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Bigger knows better: Young children selectively learn rule games from adults rather than from peers

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Preschoolers' selective learning from adult versus peer models was investigated. Extending previous research, children from age 3 were shown to selectively learn simple rule games from adult rather than peer models. Furthermore, this selective learning was not confined to preferentially performing certain acts oneself, but more specifically had a normative dimension to it: children understood the way the adult demonstrated an act not only as the better one, but as the normatively appropriate/correct one. This was indicated in their spontaneous normative interventions (protest, critique, etc.) in response to third party acts deviating from the one demonstrated by the adult model. Various interpretations of these findings are discussed in the broader context of the development of children's social cognition and cultural learning.

Humans are cultural learners, and human infants start to become so early in on togeny. From the second year, they begin to imitatively learn instrumental, playful, symbolic, and other kinds of acts from adults (e.g., Carpenter, Nagell, & Tomasello, 1998; Gergely, Bekkering, & Király, 2002; Meltzoff, 1995). When imitating others, even young children seem not to be confined to re-enact merely idiosyncratic intentional acts of an individual. Rather, they learn something about general, normatively structured, rule-governed forms of actions.

Several lines of evidence speak in favour of such forms of 'normative learning', as it could be called. First, children from around 2 years exhibit so-called 'functional fixedness' (Duncker, 1945) after imitatively learning how to use novel artefacts: that is, when they see someone use a novel object systematically in an instrumental way, they

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not only use the object in similar ways themselves later on, but *only* use it for this purpose and assume other people will do so as well, and tend to use only this object (rather than different ones) for this purpose (Casler & Kelemen, 2005). One rich interpretation of this phenomenon is that it indicates that children not only understand what the other person was up to, but understand how *one* appropriately acts with the tool because that is *what it is for*.

Assessing normative issues more directly, a recent series of studies has documented early normative learning in the domain of playing games. In these studies, children from age 2 not only imitatively acquired new (game) actions, but indicated that they understood these actions in normative terms as rule-governed by enforcing the rules towards third parties: in particular, they normatively responded to third party deviations from this demonstrated way to play the game (Rakoczy, 2008; Rakoczy, Brosche, Warneken, & Tomasello, 2009; Rakoczy, Warneken, & Tomasello, 2008; Wyman, Rakoczy, & Tomasello, 2009).

But how sophisticated, flexible, and selective is such precocious normative learning? Do young children flexibly track and take into account relevant aspects of the context, of the type of activity (and the potential mistakes related to it), and of the kind of model when learning normatively structured activities?

Some recent research suggests that young children seem to be already relatively flexible in that they understand the rudiments of the context-relativity typical of many normative practices (e.g., what counts as a brutal foul in soccer is just a regular attack in rugby). In several of the studies mentioned above, for example, children from age 2 protested against an act by a puppet that constituted a mistake in the context of a game, but did not do so in response to the very same act when the puppet had changed the context beforehand, e.g., by announcing that she was not going to play the game (Rakoczy *et al.*, 2008, Study 2a; Rakoczy *et al.*, 2009; Wyman *et al.*, 2009).

Furthermore, young children seem to be flexible in that they distinguish between different kinds of mistakes (e.g., action mistakes, verbal mistakes) and track accordingly who is to be criticized in which ways (e.g., wrongdoers for acting wrongly vs. wrongsayers for speaking wrongly; Rakoczy & Tomasello, in press) and distinguish between different kinds of norms (conventional vs. moral) in different domains (Smetana, 1981; Turiel, 1983).

Beyond such rudimentary flexibility, however, it is crucial for mature cultural normative learning to take into account the quality of different potential models. In particular, given the arbitrariness and therefore opacity of most cultural and conventional affairs (which make external checks hard to come by or even impossible), learning cultural affairs selectively from competent senior members of the community (rather than from anyone) is a crucial milestone in becoming a competent member of the culture oneself.[1]

Selectivity in (non-normative) learning from different kinds of models has been the focus of much recent research in social cognitive development (for overviews, see Harris, 2007; Koenig & Harris, 2005a). Numerous studies have revealed that children from around 3 to 4 years take into account different model characteristics when having to select among two models in novel word learning situations. For example, children have been found to selectively learn from models that express knowledge and/or

[1] *For similar points, though with special theoretical commitments (to a module-like system for 'natural pedagogy' and the corresponding nativism) we do not share, see Gergely and Csibra (2006).*

certainty (Birch, Frampton, & Akmal, 2006; Koenig & Harris, 2005b; Matsui, Yamamoto, & McCagg, 2006; Moore, Bryant, & Furrow, 1989; Sabbagh & Baldwin, 2001).

Probably the best documented achievement of preschoolers in this context is their ability to track and take into account the varying reliability of different agents. When children first witness two agents one of whom proves reliable in naming familiar objects while the other proves unreliable, and then can choose between the two agents in learning novel words for novel objects, 4-year-olds (and sometimes 3-year-olds) prefer the previously reliable agent (Clément, Koenig, & Harris, 2004; Jaswal & Neely, 2006; Koenig, Clément, & Harris, 2004; Koenig & Harris, 2005b; Pasquini, Corriveau, Koenig, & Harris, 2007). And this selectivity in young children seems to extend to normative learning: children in one recent study did not only learn to play a novel game differentially from a reliable model (in contrast to an unreliable one), but considered the way the reliable model did it in normative terms as the appropriate/correct way (as indicated in their protest against the unreliable model; Rakoczy, Warneken, & Tomasello, 2009).

However, in everyday situations of cultural learning there is frequently hardly any explicit information about the certainty, competence, or reliability of potential models. In the absence of any such overt expression (e.g., of certainty) or any previous history (of competence), one model characteristic that supplies a good heuristic basis for selective learning is *age*: prima facie, in most domains adults are more reliable members of a culture and thus know more about cultural affairs than children do. Consequently, a good default strategy, in particular when it comes to arbitrary and therefore opaque conventional activities, is to selectively learn from adults rather than from peers. And recent research has just begun to document such a default preference in young children in the domain of learning novel words (Jaswal & Neely, 2006). Without any further information, children in this study tended to learn novel words from adults rather than from peers. And this selective learning proved quite flexible, in that it could be reversed under appropriate circumstances: when adults proved unreliable over time, children began to prefer more reliable peers over unreliable adults (Jaswal & Neely, 2006).

But from these studies, it remains unclear how general a phenomenon such selective learning is: does it extend beyond the arguably quite special domain of word learning? And it also remains unclear what this kind of selective learning is based on: do children just prefer some models (adults) and mimic their idiosyncratic acts? Or do they understand adult model acts as a kind of command 'Do it like this!' to be obeyed? Such accounts employ lower-level explanations of selective learning in that children's preference for certain kinds of models is not seen as based on differential presumptions of competence nor on considerations concerning conventionality or normativity.

Alternatively, is it that, in contrast to such rather lower-level explanations, young children view the adult as transmitting some general cultural information with conventional and normative structure: 'This is how this action goes, this is how we do it'.

A crucial way to test between these different possibilities is to look at children's behaviour not only in the first person (who does the child imitate herself), but in response to third person actions. Would children expect others to act as the adult model did (revealing an assumption of conventionality, see, e.g., Diesendruck & Markson, 2001)? And crucially, would they criticize others in the case of actions deviating from the ones modelled by the adult (indicating they view the actions as normatively structured)?

In sum, preschoolchildren have on the one hand been shown to be cultural normative learners, acquiring from adult models normatively structured forms of action (this becomes clearest in children's protest against third party mistakes). But we do not know yet how systematic and selective such normative learning is. On the other hand,

preschoolers have been shown to be systematic and selective in their learning of words from others (preferring reliable over unreliable models, adults over peers, etc.). It remains to be seen, however, how general such selectivity is (beyond the domain of word learning), and how it is to be characterized exactly – in particular, whether it involves any normative awareness (of the selectively imitated act as the correct one).

The present work, therefore, aims at addressing these questions by investigating young children's selective normative learning from models of different age. To this aim, children's selective acquisition of conventional activities (beyond just linguistic learning) from adult versus peer models was studied. As the earliest competence in selective learning of linguistic labels as a function of model documented in the literature is in children aged 3–4 (Jaswal & Neely, 2006; Koenig & Harris, 2005b), we focused on this critical age range and tested children at 3 and 4 years.

Children were presented with video clips of an adult and a peer model. In the *novel label tasks* taken from previous research, the two models labelled novel objects differently with novel labels and children were then asked what the object was called (following Jaswal & Neely, 2006). In the *novel game tasks*, the two models demonstrated how to play simple games in different ways. Children were then allowed to play the games themselves, and their selective imitation was investigated. To test for normative awareness, children's spontaneous responses to a third party (a puppet) playing the game in either of the two ways were then recorded. The logic is the following: if children see the way of playing the game shown by one model in normative terms as the appropriate, correct one, then they should not only selectively imitate this way, but protest when the third party plays differently.

Method

Participants

Twenty-four 3-year-old children (10 males, 14 females, $M = 2;11$, range $= 2;9-3;3$) and twenty-four 4-year-old children (13 males, 11 females, $M = 4;0$, range $= 3;10-4;2$) were included in the final sample. Four additional children were excluded from the study due to experimental error ($N = 3$), or because they were uncooperative ($N = 1$). All children were native German speakers and recruited in urban day-care centres. They came from mixed socio-economical backgrounds.

Design and procedure

All children were tested individually in their day-care centres. All testing was done by two experimenters in a quiet room. Each session was videotaped and lasted approximately 30 min. For all children, a session consisted of (i) a short warm-up, (ii) a block of four novel label tasks, and (iii) and a block of four novel game tasks.

Warm-up

There was a general warm-up in which the first experimenter (E1) played with the child until she felt comfortable, followed by a specific warm-up in which the puppet that E2 played was introduced. E2 brought out a hand puppet called 'Max' which she animated and introduced to the child. E1, Max and the child then played with a ball and other toys to make the child feel comfortable with the puppet. Then E1, the child and the puppet took turns in performing simple instrumental actions (e.g., drawing) and the puppet committed some instrumental mistakes (e.g., took a malfunctioning pen). The rationale

for this was to give children, particularly shy ones, time to familiarize themselves with situations where mistakes happen and they can intervene.

Novel label tasks

After the warm-up, E1 introduced the child to a laptop computer and two actors shown on the screen – a 4-year-old male child and a male adult. She told the child the actors' names and played a short movie where the informants introduced themselves. In each of the four subsequent novel label trials, E1 first showed the child a novel object (mostly unfamiliar objects from hardware stores) and asked her whether she knew what it was. Usually children answered 'no', but if they claimed, e.g., 'yes, that's a screw', they were allowed to explore the object and were corrected. E1 then said, 'Okay, so let's watch a movie' and started a video clip in which the two actors labelled the same object with different novel words (e.g., 'doso' vs. 'toma'). A still image of the two actors remained on the screen, and E1 asked the test question: 'So, tell me … (name of the child), what is this?' (points to the novel object). If the child did not answer, E1 asked the forced choice question (e.g., 'Is it a doso or a toma?'). Across children, it was systematically varied which actor used which label, which actor labelled the objects first, and which actor sat at which side of the table.

Novel game tasks

Children were presented with four such trials in which the two actors demonstrated a simple novel game act in different ways. Across children, it was systematically varied which actor played the game in which way, which actor played first, and which actor sat at which side of the table. Similar games as in a recent study on children's normative understanding of simple game rules were used (Rakoczy *et al.*, 2008; Study 1). For example, in one game called 'Daxing' the objects were a styrofoam board with a gutter at one end and a building block, as well as a wooden stick which could be used as a kind of bat (for the other tasks, see Appendix A). E1 first showed the objects to the child and explained 'Look, with this one can play a game. It is called 'Daxing'. And later on it's your turn to dax. But first we'll watch a movie of the boy and the man'. Then E1 and the child watched the movie. In the movie actor 1 (the adult model for half of the children, the child model for the other half) said he was going to dax, took the stick and pushed the building block over the board into the gutter; actor 2 then said 'No, *this* is how daxing goes' and put the block on the board and lifted it so that the block slid down into the gutter; Actor 1 said 'No, *this* is how daxing goes', acted according to his way again, and then actor 2 repeated his turn.

After the movie still pictures of each actor performing his act remained on the screen as a memory aid. E1 reminded the child who had done what (by pointing to each still picture in turn, saying 'He did it like this'/'And he did it like that'), handed her the objects and told her it was her turn to dax now. After the child had performed her act, Max the puppet appeared and asked whether it was his turn now. Usually, the child invited Max to have his turn, and if not E1 did so. E1 then turned away and wrote something down, and Max announced that he was going to dax, and performed an action twice (each time for approximately 20 s): in the *experimental condition*, this was the act performed previously by the child model, and in the *control condition* the puppet acted as the adult model had acted before. Each child received a block of two experimental condition trials and two control trials (order counterbalanced across children).

Observational and coding procedure

Sessions were videotaped and records were transcribed and then coded by a single observer. For each age group, an additional observer coded the novel game tasks of a randomly selected 20% of all sessions for reliability.

Novel game trials: Imitation

Children's own actions when given the game objects were coded into one of five jointly exhaustive categories: 'like adult model' (child performs the full act of the adult model); 'partly like adult model' (child performs a part of the act of the adult model; e.g., in Daxing lifts the board but does not let the block slide down completely); 'like child model' (child performs the full act of the child model); 'partly like child' (child performs a part of the act of the child model); 'other' (child does not perform any of the above). Inter-rater reliability on this measure was excellent (3-year-olds: weighted $\kappa = .83$/4-year-olds: weighted $\kappa = .99$).

Novel game trials: Responses to the puppet

For coding, the test phase of each task was divided into six subphases (before, during and after each of the two act tokens of Max). For each phase, all relevant intervention actions and utterances of the child in response to the puppet's behaviour were carefully described and given one of the following codes. (1) *Normative protest*: the child clearly intervened in a normative way, making use of normative vocabulary (e.g., 'No! It does not go like this!'). (2) *Imperative protest*: the child expressed an imperative to Max without using normative vocabulary, either in the negative (e.g., 'No! Not in this hole!') or in the positive (e.g., 'Take the stick!'). (3) *Hints of protest*: this code was given when the child responded in a way reminiscent of protest, but not clearly enough for either of the above categories. In this category, fell pointing or gesturing towards the missing object, giving the 'missing' object to Max, physically preventing an action by Max, and doing a part of the action Max was omitting. Inter-rater reliability was excellent (age 3, weighted $\kappa = .98$; age 4, weighted $\kappa = .98$). Each task then received as code the highest code that appeared in its subphases (e.g., if in a given task a child produced one action qualifying as *normative protest* and one qualifying as *hints of protest*, the task got as its overall code 'normative protest').

Novel label trials

Children's answers to the test questions 'What is this?' were scored as 'correct' if the child followed the adult actor's label, incorrect if she followed the peer actor. If children did not unambiguously choose one of the labels, this was coded as 'other'.

Results

Novel game tasks: Imitation

The sum scores of the complete or partial imitations of either model in the four novel game trials are depicted in Figure 1. For statistical purposes, only complete imitations of either model were taken into account. Accordingly, difference scores were computed between the number of trials in which children completely imitated the adult (0–4) and the number of trials in which they completely imitated the child (0–4). Children

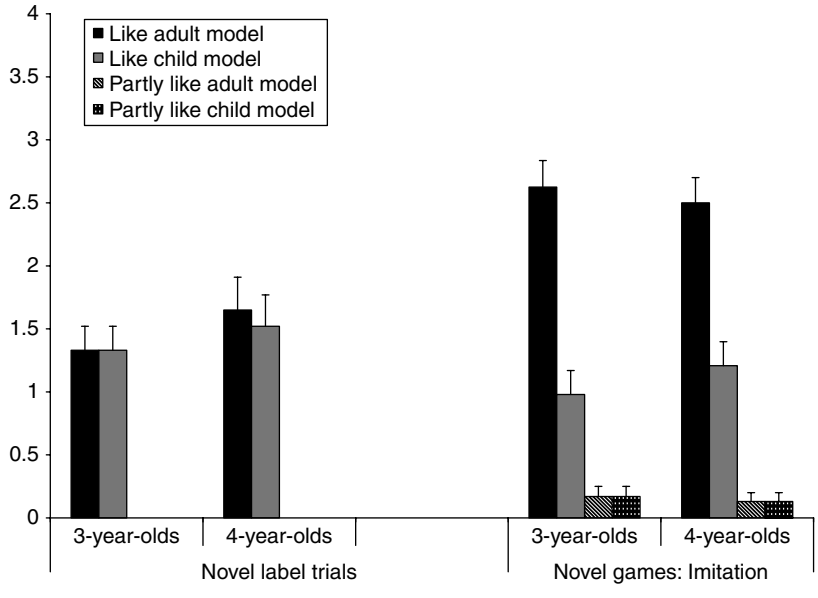

Figure 1. Mean sum scores imitations of either model in the novel game task and in the novel label tasks.

imitated the adult model significantly more often than the child model: the sum of these values over the four novel game tasks was significantly greater than zero ($t(47) = 5.30$, $p < .01$), with no difference between age groups ($t(46) = 0.67$, $p = .51$).

Novel game tasks: Responses to the puppet

The mean sum scores over the two tasks per condition for the different response categories are depicted in Figure 2. For statistical analysis, only *normative* and *imperative* protest were taken into consideration (the third category, *hints of protest*, was not convincing enough an indicator of normative awareness).

First, on a conservative measure, a 2 (age) × 2 (condition) ANOVA on the mean sum scores of *normative protest* was computed. It yielded a main effect of condition such that children intervened more in the experimental than in the control condition ($F(1, 46) = 18.52, p < .01$), but no effect for age ($F(1, 46) = 1.02, p = .32$) and no age X condition interaction effect ($F(1, 46) = 0.06$, $p = .80$).

Second, on a more liberal measure (mean sum score of tasks per condition in which children produced *normative protest* or *imperative protest* responses), a 2 (age) × 2 (condition) ANOVA yielded only a main effect of condition ($F(1, 46) = 5.54$, $p < .05$), but again no effect for age ($F(1, 46) = 0$, $p = 1$) and no age X condition interaction effect ($F(1, 46) = 0.15$, $p = .70$).

Novel label tasks

The sum scores of trials in which children adopted the label from either model are also depicted in Figure 1. Difference scores (between the sum of trials in which children followed the adult model and the sum of trial in which children followed the child model) were not different from zero ($t(47) = 0.08$, $p = .94$), and were not different between the age groups ($t(46) = 0.24$, $p = .81$).

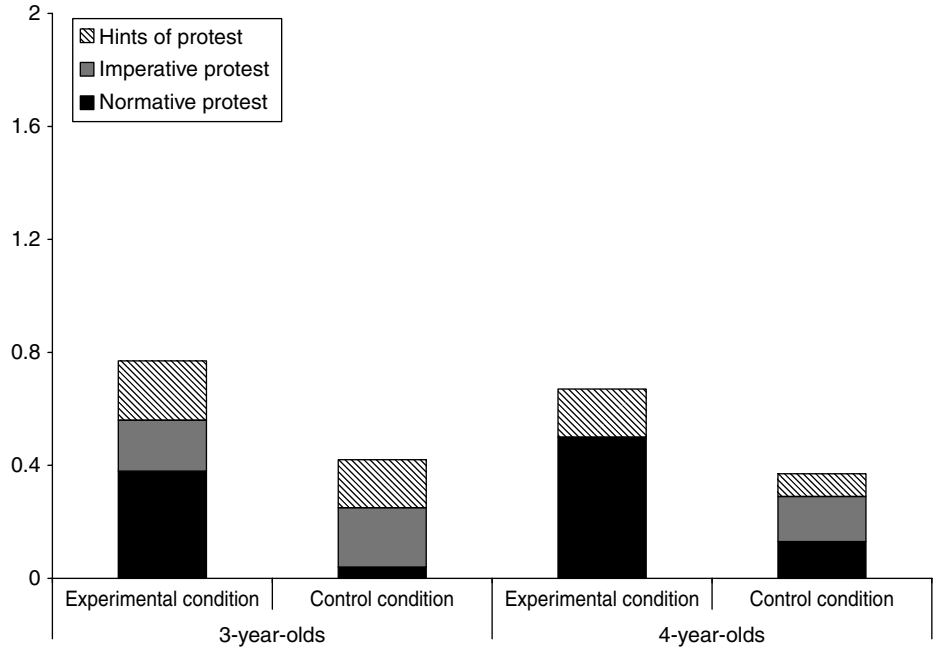

Figure 2. Mean sum scores of the different forms of protest in the two conditions.

Discussion

Summary of the present findings

Previous research had shown that children from age 3 to 5 engage in selective learning as a function of model characteristics, preferring adults over peers, for example. Another line of previous research had shown that children from around 2 to 3 engage in what could be called 'normative learning'; that is, they imitatively learn rule-governed activities from adults and understand them as normatively structured (as indicated most clearly in their third party critique and protest). Against the background of these two lines of inquiry, the present study looked at selective normative learning in the domain of playing games. The guiding questions were: how general is young children's selective learning from adults over peers (beyond the domain of linguistic learning)? And is early selective learning normatively structured? That is, do young children understand what they selectively imitate in normative terms as the correct/appropriate thing to do?

The present results clearly show that in fact young children (3- and 4-year-olds alike) do engage in selective learning from adult over peer models outside of the domain of language learning, namely in the domain of games. This result is in line with recent findings of selective imitation of simple instrumental acts from adults over peer models (Zmyi, Daum, Prinz, & Aschersleben, 2008). And the present results show that such selective learning of game acts is normatively structured: children not only acted like the adult model more often than like the child model, but they also tended to criticize a third party as incorrect when she acted like the child model. This result is in line with some recent findings that somewhat older children (4–5 years) learn selectively and in normatively structured ways from reliable over unreliable models (Rakoczy *et al.*, 2009).

Learning words from adults versus peers

Before we turn to the broader implications of this central result, one surprising finding of the present study needs to be discussed: children showed selective learning only when it came to game activities, but not when it came to learning new words. That is, the present study fails to replicate the pattern of results by Jaswal and Neely (2006). It is currently not clear what the grounds are for these discrepant findings regarding word learning. One potential concern with the present method was that during the making of the videos, the adult adapted his way of speaking (pronouncing the words, etc.) as much as possible to the child model's way in order to make the two models as comparable as possible. However, that might have traded comparability for naturalness (the adult might have sounded artificial), and that might be a reason why children did not preferentially learn from him. A follow-up study, however, failed to find evidence for this. This study used pictures of the two models and asked children who they would ask about the name of an object (a method widely used in this area, adopted from Koenig & Harris, 2005b; VanderBorght & Jaswal, 2009), but still, 3- and 4-year-olds did not show any preference (and only 5-year-olds did; see Appendix B). Another possibility is that a methodological difference between the present study and Jaswal and Neely's study is responsible for the diverging results, namely the inclusion of a familiarization period: in contrast to the current study, Jaswal and Neely always had a first phase where both models labelled known objects differently but correctly (e.g., 'sneakers' and 'shoes'), and in which children were asked whether someone had said something wrong. Merely asking such a question might already sensitize children to the very possibility of mistakes, and that might be a reason why children in the Jaswal and Neely study might have been more 'normatively alert', so to speak. Another follow-up study, however, in which we included such a familiarization phase, failed to produce evidence for this suggestion (3- and 4-year-olds still did not prefer one of the models; see Appendix C). In sum, then, it remains unclear at present how the divergence between these different studies can be accounted for, and future studies are needed to further explore potential explanations. It should be noted, however, that selective word learning was not the focus of the present work at all, but rather served as a frame of reference.

Selective learning from adults versus children in broader perspective

The focus of the present study was on children's learning of game actions, and it is remarkable that in this area under consideration here (despite the negative findings regarding word learning) children from age 3 showed a clear pattern of selective learning. When it comes to rule-governed activities, children from early on thus seem to have a default tendency to preferentially learn to play the game from adults.

But what does that mean? What is such selectivity based on? Looking just at imitation data leaves open a number of rather lower-level explanations: (i) children could just view the adult demonstration as an implicit command towards the child 'Do it like this!' to be blindly obeyed. Or (ii) they could just see the adult as performing a somehow preferable idiosyncratic act they individually copy 'I do what you did'. On the basis of such lower-level interpretations, however, we would not expect the child to have any specific expectations what others will or should do (we know from recent research that even 1-year-olds do not expect idiosyncratic preferences to generalize across individuals; Graham, Stock, & Henderson, 2006; Henderson & Graham, 2005).

In addition to mere imitation, however, the present findings reveal that children do have such normative expectations: they expect others should perform actions in

the way the adult has shown, and they normatively intervene in cases of deviations from this standard. Such a pattern of generalization beyond the first person case seems incompatible with lower-level accounts along the lines of (i) and (ii). Rather, what the findings suggest is that children engage in selective learning with a normative structure, viewing the action selectively learned from the adult in normative terms as the appropriate, correct one everyone should follow.

This still leaves open, however, a crucial question, namely what children's selective learning from the adult is based on. It could be that (iii) children consider adults more competent models and transmitters of cultural knowledge and therefore assume the adult way of playing is the correct one. But it is also possible that children's grasp of the situation is somewhat less sophisticated. For example, (iv) children might have a generalized assumption that adults should be followed by everyone – without further reason (e.g., because they are competent, knowledgeable, or reliable). The present data alone, and previous data of selective learning cannot decide between these options. But two other recent studies suggest that children do not assume adults should always be followed without further reason, but rather that preschoolers' preference for adults as sources of knowledge is quite flexible and sophisticated and therefore not readily compatible with (iv). First, in a word learning task, when an adult repeatedly proved incompetent and a child competent, competence came to trump age, and children reversed their initial preference for the adult (Jaswal & Neely, 2006). Second, for some areas (e.g., questions about child toys) children have been found to reasonably rely more on peers than on adults although they prefer adults when it comes to questions, for example, of the nutritional values of food (VanderBorght & Jaswal, 2009).

Several questions, then, remain to be clarified by future research. First of all, even given that children's preference for certain kinds of models is quite flexible (adapting as a function of previous history and domain, for example), what do they consider responsible for the fact that this model is to be preferred? Is it competence? Or might it be something less sophisticated, something like a proto-concept of 'general fitness/suitability'? Such a possibility is highlighted, for example, by recent findings that children view physically stronger actors as generally more preferable in all kinds of areas, e.g., word learning (Fusaro, Corriveau, & Harris, 2009). Do they think these actors are stronger and in addition (or therefore?) more knowledgeable? Or do they rather ascribe an as yet undifferentiated disposition – perhaps hard to grasp with our adult conceptual scheme – that refers to general suitability?

Another related question concerns the broader developmental course of children's selective normative learning. First, where does this selective learning come from? Is there such a thing as a biological disposition to distinguish between models of different characteristics (such as age)? Or is the disposition to preferentially learn from different kinds of models gradually acquired? Second, how is subsequent development to be characterized? In particular, how does this selectivity develop towards more flexibility and sophistication? Is there at first a rather domain-general presumption of competence in adults? Or are there early on already areas where children consider peers more competent members of the (sub) culture? Some studies suggest that early infants in some domains might actually imitate more from peers than from adults (e.g., Ryalls, Gul, & Ryalls, 2000) – but if there is such a pattern, is this based on presumed competence in favour of peers, or just on preference and sympathy? And how then do children learn to differentiate what kind of model knows best about what kind of domain?

This connects to broader questions in this area to be addressed in future research: how do children come to differentiate between areas that are subject to normative

considerations from those that are not? And how do they come to learn what model characteristics are relevant for learning in such different areas (competence is relevant in normative areas, whereas similarity in taste, for example, is relevant in areas that deal more with personal preferences). Similarly, how do children come to learn in which situations there is something general, conventional and normative to be learned, and in which not? And finally, how do they come to distinguish different kinds of norms pertaining to different domains, such as purely conventional versus moral norms (see Turiel, 1983)?

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Appendix A

Game	Material	Procedure
'Daxing'	Styrofoam board with gutter at one side; building block; wooden stick	A_1: use the stick to push building block across the board into gutter A_2: lift board so that building block slides into gutter
'Duping'	Box with small hole in the middle of the top, and one black tube attached next to it; red marbles	A_1: throw marbles into the black tube A_2: throw marbles into the small hole
'Miecking'	Cardboard box with a black tube running down attached to it; On the top there is a tray attached to the cardboard box which can be used like a catapult, white table-tennis ball…	A_1: throw table-tennis ball through the tube A_2: put table-tennis ball on to the tray and catapult it away
'Baffing'	a piece of play-dough; a rubber doorstopper	A_1: make a ball out of the play-dough, kick the ball with the doorstopper over the table A_2: fixate play-dough between the two arms of the doorstopper, and roll both over the table

Note. The verbs used in German were 'Daxen', 'Dupen', 'Mieken', and 'Baffen'.

Appendix B

Follow-up Study 1: Novel label tasks without video

Participants

Sixteen 3-year-old children (34–38 months), sixteen 4-year-old children (46–50 months) and nineteen 5-year-old children (58–62 months) were included in the final sample.

Design and procedure

Following VanderBorght and Jaswal (2009), the two models (the same two as in the videos) were represented with photographs. To introduce them, the experimenter (E) told the child the names of the models and some general features about their lives ('This is an adult, he goes to work every morning … '/'That is a boy, as old as you, he also goes to day care, just like you … '). Child had no trouble recognizing who was the adult and who the child.

The novel label tasks was basically administered in the same way in the main study, except for the following modification: children saw the novel object, and then they were asked the 'ask' question 'Who would you ask what this is called?' (as used in studies by Koenig and Harris (2005a) and VanderBorght and Jaswal (2009)). Regardless of their answer, both models named the object differently (to do this, E animated the picture and spoke for them in different voices) before the standard 'endorse' question 'What is this?' was asked. Each child thus answered 1 'ask' questions and 1 'endorse' question on each of the four tasks.

Results

Table B1. Mean sum of trials in which children chose one of the two models

	3-year-olds		4-year-olds		5-year-olds	
	Ask	Endorse	Ask	Endorse	Ask	Endorse
Adult model	2.13	2.25	2.13	1.94	3.06	2.89
Peer model	1.87	1.75	1.87	2.06	0.93	1.11
Difference adult-peer model	$t(15) = 0.49$, $p = .63$	$t(15) = 1.07$, $p = .30$	$t(15) = 0.41$, $p = .68$	$t(15) = 0.18$, $p = .86$	$t(18) = 3.82$, $p < .01$	$t(18) = 3.84$, $p < .01$

Appendix C

Follow-up study 2: The role of the familiarization phase

Participants

Seventeen 4-year-old children (46–50 months) were included in the final sample.

Design and procedure

The same procedure as in follow-up Study 1 was used, except for the following modification: a familiarization phase as in Jaswal and Neely (2006) was included in which the child model and the adult model labelled four familiar objects in different but equally correct ways (e.g., a shoe was called a 'shoe' by one model, and a 'sneaker' by the other model). Children were then asked whether someone had said something wrong (children mostly answered this question correctly, but in the few case where they answered incorrectly they were corrected). The novel label tasks were then administered in the same way as in follow-up Study 1.

Results

Table C1. Mean sum of trials in the novel label tasks in which children chose one of the two models

	Ask	Endorse
Adult model	2.47	2.21
Peer model	1.53	1.79
Difference adult–peer model	$t(16) = 1.75$, $p = .10$	$t(16) = 0.59$, $p = .57$