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## From what I want to do to what we decided to do: 5-year-olds, but not 3-year-olds, honor their agreements with peers



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### ABSTRACT

Sometimes we have a personal preference but we agree with others to follow a different course of action. In this study, 3- and 5-year-old children ( $N = 160$ ) expressed a preference for playing a game one way and were then confronted with peers who expressed a different preference. The experimenter then either got the participants to agree with the peers explicitly or just shrugged her shoulders and moved on. The children were then left alone to play the game unobserved. Only the older children stuck to their agreement to play the game as the peers wished. These results suggest that by 5 years of age children's sense of commitment to agreements is strong enough to override their personal preferences.

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### Introduction

Reasonably often in everyday life we have a personal preference for one course of action, but for whatever reason we agree with another person or group of people to follow a different course of

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action. Assuming that we are capable of understanding the social implications of such an agreement, we have now made a joint commitment to the group's decision.

A number of recent studies have shown that children as young as 3 years understand the social implications of making joint commitments with a collaborative partner. On the one hand, they understand that the partner is committed to them, and so they verbally protest, often using normative language, when a partner does not act in accordance with the commitment (Kachel et al., 2018). On the other hand, 3-year-olds also understand that when they make a joint commitment with a partner, they themselves are committed to behave accordingly. That is, when they have made a joint commitment with a partner—typically orchestrated by an adult, with children explicitly agreeing by saying something like “OK”—they behave more cooperatively than when they have made no such commitment. For example, Gräfenhain et al. (2013) found that children who had made a joint commitment to put together a puzzle with a partner waited for that partner when she/he was delayed, helped the partner to get her/his reward even after receiving theirs, assumed the partner's role if necessary, and so on in a way that children who just worked alongside another child did not. And Kachel and Tomasello (2019) found that when an adult used an exciting toy to tempt 3-year-olds away from a game with a partner, children who had made a joint commitment to that partner resisted the temptation more often than children who had not.

In all these studies, children who made a joint commitment were engaged with their partner in interdependent collaboration. In addition, there are a few studies in which preschool children made verbal commitments or promises outside of collaboration, and this changed their behavior as well. For example, preschool children cheated less in a game after verbally committing not to do so than when they were just told not to cheat (Evans et al., 2018; Heyman et al., 2015). And when preschoolers were asked to promise to continue a cleaning task—and they agreed—they persisted longer in the task than without such a promise (Kanggiesser et al., 2017). But such verbal commitments and promises to adults have complex motivations because adults may potentially punish the children for cheating, and verbal promises even carry an extra force in that one may be punished not only for cheating but also for breaking one's promise.

In the current study, we focused on a situation in which a child already had a previous preference for one course of action and then agreed with peers to follow another course of action (without any explicit promise). Specifically, the child expressed a preference for operating a sticker dispenser so as to get one set of stickers but then saw some peers express a preference for operating the sticker dispenser so as to get a different set of stickers. In the agreement condition the adult got the child to agree with the peers to act in their preferred way, whereas in the control condition the child saw the peers' preferred choice but was not prompted to agree with it. The most important outcome measure was what the child then chose to do on her/his own after both the peers and the adult had left the scene. This procedure was aimed at determining whether the child had in some sense internalized the agreement and changed her/his motivation to act, even when alone, as a result. The control condition was meant to isolate the effect of the agreement itself, ruling out the possibility that the child was just conforming to the peers.

We tested both 3-year-old and 5-year-old children. Our hypothesis was that 5-year-olds would better understand the implications of agreements because it is only by this age that children create new games via agreed-on rules with peers that they then enforce normatively on others and themselves (Hardecker et al., 2016). In addition, it is also possible that overriding one's personal preference in deference to an agreement with others requires a certain level of inhibitory control. Given that this develops significantly during the preschool years (e.g., Carlson & Moses, 2001), this is another reason why 5-year-olds might be better at superseding their own personal preference. It is also possible that developing skills of theory of mind—typically showing a major transition at 4 years of age—also play a role. In any case, our prediction was that children's private decision making would be influenced by their previous group agreements because during the agreement children have reconceptualized things as “We are going to do X” and this supersedes their previous individual personal preference (either because they feel an obligation to stick with their agreement or because the agreement has caused them to change their personal preference). On the other hand, it is possible that what is driving children's behavior is simply conformity to the group—not the agreement per se—in which case we would expect no difference in the experimental and control conditions.

We also measured how long children took to make their final decision (latency) and whether they protested if the sticker apparatus malfunctioned and gave them the wrong kind of sticker. First, it might be that children in the control condition, after hearing their peers express a preference, would not feel entitled to decide on their own (Waddington et al., 2022). In that case we might expect longer latencies in the control condition compared with the agreement condition. But one could also imagine a scenario in which the children take more time in the agreement condition as a sign of inner conflict between their initial preference and the commitment they feel toward their peers (Chajes et al., 2022). Second, from the literature we know that young children tend to protest against transgressions of rules and norms, which is interpreted as a sign of normative or moral considerations (Friedrich & Schmidt, 2022; Kachel et al., 2019). To see whether the participants in our study felt any moral obligation, we manipulated the sticker dispenser in a way that always released the set of stickers that had not been chosen. Hence, “by accident” the children who followed the agreement produced the opposite of the agreed-on decision, and the children who ignored the agreement ended up conforming with it. If the commitment to the peers trumped personal preference, we might expect the children who ignored the agreement to protest less than those who attempted to implement the agreement.

Finally, another variable of interest was the number of peers involved. Most previous studies have used a dyadic setup with only one interactive partner, but it is conceivable that in the specific context of making agreements the number of interactive partners has a significant effect on how strongly committed one feels. Thus, we manipulated across children whether they interacted with one peer versus three peers. This might interact in interesting ways with age because it might be, for example, that 3-year-olds understand and appreciate the implications of agreements only in dyadic interactions with individuals, whereas older children understand such agreements even when they are negotiated in more complex situations among multiple partners. In this case we might expect the younger children to follow the agreement in the dyadic context but not in the group context. It is also possible that the majority of multiple peers in a group context, compared with a dyadic context, influences the participants' behavior toward conformity (Haun et al., 2012; Haun & Tomasello, 2011). In this case we would expect especially the older children to follow the agreement in the group condition compared with the dyad condition.

## Method

### *Participants*

We tested 160 participants (80 female) from two age groups ( $M = 5$  years 3 months,  $SD = 2$  months, range = 5;0–5;7 [years;months];  $M = 3$  years 3 months,  $SD = 2$  months, range = 3;0–3;6) in a between-participants design. The sample size was specified prior to data collection based on typical sample sizes in this field. Children were randomly assigned to one of four conditions: dyad/agreement, dyad/control, group/agreement, or group/control. They were recruited from 33 different urban day-care centers (where testing also took place). An additional 29 children were tested but excluded due to a technical error ( $n = 2$ ), an experimenter mistake ( $n = 8$ ), the child not agreeing ( $n = 11$ ), or the child being unable or unwilling to follow the instructions ( $n = 8$ ). All participating children had the informed consent of their parents. The study was conducted in Leipzig, Germany. The procedure was approved by the departmental ethics committee at the Max Planck Institute for Evolutionary Anthropology.

### *Piloting*

We piloted 54 children before we started data collection to adjust the procedure, optimize the apparatus, and train the experimenters.

### *Material and procedure*

We created a scenario in which a group or dyad of children (participant and peer/s) needed to agree on one of two options (choose one of two kinds of stickers). A conflict of interest occurred because the

peers always preferred the opposite of the participant's choice. An agreement, which committed the participant to receding from her/his original choice and going along with the peer's/peers' choice instead, was orchestrated by the experimenter. Eventually the participant implemented her/his decision in private (unobserved by the experimenter or the peer/s). Testing was conducted by one experimenter (E1) and one assistant in the background (E2). Each participant went through a warm-up and an instruction phase, which was followed by the test situation (see Table 1). The setup included an apparatus (sticker dispenser) and a laptop.

The peers were simulated by a video (recorded in advance) framed as a conversation with children from another kindergarten via video conference. This was done to ensure that all participants received the same kind of stimulus. Four different videos were used for the warm-up and the instruction phase: two showing only one peer (*dyad* condition) and two showing three peers (*group* condition). The sex of the video peer/s matched the sex of the participant.

The apparatus we used for the decision was a sticker dispenser (see Fig. 1). It had two sides (blue and green) containing plastic balls with two different kinds of stickers. A marble needed to be inserted into one of two holes on top of the apparatus, either on the blue side or on the green side, and a ball with stickers of the corresponding kind was released. After the instruction phase, the experimenter had only one marble left. However, each plastic ball contained four stickers in the group condition and two stickers in the dyad condition. So even with just one shot, there were enough stickers for all the children, although they needed to agree on which kind of stickers they would seek.

At the end of the instruction phase, the participant was asked to say which side she/he liked better and indicate that choice by putting a green or blue wooden cube in front of the laptop so that the peer/s could see it (see Fig. 2A). After the participant had voiced her/his preference, E2 imperceptibly stopped the video. E1 acted as if the phone connection to the peer/s had been interrupted and "called" them again, starting a new video. For this second part we used two different sets of videos, one in which the peer/s preferred the green side and one in which they preferred the blue side. Thus, E1 was able to create the conflict of interest by choosing a video in which the peer/s preferred the side that the participant had rejected before (see Fig. 2B). After the peer/s had voiced their preference (and put the corresponding colored cube in front of them), E1 repeated that there was only one marble left and then suggested choosing the option preferred by the peer/s (see Fig. 2C), saying "What if . . . hmm . . . you take the . . . green/blue side?" Here E1 acted as if it were a totally random suggestion by shrugging, hesitating, and thinking before actually naming the color. At this point we implemented the agreement manipulation. The behavior of the video peer/s differed depending on the condition: In the *agreement* condition, the peer/s immediately agreed to E1's suggestion and the participant either

**Table 1**  
Testing procedure for the agreement and control conditions

Warm-up	E1 entered the test room with the participant, started the "video conference" on the laptop, and introduced the peer/s to the participant.
Instruction of apparatus	E1 explained and demonstrated the apparatus (sticker dispenser) to the participant and the peer/s. The participant was allowed to try it out and put a marble in each of the two sides (representing the two options).
Introduction of test situation	E1 noticed that there was only one marble left to play with for the participant and the peer/s. She asked the child about her/his preferred side of the apparatus. Then E1 asked the peer/s, who always chose the side <i>not</i> preferred by the participant. E1 reminded the child that there was only one marble left for all of them and suggested that the child choose the side preferred by the peer/s. Agreement condition: Peer/s spontaneously agreed to E1's suggestion, and E1 then asked the participant to agree as well. Control condition: E1 waited for a moment, then shrugged and continued with the next step of the procedure.
Test situation	E1 sent the peer/s away, gave the marble to the participant, allowed the participant to start playing, and left the room under a pretext. After the participant had made her/his decision, E1 came back and asked how it went.
Debriefing	The participant was told that the apparatus sometimes did not work the way it should and was allowed to choose three stickers from an additional sticker box instead.

Note. "Peer/s" means one interaction partner in the dyad condition or three interaction partners in the group condition. E1, experimenter.



**Fig. 1.** Sticker dispenser with blue and green sides containing half-transparent plastic balls with two different kinds of stickers. A marble needs to be inserted into one of two holes on top of the apparatus to release a ball of the corresponding color. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)



**Fig. 2.** (A) Test setup with the participant sitting in front of the laptop on which the peer/s appear and between the sticker dispenser (left) and the instructing experimenter (right). The participant makes her choice (in this case she prefers the stickers from the blue side of the apparatus) and puts a corresponding cube in front of the laptop to show it to the peer/s. (B) Image of the screen while video conference with the peer/s was simulated. Peers make their choice (in this case they prefer the stickers from the green side of the apparatus) and put a corresponding cube in front of them to show it to the participant. (C) The experimenter suggests taking the stickers from the side preferred by the peers (in this case from the green side). She shrugs and hesitates to let it look like a random suggestion. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)



Fig. 2 (continued)



Fig. 2 (continued)

spontaneously agreed as well or was asked to also agree by E1. In the *control* condition, the peer/s did not agree but stayed quiet and E1 continued the procedure after a moment. It was crucial for us that the only difference between the control and agreement conditions was the actual agreement. Children in the control condition also heard and saw the suggestion of E1 and the preference of the peer/s—both different from their own preference. The aim of this was to rule out that the participant's following behavior was motivated by conformity, majority, or obedience to the experimenter.

To start the test situation, E1 sent the peer/s away, saying that she would finish the game together with the participant and would collect their stickers in an envelope so that she could bring them the next time she visited them at their kindergarten. The peer/s left the screen while their blue or green cube stayed on the table/s as a reminder and E1 handed the marble to the participant, saying that she needed to check something outside the room but inviting the participant to put the marble inside the apparatus while she was gone. E1 came back into the room after the participant had put the marble in and asked "How did it go?"

In the instruction phase, the apparatus released a blue sticker ball when the marble was inserted on the blue side and released a green sticker ball when the marble was inserted on the green side. For the



test phase, it was manipulated so that it now released a green ball when the marble was inserted on the blue side and vice versa. Although our main measures were the participant's choice and the latency to make this decision, this feature of the apparatus allowed us to record an additional measure—the participant's reaction to the violation of expectation.

### Debriefing

After the test E1 explained to the participant that the apparatus sometimes did not work the way it should and invited the participant to choose three additional stickers from another box instead.

### Measurement and coding

All sessions were videotaped and coded by the first author. In addition, 25% of the video recordings were coded a second time for reliability by an assistant who was blind to the research hypothesis ( $\kappa_{\text{decision}} = 1$ ,  $r_{\text{latency}} = .997$ ,  $\kappa_{\text{reaction}} = .783$ ). For the main measure, we coded which of the two options the participant chose as a binary measure (peer's/peers' preference/agreement = 1, own original preference = 0).

Furthermore, we collected two rather explorative measures to gain additional information about the child's motivation and the foundations of the child's actions. The first was the latency—the time the child took before she/he acted (in seconds, starting when the participant got the marble and, ending when she/he inserted it). Hesitant behavior could indicate motivational conflicts. The second was a protest measure when expectations were violated: The test apparatus was designed in such a way that it never provided the outcome that was expected by the participant. If the participant decided to act in accordance with her/his agreement or the preference of the group, the outcome would be the participant's originally preferred option. If the participant decided to act in accordance with her/his original preference, the outcome would be the option agreed on or preferred by the group. We coded whether the participant spontaneously reported this malfunction of the apparatus to the experimenter (complaint = 1, no reaction = 0). A complaint was classified as any spontaneous utterance by the participant about the malfunction of the apparatus (e.g., "I didn't want blue!"; "But I put it on the green side!").

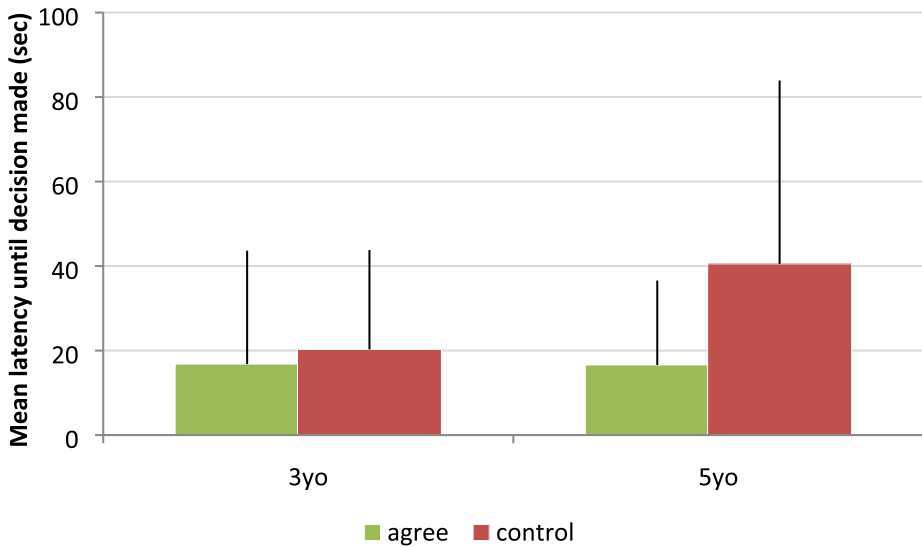
This provided us with an additional measure for the child's emotional reaction to either accidentally breaking or keeping an agreement.

## Results

All measures were analyzed using the statistical software package R 3.0.1 (R Development Core Team, 2013). We ran generalized linear models (Baayen, 2008) with a binomial error structure on the measures *decision* and *reaction* and ran a general linear model on the measure *latency*. The models on the measures *decision* and *latency* included age (3 or 5 years), number of participants (dyad or group), condition (agreement or control), and all two-way interactions between these factors. The model on the measure *reaction* included age (3 or 5 years), number of participants (dyad or group), condition (agreement or control), the participant's decision, and all three-way interactions among these factors. We controlled for potential effects of sex by adding this factor to the models as well. Detailed tables of the statistical results can be found in the online [supplementary material](#).

### Decision

Overall, the full model was significant (likelihood ratio test:  $\chi^2 = 37.138$ ,  $df = 7$ ,  $p < .001$ ) in comparison with a null model (comprising only sex). We found no three-way interaction among all three factors (likelihood ratio test comparing a model including the interaction of age, number of participants, and condition and a reduced model including no such interaction,  $\chi^2 = 0.710$ ,  $df = 1$ ,  $p = .399$ ). The data showed an interaction of age and condition ( $\chi^2 = 6.603$ ,  $p = .010$ ), with the 5-year-olds being more likely to decide in favor of the peer/s only if they had agreed to do so beforehand than when there was no such agreement ( $\chi^2 = 17.950$ ,  $p < .001$ ) (see Fig. 3). The number of participants



**Fig. 3.** Numbers of children, by age, taking the peer's/peers' preferred side (out of 40) in the agreement condition compared with the control condition without an agreement.

(dyad or group) did not affect the participants' decisions ( $z = 0.376, p = .707$ ), and neither did sex ( $z = -0.355, p = .723$ ).

### Latency

Overall, the full model was significant (likelihood ratio test:  $F = 3.321, df = 7, p = .003$ ) in comparison with a null model (comprising only sex). We found no three-way interaction among all three factors (likelihood ratio test comparing a model including the interaction of age, number of participants, and condition and a reduced model including no such interaction,  $F = 1.724, df = 1, p = .191$ ). The data showed an interaction of age and condition ( $F = 4.743, p = .031$ ), with the 5-year-olds needing much more time to decide and act when no agreement had been made (control condition) compared with the agreement condition ( $F = 12.985, p < .001$ ) (see Fig. 4). The number of participants (dyad or group) did not affect the latencies ( $t = -0.117, p = .907$ ), and neither did sex ( $t = 0.351, p = .726$ ).

### Reaction

Overall, the full model was significant (likelihood ratio test:  $\chi^2 = -46.368, df = 14, p < .001$ ) in comparison with a null model (comprising only sex). We found no three-way interactions within any combination of the four factors. The data showed an interaction of decision and condition ( $\chi^2 = 8.618, p = .003$ ), with children breaking the agreement (following their original preference despite having agreed to follow the peer's/peers' preference) being less likely to complain about the malfunction of the apparatus than children who were not committed by an agreement ( $\chi^2 = 4.108, p = .043$ ). The opposite was the case for the children who followed the peer's/peers' preference (see Fig. 5); they were more likely to complain when they agreed to take that side than when there was no such commitment ( $\chi^2 = 3.468, p = .063$ ). Furthermore, the data showed a trending interaction of the number of interaction partners (dyad or group) and condition ( $\chi^2 = 3.806, p = .051$ ), with children in the control condition more likely to complain about the unwanted outcome when they interacted with a group



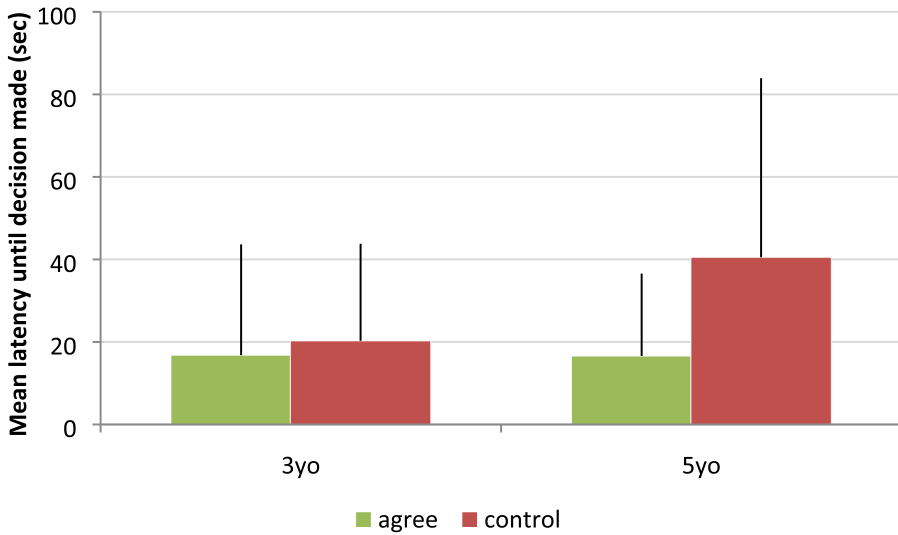


Fig. 4. Mean latencies (in seconds) and standard deviations until the participants made their decision and inserted the marble into the apparatus in the agreement condition and the control condition without an agreement. Data are split according to age.

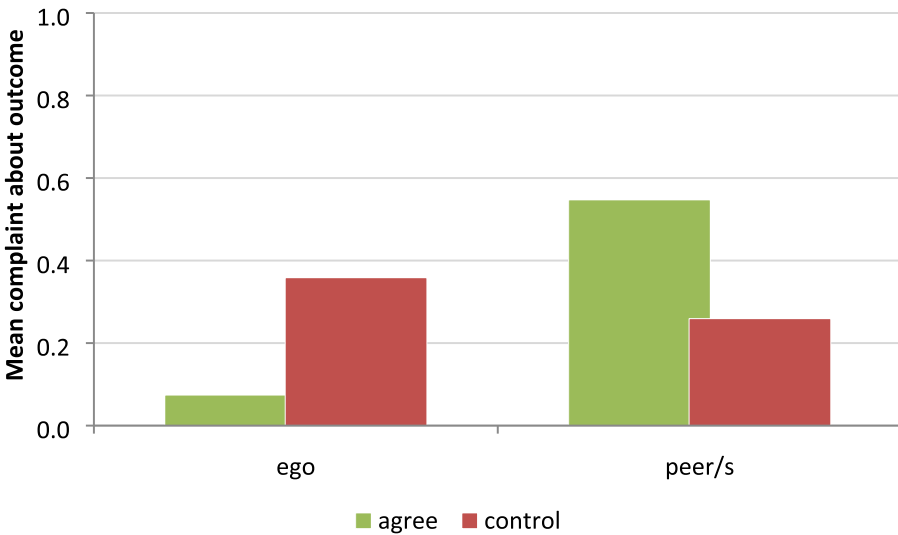


Fig. 5. Mean complaints about the unwanted outcome (violation of expectation) for the agreement condition and the control condition without an agreement. Data are split according to the decision the participants made; “ego” means the participants chose their originally preferred option, whereas “peer/s” means the participants chose the option preferred by the peer/s.

before than when they interacted in a dyad ( $\chi^2 = 3.302, p = .069$ ). Boys were slightly more likely to complain than girls ( $z = 1.898, p = .058$ ).

### Additional analysis: Non-agreeing children (dropouts)

A total of 11 children refused to agree when E1 asked them to agree (9 3-year-olds and 2 5-year-olds; 9 in the dyad condition and 2 in the group condition). Nevertheless, we completed the testing procedure with these children and recorded their decisions. Hence, we were able to run an additional analysis on a sample including the 160 children from the original analysis and the 11 dropouts. The goal of this was to rule out that we selected children for their conformism or willpower by dropping the ones who refused to agree. The results from the analysis with this additional dataset are equivalent to the results from the data reported in the article.

Furthermore, we found that children were significantly more likely to refuse to agree when they played with only one other peer (dyad) than when they played with a group of peers (exact binomial test,  $p = .033$ ).

## Discussion

We presented 3- and 5-year-old children with a situation in which their preference for one of two options conflicted with that of a peer or a group of peers. In the agreement condition, this was resolved by an agreement among the children to choose the side of the peer/s. In the control condition, no such commitment was elicited. When the children were unobserved, we measured whether they followed their original preference or stuck to their agreement, the latency of the decision making, and their reaction to not getting the expected outcome. In line with our prediction, we found that 5-year-olds, but not 3-year-olds, abided by the agreement and took the option they did not prefer but had agreed on with their peer/s.

In our study we considered an agreement to be a speech act that induces a feeling of commitment to a certain behavior. The extent of this feeling of commitment depends on various factors (for an overview, see Bonalumi et al., 2023) such as the role in and dependency of the commitment (first person [other agent depends on me] vs. second person [I depend on other agent]) and whether a commitment was induced explicitly (like in this study) or implicitly without a certain speech act like an agreement or a promise. Another important factor might be how costly it is to act in line with one's feeling of commitment (do I need to give something up for this?) and whether it is a one-shot or repeated interaction (would my future self profit from what I do now?).

Previous studies have shown that 3-year-old children honor commitments to peers and expect others to do so when collaborating on a joint goal (Gräfenhain et al., 2009, 2013; Hamann et al., 2012). However, our test setup was characterized by conflicting goals of the participants. Under these circumstances, the purpose of the commitment was rather to resolve a conflict of interests and not just to coordinate a cooperative activity that was beneficial to all participants. This required the ability to stand back from one's immediate material needs (i.e., to obtain certain stickers) and follow social needs instead, which in this case implied acting in line with one's commitment to honor an agreement. Furthermore, there was no interdependence between the participants and the other parties like in former studies (Melis et al., 2016) in which 3-year-olds already seem to show some sense of commitment (Hamann et al., 2012). Hence, one can conclude that children in our study followed their agreement not in expectation of a personal gain but rather because of its binding force.

The younger children in our study did yet not possess mature executive functions such as inhibitory control (Carlson & Moses, 2001) that are necessary to subordinate their own desires to social goals such as living up to one's agreements and commitments. To honor their commitment in this study, children needed to inhibit their own desire to play the game the way they first wanted to play it. Another possible interpretation could be that each participant had a desire of a "me" (getting Sticker A) and a desire of the "we"—the group to which the child belongs (getting Sticker B). A 3-year-old might perceive this situation like "I want this but *they* want that," whereas a 5-year-old perceives it as "I want this but *we* decided that," which allows the child to act in line with the agreement. This might be suggested by the fact that it is only at this age that children create new games via agreed-on rules with peers that they then enforce normatively on others and themselves (Hardecker et al., 2016). A developmental prerequisite of this is that the child has a theory of mind to simultaneously

represent her/his own desire, the other person's desire, and the composite desire of the *we*. For a feeling of commitment to set in, it is crucial that this desire of the *we* is perceived as common ground among the affected parties—something that only happens in the later preschool years (Siposova et al., 2021).

Our second measure (latency) revealed that 5-year-old children struggled to solve the resulting conflict of interest when no commitment was in place (control condition). The majority of them followed their original preference, although they needed much more time to do so compared with the 3-year-olds, who seemed to not consider the opinion of their peer/s at all. As soon as children can represent desires of others parallel to their own, they require strategies for how to coordinate them—especially if those desires are in conflict with each other (Grüneisen & Tomasello, 2019). This finding emphasizes the significance of commitments in the presented context of peer group decision making.

Our third measure (violation of expectation) showed that even the children who decided to follow their own preference seemed to be implicitly affected by the agreement in that either they were less upset when they did not get what they wanted (because they then at least honored their commitment) or they felt less entitled to complain (because they implicitly knew that they should have followed the agreement). The children who took the side of the peer/s because they had agreed to do so were more likely to complain than the children who had not committed and chose that side for other reasons (most likely conformity). This might be due to a greater emotional affectedness among children who feel committed to an agreement that they then accidentally break (because of the malfunction of the apparatus), whereas children who had just conformed to the peer/s opinion behaved rather indifferently.

When establishing the commitment, we observed that children playing together with a group of peers were more likely to agree than children playing in a dyad with only one peer. At this stage of the interaction, therefore, they showed a certain sensitivity to majority, which has been observed before (Haun et al., 2012; Haun & Tomasello, 2011). However, once they had agreed to take a particular side, an implicit sense of commitment was manifested that was not affected by the number of parties involved.

Our findings are in line with recent studies showing that preschoolers demonstrate loyalty to their peer group even if betraying it would be materially advantageous to them and that they also appreciate such behavior in others (Misch et al., 2014, 2016). We can rule out the possibility of the findings being based on conformity to the peers or the experimenter given that the peer/s voiced their opinion and the experimenter made the very same suggestion in both the test and control conditions. Furthermore, it is known that conformity is an explicit phenomenon that is demonstrated in a social situation but does not change the children's implicit convictions (Haun & Tomasello, 2011).

Nevertheless, one limitation of the study is the artificiality of the peer simulation via video conferencing. A face-to-face interaction might have induced stronger proximity and feelings of commitment in our participants. However, there is literature showing that nowadays video conferencing is used in many families to maintain relationships, for example, if grandparents or friends live far away or a parent works in shifts (Inkpen, 2013). Tarasuik et al. (2011) compared the level of interactivity that young children exhibited with a parent in person and by video and found no difference. Likewise, our participants lively talked to their video peers in the introductory phase, and some even tried to summon them again in the decision phase when “the call” was over. Hence, we consider this setup to be a good compromise between naturalness and controllability of the interaction. Another limitation is the experimenter (as an authority figure) orchestrating the agreement. One might think that children would be more likely to subordinate to an adult than when they are interacting solely with peers (Laupa, 1994)—although there is research showing that the opposite is the case (Dunn & Herrera, 1997; Laursen, 1993). Nevertheless, we tried to diminish the experimenter's influence by letting her leave the room before the children made their decision. However, we cannot rule out that children would behave differently if no adult was involved in the interaction. Furthermore, we cannot rule out that the children were influenced by the knowledge that the peer/s would receive envelopes with the stickers and, therefore, would find out about the decision. Another possible explanation for the children to choose the agreed-on option might be that the agreement process changed the initial preference of the children or made them at least curious about why this option is preferred by the others.

The apparatus (sticker dispenser) could also be used in a more natural context. For future studies, it would be interesting to see whether a group of children would spontaneously come up with an agreement as a solution for a situation with conflicting interests of the group members. It has been shown that preschoolers are able to solve comparable problems by negotiation when multiple rounds allow for taking turns (Grocke et al., 2015; Melis et al., 2016). Friendship and group status are additional parameters that might influence children's feeling of commitment in a scenario like ours (see Balliet et al., 2014; Komolova & Wainryb, 2011).

Previous studies have suggested that dependency (mutual or at least unilateral) is necessary to elicit a sense of commitment in humans (Michael et al., 2016). In this study, we showed that children at the end of their preschool years demonstrate an implicit sense of commitment after a verbal agreement that is stronger than their personal desires and is not based on direct reciprocity or fear of punishment. This is an important feature that makes us reliable members of groups and enables us to solve various problems when living together with others cooperatively.

### Data availability

Data will be made available on request.

### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.jecp.2023.105811>.

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