

# Young Children's Understanding of Joint Commitments

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When adults make a joint commitment to act together, they feel an obligation to their partner. In 2 studies, the authors investigated whether young children also understand joint commitments to act together. In the first study, when an adult orchestrated with the child a joint commitment to play a game together and then broke off from their joint activity, 3-year-olds ( $n = 24$ ) reacted to the break significantly more often (e.g., by trying to re-engage her or waiting for her to restart playing) than when she simply joined the child's individual activity unbidden. Two-year-olds ( $n = 24$ ) did not differentiate between these 2 situations. In the second study, 3- and 4-year-old children ( $n = 30$  at each age) were enticed away from their activity with an adult. Children acknowledged their leaving (e.g., by looking to the adult or handing her the object they had been playing with) significantly more often when they had made a joint commitment to act together than when they had not. By 3 years of age, children thus recognize both when an adult is committed and when they themselves are committed to a joint activity.

*Keywords:* social-cognitive development, joint action, joint commitment, obligation

All social animals do things in groups. But the nature of group activities may differ greatly depending on the type of social engagement involved. For example, imagine that five people who are independently purchasing tickets at the same time outside a rock concert get tickets that happen to be right next to each another; they proceed through the entrance gate, basically in tandem, and then on to their respective seats in tandem. It might be difficult if not impossible for an outsider to distinguish this group of five from another group of five who decided to go to the concert together. The latter group would proceed through the entrance gate and on to their seats in basically the same manner. But there is a crucial difference. If in the first group an individual wanted to stop and buy a drink on the way in, he or she would just do it with no concern for the others, and they would not even notice. In contrast, if an individual in the second group wanted to stop and buy a drink, he or she *ought* to inform the others and they *ought* to wait for her and expect her return.

What sets the first group apart from the second group is that the individuals in the second group are engaged in a joint activity

(Tuomela, 2007, says that the first group is engaged in a group activity in "I-mode," whereas the second is engaged in a group activity in "We-mode"). The people in the second group do not just have coincidentally similar individual goals ("I want to attend this concert"). Rather, they know that they share a goal with each other ("We want to attend this concert together"), which renders them responsive to each other's intentions and actions (e.g., deliberately adapting their pace to each other as they make their way to their seats; see Bratman, 1992, in press). They thus act together at least partly for the motivational sake of enjoying the joint activity (Tuomela, 1990). The reason why the individual stopping to buy a drink ought to inform the others is that joint activities involve certain rights and obligations. That is, as soon as individuals agree to act together, they have formed a joint commitment ensuring that each partner fulfills his or her role until their joint goal is achieved. No partner should then suddenly break off from the joint activity without checking with the others; otherwise, he or she would give the others the right to protest, try to re-establish the joint activity, or stop the action entirely (Gilbert, 1989, 1990; Miller, 2002). It is thus their joint commitment that motivates partners to fulfill their roles in order to achieve their shared goal, and this obligates partners to monitor and regulate each other's behavior in case any coordination problems occur (see also Clark, 2006).

There is very little research addressing the question of when young children interact with others with an understanding of joint commitment. Young children engage in many group activities with both adults and peers from very early on. For example, 15- to 18-month-olds engage in social games such as rolling a ball back and forth or stacking blocks on a tower with an adult (Eckerman & Didow, 1989; Eckerman & Stein, 1990; Ross & Lollis, 1987). Somewhat later, around the end of the second year, children are able to engage skillfully in cooperative games with peers (see

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Eckerman & Peterman, 2001, for an overview), and they also begin to coordinate their actions with a peer by taking on and even reversing complementary roles in a problem-solving situation (Ashley & Tomasello, 1998; Brownell & Carriger, 1990; Brownell, Ramani, & Zerwas, 2006). Perhaps the most relevant study in this age range is that of Warneken, Chen, and Tomasello (2006). They presented 18- and 24-month-old children with both cooperative games and cooperative problem-solving tasks. They found that children at both ages coordinated their actions with those of an adult experimenter and cooperated to achieve a joint goal. Most relevant for current purposes, Warneken et al. (2006) manipulated the experimenter's behavior within the cooperative tasks to assess how children would react when he suddenly stopped acting in the middle of an activity. In response to this interruption, children in both age groups attempted to re-engage the experimenter back into the cooperative activity—for example, by gesturing toward the toy or by placing the toy closer to the experimenter (see also Warneken & Tomasello, 2007, for similar findings with 14-month-olds). These findings are consistent with the idea that children wanted to remind the partner of his commitment to fulfill his role in their joint activity. However, a simpler explanation is also possible. Because children needed the experimenter to achieve the desired effect with the apparatus, their attempts to re-engage the experimenter might simply represent their use of him as a “social tool” to achieve their own individual goals.

The only previous direct study of children's understanding of joint commitments was conducted with older children. Mant and Perner (1988) tested preschool- and school-aged children using a verbal task and verbal measures. They found that although children may be starting to understand some aspects of joint commitments by 5 years of age, they do not fully understand how commitments can be formed and what consequences they entail until 9 to 10 years of age (see Astington, 1990, and Maas & Abbeduto, 2001, for similar findings on children's understanding of promising). The implication of this developmental finding is that very young children engage in joint activities with basically no understanding of the joint commitment involved.

However, another possibility is that verbal tasks with verbal measures are not the most appropriate way to test for young children's understanding of joint commitments and other social obligations. One piece of evidence in this direction comes from recent research on young children's understanding of rules, which similarly obligate the players of a game to conform their behavior to a previously established conventional norm. In a study by Rakoczy, Warneken, and Tomasello (2008), for example, even 2- and 3-year-old children noticed when such a conventional norm was broken (not within a joint activity but within an individual game), and they even intervened to try to rectify the situation. One might also interpret 3-year-olds' ability to agree with others on temporary functions of certain play objects in pretense—and to object to violations of this agreement—as something in the direction of the recognition of a joint commitment (Wyman, Rakoczy, & Tomasello, 2009). However, none of these studies directly investigated what young children understand of the joint commitments and obligations inherent in joint activities, as they were more about obligations of conformity (to rules), whereas joint activities involve more direct obligations of cooperation.

In the two studies reported here, therefore, we investigated young children's understanding of joint commitments more directly. In Study 1, we investigated whether 2- and 3-year-old children understand that establishing a joint commitment obligates both partners to fulfill their roles by manipulating whether the play partners (the child and an adult) had or had not established a joint commitment to play together. Then, after playing with the child for a short time, the adult partner suddenly interrupted her play for no obvious reason. We predicted that children would react more often to this interruption when they had established a joint commitment with the adult to play the game together than when they had not—considering the adult in the first case as not fulfilling her role anymore. Importantly, we used games that could be played either jointly or individually. If children reacted to the interruption when they had established a joint commitment with the adult but continued to play the games alone when they had not, this would further indicate that children in the first case understood the adult as a partner in a joint activity rather than as a social tool. In Study 2, we investigated how 3- and 4-year-old children interrupted a joint activity themselves. After engaging them in a game, we tempted children to leave this game to play a new, highly attractive game in another corner of the room. We predicted that if children understood that partners are not supposed to just break off from a joint activity without checking with each other, they would acknowledge their leaving to their play partner more often when they had established a joint commitment to play the first game together than when they had not. Developmentally, we expected to find a growing understanding of joint commitments across the three age groups.

### Study 1

In Study 1, we used the general method of Warneken et al. (2006), but with two crucial differences. First, we used games that could all be played either alone or jointly with a partner. Thus, children could easily achieve the games' effects alone (e.g., make two rabbits appear by pressing two levers), and by demonstrating both modes of play to the children, we ensured that they knew this fact. The games thus did not have the instrumental goal of acting in pursuit of a desired outcome (e.g., to get access to an enclosed toy) but instead had a more motivational goal of acting together just for the sake of acting jointly. This was done to ensure that any attempts to re-engage the adult could not be attempts to just use her as a necessary social tool to play the game but rather would be attempts to re-establish her commitment to the activity. Second, instead of always establishing joint play, we established two different play contexts. In one condition, the experimenter established a joint commitment to play the game together with the child; that is, she explicitly invited the child to play together with her, awaited a positive agreement before proceeding, and then they played jointly for a short time. In the other condition, the experimenter simply joined the already-playing child for a short time. In both conditions, the experimenter then suddenly interrupted her play. We predicted that if children understood something about joint commitments, they would attempt to re-establish their previous joint play with the adult in the condition with joint commitment—for example, by trying to re-engage her in the game. In contrast, we predicted that they would play the game on their own more often in the condition without a joint commitment.

Because we were interested in young children's understanding of commitments in joint activities, we focused on the youngest children who might be expected to be sensitive to this dimension. On the basis of previous research (especially Rakoczy et al., 2008), we started with young 2- and 3-year-old children.

### Method

#### Participants

Twenty-four 2-year-old children (12 girls; mean age = 26 months 15 days, range = 24 months 20 days to 28 months) and twenty-four 3-year-old children (12 girls; mean age = 38 months 12 days, range = 36 months 26 days to 40 months) participated in the study. Children were recruited from a database of parents who had agreed to participate in studies of children's social-cognitive development. Families were from heterogeneous socioeconomic backgrounds in a medium-sized German city. All children were White and native German speakers. The majority regularly attended day care centers (71% of the 2-year-olds and 92% of the 3-year-olds), and about half of the children in each age group had siblings. Children were individually tested in a child laboratory in sessions lasting approximately 45 min. They received a small gift at the end of the test session. Three additional 2-year-olds and 3 additional 3-year-olds were invited but could not be tested due to shyness.

#### Games and Materials

Four different games were designed for this study. Though varying in different aspects, all games had several things in common. Most importantly, players could play the games in any of three different ways: alone, in parallel with another player, or jointly with another player. Along with the main toy, all games also involved a "tool" (e.g., a small block or mallet) that players held in their hands while playing. Finally, every game began with a synchronizing element (e.g., clapping hands or counting), which enabled players to coordinate their actions and the start of the game's rounds if they so desired—that is, to perform their identical roles synchronously. Figure 1 depicts the different toys and tools of the respective games.

Two stationary cameras fixed at opposite corners of the testing room's ceiling filmed the session. In addition, a moveable camera on a tripod provided a close-up of the child and the experimenter.

#### Procedure

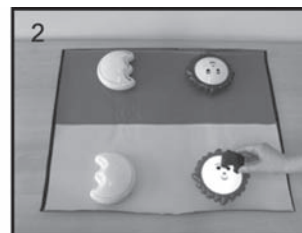
Two female experimenters carried out the test sessions, each performing a fixed role: One acted as the experimenter, and the other (the assistant) helped demonstrate the games and operated the moveable camera during the test session. In addition, the assistant timed each phase (see below), signaling the beginning and end by inconspicuously clearing her throat.

Children were randomly assigned to one of two conditions using a between-subjects design. Thus, 12 children in each age group were assigned to the joint commitment condition and 12 to the no joint commitment condition. Gender was approximately evenly distributed between conditions. The sequence of the four games was the same for every child (see Figure 1).

After a brief familiarization period with the experimenter and the assistant in a playroom, parents and children were led to the



**Tubes:** Players knock on their respective tube with a colored wooden block counting "One, two, three," and at "go!", they drop the block down the tube, and repeat.



**Lights:** Players label one of the lamps (e.g., "Sun!") and then press the light with a colored U-shaped wooden block repeatedly, then the other light.



**Rabbits:** Players clap their hands twice saying, "Rabbit...", and at "hop," they repeatedly press their respective lever with a small colored sponge, making a rabbit appear.



**Bells:** Players knock on the horizontal rod with their respective mallet, counting, "And one, two" and at "go!" players run the mallet along the bells repeatedly.

Figure 1. Study 1: The four games with one of their tools, in the order (1–4) in which they were presented.

testing room. During the entire test session, parents sat on a chair in a corner of the room and pretended to read a magazine, providing an obvious excuse for not being able to participate in the games in case children addressed them. In addition, the experimenters instructed parents not to prompt children to play with (or without) another person. Because some of the 3-year-olds seemed to be inhibited when playing in front of their parents, the parents of 11 children were not present in the room during the test session but instead watched the scene through a one-way mirror (4 children in the joint commitment condition and 7 in the no joint commitment condition). Both parents and children had agreed upon this arrangement before the test session started.

**Warm-up phase.** In a warm-up procedure that was designed to establish a social play atmosphere with the experimenter as a social partner, the experimenter engaged the child in a familiar game (stacking rings on a rod). While playing, the experimenter commented on the child's actions, helped if necessary, and repeatedly asked the child to pass her a ring so she could also play the game. After approximately 4 min, the assistant introduced the first game.

The testing procedure was the same for each game and had five phases: a demonstration phase, an initiation phase, a common play phase of 15 s, an interruption phase of 20 s, and a second round of play. The experimental conditions differed in how the games were initiated (i.e., with or without an agreement to act together) and how the experimenter played the games in the common play phase

(i.e., jointly or in parallel); the other phases were identical for all children in both conditions. The following section describes each phase in detail.

*Demonstration phase.* Before each game, the assistant showed the child the toy, saying, "Look, we have another fun game!" and put the toy on a table in the corner of the testing room. As all games were novel to children, the assistant announced that she and the experimenter would first show them how to play the game. The experimenter always started the demonstration by playing alone for two rounds, obviously having fun and briefly glancing at the child from time to time, while the child and the assistant watched her from some distance. The assistant then approached the table and commented that this was a fun game; then she and the experimenter demonstrated the game together, playing jointly for two rounds. While playing, the adults established eye contact with each other, smiled, and ostensibly coordinated with each other to emphasize their joint play. If the child became impatient while watching them, the assistant repeated that the adults would first demonstrate the game.

The procedure of the warm-up and the procedure of the demonstration were identical for both conditions. Thus, every child was familiar with the experimenter and knew that each game could be played both alone and jointly with another person.

*Initiation phase.* After the demonstration of the game, a play context was initiated, which depended on the condition to which the child was assigned. That is, the experimenter either invited the child to play the game together with her (joint commitment condition) or else it was established that each player played the game on his or her own but with the same toy (no joint commitment condition).

Thus, in the joint commitment condition, at the end of the demonstration the assistant apologized that she had to go to the camera, handed the experimenter her tool, and moved away to the camera. The experimenter then searched for a new partner and invited the child by offering one of the tools and saying, "Oh, [child's name], will you play with me?" If the child agreed either verbally or nonverbally to this invitation (e.g., by nodding or reaching for the tool), the experimenter announced, "Then we will play [game's name] together!" The experimenter handed the child the tool and moved the toy to the floor in the center of the room. As she did so, she announced once more that they would play the game together. Once on the floor, the experimenter attempted to start the game jointly—that is, she established eye contact with the child and, if necessary, waited for the child before starting to play.

If a child did not accept the invitation immediately (as was the case in at least one game for seven 2-year-olds and three 3-year-olds), the experimenter repeated her invitation. If the child still did not respond, the experimenter and the assistant briefly demonstrated the game again, this time on the floor. If the child still did not agree to play, the experimenters moved on to the next game (this happened three times, with one 2-year-old and one 3-year-old).

In the no joint commitment condition, in contrast, at the end of the demonstration the experimenter apologized that she had to go to the camera, handed the assistant her tool, and moved away to the camera. The assistant then turned to the child and said, "So, [child's name], now you can play!" She handed the child one of the tools and moved the toy to the floor in the center of the room. While doing this, the assistant repeated that it was now the child's

turn to play. As soon as the child started to act on the toy, the experimenter approached the toy without looking at the child and announced to herself, "Oh, that's fun. I'll play [game's name]!" The assistant left the scene and moved to the camera.

If a child in this condition hesitated to start playing (as was the case in at least one game for four 2-year-olds and four 3-year-olds), the assistant encouraged and instructed the child how to play the game again. If the child did not start to play after that, both experimenters briefly demonstrated the game a second time, this time on the floor. If children still did not start playing (this happened five times, with three 3-year-olds), the experimenters moved on to the next game.

*Common play phase.* After the game was initiated, the experimenter and the child played for about 15 s. The experimenter behaved differently depending on the condition.

In the joint commitment condition, the experimenter acted according to the previously established joint commitment to play the game together; that is, she attended to and coordinated her actions with the child (e.g., waiting for the child before starting to play and acting contingently). Especially when starting to play a new round by performing the game's synchronizing element (e.g., by clapping hands), the experimenter ostensibly referred to the child by establishing eye contact, raising her eyebrows, and smiling at the child.

In the no joint commitment condition, the experimenter played in parallel to the child, smiling and obviously having fun but not attending to or acting contingently to the child. The experimenter performed the game's synchronizing element, but without referring to the child.

*Interruption phase.* After this short play phase, the experimenter suddenly stopped playing just as she was supposed to start the game's next round (i.e., in the middle of performing the synchronizing element) and ostensibly placed her tool on the floor in front of her. She then leaned back a little, looked at the child, and smiled in a friendly manner. This interruption was identical for both conditions and lasted for 20 s.

If a child clearly attempted to contact the experimenter during the interruption period by inviting her to play, either verbally or by offering her a tool, the experimenter looked inquiringly at the child (i.e., with raised eyebrows, looking back and forth between the tool and the child), and took the offered tool. However, she did not start playing until the 20 s were over. The experimenter thus did not explicitly accept or reject the child's offers, but did not ignore them either.

*Second round.* The sequence of the common play and the interruption phases was then repeated for a second time. The game ended with a last short play phase in which the experimenter behaved as in the previous common play phases. This was done so that children would not become frustrated with an experimenter who did not restart playing after the interruption phase.

### *Coding and Analyses*

Of primary interest were children's reactions to the experimenter's interruption. On the one hand, children could easily play alone, as they did not need another person for the games. On the other hand, children could react to the experimenter's sudden change in behavior, and we were mainly interested in whether children reacted differently depending on which condition they

were in. Therefore, we coded whether children showed the following types of behavior: (a) reactions clearly indicative of expecting the experimenter to play with them, like attempting to re-engage the experimenter into the game or waiting for her to restart playing; (b) playing alone with the toy; or (c) other kinds of behavior, like asking for a new game or disengaging from the toy. Note that some reactions of the third type could also indicate that children expected the experimenter to play with them, but to be conservative we treated them separately. Table 1 provides a detailed description of the coding categories.

Each child received only one code per interruption phase. We used a hierarchical coding system; that is, if children showed at least one episode of the behavior "expecting the experimenter to play," this category was coded for that interruption phase. If children did not react to the experimenter's interruption at all but just played with the toy, this was coded. If neither of these two behaviors was observed, the child received the code "other kinds of behavior."

Children could participate in a maximum of eight interruption phases, two within each of the four games. Sometimes children did not start to play the game at all (see above) or else started to play but lost interest in the game during the first common play phase. Thus, 5 children completed only three of the games (one 2-year-old and four 3-year-olds), and 3 children completed only two of the games (one 2-year-old and two 3-year-olds). Sometimes children only participated in the first interruption phase of a game and did not restart the game after the experimenter had started again, because they got tired or were not interested in the game anymore. This happened at least once for seven 2-year-olds and two 3-year-olds. Therefore, we chose the higher score of the two interruption phases for each game, resulting in a total of two, three, or four scores per child overall. The mean percentage of games in which children showed a certain type of behavior as a proportion of all games in which children participated was then used for analyses.

In the common play phases, children in the no joint commitment condition played alongside an experimenter who played on her own, without attending to or interacting with them. In the inter-

ruption phases that followed, therefore, children might have been too inhibited to contact the experimenter, even if they wanted to. Thus, in addition to the main analysis, we coded the comments children directed to the experimenter during interruption phases (e.g., commenting on the activity or the situation), as we considered that these comments indicated children's comfort in interacting with the experimenter. To ensure that the comments were clearly directed to the experimenter, only comments with looks to the experimenter's face immediately before, during, or after the comment were coded. This category was coded binarily; that is, if children spoke to the experimenter at least once during an interruption period, 1 was coded, and if no such comment occurred, 0 was coded. Again, we chose the higher score of the two interruption phases for each game and then calculated the mean percentage of games in which children directed their comments to the experimenter for each child individually.

The experimenter coded children's behavior from videotape. A second, independent coder who was blind to the hypotheses of the study watched the recordings of 25% of children who were randomly chosen from each age group (6 children from each group). The second coder saw only the interruption phases, so that she was also blind to condition. For the hierarchical reaction coding, raters agreed in 88% of the interruption phases (Cohen's kappa = .80), and for children's verbal comments, they agreed in 88% of the interruption phases (Cohen's kappa = .63). All *p* values reported below are two-tailed.

## Results

Preliminary analyses revealed that children's behavior did not differ across the four different games (Friedman tests, all *p* values > .26). This factor was therefore collapsed in the subsequent analyses.

### Children's Reactions to the Interruptions

Figure 2 depicts the mean percentage of games in which children showed each of the three different types of behavior as their

Table 1  
Study 1: Coding Categories for Children's Behavior During the Interruption Phases

Category	Definition
Expecting the experimenter to play	
Attempt to re-engage the experimenter	C offers one of the tools to E (i.e., holds, gives or puts a tool close to E) while looking at E's face. C points to the toy and/or to E's tool while looking at E. C verbally invites E (e.g., "You too!"). C verbally teaches E how to play the game (e.g., "Say 1, 2, 3, and then throw the block!").
Waiting	C leans back or places the tool down, does not play but stays in his or her place for at least 5 s, and looks at least once at E's face.
Playing alone with the toy	C performs the game's actions. C continues to act on the toy (e.g., explores the toy or plays with the tools).
Other types of behavior	C disengages from the toy (C turns to another object or location in the room, e.g., the parent or window). C verbally asks E to play a new game. C does not play but talks to E. C does not play but stays in his or her place for at least 5 s, but does not look at E's face.

Note. Children received one code per interruption phase. C = child; E = experimenter.

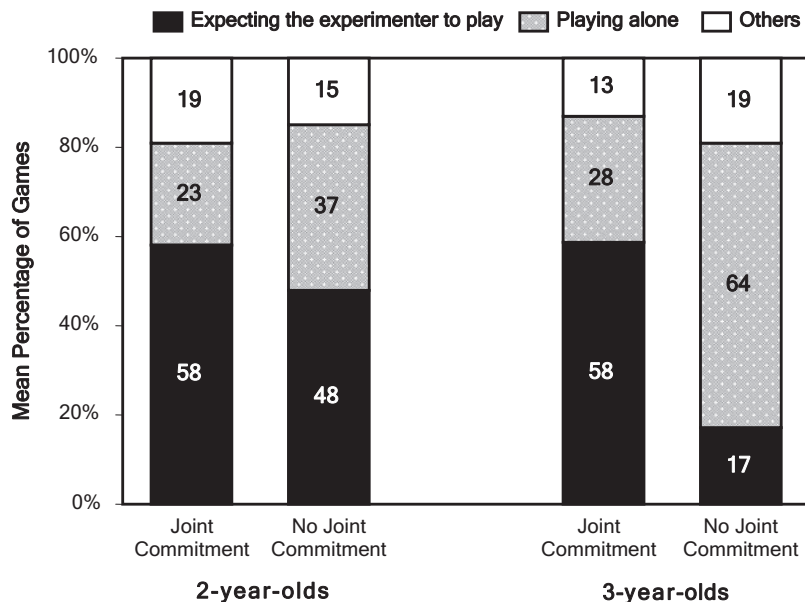


Figure 2. Study 1: Mean percentage of games in which children showed each of the three different types of behavior as their highest response.

highest response, for each age group and condition separately. We were most interested in whether children's behavior during the interruptions differed as a function of condition. Therefore, we first analyzed the mean percentage of games in which children showed behaviors that indicated they expected the experimenter to play—that is, in which they attempted to re-engage her or waited for her; we considered this to be strong behavioral evidence that children understood the experimenter as committed to the game. We expected children in the joint commitment condition to show more of this type of behavior and expected children in the no joint commitment condition, in contrast, to play alone more often. This prediction was supported. A two-way analysis of variance (ANOVA) on the mean percentage of games in which children expected the experimenter to play, with age (2 and 3 years old) and condition (joint commitment vs. no joint commitment) as between-subjects variables, revealed a main effect of condition,  $F(1, 44) = 6.17, p < .05$ , partial  $\eta^2 = .12$ . Thus, across age, children expected the experimenter to play with them significantly more often in the joint commitment condition (in 58% of the games) than in the no joint commitment condition (32%).

Because the effect of age and the interaction of age and condition were not far from reaching significance—for both,  $F(1, 44) = 2.22, p = .14$ , partial  $\eta^2 = .05$ —we also analyzed each age group separately to prevent a misinterpretation of the main effect of condition (Clauß & Ebner, 1979). Comparisons revealed that 3-year-olds expected the experimenter to play significantly more often in the joint commitment than in the no joint commitment condition,  $t(15) = 2.57, p < .05$ . In contrast, 2-year-olds did not differentiate between conditions,  $t(22) = 0.78, p = .44$ . Note that in case the assumed equal variances for  $t$  tests were not fulfilled, we used the corresponding values for unequal variances.

We also conducted a two-way ANOVA on the complementary behavior of playing alone, with age and condition as between-subjects variables. Results revealed an effect of condition,  $F(1,$

44) = 7.21,  $p = .01$ , partial  $\eta^2 = .14$ , suggesting that children played the game alone in the no joint commitment condition more often (in 51% of games) than in the joint commitment condition (26%). In addition, a marginal main effect of age revealed that 3-year-olds tended to play alone more often (in 46% of the games) than 2-year-olds (30%),  $F(1, 44) = 2.95, p = .09$ , partial  $\eta^2 = .06$ . No interaction of the two factors was found,  $F(1, 44) = 1.25, p = .27$ , partial  $\eta^2 = .03$ . Note that multiple testing of essentially the same data set required some error-level correction. We did this using Fisher's omnibus test (Haccou & Meelis, 1994), which justified the two separate analyses of variance,  $\chi^2(12, N = 48) = 32.52, p < .001$ .

In sum, overall analyses revealed that children expected the experimenter to continue to play with them after her interruption more often when they had established a joint commitment to play together, but played on their own more often when they had not established a joint commitment. This effect, however, was mainly driven by the 3-year-olds. Whereas children in this age group adapted their behavior to the respective play context, the 2-year-olds reacted to the experimenter's interruption equally in both play contexts and were thus more social than expected.

#### Comments Directed to the Experimenter

To see whether children were equally likely to talk to the experimenter in both conditions, we compared how often children directed their comments to the experimenter during the interruption phases. Results revealed that children in both age groups verbally contacted the experimenter. Overall, both 2- and 3-year-olds talked to the experimenter in 31% to 34% of the games in each condition. A two-way ANOVA on the mean percentage of games in which children talked to the experimenter, with age and condition as between-subjects variables, yielded no significant effects (all  $p$  values  $> .89$ ). Thus, children in both age groups

commented on the situation to the experimenter irrespective of the condition in which they participated, suggesting that children in both conditions considered her to be a social partner with whom they could interact, if they so desired.

### *Discussion*

The current study is a first step in investigating young children's understanding of the obligations inherent in joint activities. Our findings suggest that young children begin to act together with others with an emerging sense of joint commitment by 3 years of age. Overall, both 2- and 3-year-old children often reacted to the unexpected interruption of the social games by trying to re-engage the adult experimenter or by waiting for her. Importantly, and unlike in the study of Warneken et al. (2006), they did this even though they could just as well have played these games alone. Indeed, the 2-year-olds in our study reacted to the experimenter's interruption as often (58%) as the 2-year-olds in Warneken et al.'s study (60%). This suggests that the children in the current study saw the experimenter as a social play partner within a joint activity and not merely as a social tool that could be used to achieve an individual goal.

As predicted, overall, children in the current study re-engaged or waited for the adult more often when she had established a joint commitment with them than when she had not—then they more often played alone. This pattern was clearly apparent in children of the older age group but less clear (and not significant) in children of the younger age group. This suggests that 3-year-olds, but not 2-year-olds, were sensitive to the subtle characteristics of the joint activity, responding appropriately to their partner's violation of the commitment to act jointly.

Several alternative explanations must be considered for these results. First, one could argue that children re-engaged the adult less often in the no joint commitment condition simply because they were inhibited to interact with her, because she behaved less socially toward them during the play phases. This is very unlikely, however, because children talked equally to the experimenter during the interruption phases in both conditions, suggesting that their different reactions to the interruptions resulted from their understanding of the respective play contexts and not from any inhibition to interact with a less social experimenter in the no joint commitment condition. One could also argue that what children are doing here is little more than what much younger infants do in the so-called "still-face" studies (see Adamson & Frick, 2003, for an overview). In those studies, infants react to an adult who has stopped interacting with them by first attempting to interact and then withdrawing from the interaction when their attempts are unsuccessful. But there are several arguments for why what we are showing here goes beyond that. First, the experimenter in this study did not present a still face; she was pleasant and at least somewhat responsive to children's re-engagement attempts. Much more importantly, 3-year-olds in the current study reacted differently in the joint commitment and no joint commitment conditions, despite the fact that the experimenter behaved identically in the interruption phases in both conditions. These children also showed specific types of behavior that indicated their understanding of the nature of the engagement. For example, some children adapted their own actions to the actions of the experimenter and thus readily stopped and restarted with the experimenter in most of the

interruption phases. These children apparently assumed that as she was jointly committed to their game, she was not supposed to stop playing without indicating this, and so they treated the interruptions as part of the game. Other children searched for an explanation for the adult's surprising behavior and started to teach her, apparently assuming that she needed help on how to play the game. Other children offered to change sides or to exchange tools, apparently assuming that the experimenter had lost interest in the game and thus trying to raise her interest level by offering a new element. These observations suggest that children were responsive to their partner's actions and intentions, supporting her when they assumed that she might need help, or adapting their actions to her actions. Children thus reacted on the basis of their understanding of the adult's violation of their joint commitment and not just because the experimenter had stopped acting.

However, one might still argue that because we manipulated both how the adult initiated the games and how she played during the play phase, these results could be explained simply as a reaction to the different way in which the adult played during this phase. That is, perhaps the older children merely differentiated between the adult's joint and parallel play behavior and preferred joint play. Thus, in the worst case this study might show that children prefer joint activity to parallel activity and not that children understand the obligations and rights engendered by joint commitments. The finding that 2-year-olds did not show a reliable difference between conditions, even though much younger infants are capable of differentiating between contingent and noncontingent behavior (e.g., Agnetta & Rochat, 2004; Asendorpf, Warkentin, & Baudonniere, 1996), and children's specific responses to the experimenter's interruption (see above) make this alternative explanation very unlikely. In addition, we should note that in a pilot study we attempted to have the experimenter play identically in both conditions (i.e., either jointly or in parallel) and found that even adult observers then had difficulty remembering whether the experimenter and the child had formed a joint commitment to play together or not. We therefore chose to manipulate the experimenter's play behavior according to whether she had established a joint commitment or not. Still, because it is difficult to distinguish these two possibilities conclusively with the current study, we conducted a very different type of study in which we assessed how children themselves interrupted a joint activity. In this study, we only manipulated one factor: namely, how the games were initiated. We made the experimenter's play behavior identical in both conditions, to ensure that any difference between conditions was because children understood the obligations engendered by joint commitments to act together.

### Study 2

To test children's understanding of their own obligation to a committed joint activity, we led the children themselves to interrupt one social game in order to play another and assessed their leave-taking behavior toward their original partner. We predicted that if children understood something about the obligations inherent in joint commitments, they would acknowledge their leaving to the experimenter more often when they had previously established a joint commitment to play the game together with her than when they had not.

In the current study, we manipulated how the games were initiated—that is, with or without a joint commitment—but did not manipulate the type of play after this. Any differences between conditions would then occur only because of children's understanding that agreeing to act together creates a joint commitment between partners, and thus certain obligations. To make the initiation phase of the joint commitment more salient to children, we encouraged children to invite the experimenter rather than merely agreeing to her invitation. Then, we kept the experimenter's subsequent play behavior identical in both conditions by having her play in parallel to the children in both conditions. However, given the findings of the pilot study for Study 1 (see above), the experimenter briefly reminded children of how the play context had been initiated while they were playing the game. Because the 2-year-olds in Study 1 did not show a clear understanding of joint commitments (and because we considered the current manipulation even more demanding than that in Study 1), we tested 3- and 4-year-old children in the current study.

### Method

#### Participants

Thirty 3-year-olds (16 girls; mean age = 38 months 14 days, range = 36 months 17 days to 39 months 23 days) and thirty 4-year-olds (14 girls; mean age = 50 months 20 days, range = 49 months 1 day to 52 months 5 days) participated in the study. Children were from the same area and background as the children in Study 1 and were recruited from the same database. Almost all children regularly attended day care centers (93% of the 3-year-

olds and 100% of the 4-year-olds), and about half of the children in each age group had siblings. Eight additional 3-year-olds and 1 additional 4-year-old were invited but could not be tested due to shyness (3 children) or because they were not interested in the games (6 children).

#### Games and Materials

Eight different games—four main games and four competing games—were used in the study. Again, they all had several aspects in common: First, the games could be played alone, in parallel with another player, or jointly with another player. Second, they all included a synchronizing element (e.g., clapping hands or counting to three) to enable players to coordinate their actions and the start of the game's rounds, if desired. In each of the four test trials, an experimenter and the child first played one game (the main game), and then an assistant later started to play another game concurrently in another corner of the room (the competing game). The main games all included a tool that players held in their hands (e.g., a wooden block or a sponge) while playing. Children could pass this tool to the experimenter when leaving the main game. The order of the main games and their paired competing games was the same for every child (see Figure 3). Because a pilot study had revealed that some 4-year-old children were not interested in two of the games we had used in Study 1 (the Lights and Bells games), we replaced them with two new games in this study. Figure 3 depicts the toys and tools of each game.

Three stationary cameras fixed at three corners of the testing room filmed the session. In addition, a moveable camera on a

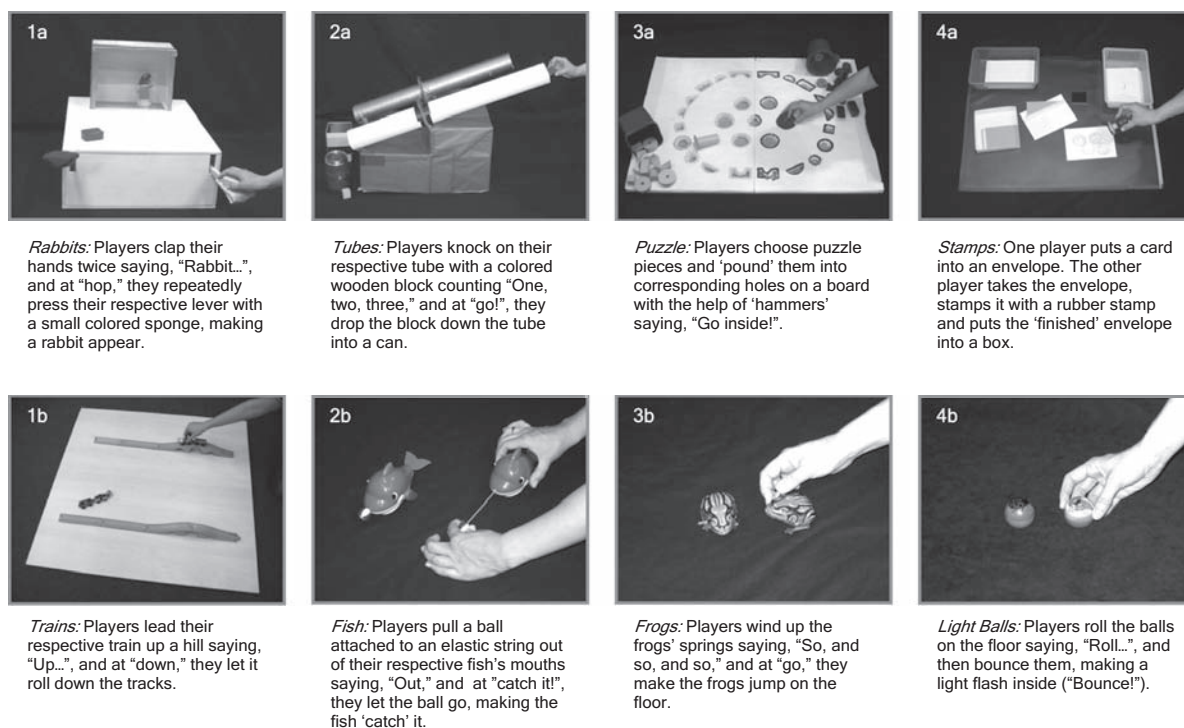


Figure 3. Study 2: The four main games, in the order (1–4) in which they were presented, with their respective tools (top row) and their paired competing games (bottom row).



tripod provided a close-up of the child and the experimenter playing on the floor.

### Procedure

Two female experimenters (hereafter called the experimenter and the assistant) carried out the test sessions. The assistant timed each phase (see below) and signaled the beginning and end by inconspicuously clearing her throat.

Children were randomly assigned to one of two conditions using a between-subjects design. Thus, 15 children in each age group were assigned to the joint commitment condition and 15 to the no joint commitment condition. Gender was approximately evenly distributed between conditions.

After a brief familiarization period with the experimenter and assistant in a playroom, parents and children were led to the testing room. During the whole test session, parents sat on a chair in a corner of the room and pretended to read a magazine.

*Warm-up phase.* The warm-up procedure was the same as in Study 1—that is, the experimenter engaged the child in a familiar game (stacking rings on a rod). After approximately 4 min, the experimenter introduced the first game.

The testing procedure was the same for each pair of games and had four phases: a demonstration phase, an initiation phase, a phase in which the experimenter and child played the main game, and a response phase in which the assistant played the competing game. Conditions differed only in how the main game was initiated (i.e., either by an agreement to act together or not); all other phases were identical for all children in both conditions.

*Demonstration phase.* As all games were novel to children, the experimenter and the assistant first demonstrated the main game together for two rounds in a corner of the room. While playing, both adults looked and smiled at each other but did not play contingently. The child sat nearby, observing the demonstration. The experimenter then told the assistant that she had to stop playing and go to the camera in another corner of the room. She handed her tool to the assistant while looking at her face and left. Then the assistant addressed the child and announced, “So, [child’s name], now you can play!” She handed one tool to the child and carried the toy over to a rug in the middle of the room (see Figure 4 for a depiction of the experimental setup). On the rug, the assistant

helped the child start playing the game if necessary and then played the game for one round only. (Note that only one 3-year-old child was reluctant to start to play one of the main games. In this case, the experimenters moved on to the next game.) Meanwhile, the experimenter approached and sat down next to the rug and observed the two players, smiling at them. The assistant then stopped playing and told the child that she had to write something down in another corner of the room and therefore could not continue to play.

*Initiation phase.* Until this moment, the procedure was the same for every child. However, the following initiation phase differed for children in the two conditions. In the joint commitment condition, before she left, the assistant encouraged the child to invite the experimenter to play the game together, “You know, [experimenter’s name] surely would also like to play. Ask her!” If the child did not dare to contact the experimenter because of shyness, the assistant encouraged the child a second and, if necessary, a third time. After the child had invited the experimenter to play the game, the experimenter agreed by saying, “You want me to play with you? Oh yes, let’s play the game together!” The experimenter and the child then negotiated who was going to play what role in the game—for example, who was going to play on which side of the toy. The experimenter again emphasized that they were now going to play this game together and started playing. If children did not dare to invite the experimenter (about 22% of all children), the experimenter herself asked them whether they wanted to play together with her after the assistant’s third request. All children approved the experimenter’s question either verbally or nonverbally (e.g., by nodding) so that the procedure could be continued as described above.

In the no joint commitment condition, instead of the assistant encouraging the child to invite the experimenter, the experimenter herself announced that she would like to play again before the assistant left: “[Assistant’s name], if you aren’t going to play anymore, then I could play instead!” The adults then negotiated which role the experimenter would play. The experimenter again emphasized that she was now going to play this game and started playing. During the whole initiation phase in this condition, the experimenter did not look at or talk to the child.

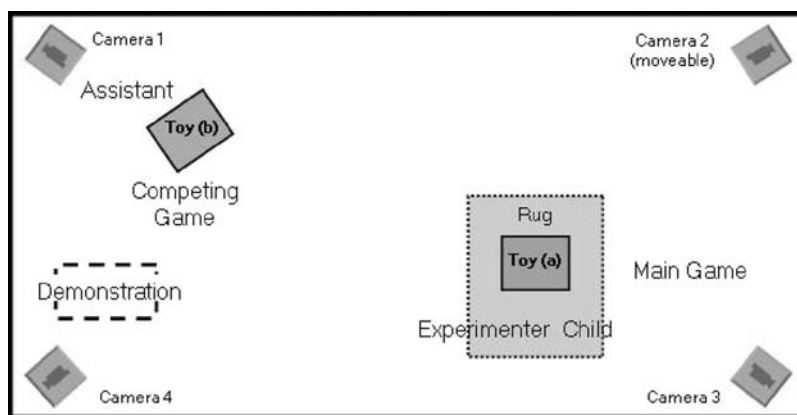


Figure 4. Study 2: Schematic depiction of the experimental set-up.

*Main game phase.* In both conditions, the experimenter then played in parallel to the child for 30 s (that is, she performed the game's synchronizing element but did not play contingently to the child). She only briefly looked up and smiled at the child from time to time. After 20 s of play, however, she briefly reminded the child of the play context that had been established at the beginning of the game. Thus, in the joint commitment condition, she looked at children and thanked them for having invited her into the fun game. In the no joint commitment condition, she looked straight ahead and announced to herself that she liked playing this fun game.

*Competing game phase.* Meanwhile, the assistant had gone over to the moveable camera. After 30 s, she went to another corner of the room where another toy was covered with a cloth (see Figure 4). She inconspicuously uncovered the toy and started to play the competing game. Because our main interest was in how children left the main games to play the new games, the competing games were designed to be highly attractive to children, to ensure that they would leave the main games. In addition, the assistant played the competing game in a way that gradually increased the likelihood that children would leave the main game to play the competing game. Thus, in both conditions, the assistant first played two turns while loudly announcing the respective synchronizing element (e.g., "up . . . and down") without looking at the child (Phase 1). During the subsequent two turns, she looked and smiled at the child while playing (Phase 2). During the next two turns, she called the child's name and asked the child to watch her before starting to play: "[Child's name], look here!" (Phase 3). If children still had not left the main game at this point, the assistant held out one of the tools in the child's direction and asked, "You too?" (Phase 4).

In both conditions, whenever the child stopped playing the main game to observe the assistant, the experimenter also stopped playing and looked and smiled at the child as if she were ready to continue to play. Whenever the child restarted playing, the experimenter also restarted. If the child left the main game to play the competing game, the experimenter stopped playing and looked inquiringly at the child. If children acknowledged their leaving to

her, she accepted the offered toy but did not react further. She remained sitting in her place for another 20 s, until the end of the trial, to see whether children looked at or came back to her, and then she got up and proposed to children that she would go and get the next game. In any case, even if children did not leave the main game, the assistant continued to play the competing game, with her play behavior being the same as the experimenter's prior behavior in the main game. (That is, she did not play contingently to the child and only briefly looked up and smiled at the child from time to time.) This was done to ensure that children did not favor the play behavior of one of the adults.

### *Coding and Analyses*

We first coded whether, during the response period, children left the main game to play the competing game. We calculated the mean percentage of main games that children left as a proportion of all main games in which they participated.

In the next step, we coded in which of the four phases of the competing game children left the main game to play this new game. For each main game that children left, they received a code between 1 and 4 corresponding to the phase in which they had left. We then calculated the mean phase in which children left the main games as a proportion of all main games in which they participated.

However, our main interest was in how children left the main game and especially whether they acknowledged their leaving to the experimenter more often when they had established a joint commitment with her. We therefore coded children's behavior when leaving the main game—that is, whether children (a) verbally or nonverbally acknowledged their leaving shortly before or while leaving, (b) acknowledged to the experimenter that they were now playing a different game only after they had already left the main game, or (c) whether they instead left and played the competing game without acknowledging their leaving to the experimenter at any time (see Table 2 for a detailed description of the coding categories). Children received one of these three possible codes for each main game they left. Again, we used a hierarchical

Table 2

*Study 2: Coding Categories for Children's Leave-Taking Behavior When Leaving the Main Games*

Category	Definition
Acknowledging the leaving to the experimenter when leaving	C gives the tool to E or puts it close to her while looking at E before or while leaving the main game (i.e., before arriving at the corner of the room with the competing game). C verbally indicates the leaving to E before or while leaving the main game (e.g., "I want to play with the trains now," or "I'm not playing with you anymore"). C socially references E before or while leaving (i.e., looks at E's face while getting up, or while going over to the competing game).
Acknowledging the leaving to the experimenter after having left	C comes back and gives the tool to E or puts it close to her while looking at E only after having left the main game (i.e., while already playing the competing game). C verbally indicates the leaving to E after having left the main game (i.e., while already playing the competing game, e.g., "Can I play here for a while?"). C leaves the main game but later returns and continues the main game within the 20 s during which E is waiting at the main game. C looks back at E's face within the 20 s during which E is waiting at the main game.
No acknowledging	C does not communicate or look at E's face while leaving or within the 20 s during which E is waiting at the main game, and does not return to the main game.

*Note.* Children received one code for each main game they left to play the competing game. C = child; E = experimenter.

coding system. Thus, if children acknowledged their leaving to the experimenter before or while leaving a main game, this category was coded; if they acknowledged their leaving only after they had left, this was coded; and if there was no acknowledgement of any kind, that was coded. The mean percentage of main games in which children showed each type of leave-taking behavior as a proportion of all main games that children left was then used for analyses.

The experimenter coded children's behavior from videotape. A second coder, who was naive to the hypotheses of the study and blind to condition, coded the behavior of a randomly selected 25% of children (8 children per age group). Interrater agreement was excellent, with the percentage of agreement ranging from 86% to 98% for the different coding categories (Cohen's kappas: .78 to .95, respectively). All  $p$  values reported below are two-tailed.

### Results

Preliminary analyses revealed, first, that children's behavior during the initiation phase of the main game (i.e., whether children actively invited the experimenter or waited for her to invite them in the joint commitment condition) did not affect when children later left the main game or how they left it. Second, comparisons of children's behavior across the four main games revealed that children were more likely to leave the Tubes game earlier and less likely to acknowledge their leaving than in the other three main games (Friedman test),  $N = 28$ ,  $\chi^2(3) = 9.3$ ,  $p < .05$ . However, analyses in which this game was excluded revealed results similar to the analyses that included all four games. Because we were mainly interested in children's general leave-taking behavior rather than in differences between the games, we collapsed children's behavior across the four games in the subsequent analyses.

#### Frequency of Leaving the Main Game

We first analyzed how often children left the main games at all to play the competing games. A two-way ANOVA on the mean percentage of main games that children left, with age (3 and 4 years old) and condition (joint commitment vs. no joint commitment) as between-subjects variables, revealed that children left the main game equally often in both age groups and conditions (all  $p$  values  $> .50$ ). Children in the joint commitment condition left in a mean of 77% of games ( $SE = 6\%$ ), and children in the no joint commitment condition left in a mean of 81% of games ( $SE = 4\%$ ). The highly attractive competing games thus succeeded in tempting children away from the main games. Two 3-year-olds in the joint commitment condition and one 4-year-old in the no joint commitment condition never left the main game; these children were not included in the following analyses.

#### Phase in Which Children Left the Main Game

Recall that the assistant tried to entice children to leave the main game in a stepwise manner across the four phases of the competing game. Children could thus leave rather early, when the assistant was playing without looking at them (Phase 1), or only later, when the assistant explicitly invited them to play the new game (Phase 4). A two-way ANOVA on the mean phase in which children left the main game, with age and condition as between-subjects vari-

ables, revealed a main effect of age,  $F(1, 53) = 7.69$ ,  $p < .01$ , partial  $\eta^2 = .13$ . Thus, across conditions, 3-year-olds were more likely to leave earlier (mean phase = 1.9) than 4-year-olds (mean phase = 2.6). In addition, a marginal interaction of age and condition revealed that the 4-year-olds in the joint commitment condition tended to leave the main game later (mean phase = 2.8) than 3-year-olds in the joint commitment condition (mean phase = 1.7),  $F(1, 53) = 3.25$ ,  $p = .08$ , partial  $\eta^2 = .06$ . No effect of condition was found,  $F(1, 53) = .25$ ,  $p = .62$ , partial  $\eta^2 = .01$ .

#### Leave-Taking Behavior

Figure 5 depicts the mean percentage of main games that children left while showing the three different types of leave-taking behavior for each age group and condition separately.

Most children acknowledged their leaving to the experimenter at least once (69% of the 3-year-olds and 83% of the 4-year-olds), indicating that most children were sensitive to the obligation inherent in such a subtle situation. Our main interest, however, was in whether or not children acknowledged their leaving to the experimenter differently—that is, depending on whether or not they had established a joint commitment with her. We first investigated whether children acknowledged their leaving at all, collapsing across the two types of leave-taking (i.e., before or while they left the game and after they had left it). A two-way ANOVA on the mean percentage of main games in which children acknowledged their leaving, with age and condition as between-subjects variables, revealed a main effect of condition,  $F(1, 53) = 7.65$ ,  $p < .01$ , partial  $\eta^2 = .13$ . Thus, across age, children in the joint commitment condition acknowledged their leaving more often (in 50% of the games) than children in the no joint commitment condition (28%). No significant effect of age,  $F(1, 53) = .02$ ,  $p = .89$ , partial  $\eta^2 = .00$ , and no interaction were found,  $F(1, 53) = .06$ ,  $p = .81$ , partial  $\eta^2 = .00$ .

However, one might argue that acknowledging one's leaving to a former play partner while already playing another game is somewhat less appropriate than doing so before or while actually leaving her. It is therefore interesting to examine whether children's leave-taking behavior also differed when only the more conservative first category was analyzed. A separate two-way ANOVA on the mean percentage of games in which children acknowledged their leaving before or while leaving, with age and condition as between-subjects variables, also revealed a main effect of condition,  $F(1, 53) = 4.51$ ,  $p < .05$ , partial  $\eta^2 = .08$ . Thus, children in the joint commitment condition (31% of games) were indeed more likely to acknowledge their leaving before or while leaving the main game than children in the no joint commitment condition (16%). Again, no significant effect of age,  $F(1, 53) = .52$ ,  $p = .48$ , partial  $\eta^2 = .01$ , and no interaction were found,  $F(1, 53) = .84$ ,  $p = .36$ , partial  $\eta^2 = .02$ . Note that multiple testing was justified by the results of a Fisher's omnibus test,  $\chi^2(12, N = 60) = 20.61$ ,  $p = .06$  (Haccou & Meelis, 1994).

#### Discussion

When leaving a game, children as young as 3 years old acknowledged their leaving to their partner more often when they had established a joint commitment to play the game together with their partner than when they had not. This finding indicates that

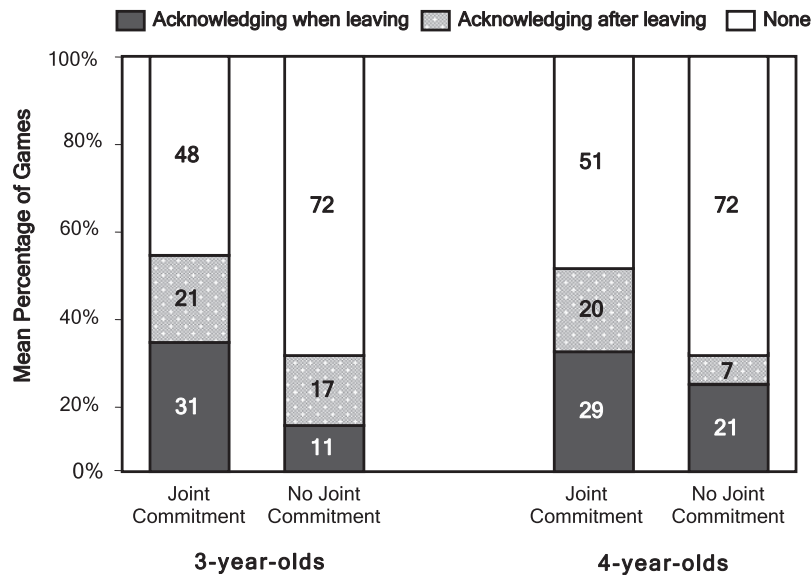


Figure 5. Study 2: Mean percentage of games in which children showed each type of leave-taking behavior as their highest response.

children from the age of 3 years on know something about the obligations that joint commitments entail.

Nevertheless, even in the joint commitment condition, children acknowledged their leaving in only about half of the games—thus, at a rather moderate rate. We believe that several aspects of the procedure might have contributed to this moderate rate. First, after the experimenter was invited to play the game together with children, she instead played in parallel with them. This might have caused children either to feel themselves less committed to the joint activity or else to doubt the adult's commitment to it. This was done to investigate whether the invitation itself, without contingent play, was enough to create a joint commitment. The results of the current study suggest that even 3-year-old children considered the invitation to the joint activity and its acceptance as enough to create joint obligations, although perhaps not sufficient by itself to do so in a fully satisfactory way, thus contributing to the moderate rate of acknowledging. They also lend support to the idea that in Study 1, the 3-year-olds differentiated between the committed versus uncommitted play context and not just between their partner's superficial joint versus parallel play behavior.

A second reason for the modest rate of leave-taking behavior found in this study might be that the experimenter did not react when children left the main game; instead, she remained in her place smiling at them. It is probable that we could have provoked more leave-taking behavior if the experimenter had reacted in a surprised or upset way to children's leaving—but then we would not have been measuring children's spontaneous leave-taking behavior. The fact that another adult, the assistant, was directly inviting children to play with her also may have made children conflicted about where their obligations lay (note that the older children in the joint commitment condition left the main game only after the assistant had called their name). For all these reasons, the leave-taking in half of the games does not seem to be such a low rate after all. Still, future research is needed to verify whether 3-

and 4-year-old children would acknowledge their leaving more often in situations that are less experimentally controlled.

In sum, by the age of 3, children in the current study spontaneously acknowledged their leaving of an activity to their partner more often when they had established a joint commitment to act together with her than when they had not, thus showing some understanding of the obligations that joint commitments entail. The findings further suggest that these young children already understood that inviting another person to act together creates a joint commitment to a joint activity, whereas merely acting similarly on the same object does not.

### General Discussion

In the two studies reported above, we applied two different approaches to assess whether young children understand that joint activities entail joint commitments. In the first study, when an adult partner unexpectedly interrupted a play situation with the child, 3-year-olds tried to re-engage her back into their game or waited for her to restart playing more often when they had established a joint commitment to play together and played on their own more often when they had not. In the second study, 3- and 4-year-old children acknowledged their leaving to their partner more often when they had established a joint commitment to play together than when they had not. Children thus showed an emerging understanding of the obligations inherent in joint commitments to act jointly.

The 2-year-olds in Study 1 behaved similarly in both play contexts, reacting to the interruption at a level as high as that of the 3-year-olds in the joint commitment condition but, unlike the 3-year-olds, irrespective of the experimenter's previous behavior. They thus reacted more socially than expected. It is possible that in the no joint commitment condition the younger children understood the experimenter as not being committed to playing with

them but were so motivated to play together with a partner that they actively attempted to create such a joint activity where none existed before. On the other hand, perhaps the younger children did not understand the role of joint commitment within the current games but instead came into the study with a previously acquired script that adults playing next to them are supposed to play together with them and to continue what they had been doing. They thus might have tried to re-engage the experimenter because they considered her to have violated this general script.<sup>1</sup> If these children did not understand that the experimenter was not committed to play with them in the no joint commitment condition, this would be in line with the findings of Mant and Perner (1988). They reported that even older children had more difficulty recognizing situations in which the main characters were not committed to an activity than recognizing situations in which they were committed. A similar effect may have occurred in the 2-year-old children in the current study. They may have had difficulty recognizing the role of an explicit agreement to act together and may therefore have had difficulty recognizing situations in which such agreements were absent. Future research is thus clearly needed into what 2-year-old children understand about joint commitments and what cues may support children's differentiation between these different situations.

What level of understanding of joint activities and commitments did the behavior of the older children in this study entail? A possible lower level explanation is that the 3-year-olds in Study 1 were simply differentiating between socially engaged activity and noncoordinated parallel activity. As outlined above, however, we think this explanation is unlikely. Previous research has shown that even 1-year-olds are sensitive to whether a partner acts contingently to them and prefer contingent to noncontingent partners (e.g., Agnetta & Rochat, 2004; Asendorpf et al., 1996). In the current study, even the 2-year-old children were thus certainly able to differentiate between the partner's play behaviors, yet they did not adapt their behavior appropriately. Being sensitive to the superficial contingency of their partner's behavior also does not seem sufficient to explain the 3-year-olds' specific responses to their partner's unexpected interruption.

Thus, our preferred higher level explanation would be that 3-year-olds already have a more sophisticated understanding of joint activity, one that includes the obligations involved. Perhaps in contrast to younger children, they recognize that an invitation to play together engenders a commitment that obliges one to continue (or to excuse oneself), and that one should not simply, for no good reason, stop engaging in the joint activity. Strong support for this explanation comes from Study 2, in which children as young as 3 years old actively acknowledged their own leaving of an activity to their partner more often when they had established a joint commitment to act together with her than when they had not. They presumably would have made this effort only if they understood at least some of the obligations that joint commitments entail.

In addition, it is important that research from other areas supports the general proposal that 3-year-olds but not 2-year-olds are capable of engaging with others in rule-governed social interactions. For example, research on children's rule following has shown that 3-year-olds are able to correctly judge when permission rules are broken (Harris & Nunez, 1996) and that they distinguish between the transgression of moral and conventional rules, something 2-year-old children do not do (Smetana & Braeges, 1990).

Furthermore, Kalish, Weissman, and Bernstein (2000) found that 3-year-olds were able to understand the behavioral consequences of an arbitrary rule that players had agreed upon (i.e., arbitrarily designating a "winner" color to marbles) and were even able to follow a change of this stipulated rule (i.e., changing the "winner" color); 2-year-olds were not tested in this study. Finally, as noted above, Rakoczy and colleagues (Rakoczy, 2008; Rakoczy et al., 2008) found that 3-year-olds reacted when a third party (a puppet) intentionally violated the rules of a game and even instructed the puppet how to play properly. The reactions of the 2-year-olds were less explicit and therefore less clear.<sup>2</sup>

Taken together, there is growing evidence that by the end of the second year of life, children are both motivated and able, at least to some extent, to act together with a peer or adult in a variety of contexts (e.g., Brownell et al., 2006; Eckerman & Peterman, 2001; Warneken et al., 2006). However, until the age of 3, children seem to misconstrue some types of individual activity, such as parallel play, as genuine joint activity. Children seem to develop an understanding of the obligations inherent in joint activities during the third year. This emerging understanding may then support children's engagement and understanding of various types of joint activities. Previous research investigating how young children establish and sustain sociodramatic play with peers, for example, has shown that from the age of 3 onward, children begin to negotiate the content of their envisaged game before starting to play, and later even step out of the actual play activity in order to redirect each others' actions and to re-establish the arranged game (e.g., Baker-Senett, Matusov, & Rogoff, 1992; Lloyd & Goodwin, 1995; Verba, 1993). After their third birthday, children also begin to use verbal polite forms when conversing with others, suggesting that they have acquired some rudimentary understanding of how partners ought to address each other in particular communicative contexts (Bates & Silvern, 1977; Nippold, Leonard, & Anastopoulos, 1982; Snow, Perlmann, Gleason, & Hoo-shyar, 1990). Children thus seem to become aware of some of the rules underlying sociodramatic play and communicative interactions after their third year of life. The emerging understanding of the obligations inherent in joint activities may thus enable children to participate more fully in cultural practices in which they both adhere to and enforce culturally important commitments, entitlements, and obligations. More research is needed into what further behavioral changes this understanding induces in children's social interactions.

The current studies thus provide evidence that already at a very young age, children not only act jointly with others in pursuit of an instrumental goal (e.g., Brownell et al., 2006; Warneken et al., 2006), but also seem to be highly motivated to engage in joint

<sup>1</sup> We thank Deborah Tollefsen and Charles Kalish (personal communications) for raising this possibility (see also Verba, 1994, for a similar explanation of episodes of young children's peer collaboration).

<sup>2</sup> Note that in our study, we did not observe children actively protesting against the experimenter's interruption of the game as in Rakoczy and colleagues' studies (Rakoczy, 2008; Rakoczy, et al., 2008). However, in a pilot study Rakoczy and colleagues found that when interacting with an adult experimenter, children did not dare to protest against the violation in the same way they did when interacting with a puppet, which children might consider to be on a similar social level as them. A similar effect might have occurred in the present study.

activities just for the sake of acting together with another person. This motivation to share intentions with other individuals, with no other immediate benefit than the enjoyment of acting jointly, seems to be uniquely human (Tomasello, Carpenter, Call, Behne, & Moll, 2005; see also Warneken et al., 2006, Study 2). In addition, the 3-year-olds' behavior in the current studies suggests a relatively early emerging understanding of joint commitments in joint activities and the obligations inherent in social activities with others.

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