

How Children Turn Objects Into Symbols: A Cultural Learning Account

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From around their second birthdays young children engage in activities in which one physical object or situation is used to "stand for" another. For example, 2- and 3-year-olds pretend that an object is something different, they create and interpret simple drawings of objects and situations, and they use simple maps, pictures, videos, and scale models to locate things in real space. These activities in which one thing or situation is used to point beyond itself to another are all uniquely human activities and may be said to involve the capacity to symbolize.

In this chapter we approach children's developing symbolic competence in the wider context of their cognitive and social development. The development of understanding symbolic actions with objects, we claim, is best considered as part of children's developing social understanding more generally, and the development of performing symbolic actions with objects is most fruitfully viewed as a process of cultural learning, based on children's nascent understanding of intentional action and on cultural scaffolding. In our review of empirical findings, we focus on three ways in which children act symbolically with objects: pretend play, drawing, and using three-dimensional objects as symbols. We also review some findings from development in the second year of life, before children become proficient symbolizers with objects, as a way of grounding children's symbolic activities in their cultural activities more generally.

OBJECTS AS SYMBOLS—SOME CONCEPTUAL CLARIFICATIONS

In discussions of symbol use and understanding developmental psychologists and other cognitive scientists often talk as if some physical objects were intrinsically symbols, inherently carrying meaning and referring to the world. But of course this is only a metaphorical way of speaking as it is people who mean and refer, using symbols as their instruments for doing so. Thus, if there is a cloud in the sky that looks like a horse, it is not—by virtue of just being there and physically resembling equines—a symbol for a horse. On the other hand, if the cloud was actually created by a skywriter with an airplane in order to advertise the weekend horse show, then that very communicative act makes the cloud into a symbol (Goodman, 1976). Following Grice (1957), we may say that clouds can have "natural" meaning—for example, dark clouds mean it is probably going to rain, which is purely a matter of causal and covariational regularities in the external world (for perceivers who know these regularities). Truly symbolic matters, however, involve "nonnatural" meaning. A human being making a horse-shaped cloud, drawing a horse on a placard, or asserting "there is going to be a horse show," with the appropriate intentions in the appropriate context, means that there is going to be a horse show. We may even use commonly known causal and correlational regularities in symbolic acts if we have the right intentions; for example, when asked what the weather is going to be like I can simply point to the dark clouds with a concerned facial expression. Nonnatural meanings are thus not out there in the world, but rather are socially constituted through the way persons use and interpret them. Symbols are objects with derived intentionality that is conferred on them through the attitudes, actions, and practices of persons that possess intrinsic or original intentionality (Searle, 1983).

Importantly, the symbolizing process always assumes a collective background of shared rules and practices for symbol making and interpreting. For example, my act of drawing a blue spot on a piece of paper counts as symbolizing water only because of constitutive rules of map-making and because of my intention to symbolize water in accordance with these rules. When I accidentally spill some blue ink on a map, it does not count as water-symbolizing because I did not intend it so. Neither have I successfully symbolized water when I mistakenly draw a green spot on a regular map—since no one else would be able to interpret it. Symbolizing is thus an act that assumes a background of shared rules and practices as an interpretive framework, and so budding child symbolizers must acquire something of these conventions before producing symbolic acts for others successfully.

These fundamental points are often neglected in the developmental psychology of symbolic understanding due to a too literal reading of the metaphor of objects as inherently meaning something. Consequently, too little emphasis has been placed on the social and intentional nature of symbols proper, thus

hindering the theoretical integration of symbolic development with children's general social cognitive and cultural development. In outline form, the view we propose to contribute to such a theoretical integration is this: From around their first birthday children understand other persons as intentional agents in some sense, consequently start to be cultural (imitative) learners, and thus grow into collective intentionality and culture (Tomasello, 1999a; Tomasello, Kruger, & Ratner, 1993). As part of this cultural learning process, children are introduced to different forms of actions, many of them involving artifacts. Through intention reading and imitation they learn the functions, the "intentional affordances" ("what we do with them"; Tomasello, 1999b) of tools, objects that are used for instrumental purposes. Importantly, in a similar way they also learn to perform symbolic actions, first without objects (gestures and language), and then with artifacts (using drawings, replicas, and other objects).

The basic claim is that both instrumental nonsymbolic and symbolic actions are acquired in similar fashion: by cultural, imitative learning based on children's intention reading. Of course symbolic actions have a different intentional structure from instrumental actions. In some sense—to be clarified later—they point beyond themselves and "stand for" something else. And they involve perspective—things are symbolized as being one way or the other, are brought under descriptions. Accordingly, the intentions underlying these kinds of actions are more complex as compared with instrumental actions and should be more difficult to read for children. Despite these differences between symbolic and other forms of actions, the basic claim goes, both are forms of human actions and are acquired by cultural imitative learning. This theoretical perspective has important developmental and comparative implications. It can explain the lack of true symbolic communication in nonhuman primate species by a lack of the necessary intention reading and imitative capacities. And the problems autistic children have with symbolic communication can be traced back to their problems with understanding persons and their actions.

For an adequate description of children's developing symbolic competence, however, some further important distinctions within the class of symbolic actions have to be made. The common denominator, the defining element of symbolic actions is that they carry semantic content. About a symbolic action it can be asked what it means. Paradigmatic symbolic actions have semantic content that represents the world under a perspective and fixes conditions of satisfaction, and they are used to refer to states of affairs in the world in different modes, with the world satisfying or failing to satisfy the semantic content. The two central modes are assertive—where one aims at truth—and imperative—where one aims at bringing the world to fit with the content of the act. The paradigm example of course are speech acts. The assertion "It is raining" has truth conditions—that it is raining—refers to the world and it is true when it is really raining, false otherwise. Assertive speech acts have so-called "word-to-world" direction of fit (Searle, 1969, 1983). With this communicative intention

in asserting the speaker commits herself to the truth of the proposition. Imperative speech acts, on the other hand, have world-to-word direction of fit. With this communicative intention in performing an imperative speech act the speaker commits herself to a change of the world according to the propositional content of the utterance. Necessary for the proper constitution of speech acts are at least collective constitutive rules and practices that confer meaning on words and forms of actions, and individual intentions in the specific case of performing a speech act.

Importantly for our present purposes, symbolic actions in this paradigmatic sense can also be performed with means other than linguistic ones, involving physical objects.¹ Using drawings, maps, photos, and other objects are good examples. When asked about the weather outside, I can take a pencil and paper and draw rain drops. Or I can go outside with my Polaroid camera and bring back the freshly developed photo as an answer. I could even take the other person to the shower and switch it on, saying “That’s what it looks like outside.” These kinds of actions make use of natural meaning (the causal regularities of camera mechanisms) and isomorphisms (in the case of drawing and the shower) or both, but still they are proper symbolic acts only in virtue of some collective standards of interpretation and the individual intentions in performing these acts. Let us then call these symbolic acts in the narrow, paradigmatic sense “denoting” symbolic acts (Goodman, 1976).

However, there are many symbolic acts—in a more wide sense of “symbolic”—that are not denoting. Most instances of drawing are not denoting, for example. When I draw a blue house with a yellow tree beside it, I could refer to a specific house and a specific tree and represent them as blue and yellow, respectively, and as standing beside each other. For example, when asked “what does it look like where you live” I could use the drawing to make an assertive act. Or I could use the drawing as an instruction for my architect, telling him how to reconstruct my home, thus making an imperative act. But I can also just sit down and make such a drawing without referring to anything and without making any kind of assertive or imperative act. I just draw a blue house beside a yellow tree, that’s all. To adopt a phrase of Goodman (1976), it is not a drawing of a specific blue house, it is just a “blue-house-drawing.” Here we have a case of a symbolic act that does not refer, because it is not intended to refer—I do not want to make any claims or requests with it, though it can be said to have semantic content: “that there is a blue house, etc.” Similarly, when I pretend that a KGB agent is following me, the question “Which agent and what do you want to tell us about him?” does not arise. It is a notoriously difficult question how to

¹ In this chapter we speak very loosely of “assertive acts” or “predication,” for example, in the context of nonlinguistic symbolic actions. This is not in any way to equate nonlinguistic acts to linguistic ones—rather, for the sake of readability we leave out the “proto”-prefix.

exactly analyze the logical structure of such symbolic acts in the more wide sense, but for our purposes it is sufficient to note that they are less complex than denoting acts in that no coordination between semantic content and referent situation is required, and accordingly no evaluation of fulfillment. Let us call these kinds of actions “nondenoting” symbolic acts (Goodman, 1976).²

Armed with these conceptual tools, we can now articulate a framework for the description and explanation of developmental phenomena in the domain of symbolic functioning: Symbols carry nonnatural meaning. They are socially constituted by use, by collective normative background practices and individual intentions in performing symbolic actions. Children are culturally introduced to these action forms as they are to other forms of actions, and acquire symbolic competence by imitative cultural learning. Our Cultural Learning Theory of symbolic development thus hypothesizes the following ontogenetic picture: Children learn different forms of symbolic actions through intention reading and cultural imitative learning. Equipped with a nascent understanding of intentional action and referential attitudes, children from 1 year on start to learn a natural language as a denoting symbolic action form (Tomasello, 2000). That the first symbol system children learn is a denoting one, is a necessary, conceptual point: The only way to learn a first symbolic action form is in triangulation contexts (Davidson, 1982), where the child and a communicative partner share common scenes of reference in the world (child–partner–world triangle), and where words and sentences are learned in referential and truth-evaluative ways. Otherwise words could not get off the ground.

Once a child has acquired basic abilities in natural language, however, this opens up the possibility to enter into other symbolic action forms. Beginning at age 2, children to some degree understand and imitatively learn nondenoting symbolic actions with objects. They describe the content of drawings and produce some simple drawings themselves. Pretend play comprehension and performance is another case. Although object substitution pretense can only be said to be symbolic in a very weak sense—one acts as if an object of kind A were a B, thus “symbolizing” B-ness—it can be considered a case of a nondenoting symbolic act. At least from 2 years on children do understand this “symbolic” relation between an object’s real and a fictive identity that is assigned in pretense (e.g., Harris & Kavanaugh, 1993). What is missing in this early understanding of drawing and pretense, however, is a grasp of denoting symbolic actions with objects.

² It is important to note, however, that these acts are logically derivative in relation to denoting symbolic actions of some kind—they can only work against a shared schema of interpretation. They cannot stand on their own, but presuppose a denoting symbolic system—a natural language paradigmatically—that can be used to fix interpretations. When you are unsure whether I have drawn a blue house or a blue hut, the question is normally settled by my telling you what I have drawn.

Somewhat later, then, children come to an understanding of denoting symbolic actions with objects and consequently imitatively learn these. This decalage of competence with denoting compared to nondenoting acts is, we argue, due to the more complex nature of the symbolic/communicative intentions in denoting actions. Somewhat simplifying, one could say that in comprehension nondenoting acts the child has only to understand that a person assigns a content—a sense—to an object (though, of course, the child does not have to understand sense as sense in an adult way), whereas regarding denoting acts he or she has to understand that sense is assigned to an object and that its user is making a form of illocutionary referential (paradigmatically assertive or imperative) act with it.

Finally, 4-year-olds, begin to acquire the ability not only to use symbolic media, but to explicitly think and talk about them as such: They achieve a metalinguistic and meta-representational ability, more generally (Perner, 2000; Perner et al., 2002). Central to this development, we argue, are specific forms of meta-representational discourse that natural languages quite naturally supply and which children gradually acquire (Tomasello & Rakoczy, 2003). Most important are propositional attitude and other embedded clause constructions, involving embedded propositions that are not states but indicate the content of a mental state (e.g., “He believes that p”), a communicative act (e.g., “She says that p”), or any meaningful state of affairs (e.g., “This drawing means that p”). The acquisition of these discourse forms provides children with the means to explicitly construe mental states and representational media as perspectively referring to the world.

In this chapter, our main focus is on children’s comprehension and use of physical objects as symbols, both in nondenoting and denoting ways. We illustrate our approach reviewing findings from the areas of drawing, pretense with objects, and use of replicas and markers in communication. Before doing that, however, it is necessary first to examine some related activities that emerge earlier in ontogeny, namely: (a) the use of material artifacts for conventional functions—such things as spoons for eating and scissors for cutting—which requires a basic understanding of how people’s intentions (though not communicative intentions) may become embodied in objects; and (b) the comprehension and expression of communicative intentions in face-to-face interaction through the use of conventionalized communicative devices such as pointing and linguistic symbols. These two precursor activities would seem to be necessary for children to learn to use objects as symbols, that is, to culturally learn, through other people, to comprehend and express communicative intentions via the medium of physical objects.

One to Two Years

Early in development, young infants grasp, suck, and manipulate objects, and so learn something of their affordances for action; this is direct individual learning (Gibson, 1982). But the material artifacts of a culture have another set of affordances for anyone with the appropriate kinds of social–cognitive and social learning skills. As human children observe other people using cultural tools and artifacts for conventional purposes, they often engage in a process of cultural learning in which they attempt to place themselves in the ‘intentional space’ of the user—discerning the user’s goal, what she is using the artifact *for*. By engaging in this cultural learning, the child joins the other person in affirming the artifact’s conventional function: Hammers are for hammering and pencils are for writing. After she has engaged in this process the child comes to see some cultural artifacts as having, in addition to their natural sensorimotor affordances, another set of what we might call intentional affordances, based on her understanding of the intentional actions that other persons normally perform with that artifact (Tomasello, 1999a, 1999b). Children begin to understand the intentionality of artifacts soon after their first birthdays, as this is when they begin reliably to use tools in conventional ways, and to reproduce the intended acts of others even when those acts are never actually enacted (Meltzoff, 1995).

So what is different if a carpenter holds up a hammer after lunch break to indicate to his coworkers that it is time to go back to work? Or a child hops a hammer up and down for her mother pretending it’s a rabbit? Or a school child asks a mate to consider a hammer the island of Cuba and then indicates where on it Havana is located? In these cases the hammer is not being used in an instrumental act toward a change of state in the physical world, but rather it is being used as a part of a communicative act whose goal it is to affect the intentional or mental states of another person. If the recipient recognizes the communicative act as such, she will search for how this manipulation of the hammer is relevant to the situation at hand (Sperber & Wilson, 1986). Holding up a hammer does not always mean “back to work”; hopping a hammer up and down does not always indicate a rabbit; and hammers are normally not Cuba. The hammer can take on these nonnatural meanings only in communicative contexts in which the interactants share, and know that they share, some kind of conceptual “common ground” such as the knowledge of how long lunch breaks last or the conventions of maps (Clark, 1996).

Could children go from instrumental manipulations of objects directly to using them and understanding them as communicative symbols? Perhaps, but it is likely they are aided in this process by their emerging understanding of communicative intentions as they are used in face-to-face interactions involving social conventions—such as gestures and language—whose sole *raison d’être* is interpersonal communication. Understanding a communicative intention as expressed in an utterance or gesture is a special case of understanding an

intention; it is understanding another person's intention to make a statement or request toward me. To understand that another person intends to open a drawer, I must simply determine her goal with respect to the drawer. But to understand what another person intends when she points me to a drawer, I must determine her goal with respect to saying something about the drawer to me. This embedded quality makes communicative intentions especially complex, and indeed in all of the animal kingdom it is only human beings who point one another to things, show one another things, teach one another things, and engage in linguistic communication about external topics.

By all accounts young children begin understanding the communicative intentions underlying gestures and language in the months immediately following their first birthdays. It is at this age that they begin to point for others simply to share attention (Liszkowski, Carpenter, Henning, Striano, & Tomasello, 2004), and they typically comprehend some linguistic symbols at this age as well. Many infants also begin actively using linguistic symbols at around this time. Some have proposed that the earliest linguistic symbols are simply vocalizations embedded in sensorimotor routines (Bates, 1979), but there is good evidence that children use many of their early linguistic symbols flexibly across contexts from the beginning (Harris, Barrett, Jones & Brookes, 1988)—one sign that they are truly symbolic. Children can also learn new words fairly readily during this period (Woodward, Markman, & Fitzsimmons, 1994), and they can also learn arbitrary gestures and sounds to refer to objects (Namy & Waxman, 1998; Woodward & Hoyne, 1999). Perhaps most importantly for current purposes, by the time they are 18 months old young children understand something of the perspectival nature of linguistic symbols as they began categorizing various entities and predicating different things about them (Clark, 1997; Tomasello, 1999a). That is, they have begun to understand that one and the same object may be a dog, an animal, a pet, or pest; and it may be big, wet, pretty, or happy. This is important for our concerns because to use an object as a symbol the child will need to understand, at least to some degree, that one object or situation may be seen from different perspectives (come under different descriptions).

Pretend Play

From around their first birthday infants learn instrumental and conventional actions with objects. And they learn symbolic actions—gestures, pointing, language—without objects. Toward the end of their second year infants then start to perform nonserious and noninstrumental actions with objects that have been traditionally called “symbolic play” (e.g., put a telephone receiver to their mouth, make chewing movements, and say “Hm! A banana”). Now, in such a pretend play action, is the telephone a “symbol” for bananas, and if so, in what way? Piaget (1962) in a conceptually less than clear way called such actions symbolic because he claimed that the objects involved (e.g., the telephone)

function as symbols of real objects (e.g., bananas). Proponents of the behaving-as-if theory of early pretense understanding, however, have disputed this claim. According to Perner (1991), for example, pretending is just acting-as-if but does not involve any kind of symbolizing. We think this disagreement is partly conceptual/terminological and only partly empirically substantial. The distinction between nondenoting and denoting symbolic actions is very helpful here: In the wide sense of nondenoting symbolism, usual pretense actions can be called symbolic actions, and objects involved can be said to be symbols for something. This, we think, is harmless. However, part of the point of pretending is the suspension of commitment to truth, that is, no claims about the world are made, no orders given, etc. That is, pretend actions are not denoting, but only symbolic in the wide sense, similar to nondenoting pictures. Both about the telephone in the pretense scenario and about yellow scribbles in a picture it can be said that they mean “banana-ness” in some sense. But neither do they refer to any specific banana, nor are they denoting acts performed. Rather, the sortal predicate “banana” is applied to both the telephone and the scribbles in a nonliteral way—the telephone symbolizes the property (or the predicate, if one prefers a more nominalist reading; see Goodman, 1976³) of “banana-ness.” It should be noted, however, that pretending can in exceptional contexts be used in a denoting way. Historical drama is an example, where by the pretense assertive claims about the world are made. Historical drama is then to usual pretending what denoting drawing is to nondenoting drawing.

Toward the end of their second year, children begin to understand and perform simple pretense actions. From 24 months they understand that one or even several different fictive identities can be assigned to an object in pretense; they can follow simple pretense scenarios, join in with appropriate own pretense actions and can draw appropriate inferences within the fictive scenario; and they start to talk about the fictive states of affairs stipulated in pretense (Harris & Kavanaugh, 1993).

Within the framework of Cultural Learning Theory, pretense development, as all symbolic development, is most fruitfully seen as part of children’s general social cognitive development: Based on their nascent ability to understand persons and their intentional actions children first learn practical instrumental actions and then language as the most basic denoting symbolic action form. Armed with an understanding of intentional action, some nascent understanding of hypothetical and counterfactual possibilities and a basic proficiency with a natural language, children then come to understand and imitatively acquire pretending as a new intentional, nonserious action form. In contrast to Piaget’s

³ We adopt here a realist way of talking about these matters, speaking of symbolization of “properties” and “propositions.” However, the present framework does not depend on such a reading—on a more nominalist reading one can substitute “predicate” for “property” and “sentence” for “proposition.”

theory (1962) and some more recent cognitive models (e.g., Nichols & Stich, 2000) that view pretense as arising out of the child's individual imagination in a mainly egocentric and assimilative process, one of the main claims of the present approach is that pretense is acquired as an action form in similar ways as are instrumental action forms, namely by cultural imitative learning, supported by adult scaffolding.

Support for this claim comes from studies by Striano, Tomasello, and Rochat (2001). Two- and three-year-old children were supplied with a rich set of different kinds of objects they could play and pretend with. The three kinds of objects were replicas (e.g., dolls, replica persons), natural objects (e.g., stones, sticks), and instrumental objects (objects with already established conventional instrumental functions, e.g., scissors). First there was a model phase in which the experimenter either performed a pretense action herself or verbally described a pretense action that could be performed, then the child could play with objects herself. The main findings were that the 2-year-olds' pretense with objects was imitatively learned to a large degree, heavily scaffolded by adult instructions, little creative and item-specific such that children pretended mostly with toys with established pretense functions (i.e., replicas). The 3-year-olds still mostly imitated the experimenter's actions or followed her verbal proposals, but in contrast to the 2-year-olds also showed a considerable amount of creative pretense, and more pretense with the natural and instrumental object sets. These findings are taken as evidence that early pretense is imitatively acquired and heavily relies on adult scaffolding, with creativity being a later achievement. In this respect pretense acquisition can be seen as analogous to language acquisition: Early acquisition is mainly a matter of imitation and rather item-specific, with creativity and generality only gradually developing.

In another set of studies, the so-called "Virgin Objects" studies (Rakoczy, Tomasello, & Striano, 2005), we looked at the imitative acquisition of pretense compared to other action forms in more detail. The main focus of these studies was the cognitive and cultural ontogeny of actions with what could be called tools (objects used for instrumental purposes) and toys (objects used in nonliteral ways in pretend actions). The reasoning here was that both kinds of actions, instrumental actions with tools and pretense actions with toys, can be and to a large degree are acquired in similar ways: by cultural imitative learning based on children's understanding of others' intentional actions. However, there are also differences to be expected in the acquisition of the two kinds of action forms. First, pretense actions basically have a more complex intentional structure than instrumental actions. In the latter the intention is to change the world in a concrete way, in the former one wants to act according to a counterfactual proposition in a nonliteral way only. Accordingly, early on imitation of instrumental acts should be easier than imitation of pretense acts. Second, in contrast to Piaget (1962), who views early pretense as less social than other action forms, we hypothesized that early pretense should be in fact more

social in nature than instrumental action forms, because it involves a stronger form of collective intentionality. Instrumental actions on tools can be acquired in a socially mediated way: Children can imitatively learn through others about the physical functions of tools which they also could discover on their own. However, these functions are “out there” in the world, anchored in the objective physical properties of the objects (the hardness of the hammer, the sharpness of the knife). The “functions” of objects in pretense contexts, in contrast, are not out there in the world, they are “status functions,” socially constituted (Searle, 1995). That is, they are constituted by a collective practice and accordingly can not be discovered in the way physical function can be discovered. This led to the prediction that children’s behavior in performing pretense should reveal itself more social than in performing instrumental actions, as indexed (e.g., by their social gazes and smiles). Third, the contention that pretense actions have a more complex intentionally structure than instrumental actions, together with claim that pretense involves a stronger form of collective intentionality, which is expected to be supplied and scaffolded by adults first, led to the prediction that early creativity should be rare in pretense acts compared to instrumental acts.

To test these claims, 24-month-old children were presented with a set of novel “Virgin” objects they did not know to simulate their first encounters with, objects uncontaminated by previous experience and affordance learning. The experimenter (hereafter E) first demonstrated one or several actions with each object in a model phase, and then in the test phase the child was given one object after the other, asked “What can you do with that?” and was given the opportunity to perform up to three actions with each object. Half of the objects E did a pretense action with, with the other half he performed instrumental actions. The frequency and quality of modeling was varied both for pretense and for instrumental actions across objects (either E performed one action with the object once, or he performed one action with the object four times, or he performed three different actions with the object).

The basic findings were that the pattern of imitations across the frequency variations were structurally analogous in the pretense compared to the instrumental conditions (for both action types, children imitated most when three different actions were presented, next most when one action was presented four times, and least when only one action was only presented once). This is taken as evidence that pretense actions are acquired by imitative learning in analogous ways as instrumental actions, and accordingly that for young children tools become tools and toys become toys ontogenetically in similar ways. However, the absolute imitation rates were significantly lower in pretense compared to instrumental actions. Regarding creativity, a huge asymmetry was found: Many children performed creative instrumental actions, whereas only few children performed creative pretense actions. This can be taken to show that indeed pretense acts because of their more complex structure are harder to understand and to imitate, and that creativity in pretense is a later achievement compared to

instrumental acts. Most importantly in terms of the social nature of children's behavior, during pretense actions children looked to the experimenter twice as often (and in one study smiled significantly more at him) as during instrumental acts, indexing some awareness of the strong collective intentionality in the joint construction of status functions in pretense.

These studies thus produced evidence that 2-year-olds understand pretense as an intentional, symbolic (in the wide sense) activity and imitatively come to acquire pretense as a symbolic action form themselves. In another set of studies (Rakoczy, Tomasello, & Striano, 2004) we tested children's understanding of the intentional structure of nonliteral pretense actions more stringently. The hypothesis here was that young children have a truly intentional understanding of pretense as symbolic activity and not only a superficial behavioral one. More specifically, that even young children understand pretending as intentionally acting according to a counterfactual scenario, that is, acting symbolically in a wide sense, different from other superficially similar forms of behaving-as-if (e.g., unsuccessfully trying to perform an action, where the actor has no such symbolic intention, and that they make use of this understanding in imitating pretense actions and joining into shared pretense scenarios).

Two- and three-year-olds were shown pairs of superficially analogous incomplete as-if-behaviors with objects, pretending to do an action and unsuccessfully trying to do the same action (e.g., to pour from a container into a cup). In both cases the actor would make pouring movements with a novel container over a cup, but without actual pouring happening. In the one case, he would mark it with signs of playfulness and sound effects as pretending to pour, in the other case he would mark it with signs of surprise and frustration as trying to really pour. Importantly, the container did really contain water and thus could be really used to pour. In the first study the situation was set up as an imitation game. After the actor's model action children were then given the object and could act with the object themselves. Three-year-olds very clearly showed that they understood pretending and trying as such: After trying models, they really performed the action themselves or tried to really perform it, often commenting on their failure (e.g., "I cannot do it either"), but after pretense models they only pretended themselves and did not care about the real effects of their acts (e.g., whether there was water coming out of the container). The 2-year-olds showed the same clear pattern after trying models: They mostly performed the real action or tried to, and hardly ever pretended themselves. After pretense models, in contrast, they equally often performed pretense and trying responses. However, they did show vastly more pretense responses after pretense models than after trying models, suggesting they did distinguish the models and responded accordingly, but suffer from a performance problem: They have a general tendency to really do the action that is hard to overcome. In another study, 3-year-olds were presented with some of the same model pairs, but now not in a strict imitation game only. Rather, the pragmatics of the situation was set up to encourage more

productive inferential responses as well (by introducing additional objects, both tools and toys, that could be used in serious and pretense actions). When the children now saw an actor try to pour they themselves then really did the action or tried to, but with different means. For example, they made use of a tool to open the container first. When the actor had pretended to pour, in contrast, children themselves pretended to pour and then went on to pretend to drink and give a Teddy bear a drink. That is, children showed a rich understanding of the intentional structures of pretending and trying as different forms of behaving-as-if: In trying to pour the actor wants to make the proposition “there is water coming out of this container” true by bringing it about, in pretending to pour the actor symbolizes “there is water coming out of this container,” he acts as if it was true. Accordingly, these two kinds of behaviors license very different inferences that children grasped: in the trying case, that other means should be used, in the pretense case, that in shared pretending the stipulated pretense proposition should be respected.

In sum, these studies showed that from their third year children understand pretending as intentional nondenoting symbolic action, based on this understanding imitatively acquire pretense as an action form and can follow into stipulated pretense scenarios in shared pretense. They understand that pretenders assign counterfactual scenarios to their actions (symbolize them in a wide sense), that these scenarios are not to be taken literally and that specific inferences and actions—quarantined from reality—are warranted regarding these scenarios.

There is thus good evidence that young children have some quite rich understanding of pretending as nondenoting symbolic action form. But what about denoting pretense? As noted before, pretense is usually characterized by being nondenoting: One does not make assertive or imperative acts about the world, but just assigns fictive content to actions, much like in nondenoting drawings. There are, however, exceptional cases where pretense can be used in denoting acts. When asked what Socrates did with the poison, for example, I can pretend to pour from a container into a cup, pretend to drink (in the same way as the actor and the child pretended in the above mentioned study), and then pretend to die. Here I make an assertive historical claim about the world. When do children understand such forms of denoting pretense? Unfortunately we know of no studies that investigated this question directly and systematically. In a recent study, however, Tomasello, Striano, and Rochat (1999) looked at the relation of understanding pretense and denoting acts more indirectly. In an object choice game, the experimenter asked children to give her one target object from an array of objects. In one condition, E first pretended that the target object (e.g., a ball) was something else (e.g., an apple). In the test phase she then asked for the ball by saying “Can you give me the...?” and held up a real apple. Though this task requires some coordination between pretense and denotation, note that the structure of this task is not the same as the structure of historical

denoting pretense in the case of Socrates: In this task a former pretense identity of an object (i.e., apple) is alluded to in order to make a serious denoting imperative act (i.e., asking for the ball). Results showed that 2-year-olds could not solve this task, and even 3-year-olds were not very good at it. This suggests that indeed children first understand pretending as intentional nondenoting activity with symbolic content, but that denoting pretense is a more complex phenomenon that requires the coordination of content and denotation is mastered only later. However, more direct and systematic research is needed to clarify this issue.

Comprehension and production of pretense as a symbolic activity does not presuppose an explicit understanding of the symbolic relations established in pretense, in the same way as linguistic competence does not presuppose explicit meta-linguistic competence. Children understand and use words long before they master the word “word,” and they understand and perform pretense long before they explicitly talk about pretense. It is a somewhat controversial question what should be regarded as the first clear indicators of an explicit meta-representational awareness of pretense as such. In their fourth year children can explicitly state what an object really is (e.g., a ball), and what one pretends it is (e.g., an apple; Flavell, Flavell, & Green, 1987), which can be taken as evidence that they explicitly understand that the pretender establishes a symbolic relation between an object (ball) and a property/predicate (being an apple). Yet not until age 5 do children seem to acknowledge that pretenders have to have some concepts pertaining to the pretend properties (e.g., have to have the concept “apple”; Lillard, 1993), putting into doubt the contention that 3-year-olds really understand the representational relation between the object and the pretend property.

Theoretically, a central factor in the development of a meta-representational understanding of pretense is, we argue, the acquisition of explicit discourse about pretending making use of embedded clause constructions (“pretend that p,” e.g., “He is pretending that she is giving him an apple”). These constructions provide a means to explicitly talk about pretense scenarios and contrast them to reality, and are organized in a systematic net of inferential relations (e.g., from “He pretends that she is giving him an apple” it usually follows “He now pretends to have an apple,” but “He is getting an apple” does not follow, etc.). Support for this central role of explicit pretense discourse comes from a recent training study we did (Rakoczy, Tomasello, & Striano, in press). Two groups of 3½-year-old children received intensive experience with diverse pretense activities (and were compared with a control group that got functional play experience). For the Explicit Group, the pretense experience was accompanied by explicit discourse making use of “pretend that” (e.g., “I pretend that this stone is an apple, but really it is a stone”) and “pretend to” (e.g., “She pretends to give him an apple”) constructions. In the Implicit Group, in contrast, the pretense scenarios were talked about implicitly, making use of specific pretense

discourse markers (e.g. “This is my apple” in a funny voice, etc.). In the posttest, only the Explicit Group showed improvement on pretense–reality distinction tasks where they had to state what an actor had pretended of an object and contrast this with what it really was, and tests where children had to tell whether someone had pretended or tried to do an action verbally. Explicit discourse about pretending and the pretense identities of objects thus turned out to be crucial in the development of reflective understanding of pretense.

In sum, based on their understanding of intentional action and basic language abilities, children from age 2 begin to understand pretense as non-denoting symbolic action form and become pretenders themselves by cultural imitative learning. Only later do they develop competence in comprehending and using pretense denotingly, and not until later in the fourth and fifth year do they have a firm explicit meta-representational grasp of pretending as symbolizing.

This pattern, we argue, shows some interesting commonalities with the development of drawing comprehension and production to which we now turn.

Drawing

From the time they utter first words, children show some awareness of drawings: They readily name the objects depicted in picture books in the routine of naming games (Ninio & Bruner, 1978). Does this show that 1-year-olds already have a proper understanding of drawings? Obviously not, for a theoretically important reason: From phenomena like naming objects in drawings, it is not clear at all whether children understand pictures as symbols even in the widest sense. The alternative would be that they understand drawings of dogs, for example, as simply objects that somehow look like dogs without being proper dogs. When we see a cloud that looks like a sheep we can recognize that and say “Look! A sheep!”, but that does not imply that the cloud symbolizes sheep in any way, nor that we think so—because symbolic content is conferred on objects by the intentions and actions of producers and users. “Drawing” is a historical concept, that is, whether something is a drawing depends essentially on its history. This leads to the methodological point that children’s reactions to drawings as objects of which they do not know the history is in principle insufficient to tell us about their understanding of drawings as truly carrying symbolic content (i.e., nonnatural meaning). Rather, the focus has to be on children’s comprehension and performance of drawing as an activity that confers meaning on scribbles.

One study with such a focus was done by Bloom and Markson (1998). Three- and four-year-old children were first asked to separately draw (with different colors) a balloon and a lollipop. Note that these drawings usually did not look like balloons or lollipops, or when they did, they looked as much like a balloon as like a lollipop. Then came an intermediate phase where child and experimenter did something else, and later the experimenter “re-discovered” the

drawings and asked the child to name them. Even the 3-year-olds were good at identifying their drawings. Importantly, to do this no reliance on similarity could have helped, so children must have remembered—aided by the different colors of the scribbles—the intentional history of the drawings. They thus showed an understanding that drawings are symbols in virtue of and individuated by the history of its creation. This study, however, only shows understanding of nondenoting symbolism in drawing, as children did not have to comprehend or produce any assertive or imperative acts involving drawing.

The development of understanding and using drawing in denoting symbolic actions was investigated in a series of studies by Callaghan and colleagues (Callaghan, 1999, 2000; Callaghan & Rankin, 2002). In one set of studies (Callaghan, 2000) an experimenter played an object choice game with children. The child was asked by E to select from an array of objects “this one,” where E held up a drawing of an object of the same kind as and sharing some properties with the target object. Three-year-old children were quite successful in these tasks, even when the target object was from the same basic level category (had the same basic sortal label) as the other distractor objects in the array. In contrast, 2½-year-old children also showed some success, but only when the target object was from a different basic level category as the distractor objects. These findings show that toward the third birthday there develops an understanding of using drawings in denoting actions, which is, however, heavily supported by the use of language, especially object category labels (as indexed by findings with the 2½-year-olds). In another set of studies, children’s comprehension and production of drawings in denoting imperative acts were directly compared (Callaghan, 1999). A similar object choice game was played, with the child in different phases in both the roles of the giver (as in the abovementioned study) and the drawer (producing a drawing to indicate to a person which object to give to the child). Two-year-olds failed both in the comprehension (i.e., did not give the depicted object) and in the production version (i.e., did not produce appropriately distinctive drawings), whereas 3- and 4-year-olds were successful in both versions. There was also a huge correlation for all age groups between comprehension and production of using drawings in the imperative act. These findings are interpreted as showing that underlying both comprehension and production is an understanding of drawing as a action that can be used in denoting symbolic acts.

Most importantly from the point of view of Cultural Learning Theory, in a training study Callaghan and Rankin (2002) looked at the factors promoting the development of understanding and using drawing in denoting symbolic actions. From 28 months on, children participated in this study for several months. The training group was involved in weekly drawing games where the intentional structure of referential drawing was highlighted: The child took out one toy at a time from a bag and the experimenter then carefully drew that object, stressing the intended match between object and drawing (“This goes with that,” placing

the object onto the corresponding drawing). The control group got a placebo version involving no such experience. After 4 months, the training group significantly outperformed the control group on both graphic comprehension (again measured by an object choice task) and production (measured by the accuracy of their referential drawing). This finding suggests that understanding and producing drawing as an intentional symbolic action form are acquired in a cultural context, with adult scaffolding and language playing a central role. Moreover, the study tested for their understanding of pretend play actions as well. Interestingly, graphic comprehension was highly correlated with pretend play comprehension, as should be expected on the hypothesis that understanding intentional symbolic action forms is the common underlying denominator in both.

In sum, there is converging evidence that toward their third birthday children (in Western cultures) begin to understand drawing as an intentional symbolic action form. They understand that the identity of a drawing is essentially constituted by the graphic intentions of the producer and that drawing can be used in denoting symbolic acts (e.g., in asking for objects). Cultural scaffolding plays an important role in this development, necessarily involving language as basic interpretational scheme: the meaning of pictures is taught by applying general predicates to scribbles (in the case of nondenoting drawings) and by verbally highlighting the relation between depicted and real states of affairs and embedding of drawings in verbal frames (in the case of denoting drawing). As in the case of pretense comprehension, in drawing we expect that comprehension of nondenoting actions precedes comprehension of denoting actions. Unfortunately, however, we know of no systematic studies that directly speak to this issue. Bloom and Markson's (1998) test of nondenoting drawing were not done with children younger than three, and Callaghan's studies did not involve tests of nondenoting drawings. Children's early naming of picture book drawings has often been taken as evidence for early understanding of nondenoting drawing. However, as argued before, it is rather ambiguous what early naming of drawings in books reveals about children's graphic understanding, as it pertains to drawings as static objects and could be based on perceived similarity alone. Everyday and some experimental observations of children's naming of their own and other person's ambiguous drawings, the production of which they have witnessed, however, provide a more convincing impression: even 2-year-old children readily follow instruction to "draw an X" (Golomb, 1973, 1992), state what they are drawing even when it is not recognizable as such, and name other people's ambiguous drawings in accordance with what they have announced to draw. Future research will have to further clarify the developmental course of comprehension and production of nondenoting versus denoting drawing.

As in the case of pretense, it is a somewhat disputed question when children first show a metarepresentational understanding of drawings as representational

objects. We agree with Perner (1991) that Level II perspective taking at 4 years (e.g., Flavell, Everett, Croft, & Flavell, 1981) presents the earliest convincing evidence that children explicitly understand drawings as representational objects that can get different interpretations from different perspectives: When sitting opposite an experimenter with a drawing of an animal lying on the floor between them, not until age 4 can children say that, for example, that from her own perspective, the turtle stands on its feet, but from the experimenter's perspective, it stands on its head. As in the case of meta-representational pretense understanding, however, not until age 5 or so do children seem to understand some more complex meta-representational aspects of the constitution of drawings: Even 4-year-olds tend to say that a person who is producing a rabbit-shaped drawing, but does not know about rabbits, is in fact drawing a rabbit (Richert & Lillard, 2002).

As in other areas of meta-representational development, explicit discourse about drawing probably plays a prominent role in developing an understanding of drawings as representational media. Though there is not one unique construction like "pretend that" in the case of pretense, there are many ways to explicitly talk about drawing and its content, paralleling meta-linguistic discourse such as, "I am drawing that he has an apple" (paralleling "I mean that he has apple"), "With this circle I refer to that ball" (paralleling "With 'ball' I refer to that one over there"). The training study by Callaghan and Rankin (2002) has provided evidence for the role of discourse about referring to objects in drawing in the development of understanding denoting drawing. We think future training studies will find evidence for the influence of explicit drawing discourse on the development of understanding drawings meta-representationally.

Using Replicas, Markers and Models

Another interesting area is children's developing comprehension and production of symbolic acts with three-dimensional objects. In the case of pretense it was seen that from 2 years on children understand and produce nondenoting symbolic actions with objects: They understand and produce pretense that a stone is an apple, for example, thereby symbolizing "apple-ness" in a nondenoting way. An interesting related question is when children begin to understand and produce denoting symbolic actions with objects. Replica object present a very interesting case here: The first instances of children's pretense with objects usually are done with replica objects in the second half of the second year (e.g., children pretend to eat replica apples), with pretense with neutral objects coming later (Elder & Pederson, 1978).

In the abovementioned study on understanding denoting drawing, Callaghan (2000) included a condition in which the experimenter asked the child for the target object by holding up a replica of the target, saying "Can you give me this one?" The 30-month-old children, in contrast to the 36-month-olds, failed at this

task. In fact, the performance in this task was very similar to the task where a drawing was used: 30-month-olds failed at both, 36-month-olds succeeded at both.

Tomasello, Call, and Gluckman (1997) tested human children and great apes (chimpanzees and orangutans) for their understanding of denoting acts with neutral marker objects and replicas. In an object finding game, subjects were introduced to three containers, into one of which one experimenter, the Hider, put an interesting object (a sticker for children, food for apes)—not visible for the subject. The second experimenter, the Communicator, then gave the subject communicative hints, accompanied by heavy use of nonverbal expressions conveying a helping attitude, by either pointing to the correct container, placing a neutral marker object on top of it, or holding up a replica of it. Thirty- and 36-month-old children were above chance in all three conditions, with pointing being easiest, followed by marker and replica (the 30-month-olds were only slightly above chance in the replica condition). The apes, in contrast, did not perform above chance in any of the conditions (with the only exceptions that those who had been trained with markers for hundreds of trials mastered this condition, and that one ape who had been extensively trained with the pointing gesture succeeded in this condition). These findings show that young children, but not apes, came to the experiment with an understanding of communicative denoting acts and with a sensitivity to the pragmatics of the game, and that this allowed them to figure out the intended use of the objects in the communicative acts of the Communicator quite rapidly. The apes, in contrast, without such an understanding of communicative denoting intentions, had to rely on purely correlational learning: Only those who had had hundreds of trials were successful. That is, children figured out the nonnatural meaning of novel denoting acts, whereas apes laboriously learned the natural meaning of the acts (pure covariation with location of food).

It seems *prima facie* a somewhat paradoxical finding that the use of neutral marker objects was easier to understand for children in this study compared to replica objects, especially given the opposite pattern in pretense development, where pretending with replicas precedes pretending with neutral objects. One possible solution for this paradox is this: In referential marker use, intrinsic properties of the object are irrelevant. Rather, it is the extrinsic spatial relation of the marker to the container that is used to make the assertive act (“It is in here!”). In referential use of replicas, however, it is intrinsic properties of the object that determine reference. Consequently, the properties in question have to be noticed, and a correspondence has to be established between the object and the one it is supposed to refer to. This correspondence is difficult for young children to establish, because interesting intrinsic properties of the object make it hard for them to understand the object as at the same time being interesting in itself and being used to refer to something else (“dual representation problem,” DeLoache, 1995a, 1995b). In pretending, in contrast, objects are not used in a

denoting way. Therefore no coordination between object and reference situation has to be established, only a coordination of object and content (i.e., fictive pretense kind and properties) assigned to it in pretense actions. As for this assignment no extrinsic spatial properties are helpful (as they are in the case of marker use), it is not easier to pretend with neutral objects. Why, however, it is in fact easier to pretend with replica objects, is a very interesting question. Should not dual representation play a role here as well? One possibility is that it is precisely because pretense is nondenoting that dual representation does not play a role: In pretense objects are not used to refer to other objects and to make denoting acts. Rather, objects are merely acted with as if they were of another kind or had some other property. For example, in pretending to cut with a miniature replica knife one does nondenotingly symbolize “knife-ness” in some way. However, that does not require coordinating the replica with a reference situation, but merely the nonliteral projection of a kind (being a knife) onto an object that looks much like objects from that kind. And this projection is very concrete, anchored in an action (e.g., making cutting movements). The intrinsic properties of replicas, above all their shape—similar to objects of the real kind—thus make it easier to perform with them nonliteral pretense actions that are similar (in terms of movement) to the actions one performs with objects of the real kind.⁴ In pretending that a replica knife is a knife one does not have to think where the handle is and accordingly where to grasp it, which in contrast one has to determine in pretending to cut with a stick.

Another, complementary, possibility is that pretense with replicas is easier because it is more common and culturally scaffolded. In fact, there is a whole industry of producing replicas of almost everything for children’s play, and parents are good customers of this industry: When they introduce infants to pretense this is mostly done with replica objects such as miniature teapots, dolls, figurines, etc. A good test case for this hypothesis, of course, would be cross-cultural studies with children from cultures without such industries.

These hypotheses about the different roles of replicas in nondenoting pretense compared to in denoting acts gain further plausibility in the light of findings on children’s use of scale models to which we now turn. It is a very robust finding that children are not very proficient in using a scale model in search tasks until 3 years (for reviews see DeLoache 1991, 1995b): When an object (e.g., a chocolate) is, invisibly for the child, hidden in a normal room (e.g., under the sofa) and the children are shown the location of the object in a

⁴ In fact, Piaget (1962) was wrong in saying that in pretense children learn that everything can be a symbol for everything. Clearly it is not the case that one can pretend of everything that it is anything one wishes—there are physical constraints on what one can pretend an object to be. Can I pretend that the Mount Everest is my T-shirt? How should I do that? (Of course I can point to the Mount Everest and say “Look! This is my T-shirt!”, but this does not constitute pretending in any more interesting sense yet).

miniature scale model of the room, 2-year-olds fail to search at the correct location in the room.⁵ Note that the logical structure of this task is more complex as in object choice task: whereas in the latter replica objects are used to refer only (“this one”), with predication mostly supplied by language (“Give me ...!”), in the former the scale model is used in a referential (“chocolate...sofa”) plus predicational act (“...is under...”). That is, the coordination between the object and the reference situation is more complex: It is not only that objects are mapped to objects, but whole states of affairs (in the model) are mapped onto states of affairs (in the room). This more complex structure readily explains why children solve this task later than simpler object choice tasks.

In contrast, it seems that children understand pretense with similar, but nondenoting structure much earlier. For example, in pretending that a small brown wooden block is a chocolate, that a cloth is really a sofa and that the chocolate is under the sofa (by putting the wooden block under the cloth), one has to understand the nondenoting relation between the real state of affairs that the wooden block is under the cloth and the pretense proposition “chocolate is under sofa”: The latter is assigned nonliterally to the former in pretending (this is structurally analogous to the case where a chocolate–sofa scale model is used to indicate the location of the target chocolate under the target sofa). Yet 2- to 3-year-old children do not seem to have very big difficulty with understanding such relations. Harris and Kavanaugh (1993), for example, found that even 2-year-olds can quite accurately describe the content of pretense scenarios of this kind. Again, this difference can be explained by the fact that in pretense one only has to understand the intention of the pretender to act according to the proposition “chocolate is under sofa” in relation to the fact that the block is under the cloth (thereby nondenotingly symbolizing “chocolate is under sofa”), whereas in the objects search task with scale models one has to understand the more complex intention of the communicator to use the real state of affairs (chocolate in model is under sofa in model) and its correspondence to the target

⁵ We agree with Perner (1991) that this task is not per se a task of symbolic understanding, because it can be based on merely understanding correspondence. However, we think whether a task requires only understanding nonnatural meaning (correspondence in this case) or natural meaning (making an assertive act about the location of the object) depends on the pragmatic context: when the child were left alone with the large room and the scale model and could figure out covariations on her own, this would be a clear case of natural meaning only. When a person makes communicative assertive acts with the model, however, it is likely that the child understands this as a communicative act. One possibility, mentioned above in the context of comparative studies, indeed is that children’s general understanding of communicative intentions and actions helps them to figure out the correspondence (that, of course, they have to understand in order to understand the communicative act). In concrete case, we concede, it might be hard or impossible to tell whether children relied on natural meaning only, unless they show explicit behavior indexing an understanding of the assertive act (e.g., saying “She has pointed out to me where it is”) and/or on the normative issues connected with that (e.g., “She has made a mistake. It is not under the chair”—DeLoache (1990, cited in Perner, 1991, p. 295) reported some such behavior). We come back to this point in the discussion section.

state of affairs to make the assertive act that the chocolate is under the sofa in the target room. That is, interesting states of affairs distract from their being symbolically used in denoting acts (to assert something about corresponding target states of affairs). In pretense acts, however, when a state of affairs is interesting in itself (e.g., block is under cloth), this does not hinder one from pretending that a corresponding proposition (e.g., “chocolate is under sofa”) holds. On the contrary, as in the case of replicas in pretense, it supports acting according the pretense proposition. In sum, a closer analysis of the different roles similarity and correspondence play in pretense compared to denoting acts with neutral objects, replicas, and models can explain the different developmental patterns in these different domains.

When do children finally acquire a meta-representational understanding of the use of objects in making denoting acts, such as in the objects choice tasks with markers and replicas, and in the object search tasks with scale models? Clearest evidence for that would be explicit discourse by children about speakers’ intentions and interpretations of such acts, for example “By holding up this replica apple he means that she should give him the corresponding real apple,” “By pointing out that in the small room the chocolate is under the sofa he wants to tell her that in the big room the chocolate is under the sofa” or “She does not understand him.”⁶ We know of no evidence speaking to this issue. But in accordance with developing meta-representational and meta-linguistic understanding in other domains, we would expect such an understanding to emerge at around 4 or 5 years.

In sum, children in their third year begin to be proficient with understanding the use of objects in symbolic denoting actions like asking for an object or telling someone where an object is. According to Cultural Learning Theory, they acquire this ability based on their understanding of communicative actions and their basic mastery of language and discourse. First, they understand that referential object use (e.g., of markers and replicas) can be embedded in language frames (e.g., asking for objects) to perform denoting acts. Later on they understand the more complex fact that whole states of affairs can be made use of to refer assertively to another structurally analogous state of affairs (e.g., pointing to a scale model to assert something about a depicted room). This understanding emerges later than an understanding of analogous relations in pretense, because actions as a nondenoting action form have a simpler structure. Explicit meta-representational understanding of the symbolic nature of denoting actions with objects, finally, is probably a later achievement in the fifth year and after.

⁶ Though it can be doubted whether even that reveals truly meta-representational understanding. Winner and Gardner (1993), for example, presented convincing evidence that even quite sophisticated metaphor understanding can be achieved without meta-representational understanding, but rather by merely understanding correspondences between source and target domain. It is an open question whether this applies to explicit comments on metaphors as well.

DISCUSSION

Symbolic actions are actions with content of some sort, actions of which it can be asked what they mean. Symbols are objects that carry meaning conferred to them by actions, attitudes, and practices of users and interpreters, that is, they have nonnatural meaning. From their second year children interpret and use symbolic action forms. First of all they learn a natural language by imitation, based on their basic understanding of intentional communicative action. On the one hand, language acquisition is thus part of children's general social cognitive development, as other simpler communicative action forms, such as preverbal gestures, being learned by imitation. On the other hand, however, language radically transforms children's social cognitive development, supplying them with a shared normative and perspectival practice that enables full explicit propositional acts (assertive and imperative) and provides a basic interpretational scheme for other symbolic action forms. By supplying the possibility to coordinate use and mention within one format in meta-linguistic discourse, and more generally by supplying embedded construction formats in propositional attitude discourse (coordinating reference to mental states and mentioning propositions to qualify their content without using them assertively), natural language provides a central vehicle for children to acquire a reflective meta-representational understanding of intentionality and symbolic relations (Tomasello & Rakoczy, 2003).

Based on some language mastery and an understanding of intentional action, toward their second birthday children begin to understand and produce simple symbolic actions with objects that through these actions become symbols. First, children acquire some understanding of nondenoting symbols, that is, objects used in nondenoting symbolic actions. Probably the first instance of such an understanding is to be found in the domain of pretend play. Toward the second birthday there emerges an appreciation that in pretending objects are intentionally treated as if they were of a different kind or had some different properties, that the objects thus symbolize these kinds and properties in a nondenoting way, that real states of affairs nondenotingly symbolize pretense propositions. This emerging understanding enables children to imitatively acquire pretense as a new symbolic action form themselves in contexts of shared intentionality (joint pretense) with adults and older children. As is suggested by the "Virgin Objects" studies, in contrast to Piaget's (1962) and other individualistic approaches to early pretending, pretense does thus not spring from the individual child's creative imagination alone, but is essentially learned in similar ways as are other action forms (e.g., instrumental actions, by cultural, imitative learning). Imitative learning of pretense is even a more social matter than the acquisition of instrumental action, as indexed by the fact that children reliably look longer to an adult partner when imitating pretense than when imitating instrumental actions. We interpret this findings as showing children's sensitivity to the stronger

collective intentionality in pretense: The symbolic status function of objects is a matter of joint construction.

Another domain of early competence with nondenoting symbolic actions involving objects is drawing. Probably at some time in their third year children understand drawings as intentionally created objects nondenotingly symbolizing properties/classes (e.g., “ball”) and general propositions (“Ball is on table”). This understanding and heavy cultural scaffolding lay the ground for the imitative acquisition of children’s own drawing practices.

Pretense and drawing are thus two domains where children, after they have learned language as basic denoting action form, acquire simple nondenoting action forms. These action forms can be said to be symbolic in some way—they have content that can usually be specified by a proposition or at least a predicate (“By dropping the ball she pretends that an apple is falling from a tree,” “He draws an apple falling from a tree,” etc.). However, they are not symbolic actions in the narrow sense of actions with content that is expressed in a certain mode (assertive or imperative as paradigmatic cases) and with certain conditions of satisfaction (truth conditions in the case of assertive acts, and fulfillment conditions in the case of imperative acts). Exploiting structural isomorphisms between mental state types and types of symbolic acts, one can say that denoting assertive acts correspond to beliefs in having mind-to-world direction of fit, imperative denoting acts correspond to intentions in having world-to-mind direction of fit, and nondenoting symbolic acts like pretending and (nondenoting) drawing correspond to imagining in having no direction of fit at all—it is not their job, so to speak to fit to the world or make the world fit to them (see Searle, 1969, 1975, 1983).

It is the job, however, of denoting symbolic acts to fit the world (assertive) or make the world fit to them (imperative). Although children understand and produce denoting linguistic acts from their second year, and are to some degree competent with nondenoting acts with objects from their second birthday, it seems not to be until later in the third year that they comprehend and perform denoting symbolic actions with objects. Only toward their third birthday do they begin to understand drawing as embedded in an imperative act of asking for an object, the use of models to make assertive claims about spatial states of affairs, and pretending with objects as embedded in imperatively requesting things. As in the acquisition of nondenoting acts, language, cultural scaffolding, and imitative learning play an essential role in the development of these denoting symbolic abilities. The reason why these action forms are mastered so relatively late is, we argue, that their structure is much more complex than that both of language and of nondenoting symbolic actions. In contrast to language, in denoting drawing, model use, etc., physical objects are involved that get an interpretation through the communicative users, thus requiring a complex coordination between intrinsic properties of objects, assigned content and reference situation, and posing dual representation problems. Furthermore, denoting actions with objects

are usually much less conventional than language, lacking systematic syntactic structure and fixed normative rules, thus requiring more creative effort in interpreting them. In contrast to nondenoting actions with objects, denoting drawing, model use, etc., require an understanding not only of symbolic contents to objects, but of assigning contents to objects to make full communicative acts about the world, with either world-to-act or act-to-world direction of fit. Furthermore, irrespective of any symbolic understanding at all, many tasks of comprehension of denoting acts necessarily presuppose a quite sophisticated understanding of correspondences between different states of affairs (e.g., isomorphic spatial relations in two spaces) without which the symbolic intention of the user could not be understood at all. In contrast, no such correspondence is required in understanding nondenoting acts. It should be noted at that point that there are no limits to the complexity of the correspondences and isomorphisms that can be exploited in using objects as symbols. For example, there are many different systems of musical notations making use of different correspondences and isomorphisms between ink patterns and pitch, volume, speed, rhythm, etc., some of which presuppose very sophisticated musical knowledge. This is to make clear that in this chapter we are dealing only with the earliest manifestations of understanding denoting physical symbol systems, and that the competence of 3-year-olds is the only the beginning of a long story. Reading maps, graphs, diagrams, and tables, for example, are all chapters to follow, indeed in a life-long learning process.

The role of correspondence in many physical symbol systems brings up a more general methodological problem already alluded to in the review of children's use of scale models: How can tasks of pure correspondence understanding be distinguished from truly symbolic tasks that involve understanding correspondence as one necessary but not sufficient condition, that is, how can the validity of truly symbolic tests be established? The basic conceptual point here is that whether objects or states of affairs carry natural meaning only, or have nonnatural meaning assigned to them, depends on the context. When for some reason there regularly tend to happen the same things in two rooms, each room carries natural meaning about the events in the other room. If, however, a person uses one room as a true model to explain what is happening in the other room, it is assigned nonnatural meaning. The clearest case for experiments with scale models, for example, would thus be to contrast a pure correspondence-and-covariation condition with a truly symbolic condition: The first would basically be a form of a correlation learning and inference task with no persons and communicative actions involved, where the subject would simply be confronted with two corresponding rooms over many trials and would have to figure out which correlations (natural meaning) hold between the two rooms and can be exploited in searching for objects. The latter would essentially involve instructions like "I am telling you where it is" and the denoting act of using the one room as a model to state where the object is in the target room. This does

establish a correspondence understanding baseline in the form of the first test. There remains, however, a central problem even with such a design: The skeptical concern remains whether the second test has to be solved by truly understanding denoting acts, or whether it could be solved by merely understanding correspondence. Subjects' searching behavior alone can not decide this issue. But their performance over time on consecutive trials may be enlightening: Success on first trials suggests that subjects understood the communicative intention of the other person, thereby grasping the nonnatural meaning conferred on the object and its corresponding relation to another state of affairs. Success only after many trials, however, suggests pure correlational learning of natural covariations. This is a very helpful distinction, especially in comparative research where children often show the first and apes the second pattern. Interpretations along these lines are very plausible, however, conceptually they are not completely waterproof. The reason is that even in correlational learning tasks one can come up with good hypotheses about natural covariations on Trial one (e.g., assuming that two cars were built from the same prototype provides good reasons to believe spatial relations of the parts are preserved across the two), and that even when one understands that the other person is making a denoting act using some correspondence, it may be very hard to figure out which correspondence is made use of (think of learning a complex music notation scheme by being shown a partiture and then listening to the corresponding piece). The only way to get even more stringent data, we think, is to broaden the scope of dependent measures, including not only searching or similar behaviors that always remain somewhat ambiguous regarding the question whether they are based on an understanding of natural or nonnatural meaning, but more normatively loaded behaviors. Denoting symbolic acts essentially involve normative issues of correctness, commitment to truth or obedience, and inferential integration. Accordingly, measures like comments on the illocutionary acts ("She says it's there"; "She wants me to give it to her") or misunderstandings ("I do not know what she says") present rather indubitable evidence for true symbolic understanding by the subject. Such measures, however, are of little use for comparative research with apes. In sum, the basic methodological problem, that it is often unclear whether a test can be solved by understanding natural meaning alone, may have no unique solution. Of course, there would be a clear solution—to ask children what the person had done—but such tasks would be restricted to older children only. If one wants to test younger children and apes, more stringent designs with better controlled independent variables and a broader scope of dependent measures can make the interpretation of many results, if not certain, at least more plausible. Apart from these ways to improve the internal validity of symbolic tests, external cross-validation of different tasks from different symbolic domains can be helpful as well. Underlying this is the theoretical point that symbolic development in different domains, though each domains of course has its specific characteristics,

is generally to be understood as based on children's basic understanding of persons, intentional actions, and communication.

Roughly, integrating evidence from different symbolic domains, symbolic development in the preschool years can then be captured by a 4 stage model, with language as first denoting action form being acquired, followed by some nondenoting symbolic action forms with objects, and later some denoting symbolic action forms involving objects (though the behaviors in the latter two, understood superficially, can be and often are the same, e.g., producing apple-shaped marks of ink on paper). Finally, an explicit meta-representational understanding of the objects as symbolic representations that require an interpretation develops, along with a meta-linguistic awareness, at around 4 to 5 years.

In how far is this supposed to be understood as a classical stage model á la Piaget describing the development of one general semiotic function? In our view, it is not very helpful to talk about one semiotic function as if it were a monolithic block, because this tends to be conceptually imprecise, blurring such important distinctions as between symbolizing in a wider, nondenoting sense without commitment to truth or changing the world, and symbolic actions in the narrow sense of denoting and making illocutionary acts, the distinction between natural language as conventional basic interpretation scheme and other derived symbolic actions, or the distinctions between different physical symbol systems. It is true, however, that symbolic development is best viewed as essentially the development of understanding and acquiring action forms in cultural contexts, based on children's appreciation of intentional action, communication, and collective intentionality.

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