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# Eighteen-Month-Old Infants Correct Non-Conforming Actions by Others

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At around their third birthday, children begin to enforce social norms on others impersonally, often using generic normative language, but little is known about the developmental building blocks of this abstract norm understanding. Here, we investigate whether even toddlers show signs of enforcing on others interpersonally how "we" do things. In an initial dyad, 18-month-old infants learnt a simple game-like action from an adult. In two experiments, the adult either engaged infants in a normative interactive activity (stressing that this is the way "we" do it) or, as a non-normative control, marked the same action as idiosyncratic, based on individual preference. In a test dyad, infants had the opportunity to spontaneously intervene when a puppet partner performed an alternative action. Infants intervened, corrected, and directed the puppet more in the normative than in the non-normative conditions. These findings suggest that, during the second year of life, infants develop second-personal normative expectations about their partner's behavior ("You should do X!") in social interactions, thus making an important step toward

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understanding the normative structure of human cultural activities. These simple normative expectations will later be scaled up to group-minded and abstract social norms.

Young children socially learn things from adults not just to facilitate their instrumental activities, but often to meet adults' expectations about how they ought to behave. In many cases, these expected ways of doing things represent group-minded social norms of how "we" in the cultural group behave (Kalish, 2005; Killen & Smetana, 2014; Rakoczy & Schmidt, 2013; Schmidt & Tomasello, 2012). By 3 years of age, children are themselves enforcing social norms on others as unaffected bystanders, often using normative language to do so (e.g., "One must do it like this").

It is unclear how young children come to this impersonal understanding of the group's normative expectations (a cultural form of "we"), but, plausibly, it is grounded in the concrete expectations that individuals have of one another, perhaps especially in situations where they are acting together (an interpersonal form of "we" consisting of "you" and "me") and so are dependent on one another for instrumental success. And during the second year of life, infants participate in social interactions in which they use their skills and motivation to share intentional states with others (Tomasello, Carpenter, Call, Behne, & Moll, 2005), providing a rich context for infants' developing understanding of how "we" do things.

In the current study, therefore, we investigate whether 18-month-old infants have an understanding of this much simpler, yet important, form of normativity (what we dub *second-personal normativity*), namely of how "we" (a dyad of "you" and "me") ought to do something in the here and now.

### Force coming from the collective "we": Impersonal normativity (social norms)

Social norms are the "glue" of human societies and the basis for the long-term stability of human cooperation (Elster, 1989; Fehr & Fischbacher, 2004). The two key features of social norms and normativity more generally are *normative force* (i.e., an agent should do X) and *generalizability* (or agent independence, i.e., any agent in similar circumstances should do X; Nagel, 1986; Rakoczy & Schmidt, 2013; Schmidt & Tomasello, 2012). Most of the time, young children follow social norms. From this first-person alignment of behavior, however, it is hard to deduce what exactly children understand about norms; in particular, whether they have any grasp of the force and generalizability of norms. Therefore, in the past decade, researchers have focused on a method in which children are given the opportunity to spontaneously intervene, protest, and correct individuals who do not follow a particular norm. Importantly, children were unaffected bystanders who did not immediately profit from correcting others. Thus, such third-party interventions provide evidence that children understand the action in question as subject to a general norm that applies not only to the self, but also to any relevant agent (Nagel, 1986).

A host of different studies using this interactive protest method has found that from around 2–3 years of age, children will actively correct others who do not conform to social norms (e.g., Rakoczy, Warneken, & Tomasello, 2008). What is important for the current study is that previous research suggests that there may be some qualitative changes in young children's thinking about norms: First, during the third year of life, children develop a more impersonal understanding of norms as abstract

and collective expectations about "our" conduct, which is reflected in 3-year-olds' use of (generic) normative language (e.g., "This is not how one does it!") when correcting others (Köymen, Schmidt, Rost, Lieven, & Tomasello, 2015; Rakoczy et al., 2008), and in their enhanced normative (and descriptive) expectations toward ingroup members (Liberman, Howard, Vasquez, & Woodward, 2018; Schmidt, Rakoczy, & Tomasello, 2012). Younger children, however, mostly use imperatives and not normative language which suggests that they are yet to develop this impersonal understanding of norms (Rakoczy et al., 2008). Second, between 2 and 3 years of age, children become less egocentric and begin understanding that norms are valid in agent-independent ways (Hardecker, Schmidt, Roden, & Tomasello, 2016; Rossano, Rakoczy, & Tomasello, 2011; Smetana, Ball, Jambon, & Yoo, 2018). Thus, they enforce norms regardless of whether they are affected by a norm violation or not and apply them more impartially.

Third, and most tellingly, 3-year-old children develop a promiscuous tendency to see single intentional acts as generalizable and binding for anyone, that is, they attribute normativity to intentional actions even when there is no evidence (e.g., no normative language or teaching by adults)—except for the intentionality of the act—that the performed action is subject to any norm (Schmidt, Butler, Heinz, & Tomasello, 2016; Schmidt, Rakoczy, & Tomasello, 2011; see also Roberts, Ho, & Gelman, 2017). Again, younger children do not seem to have such a proclivity to quickly infer the generic, normative, or collective way of doing something and may need more scaffolding or verbal instruction to infer normativity, perhaps particularly when there are alternative ways of doing something as in conventional norms (Hardecker & Tomasello, 2017). Converging evidence for this developmental shift during the third year of life toward inferring cultural knowledge (e.g., about artifacts) comes from research on children's inductive inferences: Three-year-olds, but not younger children, do not need explicit verbal cues (e.g., novel labels) to make generic inferences about novel objects (Butler & Tomasello, 2016; but see Träuble & Bätz, 2014; Träuble & Pauen, 2007, 2011, for findings suggesting that even 12-month-olds learn simple cultural knowledge about artifacts without verbal cues).

### Force coming from the dyadic "we": Second-personal (interpersonal) normativity

The research reviewed above suggests that young children develop an understanding of social norms (impersonal normativity) during the third year of life. It is an open question whether and how this developmental achievement capitalizes on the development of a simpler, interpersonal form of normativity—of how "we" ("you" and "me") do something—during the second year of life. We suggest that human norm–psychology develops through social (in particular, triadic) interactions in which infants gradually learn to refer jointly and interpersonally to some state of affairs both using and developing their skills and motivation for shared intentionality (Carpendale & Lewis, 2004; Rossano, 2012; Tomasello et al., 2005). Around 9–12 months of age, infants begin to jointly attend to objects and events with others, thereby sharing attention to, and emotions about, some third entity (Carpenter & Liebal, 2011). During the second year of life, then, toddlers begin to form joint goals and intentions in collaborative and playful (e.g., pretend) activities with others (Rakoczy, 2008; Warneken, Chen, & Tomasello, 2006). Importantly, this allows the young learner to actively join in social activities and to understand them not as individualistic behaviors, but as joint actions in which

"we" both are committed toward achieving some goal (by fulfilling our individual roles or by performing the same or complementary actions), and thus, toddlers may implicitly understand something important: that "we" intend to do something together in obligate ways, thereby accepting force coming from "us" (Darwall, 2006; Tomasello, 2016; Tomasello, Melis, Tennie, Wyman, & Herrmann, 2012). And this, we argue, is the cradle of the earliest forms of normative expectations that are concrete, second-personal, bound to a specific joint intentional activity, and generalizable from one partner to another partner: "I" expect "you" to act in ways that "we" together have intended.[1] From a developmental perspective, second-personal normative expectations about another's behavior arising in joint intentional activities would be an important step toward, but not amount to, an understanding of social norms proper as abstract and impersonal group-wide standards that apply to any agent alike (e.g., "One [in general] should do X in context C"; Rakoczy & Schmidt, 2013; Schmidt & Rakoczy, 2019; Schmidt & Tomasello, 2012).

In early triadic interactions, infants not only develop an understanding of normativity, but of language, too (Tomasello, 2003; Tomasello, Mannle, & Kruger, 1986)—which is itself a normative construct (Brandom, 1994). Adults' use of both normative (e.g., deontic terms, such as "wrong," "must") and non-normative language in everyday interactions is important for infants' developing understanding of normativity given that any language use is subject, and often points, to norms and thus helps infants to learn about (different types of) norms and share meaning with others (Dahl, 2016; Dahl & Tran, 2016; Nelson, 2007; Rakoczy & Tomasello, 2009; Smetana & Braeges, 1990; Smetana et al., 2018). More generally, the interrelation between language development, shared intentionality, and normativity is reciprocal (Lamm, 2014; Rakoczy, 2010). Hence, we expect abilities for normativity to be interrelated with early linguistic capacities.

As explained above, the two key main features of normativity are normative force and generalizability. Regarding the latter, much research suggests that during the first 2 years of life, infants develop *descriptive expectations* about agents' social behavior (e.g., expecting equal resource allocation or behavior in line with social relationships; Geraci & Surian, 2011; Meristo, Strid, & Surian, 2016; Powell & Spelke, 2013; Rhodes, Hetherington, Brink, & Wellman, 2015; Schmidt & Sommerville, 2011) and about the *generalizability* (to other agents or objects) of conventional forms, such as object labels and functions (Buresh & Woodward, 2007; Diesendruck & Markson, 2011; Elsner & Pauen, 2007; Graham, Stock, & Henderson, 2006; Henderson & Scott, 2015; Henderson & Woodward, 2012). Thus, we predict that 18-month-olds may learn a novel action in a joint intentional activity with a first partner and generalize this action to a second dyad with another partner.

## The present study

In the current study, therefore, we used the interactive method of spontaneous intervention and protest to systematically assess whether 18-month-old infants would form

[1]These early normative expectations might be the basis for the development of understanding conventional norms. But they might also be the basis for many moral norms, in particular, when coupled with empathic concern (Jensen, Vaish, & Schmidt, 2014; Schmidt & Sommerville, 2011), an aversion to harm (Nichols, 2004), or a sense of self-other equivalence (Tomasello, 2016).

second-personal normative expectations (e.g., "You should do X!") in an interactive context (a joint intentional triadic activity). In two experiments, infants had the opportunity to spontaneously intervene when a puppet's (a partner in a test dyad) actions did not conform to what infants had learnt from and with an adult (a partner in an initial dyad) in a joint intentional triadic activity (i.e., performing simple, game-like actions).

Based on our theoretical proposal of early second-personal normative expectations arising in interactive contexts (joint intentional activities) and being generalizable from one partner to another partner, we predicted that in both experiments, infants would be more likely to intervene and correct the puppet in the test dyad in the interactive normative game contexts than in the non-normative contexts involving individual intentionality. Given the hypothesized bidirectional relation between normativity and language, we asked parents to fill in a questionnaire rating their infant's (normative and general) language comprehension. We predicted that infants' tendency to correct deviating behavior in the joint intentionality contexts would be positively related to their parent-rated language (in particular, normative language) comprehension.

## EXPERIMENT 1

In Experiment 1, we sought to provide a first experimental investigation of second-personal normative expectations in infants arising in interactive contexts. We had infants participate in a rich context that indicated that the modeled action would indeed be generalizable and normative versus non-generalizable and idiosyncratic, similar to strategies used in prior research with young children (Rakoczy et al., 2008; Schmidt et al., 2011). Thus, before performing a game-like act with some artifacts, the adult used both linguistic and social–pragmatic cues marking the upcoming action either (1) as if it were a generalizable game action, a joint intentional triadic activity (*game context*), or (2) as if it were a specific, idiosyncratic action based on individual intentionality, an ad hoc invention (*discovery context*).

### Method

#### *Participants*

Sixty 18-month-olds (range = 18 months ± 2 weeks) with mixed socioeconomic backgrounds participated, recruited from a database of parents who had volunteered to take part in developmental studies. All infants were native German learners. Each condition comprised 30 infants (15 girls and 15 boys), each with a mean age of 18 months (17 months, 29 days, for both conditions). Eight additional infants were tested but excluded from the final sample due to fussiness (3), experimenter error (1), or parental interference (4). The two experiments of this study were conducted according to guidelines outlined in the Declaration of Helsinki, with written informed consent obtained from a parent or guardian for each child before any data collection took place. All procedures involving human subjects in this study were approved by the internal ethics committee at the Max Planck Institute for Evolutionary Anthropology.

### *Design*

In a between-participants design, half of the infants participated in the game context, the other half in the discovery context. Infants were randomly assigned to one of the two conditions. All infants first received two warm-up tasks (fixed order) followed by four target tasks (order systematically varied).

### *Materials*

A puppet, a paperboard box to hold the materials, a softball and two instrumental tasks (warm-up session), and four target tasks were used to conduct the experiment.

### *Procedure*

During the experiment, parents sat in a chair to the rear right of the infant, or, if infants expressed distress, they sat on their parent's lap. Parents were instructed to remain silent and not to direct their infant's attention in any way. The experimenter leading the session (E1), the puppet (operated by E2), and the infant sat together at a table (see Figure 1, for a schematic of the experimental setup).

*Warm-up session.* E1, the infant, and the puppet played together with a ball. Then, in two instrumental tasks, E1 performed an action (e.g., pushing balls through holes of a cuboid or putting a disk onto a peg) which the infant could reproduce.

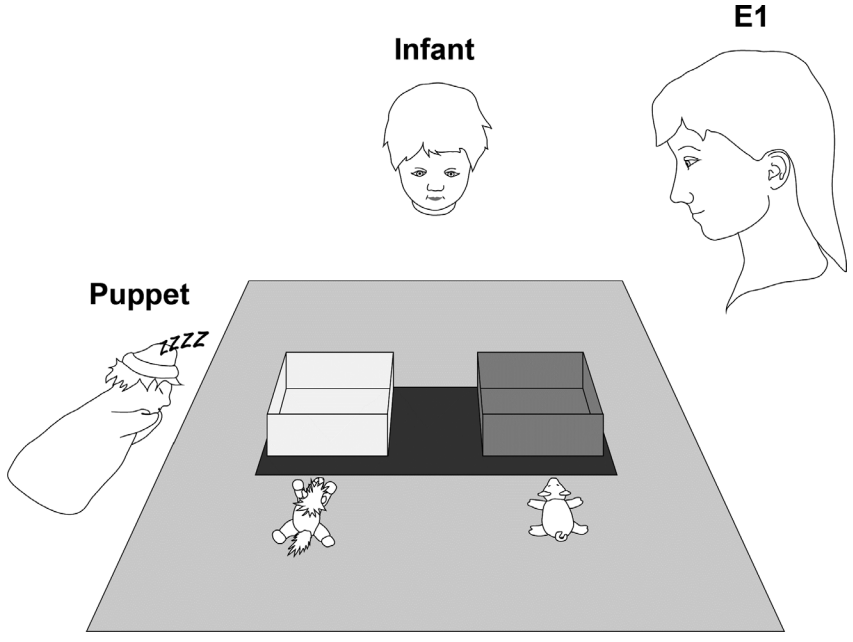


**Figure 1** Schematic of the experimental setup in both experiments, here, with materials from Experiment 2.

TABLE 1
Experiment 1: Phases of the Target Tasks for Each Condition

| | *Condition* | |
|---|---|---|
| *Phase* | *Game context* | *Discovery context* |
| Introductory | E1 shows infant a box with her games, "Look, my games are in here." | E1 incidentally finds an unknown box in the room, "Huh, what kind of box is that over there? I'm going to bring it here." |
| Model | E1 puts objects on the table ("Look what I have here!") and marks the upcoming act with ostensive cues and as if it were a generic act, an existing game, "[Infant's name], look, this game is called X-ing, this is X-ing. I'm going to show you how X-ing goes. Look, this is how X-ing goes." | E1 looks into the box, gets out three objects successively, shrugs her shoulders, and wonders about each object and pretends to be ignorant. E1 marks the upcoming act with ostensive cues and as if it were an ad hoc invention, "Huh, hmm, what's that? Look, what's that?" E1 looks at the infant "Well, [infant's name]." E1 shrugs her shoulders and says to the infant "Hmm, I don't know that. What's that?" |
| | E1 performs the action $A_1$ with confidence without any utterances. | |
| Action | E1 prompts the infant to act on the objects, "Now you can have this." Thereafter, E1 puts the objects ready for the puppet, "Now Max has this, look!," and turns away from the table. | |
| Test | Puppet (E2) looks curiously at the objects, "Oh, I'm going to do something!," and performs the action $A_2$, and hums along, for approximately 20 sec. | |

*Notes.* $A_1$ = first action performed by E1; $A_2$ = second (alternative) action performed by the puppet (E2); X-ing = name of the target task (see Table 2).
Before the introductory phase, the puppet went to sleep, and came back before the test phase of the first trial began. Thereafter, the puppet always went to sleep before the model phase of the next trial (and always came back before the test phase).

*Target tasks.* Table 1 provides a detailed overview of the procedure. Each target task consisted of three phases (model, action, and test), and an introductory phase preceded the first trial only. Table 2 provides an overview of the four different target tasks. Each infant was presented all four target tasks. In the model and action phases of each task, the initial dyad was E1 and the infant (the puppet was absent), and E1 modeled an action the infant could reproduce. In the test phase dyad, infants were paired with a puppet that performed an alternative action while E1 was turned away from the table. In one target task ("Daxing"; see Table 2), for instance, E1 put a yellow block onto a board and used a green block to push the yellow block across the board into a gutter. The puppet's alternative action was to put the yellow block onto the board, but instead of using the green block, the puppet lifted the board so that the block slid into the gutter.

*Questionnaire.* Before the experiment, parents were asked to fill out a questionnaire rating their infant's language comprehension ("Do you think your infant understands the following words/phrases?") on a 5-point Likert scale (with "Certainly not!" as 0, and "Yes, for sure!" as 4). The questionnaire contained 16 normative items ("right," "wrong," "good," "bad," "mean," "This is how it is done!," "This is not how it is done," "You may not do that," "No!," "Where does this belong?," "Not like this!," "This is how we do it!," "This is how one does it!," the German word "Doch!,"

TABLE 2
Experiment 1: Overview of the Target Tasks

| *Target task* | *Material* | *Actions* |
|---|---|---|
| "Daxing" | Styrofoam board with gutter at one side, yellow and green building block | $A_1$: Put the yellow block on the board, use the green block to push the yellow block across the board into the gutter.<br>$A_2$: Put the yellow block on board, lift the board so that the block slides into the gutter.<br>Object not used in $A_2$: green block |
| "Lafting" | Wooden goal-like object ("goal"), T-shaped green object ("bat"), Styrofoam cuboid covered by white plastic foil | $A_1$: Put the cuboid in front of the goal, use the bat to push it slowly through the goal.<br>$A_2$: Slide the cuboid slowly past the goal (from left to right; infant's view), then slide it past the goal to the right (away from the infant).<br>Object not used in $A_2$: bat |
| "Schacking" | Cylindrical plastic case with two cohered pink cords, two wooden rings | $A_1$: Put the two rings into the plastic case, take the cord and pull it up, so the case is lifted and turned around and the rings fall out.<br>$A_2$: Slide one ring to the right (infant's view), cover it with the plastic case, and smoothly slide the case (with the ring underneath) back and forth (right, left, right).<br>Object not used in $A_2$: one ring |
| "Toffing" | Little can, bucket with a triangular paperboard basement, black puck-like object ("puck") | $A_1$: Put the puck onto the bottom of the (upside-down positioned) can, and then put both objects into the bucket.<br>$A_2$: Use the can to push the puck across the table, and then put the can onto the triangular basement of the bucket.<br>Object not used in $A_2$: puck (after being pushed across the table) |

*Note*. In each target task, the puppet ignored an object during the action $A_2$ which was actively used by E1 during the action $A_1$. The purpose for this was to allow for spontaneous interventions in response to the puppet ignoring an object that "belongs" to the game-like action.

"This has to go there!," and "You did a good job!") and 13 non-normative items[2] ("share," "allocate," "help," "Can you give me?," "Can you bring me?," "Come here," "I don't know," "Do you know that?," "That's yours!," "That's mine!," "Shall I help you?") including two foreign words, "fair" and "unfair," expected to be rated very low and not considered in the analyses.

[2]Note that the normative/non-normative distinction here is not the only way to categorize the items and that our non-normative items certainly do not represent the full range of non-normative language. Our focus was on clear cases of normative vocabulary and on verbal constructions that signal appropriate behavior and prohibitions (e.g., deontic language, constructions, such as "to belong to," that signal normativity, and "No!" which is often found in normative contexts; Dahl & Tran, 2016). Some items, such as "allocate" or "That's yours!" could be considered normative, but either lack normative language or may refer to non-normative concepts, such as possession (rather than property; Rossano et al., 2011).

### Coding and dependent measures

All sessions were videotaped and coded by a single observer. A second independent observer coded a random sample of 20% of all sessions for reliability.

*Test phase.* For the test phase of each target task, all relevant verbal and behavioral responses were described and assigned to the main coding category *communicative intervention*, which included verbal protest (i.e., simple imperative-like phrases performed in an asking manner, such as "In there!"), suggesting and assisting behavioral interventions (with or without attention-getting adverbs such as "There!")—such as giving, offering, or pointing to game-relevant objects—performed for the benefit of the puppet (e.g., indicated by looks to the puppet or by putting objects close to the puppet), and head-shaking (as a conventional gesture for "no"; Fenson et al., 1994). Further behaviors and utterances not considered in the analyses were ambiguous and irrelevant behaviors (e.g., mere grasping for objects, offering objects to the parent or to E1, throwing objects on the floor). For each trial, communicative intervention was coded dichotomously (1 or 0) based on whether infants performed one of the target behaviors at least once. Overall, the proportion of communicative interventions was computed for each infant by summing up the dichotomous scores of each trial and dividing the resulting sum by the total number of trials. Reliability was very good: Cohen's $\kappa = .95$.

*Action phase.* For each trial, infants' imitation of E1's action $A_1$ was given one of the following mutually exclusive (and jointly exhaustive) codes: (1) *full imitation* (complete reproduction of $A_1$), (2) *partial imitation* (reproduction of at least one sub-action of $A_1$), or (3) *no imitation* (no reproduction of $A_1$). Reliability was very good: Cohen's $\kappa = .85$. Overall, proportions of *imitation* (based on a dichotomous score for full or partial imitation per trial) and *full imitation* were computed for each infant by summing up dichotomous scores of each trial and dividing the resulting sum by the total number of trials.

### Statistical analysis

As the data partly deviated clearly from the assumptions of an independent samples *t*-test or a Mann–Whitney *U*-test (i.e., regarding homogeneity of variances; Ruxton, 2006), we used Welch's unequal variance *t*-test with adjusted degrees of freedom for comparisons of independent samples. All statistical tests were run two-tailed. Nine parents (game context: 3; discovery context: 6) completed <15% of the questionnaire and were not included in the analyses. Questionnaire data from 51 parents were included (range of completion: 86–100%). For each infant, a continuous mean score (summed scale of normative items divided by the number of rated normative items; 0–4) of rated normative language comprehension was computed. Analogously, a mean score (0–4) of rated non-normative language comprehension was computed (based on the non-normative items excluding the two foreign words rated very low: $M = 0.56$, $SD = 0.78$; $M = 0.53$, $SD = 0.64$).

## Results

### *Communicative intervention and imitation*

As displayed in Figure 2, infants performed significantly more communicative interventions in the game context ($M$ = .22, $SD$ = .26) than in the discovery context ($M$ = .08, $SD$ = .18), $t(51.21) = 2.31$, $p$ = .02, Cohen's $d$ = 0.60. Moreover, infants performed significantly more imitation (partial or full) in the game context ($M$ = .93, $SD$ = .13) than in the discovery context ($M$ = .75, $SD$ = .25), $t(44.80) = 3.43$, $p$ = .001, $d$ = 0.88. Infants' full imitations were at equal magnitudes in the game context ($M$ = .12, $SD$ = .19) and the discovery context ($M$ = .08, $SD$ = .14), $t(52.10) = 0.77$, $p$ = .45, $d$ = .20.

### *Relation of (normative) language comprehension and intervention*

Overall, parents tended to be rather certain (mean score range: 0–4) that their infant understood the language items in both the game context (normative language: $M$ = 2.83, $SD$ = 0.47; non-normative language: $M$ = 2.87, $SD$ = 0.38) and the discovery context (normative language: $M$ = 2.70, $SD$ = 0.54; non-normative language: $M$ = 2.73, $SD$ = 0.62). In the game context, infants' mean proportion of communicative interventions in the test phase and the mean score (0–4) of parents' ratings of their infant's normative language comprehension showed a significant positive partial correlation controlling for parent-rated non-normative language comprehension (0–4), $r_s$ = .45, $n$ = 27, $p$ = .01. That is, the higher the infants were rated on normative language comprehension, the more they intervened in the test phase. There was no relation between infants' non-normative language comprehension and their communicative interventions, $r_s$ = .07, $n$ = 27, $p$ = .74. In the discovery context, there were no obvious correlations of infants' rated normative or non-normative language comprehension and their interventions, $r_s = -.16$, $n$ = 24, $p$ = .45 (partial correlation controlling for non-normative language comprehension); $r_s$ = .09, $n$ = 24, $p$ = .69 (simple correlation, normative language); $r_s$ = .25, $n$ = 24, $p$ = .24 (simple correlation, non-normative language).

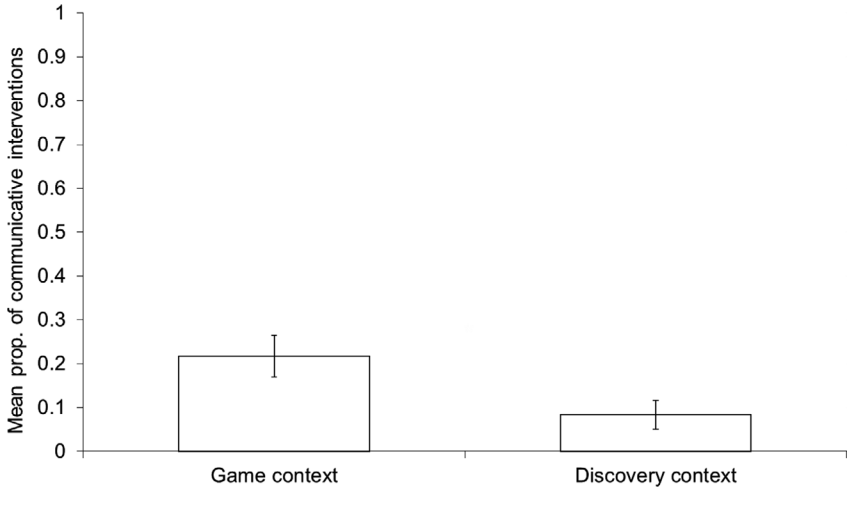


**Figure 2** Mean proportion of communicative interventions (out of four trials) in the test phase dyad for each condition (Experiment 1). Error bars indicate standard errors of the mean.

### Discussion

In this first experiment, we found that 18-month-old infants generalized novel, in part arbitrary, game-like actions from an initial dyad (with an adult) to a second dyad (with a puppet), thus performing more unsolicited communicative interventions against the puppet's deviating action when the adult model had marked the upcoming act as if it were a well-known generic and normative act (an existing game in a joint intentional triadic activity) than when the adult had marked the upcoming act as if it were a spontaneous idiosyncratic act based on individual intentionality and thus not generalizable or normative. Moreover, infants showed equal rates of full imitation and high rates of overall imitation in both conditions, which suggests that they did not regard the model's actions as simply non-intentional or less attractive in the discovery context. Crucially, however, they performed significantly more communicative interventions and more overall imitation in the game context than in the discovery context.

Moreover, as predicted, infants' tendency to intervene and their parent-rated normative language comprehension (controlling for non-normative language) were positively associated in the game context only. Thus, these results fit in with theoretical views that stress the dialectical relationship between language development and normativity (Lamm, 2014; Rakoczy, 2010), potentially based on shared intentionality as a social–cognitive and motivational prerequisite for both young children's early norm–psychology and their language learning (Schmidt & Rakoczy, 2019; Schmidt & Tomasello, 2012; Tomasello, 2008). Overall, these findings provide first evidence for second-personal normative expectations arising in joint intentional activities.

Notwithstanding the above, this first experiment has limitations. First, although infants' differential intervention pattern in the two conditions and the positive association between communicative interventions and language comprehension suggest that infants formed second-personal normative expectations about the puppet's behavior in the test dyad, it is also possible that they merely formed descriptive expectations about what the puppet *will* do and therefore assisted and helped the puppet to perform the action modeled by the adult (although the puppet had a different goal, it did not give any cues of needing help or of performing the canonical action, e.g., "Daxing"). Infants might have helped the puppet more in the game than in the discovery context, because the adult appeared knowledgeable in the game context only. The positive association between infants' communicative interventions and their language comprehension seems to speak against this possibility. Nevertheless, a situation in which infants have the opportunity to correct and undo the puppet's action (rather than merely assisting the puppet achieving a putative goal) would provide much stronger evidence for second-personal normative expectations beyond descriptive expectations. Therefore, we conducted a second experiment that was designed to allow for an interpretation of infants' spontaneous interventions as based on second-personal normative expectations.

## EXPERIMENT 2

In this experiment, we sought to test more directly for second-personal normative expectations by giving infants the opportunity not only to intervene generally, but also to actively correct and undo their new partner's behavior in the second dyad, which would provide strong evidence for (second-personal) normative expectations (e.g.,

"You should do X!"). In an initial dyad, an adult was either (1) showing the infant a simple action that ought to be performed in one particular way (*normative game*) indicating that we (the adult and infant) do X in this joint intentional activity, or (2) showing the same action, but stressed that it can be performed in alternative ways and that she individually preferred one way (*non-normative game*) indicating an idiosyncratic preference based on individual intentionality. We hypothesized that infants would perform more communicative interventions when their partner in a second test dyad, a puppet, performed an alternative action when the adult had engaged the infant in a joint intentional activity with normative constraints than when the adult had performed the action indicating an individual preference based on individual intentionality without normative constraints.

## Method

### *Participants*

Sixty 18-month-olds (range = 18 months ± 2 weeks) with the same characteristics as in Experiment 1 participated. Each condition comprised 30 infants (15 girls and 15 boys), each with a mean age of approximately 18.5 months (18 months, 13 days; 18 months, 15 days). Seventeen additional infants were tested but excluded from the final sample due to a fire alarm (1), fussiness (7), failure to meet the inclusion criterion of at least two valid trials (2), experimenter error (3), or parental interference (4).

### *Design*

The number and order of tasks (warm-up session, four target tasks) was identical to Experiment 1. Infants were randomly assigned to one of two between-participants conditions: *normative game* or *non-normative game* (each with four target tasks, order systematically varied). The location the model talked about first (left versus right) and the identity of the first object used by E1 (X, Y; see Table 3) were counterbalanced across infants.

### *Materials*

A puppet, a bag to hold the materials, a softball and two instrumental tasks (as in Experiment 1), and four target tasks were used to conduct the experiment (see Table 3, for details on the materials used).

### *Procedure*

The general procedure was similar to Experiment 1. Infants sat on their parent's lap. Parents were instructed to remain silent and not to direct their infant's attention in any way. The experimenter leading the session (E1), the puppet (operated by E2), and the infant sat together at a table.

*Warm-up session.* E1, the infant, and the puppet played together with a ball. Then, in two instrumental tasks, E1 performed an action which the infant could reproduce. In the first instrumental task (pushing balls through holes of a cuboid), E1 and

TABLE 3
Experiment 2: Overview of the Materials Used in the Target Tasks

| *Target task* | *Objects X and Y* | *Platform with symmetrically arranged locations A and B* |
|---|---|---|
| 1 | Two little stuffed animals (horse, pig) | Colors of locations: yellow, green<br>Shape of locations: open rectangular boxes |
| 2 | Two little stuffed animals (squirrel, bird) | Colors of locations: orange, violet<br>Shape of locations: open rectangular boxes |
| 3 | Two little objects (banana, mushroom) | Colors of locations: dark green, pink<br>Shape of locations: open circular boxes |
| 4 | Two little objects (apple, onion) | Colors of locations: red, blue<br>Shape of locations: open oval boxes |

the infant played together without the puppet. In the second instrumental task (putting a disk onto a peg), the puppet made an instrumental mistake (putting a disk vertically onto a peg, so it would not fit) and infants had the opportunity to intervene, correct, and help the puppet, either spontaneously or, if they did not intervene, the puppet would ask for help. This was done to familiarize and make infants feel comfortable with the puppet and to make clear that it was fine to intervene and interact with the puppet (Rakoczy et al., 2008).

*Target tasks.* Table 4 provides a detailed overview of the procedure. Each target task consisted of an introductory, a model, an action, and a test phase. In the model and action phases of each task, the initial dyad was E1 and the infant (the puppet was absent), and E1 modeled an action the infant could reproduce. In the test phase dyad, infants were paired with the puppet that performed an alternative action. In the normative game, E1 emphasized and gestured that the actions ought to be performed in one particular way (a normative joint intentional triadic activity), and in the non-normative game, E1 emphasized and gestured that the actions can be performed in alternative ways and that she individually preferred one way (a non-normative activity based on individual intentionality; see Table 4). In all target tasks (see Tables 3 and 4), an object X (e.g., a little pig) was positioned behind (from infants' viewpoint) location A, and an object Y (e.g., a little horse) was positioned behind location B (both locations affixed to a platform). In the model phase, E1 put object Y into location B (e.g., the horse into B) and object X into location A (e.g., the pig into A). In the test phase dyad, the puppet's alternative action was to put the objects X and Y into the opposite locations (e.g., the pig [X] into B and the horse [Y] into A), thus making a diagonal movement toward the locations with each object.

*Questionnaire.* The same questionnaire as in Experiment 1 was administered. One parent filled in the questionnaire after the experiment. This data point was included, and the results remained the same if this data point was excluded.

### *Coding and dependent measures*

All sessions were videotaped and coded by a single observer. A second independent observer coded a random sample of 20% of all sessions for reliability.

TABLE 4
Experiment 2: Phases of the Target Tasks for Each Condition

| | *Condition* | |
|---|---|---|
| *Phase* | *Normative game* | *Non-normative game* |
| Introductory | 1. E1 lets infant explore the two objects X and Y (e.g., "Look, a pig. And a horse!") of the task successively. | |
| | 2. E1 puts platform with locations A and B on the table ("I'm getting a game out.") and positions X and Y behind A and B. ("Look, now we are going to play a game.") | |
| Model | 1. E1 points to X and then to location A while saying "Look, the X must go in here, yes!" and nodding. | 1. E1 points to X and then to locations A and B successively while saying "Look, the X can go in here or in here!," nodding, and moving her head sideways for each location. |
| | 2. E1 points to Y and then to location B while saying "And the Y must go in here, yes!" and nodding. | 2. E1 points to Y and then to locations B and A successively while saying "And the Y can go in here or in here!," nodding, and moving her head sideways for each location. |
| | 3. E1 "So, look, the Y must go in here," puts Y in B, "And the X must go in here," puts X in A. E1 "Done!" | 3. E1 "So, look, I [points to herself] put the Y in here," holds Y centrally between A and B, and puts it in B spontaneously, "And I [points to herself] put the X in here," holds X centrally between A and B, and puts it in A spontaneously. E1 "Done!" |
| | 4. E1 then positions X behind A and Y behind B again. | |
| Action | 1. E1 puts platform close to the infant and X in front of A, "Now, it's your turn! The X, you!" After the infant has acted on X, E1 puts Y in front of B, "The Y, you!" | |
| | 2. E1 puts platform further away from the infant and X and Y behind locations A and B. | |
| Test | 1. The puppet reappears and looks at objects, "Oh!" | |
| | 2. E1 points to the puppet and looks toward the infant, then points to object X, "Now, it's Max' turn, look, Max, and the X!"; E1 turns away from the table. | |
| | 3. The puppet takes X, moves centrally toward the platform, "Hmm," looks to the right and the left location, then puts X in B, stays behind location B (approx. 5 sec). | |
| | 4. The puppet takes Y, moves centrally toward platform, "Hmm," looks to the right and the left location, then puts Y in A, stays behind location A (approx. 5 sec). Then, the puppet moves to the edge of the table. | |

*Notes.* X = first object used by E1; Y = second object used by E1; A = location which E1 uses for object X; B = location which E1 uses for object Y.
In each trial, the puppet went to sleep before the introductory phase and came back before the test phase. After two trials, E1, the infant, and the puppet briefly played with a ball. Local adverbs refer to infants' point of view.

*Test phase.* For the test phase of each target task, all relevant verbal and behavioral responses were described and assigned to the main coding category *communicative intervention*, if infants' interventions were indicative of (1) referring to the "correct" location (i.e., the one E1 modeled) and (2) being communicative (i.e., directed at or for the benefit of the puppet). Thus, interventions that were indicative of referring to the "correct" location, but not communicative, were coded as *non-communicative intervention*. The reason for differentiating between communicative and non-communicative interventions was to provide the strongest possible evidence for second-personal normative expectations, which require that the infant not only corrects or undoes the puppet's action (this could be an egocentric act not underlain by normative expectations),

but that the infant does so with the intention to correct the puppet—thus, the puppet should be the addressee of the infant's corrective action. Note that this distinction was not required in Experiment 1, because relevant interventions in Experiment 1 (e.g., giving objects) were directly interpretable as communicative as opposed to non-communicative and egocentric (e.g., grasping for objects).

Communicative interventions included (1) *verbal protest*, such as normative phrases (e.g., "Must go in there!") and imperative-like phrases (e.g., simple action directives and rejections, e.g., "In there!," "There!," "No!," "Stop!"), and (2) *behavioral-expressive interventions*, such as putting an object into the "correct" location or pointing toward to "correct" location (before or after the puppet put the object into the "wrong" location), and negative-questioning expressions (i.e., head-shaking, lifting arms with palms up, and questions or interjections, such as "What?," "Huh?," "Oh [oh]!," "Ah!"). Further behaviors and utterances not considered in the analyses were ambiguous and irrelevant behaviors (e.g., mere grasping for objects, offering objects to the parent or to E1, throwing objects on the floor). Non-communicative interventions included the same "protest" categories, except for normative phrases and second-personal imperative-like phrases (i.e., "No!" and "Stop!"), which were directly coded as communicative, since these utterances require an addressee.

For each trial, communicative and non-communicative interventions were coded dichotomously (1 or 0) based on whether infants performed one of the target behaviors at least once. Overall, the proportion of communicative and non-communicative interventions was computed for each infant by summing up the dichotomous scores of each trial and dividing the resulting sum by the total number of trials. Reliability was very good: $\kappa = .85$ (communicative intervention) and $\kappa = .83$ (non-communicative intervention).

*Action phase.* For each trial, we coded whether infants put the two animals in E1's location (i.e., the location modeled by E1). Infants received the following scores per trial: (1) a 1 for directly putting an animal in E1's location, (2) a 0.5 for putting an animal in the opposite location (not modeled by E1) and then in E1's location, (3) a 0 for not acting on the objects or not choosing any location, (4) a $-0.5$ for putting an animal in E1's location and then in the opposite location, or (5) a $-1$ for directly putting an animal in the opposite location. Thus, the maximum score per trial was 2 (i.e., the infant directly put both animals in the locations modeled by E1) and the minimum score was $-2$ (i.e., the infant directly put both animals in the opposite locations). Overall, the proportion of imitation was computed for each infant by summing up the scores of each trial and dividing the resulting sum by 2 and by the total number of trials. Reliability was very good: $\kappa = .90$. All above proportions of the action and test phases were computed based on four trials unless infants provided less than four trials: Twenty-two trials (normative game, 14; non-normative game, 8) were excluded because of fussiness (20) or parental interference (2).

### Statistical analysis

Analyses were carried out as in Experiment 1. Questionnaire data from all parents were included (range of completion: 93–100%).

## Results

### *Intervention and imitation*

As displayed in Figure 3, infants performed significantly more communicative interventions in the normative game condition ($M$ = .26, $SD$ = .34) than in the non-normative game condition ($M$ = .10, $SD$ = .17), $t(42.78) = 2.26$, $p$ = .028, Cohen's $d$ = 0.59. Infants' non-communicative interventions did not differ between the normative game condition ($M$ = .18, $SD$ = .25) and the non-normative game condition ($M$ = .19, $SD$ = .23), $t(57.22) = 0.18$, $p$ = .86, $d$ = 0.05. Infants imitated E1's actions (i.e., putting the two objects in the locations modeled by E1) at equal proportions in both conditions (normative game, $M$ = .82, $SD$ = .40; non-normative game, $M$ = .81, $SD$ = .31), $t(54.42) = -0.10$, $p$ = .92, $d$ = 0.03.

### *Relation of (normative) language comprehension and intervention*

As in Experiment 1, parents tended to be rather certain that their infant understood the language items in both the normative game (normative language: $M$ = 2.87, $SD$ = 0.41; non-normative language: $M$ = 2.89, $SD$ = 0.48) and the non-normative game (normative language: $M$ = 2.88, $SD$ = 0.50; non-normative language: $M$ = 2.94, $SD$ = 0.45). In the normative game condition, infants' mean proportion of communicative interventions in the test phase and the mean score (0–4) of parents' ratings of their infant's normative language comprehension showed a significant positive correlation, $r_s$ = .44, $n$ = 30, $p$ = .015. That is, the higher the infants were rated on normative language comprehension, the more they intervened communicatively in the test phase. However, there was no significant relation when controlling for infants' non-normative language comprehension, $r_s$ = .12, $n$ = 30, $p$ = .54, as there was also a positive relation between infants' non-normative language comprehension and their communicative interventions, $r_s$ = .48, $n$ = 30, $p$ = .007. In the non-normative game condition, there

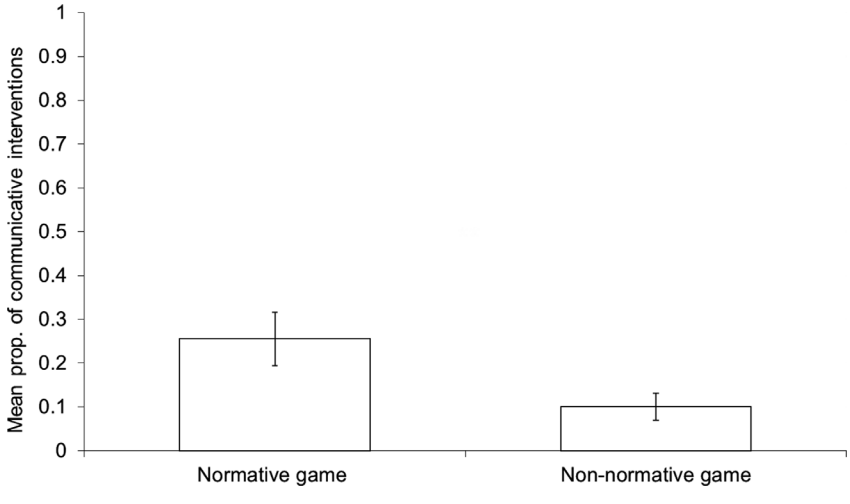


**Figure 3** Mean proportion of communicative interventions (out of two to four trials) in the test phase dyad per condition (Experiment 2). Error bars indicate standard errors of the mean.

were no significant correlations of infants' rated normative or non-normative language comprehension and their communicative interventions, $r_s = -.22$, $n = 30$, $p = .26$ (partial correlation controlling for non-normative language); $r_s = -.02$, $n = 30$, $p = .90$ (simple correlation, normative language); $r_s = .23$, $n = 30$, $p = .22$ (simple correlation, non-normative language).

### Discussion

In Experiment 2, we obtained more conclusive evidence for infants forming second-personal normative expectations about what the puppet should do based on what "we" (the adult and the infant) had done in the initial dyad. Although infants performed non-communicative interventions in both the normative game and the non-normative game conditions at equal magnitudes (which suggests that, overall, infants preferred the objects to go into the modeled locations), they performed more communicative interventions (including undoing the puppet's action and putting an object into the "correct" location, directive behaviors, and performing verbal protest, e.g., "No! In there!") in the normative game condition than in the non-normative game condition. These results are thus in line with Experiment 1, but also go beyond the first experiment and suggest that by 18 months of age, infants do not just form descriptive expectations about what another agent will do (and thus, e.g., help the agent achieve her goal), but also second-personal normative expectations about what their partner in a joint intentional triadic activity should do.

## GENERAL DISCUSSION

Human cultural learning is a remarkable outlier in the animal kingdom. From early on, human children are both motivated and culturally expected to learn not only specific, individual forms of behavior, but rather general forms of conduct—social norms—that apply to any competent cultural agent (Rakoczy & Schmidt, 2013; Schmidt & Rakoczy, 2019; Tomasello, 2016). Children develop an impersonal understanding of social norms between 2 and 3 years of age and thus enter the cultural world in the later third year of life. Here, we investigated a simpler, yet important, building block of human norm–psychology in the second year of life: second-personal normative expectations ("You should do X!") originating in interactive contexts (joint intentional triadic activities) in which 18-month-old infants learn a simple game-like act from and with an adult partner and can generalize the learnt act to a second puppet partner.

In two experiments, we systematically investigated early second-personal normative expectations by giving infants the opportunity to intervene communicatively when a puppet partner deviated from what infants had learnt from and with an adult partner during an interactive activity. In Experiment 1, we found that infants generalized novel, game-like actions from an initial dyad (with an adult) to a second dyad (with a puppet), and thus performed more communicative interventions against the puppet's non-conforming action when the action had been marked by the adult as a well-known, generic, and normative act than when the action had been marked as a spontaneous and idiosyncratic non-normative act. An alternative explanation for infants' behavior in Experiment 1, however, may be that infants did not form second-personal normative expectations about the puppet's behavior, but only had descriptive

expectations that the puppet will perform the canonical action—and therefore, infants intervened and assisted the puppet more in the game context than in the discovery context, as the adult partner appeared more knowledgeable and confident in the game context.

Experiment 2 was designed to rule out such alternative explanations and tested for second-personal normative expectations more directly by giving infants the opportunity to actively undo and correct the puppet's actions (communicatively) in the second dyad—crucially, mere descriptive expectations that the puppet will perform the modeled action were violated in the same way in both conditions in this experiment (i.e., the puppet put the objects in the opposite locations). Moreover, the adult in the initial dyad did not use any novel labels (e.g., "Daxing") that might per se signal generalizability, but rather gave verbal and gestural cues that the modeled action was either obligatory (normative) or a personal preference (non-normative). We found that infants not only generalized a simple game-like action from an initial dyad (with an adult) to a second dyad (with a puppet), but also that they actively corrected, verbally protested, and directed the puppet's behavior in communicative ways, suggesting that infants formed second-personal normative expectations about what the puppet should do. Importantly, infants performed more communicative interventions in the normative game condition (in which the adult showed the infant an obligatory action indicating what "we" jointly should do) than in the non-normative game condition (in which the adult showed the infant the same action, but emphasized that she merely had an idiosyncratic preference for the action, indicating what "she" wanted to do).

The present findings are novel in four ways. First, extending prior research on young children's understanding of impersonal normativity (i.e., social norms; Rakoczy & Schmidt, 2013; Schmidt & Tomasello, 2012), the current experiments provide evidence for a simpler and more concrete form of normative understanding in the second year of life: second-personal normativity which may emanate from joint intentional activities. Second, in contrast to much prior research that has found that infants develop descriptive expectations about others' behavior (e.g., Powell & Spelke, 2013; Rhodes et al., 2015; Schmidt & Sommerville, 2011) and about the generalizability (to other persons, objects, etc.) of conventional forms (see Diesendruck & Markson, 2011), the present research suggests that infants also have a rudimentary understanding of the normative dimension of human action, forming second-personal normative expectations about a partner's behavior in a triadic interaction. Third, while recent research suggests that infants have social preferences for agents who perform helping versus hindering actions or who allocate resources equally (see Geraci & Surian, 2011; Hamlin, 2013), the current research goes beyond non-normative preferences and is the first to suggest that infants can hold concrete, second-personal normative expectations, which may be crucial for both the ontogeny of understanding conventionality and morality (Schmidt & Tomasello, 2012; Turiel, 1983). And fourth, in the current experiments we used partly novel objects and partly arbitrary actions in both experiments—for instance, the locations in Experiment 2 were equivalent and suitable for putting in either object (Schmidt, Rakoczy, Mietzsch, & Tomasello, 2016)—and so infants could not simply form expectations based on prior experience with these particular objects and actions, in contrast to actions that are familiar and potentially regular, such as resource allocations.

Notwithstanding the above, communicative interventions did not occur with high frequency—a typical finding for the rather demanding method of spontaneous

intervention and protest (Rakoczy, Brosche, Warneken, & Tomasello, 2009; Schmidt et al., 2011; Wyman, Rakoczy, & Tomasello, 2009). Furthermore, the current study faces the general challenge of how to empirically assess normative understanding in non-verbal or just-verbal agents (e.g., infants or even non-human primates). If a child (or an adult) judges, "No, that's wrong!," we may directly take this as evidencing normative understanding. But even here, one may want to rule out that the agent simply prefers a different course of action and therefore uses normative vocabulary to give her concern more weight. And if infants performed communicative interventions in a random context, this behavior per se would be hardly interpretable, but only becomes intelligible within a normatively structured experimental context and may plausibly be taken as evidence for simple normative understanding—even more so if alternative possibilities (e.g., mere preferences) can be ruled out (e.g., via differentiating between communicative and non-communicative interventions or via the existence of a non-normative control condition). Nonetheless, the assessment of normative understanding poses major challenges and future research should introduce further methods and techniques to improve interpretability of observed behaviors.

We also found evidence for the predicted relation between parent-estimated language comprehension and infants' communicative interventions in response to the puppet's non-conforming behavior in the target conditions (joint intentional activities) only. We suggest that this relation is dialectical (*cf.* Lamm, 2014; Rakoczy, 2010): Infants' early ability and motivation for shared (joint) intentionality allows for language acquisition and norm development. And language (which is itself normatively structured), in turn, helps infants and young children gradually develop an understanding of normativity—with the proposition that the development goes from the interpersonal to the impersonal, and so from entertaining joint intentional states (a concrete joint agent "we") to collective intentional states (an abstract impersonal agent "we," i.e., social norms). Nonetheless, much more research is required to assess the interrelation between language development—and other cognitive capacities—and norm development. For instance, given the potential reciprocal relation between normativity and language, to what extent can we actually separate these phenomena, especially when interventions are at least in part verbal? Furthermore, we obtained evidence for both a specific relation between normative language comprehension and infants' communicative interventions (Experiment 1) and a general relation between language comprehension and infants' communicative interventions (Experiment 2). And although we controlled for non-normative language when assessing the interrelations, our measure of non-normative language comprehension is certainly not a comprehensive assessment of general language skills; this measure could be extended in future work. More generally, other measures of infants' (normative) language skills seem desirable as parents' ratings may be influenced by their own attitude toward norms and by their everyday perception of infants' norm-relevant behavior. Lastly, other capacities, such as executive skills, might play an important role in infants' developing understanding of normativity, too.

An interesting finding to be explored further is that infants also showed non-communicative interventions (e.g., putting the objects into the modeled locations without communicating with the puppet) in both conditions of Experiment 2, and infants' imitative behavior did not differ between conditions either. This suggests a more general preference for regularity and order, very much reminiscent of Piaget's (1965/1932, p. 16) description of "motor rules" and ritualized behaviors that are individual—not social or collective—and thus non-normative (based on individual intentionality, e.g.,

"I want X"). Nevertheless, as Piaget (1965/1932, p. 23) noted, such ritualized behaviors share with many norms—especially conventional norms (which, on a descriptive level, are social regularities; Lewis, 1969)—the concept of regularity. Hence, it may be that infants' apparent preference for regularity is an important mechanism in the development of norms (or modal cognition more generally; Shtulman & Phillips, 2018), perhaps in particular regarding conventional norms.

Taken together, the present work suggests that 18-month-old infants form second-personal normative expectations about how a partner in a dyad should act based on what infants have done together in a previous dyad with an adult. The results of two experiments suggest that infants not only generalize an action from one situation to another (e.g., thus holding descriptive expectations about an agent's action), but also have a rudimentary understanding of the normative force that emanates from joint intentional activity, normatively expecting from "you" to act how "we" have just acted. Conceptually, this could be seen as the primordial form of a "social contract" underlain by an interpersonal "we" that regulates both "you" and "me" and may thus be a legitimate source of normative force. However, such concrete and interpersonal normativity (i.e., second-personal normative expectations) does not amount to an impersonal understanding of norms proper, as abstract and group-wide standards, which apply to all relevant persons in agent-independent ways (Nagel, 1986). Future work may investigate whether infants' understanding of normativity is even richer. At any rate, the current findings show that from early on, human cultural learning is not confined to imitation, but entails a social–normative dimension with infants being motivated to engage in joint activities and even actively intervening when things deviate from what "we" intended to do. These social–cognitive capacities and motivations may be an important step toward developing an understanding of social norms and thus of our normatively structured institutional reality.

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## CONFLICTS OF INTEREST

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