially normative (i.e., it is the right thing to do because everybody ought to do it) rather than instrumental normative interpretation (i.e., it is the right thing to do because it works). Future manipulations of the success of the outcome of the demonstrated behavior could shine a light on the strength of social versus instrumental normative influences.

Furthermore, in addition to the question of whether the number of peers influences the strength of normative interpretations of their behavior (analogous to the fact that it increases their copying; e.g., Herrmann et al. 2013), another open question is whether the normative interpretation of the majority changes in case of (strong) conformity, that is, when children have an initial preference or initial correct knowledge and change their behavior to adopt the majority (Haun & Tomasello, 2011). Are these instances underlain by a stronger normative inference as compared to majority-biased transmission?

Finally, the degree of consensus seems to influence children depending on their age, when it comes to copying a majority or not (Morgan et al., 2015). Thus, an interesting route for future research concerns the question of how normative inference of majority behavior is influenced by the number of people in the majority and the number of dissenters.

5 | CONCLUSION

Overall, the present study revealed that preschool-age children not only conformed to the behavior of a unanimous majority of peers but also interpreted their behavior as normative, thus understanding it as obligatory for anyone, even those individuals whom children know to be unaware of the majority behavior. However, we also found that this interpretation changed when children saw an alternative behavior of a lone dissenter. Being presented with both, the majority behavior of peers, as well as the dissenter behavior of a peer, weakens children's tendency to understand the majority choice as the right thing to do. This additional information allows for more diversity in children's views of the situation: some of them still understand the majority as correct and the dissenter as wrong; however, some children see that the dissenter is correct and the majority incorrect, whereas other children even construe the majority as well as the dissenter as equally correct. In any case, adding more variety to the behavioral information that children receive from peers shapes their understanding of what is acceptable and helps them accommodate to their specific social environments, which is a crucial component of navigating through the complex behavioral information by peers and adults of everyday life.

CONFLICTS OF INTEREST STATEMENT
We have no conflicts of interest to disclose. There is no funding to declare for this research.

DATA AVAILABILITY STATEMENT
The data for this study is made publicly available: https://osf.io/rsypb/?view_only=336dd20b3bbe4d8ab06b72f1a3a6ebfd

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REFERENCES

Asch, S. E. (1956). Studies of independence and conformity: I. A minority of one against a unanimous majority. *Psychological Monographs: General and Applied*, *70*(9), 1–70. https://doi.org/10.1037/h0093718

Bartón, K. (2022). MuMIn: Multi-model inference (R package version 1.47.1). https://cran.r-project.org/package=MuMIn

Bates, D., Mächler, M., Bolker, B., & Walker, S. (2015). Fitting linear mixed-effects models using lme4. *Journal of Statistical Software*, *67*(1), 1–48. https://doi.org/10.48550/arXiv.1406.5823

Bernard, S., Harris, P., Terrier, N., & Clément, F. (2015). Children weigh the number of informants and perceptual uncertainty when identifying objects. *Journal of Experimental Child Psychology*, *136*, 70–81. https://doi.org/10.1016/j.jecp.2015.03.009

Bernard, S., Proust, J., & Clément, F. (2015). Four-to six-year-old children's sensitivity to reliability versus consensus in the endorsement of object labels, *Child Development*, *86*(4), 1112–1124. https://doi.org/10.1111/cdev.12366

Boseovski, J. J., Marble, K. E., & Hughes, C. (2016). Role of expertise, consensus, and informational valence in children's performance judgments. *Social Development*, *26*(3), 445–465. https://doi.org/10.1111/sode.12205

Burdett, E. R., Lucas, A. J., Buchsbaum, D., McGuigan, N., Wood, L. A., & Whiten, A. (2016). Do children copy an expert or a majority? Examining selective learning in instrumental and normative contexts. *Plos One*, *11*(10), e0164698. https://doi.org/10.1371/journal.pone.0164698

Burdett, E. R., Whiten, A., & McGuigan, N. (2022). The ontogeny of selective social learning: Young children flexibly adopt majority-or payoff-based biases depending on task uncertainty. *Journal of Experimental Child Psychology*, *214*, 105307. https://doi.org/10.1016/j.jecp.2021.105307

Butler, L. P., Schmidt, M. F. H., Burgel, J., & Tomasello, M. (2015). Young children use pedagogical cues to modulate the strength of normative inferences. *British Journal of Developmental Psychology*, *33*(4), 476–488. https://doi.org/10.1111/bjdp.12108

Casler, K., Terziyan, T., & Greene, K. (2009). Toddlers view artifact function normatively. *Cognitive Development*, *24*(3), 240–247. https://doi.org/10.1016/j.cogdev.2009.03.005

Chen, E. E., Corriveau, K. H., & Harris, P. L. (2013). Children trust a consensus of outgroup members but do not retain that trust. *Child Development*, *84*(1), 269–282. https://doi.org/10.1111/j.1467-8624.2012.01850.x

Corriveau, K. H., Fusaro, M., & Harris, P. L. (2009). Going with the flow: Preschoolers prefer nondissenters as informants. *Psychological Science*, *20*(3), 372–377. https://doi.org/10.1111/j.1467-9280.2009.02291.x

Corriveau, K. H., & Harris, P. L. (2010). Preschoolers (sometimes) defer to the majority in making simple perceptual judgments. *Developmental Psychology*, *46*(2), 437–445. https://doi.org/10.1037/a0017553

Deutsch, M., & Gerard, H. B. (1955). A study of normative and informational social influences upon individual judgment. *The Journal of Abnormal and Social Psychology*, *51*(3), 629–636. https://doi.org/10.1037/h0046408

Einav, S. (2014). Does the majority always know best? Young children's flexible trust in majority opinion. *Plos One*, *9*(8), e104585. https://doi.org/10.1371/journal.pone.0104585

Evans, C. L., Burdett, E. R., Murray, K., & Carpenter, M. (2021). When does it pay to follow the crowd? Children optimize imitation of causally irrelevant actions performed by a majority. *Journal of Experimental Child Psychology*, *212*, 105229. https://doi.org/10.1016/j.jecp.2021.105229

Evans, C. L., Laland, K. N., Carpenter, M., & Kendal, R. L. (2018). Selective copying of the majority suggests children are boardly "optimal-" rather than "over-" imitators. *Developmental Science*, *21*(5), e12637. https://doi.org/10.1111/desc.12637

Hardecker, S., Schmidt, M. F. H., Roden, M., & Tomasello, M. (2016). Young children's behavioral and emotional responses to different social norm violations. *Journal of Experimental Child Psychology*, *150*, 364–379. https://doi.org/10.1016/j.jecp.2016.06.012

Haun, D. B. M., Rekers, Y., & Tomasello, M. (2012). Majority-biased transmission in chimpanzees and human children, but not orangutans. *Current Biology*, *22*(8), 727–731. https://doi.org/10.1016/j.cub.2012.03.006

Haun, D. B. M., & Tomasello, M. (2011). Conformity to peer pressure in preschool children. *Child Development*, *82*(6), 1759–1767. https://doi.org/10.1111/j.1467-8624.2011.01666.x

Herrmann, P. A., Legare, C. H., Harris, P. L., & Whitehouse, H. (2013). Stick to the script: The effect of witnessing multiple actors on children's imitation. *Cognition*, *129*(3), 536–543. https://doi.org/10.1016/j.cognition.2013.08.010

Köymen, B., Schmidt, M. F. H., Rost, L., Lieven, E., & Tomasello, M. (2015). Teaching versus enforcing game rules in preschoolers' peer interactions. *Journal of Experimental Child Psychology*, *135*, 93–101. https://doi.org/10.1016/j.jecp.2015.02.005

Morgan, T. J., Laland, K. N., & Harris, P. L. (2015). The development of adaptive conformity in young children: Effects of uncertainty and consensus. *Developmental Science*, *18*(4), 511–524. https://doi.org/10.1111/desc.12231

Nagel, T. (1970). *The possibility of altruism*. Clarendon Press.

Rakoczy, H., Hamann, K., Warneken, F., & Tomasello, M. (2010). Bigger knows better: Young children selectively learn rule games from adults rather than from peers. *British Journal of Developmental Psychology*, *28*(4), 785–798. https://doi.org/10.1348/026151009x479178

Rakoczy, H., Warneken, F., & Tomasello, M. (2008). The sources of normativity: Young children's awareness of the normative structure of games. *Developmental Psychology*, *44*(3), 875–881. https://doi.org/10.1037/0012-1649.44.3.875 18473651

Rakoczy, H., Warneken, F., & Tomasello, M. (2009). Young children's selective learning of rule games from reliable and unreliable models. *Cognitive Development*, 24(1), 61–69. https://doi.org/10.1016/j.cogdev.2008.07.004

Roberts, S. O., Gelman, S. A., & Ho, A. K. (2017). So it is, so it shall be: Group regularities license children's prescriptive judgments. *Cognitive Science*, 41(S3), 576–600. https://doi.org/10.1111/cogs.12443

Schillaci, R. S., & Kelemen, D. (2014). Children's conformity when acquiring novel conventions: The case of artifacts. *Journal of Cognition and Development*, 15(4), 569–583. https://doi.org/10.1080/15248372.2013.784973

Schmidt, M. F. H., Butler, L. P., Heinz, J., & Tomasello, M. (2016). Young children see a single action and infer a social norm: Promiscuous normativity in 3-year-olds. *Psychological Science*, 27(10), 1360–1370. https://doi.org/10.1177/0956797616661182

Schmidt, M. F. H., Rakoczy, H., & Tomasello, M. (2011). Young children attribute normativity to novel actions without pedagogy or normative language. *Developmental Science*, 14(3), 530–539. https://doi.org/10.1111/j.1467-7687.2010.01000.x

Schmidt, M. F. H., & Tomasello, M. (2012). Young children enforce social norms. *Current Directions in Psychological Science*, 21(4), 232–236. https://doi.org/10.1177/096372141244865

Sibilsky, A., Colleran, H., McElreath, R., & Haun, D. B. M. (2021). Conformity decreases throughout middle childhood among ni-Vanuatu children: An intracultural comparison. *Developmental Psychology*, 57(9), 1497–1509. https://doi.org/10.1037/dev0001234

Sibilsky, A., Colleran, H., McElreath, R., & Haun, D. B. M. (2022). Expanding the understanding of majority-bias in children's social learning. *Scientific Reports*, 12(1), 6723. https://doi.org/10.1038/s41598-022-10576-3

Stengelin, R., Haun, D. B. M., & Kanngiesser, P. (2023). Simulating peers: Can puppets simulate peer interactions in studies on children's socio-cognitive development? Child Development. Advance online publication. https://doi.org/10.1111/cdev.13913

van Leeuwen, E. J. C., Cohen, E., Collier-Baker, E., Rapold, C. J., Schafer, M., Schutte, S., & Haun, D. B. M. (2018). The development of human social learning across seven societies. *Nature Communications*, 9(1), 2076. https://doi.org/10.1038/s41467-018-04468-2

Wilks, M., Collier-Baker, E., & Nielsen, M. (2015). Preschool children favor copying a successful individual over an unsuccessful group. *Developmental Science*, 18(6), 1014–1024. https://doi.org/10.1111/desc.12274

Wood, W., Lundgren, S., Ouellette, J. A., Busceme, S., & Blackstone, T. (1994). Minority influence: A meta-analytic review of social influence processes. *Psychological Bulletin*, 115(3), 323–345. https://doi.org/10.1037/0033-2909.115.3.323

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Appendix A

Individual Pathways Regarding Protest, Teaching and Conformity in the Majority-Dissenter Condition

The graph illustrates how many children protested against which option, taught which option and then which option they chose themselves. Following the pathways from left to right shows how many children followed which paths and in the end leads to a color code indicating how children's responses can be interpreted with regard to their normative understanding.

Colors indicate patterns:

Grey = inconclusive (children's normative understanding remains unclear)
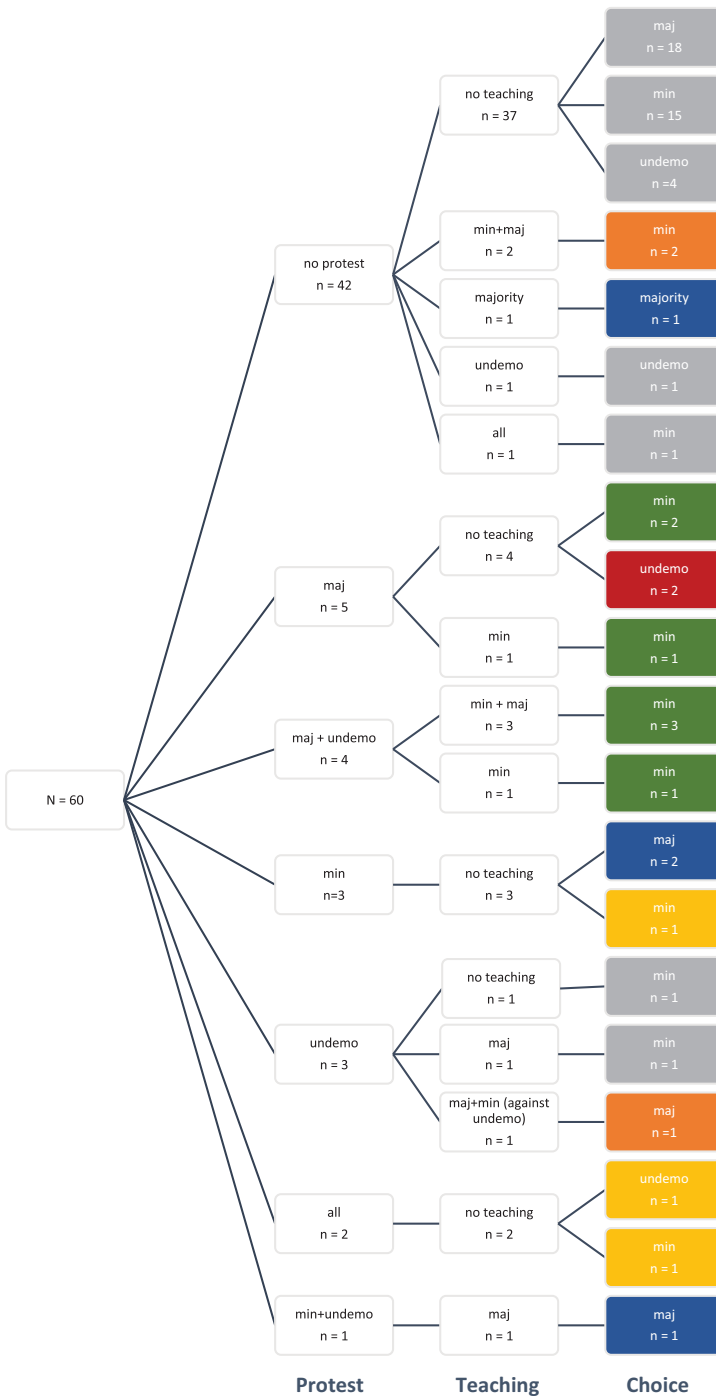
Yellow = inconsistent children

Blue = children believe the majority is correct

Green = children believe the dissenter is correct

Red = children believe the majority is incorrect

Orange = children believe both majority and dissenter are correct

| Protest | Teaching | Choice |

Appendix B

Individual Pathways Regarding Protest, Teaching and Conformity in the Majority Condition

The graph illustrates how many children protested against which option, taught which option and then which option they chose themselves. Following the pathways from left to right shows how many children followed which paths and in the end leads to a color code indicating how children's responses can be interpreted with regard to their normative understanding.

Colors indicate patterns:

Grey = inconclusive (children's normative understanding remains unclear)

Yellow = inconsistent children

Blue = children believe the majority is correct

Protest · Teaching · Choice

Appendix C

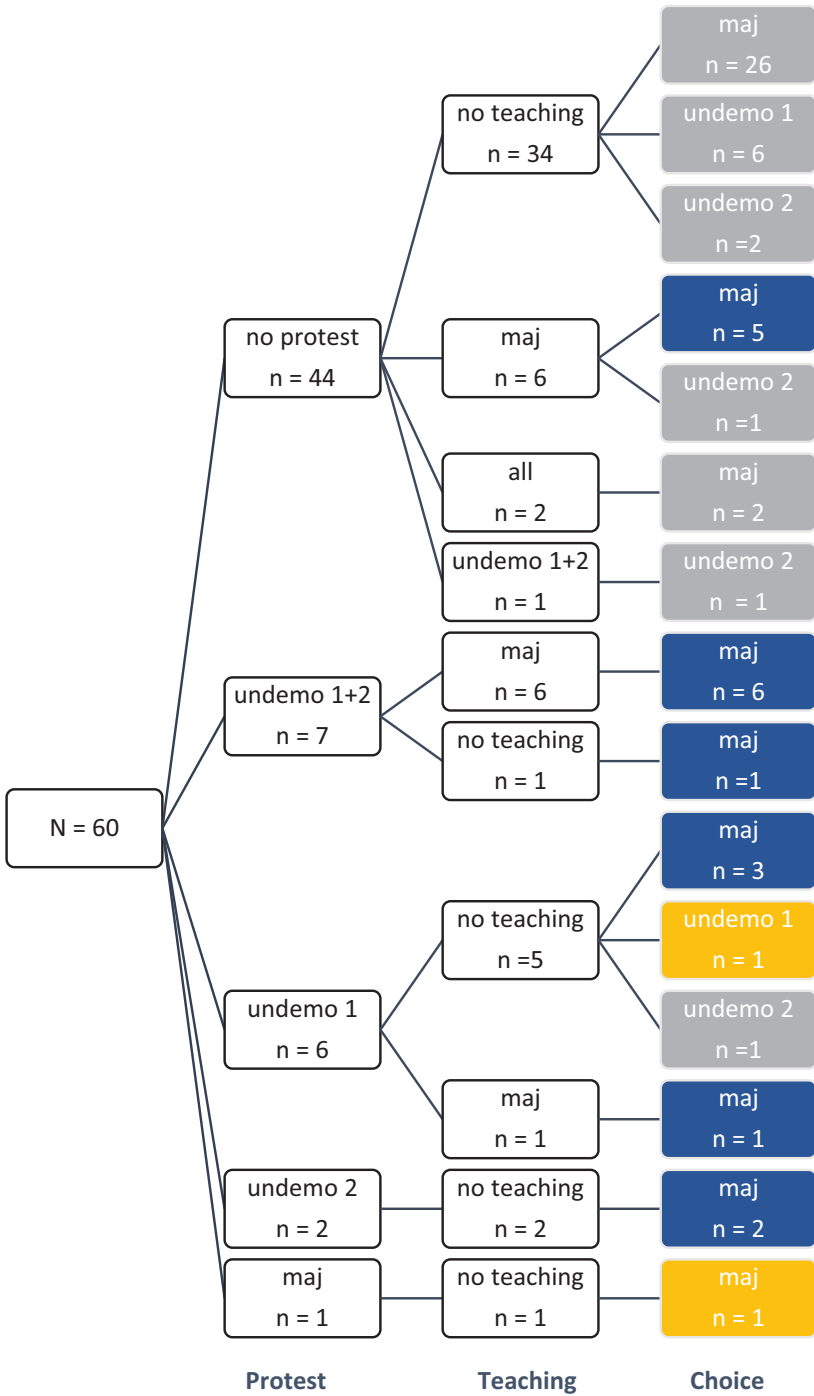**Individual Pathways Regarding Protest, Teaching and Conformity in the Control Condition**

The graph illustrates how many children protested against which option, taught which option and then which option they chose themselves. Following the pathways from left to right shows how many children followed which paths and in the end leads to a color code indicating how children's responses can be interpreted with regard to their normative understanding.

Colors indicate patterns:

Grey = inconclusive (children's normative understanding remains unclear)

Yellow = inconsistent children

Green = children believe one specific individual is correct

Purple = children believe both individuals are correct

Protest	Teaching	Choice

N = 60

- **no protest** n = 52
  - **no teaching** n =44
    - min1 n = 26
    - undemo n = 10
    - min2 n = 8
  - **min 1** n =2 → min1 n =2
  - **min2** n = 2 → min1 n =2
  - **min 1+undemo** n =2 → min1 n =2
  - **min 1+2** n =1 → min1 n =1
  - **all** n = 1 → min1 n =1
- **undemo** n =2
  - **no teaching** n =2
    - min1 n = 1
    - min2 n = 1
- **undemo + min1** n = 2
  - **against min 1** n = 1 → min2 n = 1
  - **min2** n = 1 → min1 n = 1
- **undemo + min2** n = 1
  - **no teaching** n = 1 → min1 n = 1
- **min 1** n = 1
  - **min1+2** n =1 → min2 n = 1
- **min 2** n = 1
  - **min1** n = 1 → min1 n = 1
- **min 1+2** n = 1
  - **min2** n = 1 → min1 n = 1