Social Engagement Leads 2-Year-Olds to Overestimate Others' Knowledge

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Previous research has found that young children recognize an adult as being acquainted with an object most readily when the child and adult have previously engaged socially with that object together. In the current study, we tested the hypothesis that such social engagement is so powerful that it can sometimes lead children to overestimate what has been shared. After having shared two objects with an adult in turn, 2-year-old children played with a third object the adult could not see. In three out of four conditions, the adult remained co-present and/or communicated to the child while she played with the third object. Children falsely perceived the adult as being acquainted with the third object when she remained co-present (whether or not she also communicated) but not when she clearly terminated the interaction by disengaging and leaving. These results suggest that when young children are engaged with a co-present person they tend to overestimate the other's knowledge.

For humans to interact appropriately with each other and arrive at some mutual understanding, they need to know what others perceive and know. Developmental research indicates that even infants possess some understanding in both of these domains. They begin to understand some basic things about seeing in the first half year of their lives, when they turn their head in the same direction another person has just looked (D'Entremont,

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Hains, & Muir, 1997; Scaife & Bruner, 1975). Between 9 and 12 months of age, they perceive others' gaze as object-directed (Johnson, Ok, & Luo, 2007; Woodward, 2003). By 12 to 15 months, they know that the eyes need to be open and unobstructed in order to see (Brooks & Meltzoff, 2002, 2008) and that the line of sight to an object needs to be clear (Butler, Caron, & Brooks, 2000; Caron, Kiel, Dayton, & Butler, 2002). Contrary to the claim that others' gaze shifts simply draw infants' attention to interesting sights that are immediately in front of them (see Butterworth, 1983; Butterworth & Jarrett, 1991), infants in this age range also follow others' gaze to hidden locations, such as behind their own bodies (Deák, Flom, & Pick, 2000) or behind barriers (Moll & Tomasello, 2004). And looking-time studies find that 12- to 15-month-olds are sensitive to the fact that another person may lack visual access to an object that they themselves can see (Luo & Baillargeon, 2007; Luo & Beck, 2010; Sodian, Thoermer, & Metz, 2007).

At around the same age, infants demonstrate some understanding of what others know: they can distinguish between what others are and are not acquainted with from the immediate past. This is suggested by studies using both looking-time methods (e.g., Onishi & Baillargeon, 2005; Surian, Caldi, & Sperber, 2007) and more active response measures (e.g., Tomasello & Haberl, 2003). In Tomasello and Haberl's (2003) study, 12- and 18-month-old infants and an adult played together with two novel objects in turn for 1 min each. Then the adult left the room. While she was gone, the infant and a second adult played with a third novel object. Finally, all three objects were held in front of the infant, at which point the first adult returned and excitedly exclaimed "Wow! Look! Look at that one!" gazing in the direction of all three objects together. She then made an ambiguous request for the infant to hand "it" to her. Infants of both ages chose the third object—indicating that they knew which of the three objects the adult did not know from past perceptual experience and was therefore requesting from them. However, when the adult had become acquainted with all three objects previously, infants showed no preference for the third toy.

Moll and Tomasello (2007) hypothesized that what enabled infants to distinguish between what the other was and was not acquainted with at this surprisingly young age was the "sharing" of the two familiar objects: being jointly engaged with the adult as she explored the objects allowed infants to register the adult as being acquainted with these objects a few moments later. Joint engagement with others has been shown to be facilitatory in other contexts as well. For example, infants learn words better when they are used to refer to things that are inside versus outside a joint attentional focus (e.g., Baldwin, 1993; Dunham, Dunham, & Curwin, 1993; Tomasello & Farrar, 1986) and play in more mature ways in joint attentional engage-

ment (Bigelow, MacLean, & Proctor, 2004). The hypothesis was that joint attentional engagement may even be necessary, at least early in ontogeny, to come to register others' acquaintance with things.

To test this hypothesis, Moll and Tomasello (2007) varied the specific way in which an adult became acquainted with objects. In one condition—modeled on Tomasello and Haberl's (2003) experimental condition—the adult shared her experience of the two known objects with the infant in joint engagement. In two other conditions, (1) infants observed the adult examine the two known objects *individually* instead of in joint engagement, or (2) the adult looked on from afar as the infant and the assistant examined the two known objects. The adult then left the room while the assistant presented the infant with the third object. In accord with the "sharing hypothesis," 14-month-old infants knew which object was new for the adult only when they had shared the known objects together. In both other conditions in which they had not shared the adult's experience with those objects, infants failed to identify which of the three objects the adult was referring to in her excited request. (By 18 months, infants knew what the adult was acquainted with both when they had explored the objects in joint engagement and when they had witnessed the adult explore the objects individually.) In a second study, Moll, Carpenter, and Tomasello (2007) found that it was not sufficient for 14-month-olds to witness an adult jointly engaging with the familiar objects with *another* person from a third-person perspective. This suggests that being addressed by the other and being involved in her activities in joint attentional engagement is what allows infants to register the adult as acquainted with the objects.

Surprisingly, it takes children another year or more before they are able to determine what others can and can not see in "level 1 visual perspective-taking" tasks (see Flavell, 1992; Flavell, Everett, Croft, & Flavell, 1981). In contrast to mere gaze following or dishabituating in a looking-time experiment, level 1 visual perspective-taking requires that the child determine what can and can not be seen from a given viewpoint. For example, in a study by McGuigan and Doherty (2002) children were asked to hide an object from an adult's view by either (1) placing it behind a barrier or (2) placing a barrier between the adult and the object. Children below 3 years of age were unable to solve both versions of this hiding task. It seemed especially difficult for them to understand that they could block a person's perception of an object by positioning an opaque barrier between the person and the object (see also Flavell, Shipstead, & Croft, 1978). And in a search task by Moll and Tomasello (2006), children below 2 years of age did not know which of two objects an adult was searching for when her view to it was blocked by a barrier. This suggests that young children are challenged when they have to identify exactly what another person can and can not see.

Taken together, this pattern of findings creates a puzzle. It suggests that level 1 perspective-taking (the ability to determine what object may or may not be seen from a given visuo-spatial position) develops significantly later than the knowledge-ignorance distinction—that is, the ability to determine what others are and are not acquainted with from previous perceptual experience. If one were to expect a developmental asynchrony of those two abilities, one would probably predict the opposite order: that children come to know what others can and can not see in the here and now *before* they come to know what others know from previous experience. Visual perception in the moment seems so direct and fundamental, whereas knowing what others have experienced involves keeping track of events that took place in the past. The question thus arises how to make sense of this counterintuitive developmental sequence.

Here, we propose an extension of Moll and Tomasello's (2007) sharing hypothesis to account for this. Just as social engagement facilitates children's ability to recognize others' perception of and acquaintance with things, it may hinder them to detect others' ignorance of objects. The idea is this: when a young child is engaged with another person, she might act on the presumption that she and the other person perceptually share the space around them—even though the other person might not be able to see what the child sees. Even adults can be "tricked" into falsely assuming a shared perceptual space with others in social engagement (see, e.g., Epley, Morewedge, & Keysar, 2004). For example, a speaker might point to his computer screen to indicate a graph to his audience—not realizing that the audience can not see the screen. The joint presence seems to suggest a shared perceptual access to the things in the room. Such an impression is most likely when the co-present person is posturally oriented toward the unseen object with her eyes open—thereby being available for perception of it.

This fits with findings that young children can readily detect another's ignorance when the other person disengages from the joint activity by leaving (e.g., O'Neill, 1996; Tomasello & Haberl, 2003) or at least turning away (Southgate, Senju, & Csibra, 2007). This is typically the case in knowledge-ignorance tasks, where a joint attentional situation is clearly terminated by the adult saying good-bye and leaving or at least turning away from the child and the stage of events. In this scenario, it is made obvious to the child that the joint attentional episode has ended and that no further sharing of events can be presupposed from this moment on. The adult is then absent as the critical event or object is presented to the child and there is thus no danger of the child assuming she can see it. This stands in stark contrast to visual perspective-taking tasks, where the child has to determine what the other perceives in the here and now. There is no prior engagement with one object but not the other: the answer does not lie in the shared history or

experience with the objects. What is experimentally varied in these tasks is not the other's continued co-presence versus disengagement from a joint attentional episode. It is her visual access to certain objects alone that is manipulated. In such a situation it should be much harder to detect ignorance or perceptual nonconnectedness, as children would need to realize that *despite* being co-present and available for perception, the other momentarily has no visual access to an object that the child sees.

In the current study, therefore, we investigated whether social engagement with an adult can compromise 2-year-olds' ability to detect others' ignorance by leading them to overestimate the "shared perceptual space." We also investigated more closely which aspects of social engagement may be responsible, separating two factors that are typically both involved in social engagement: "co-presence" (operationalized as the adult being physically present, facing the child, and potentially available for interaction) and "communication." An adult's co-presence in the child's visual field (close by, facing the child, and ready for interaction) is probably the most obvious basis for an assumption of shared perceptual experience (see Saylor & Carroll, 2009) because jointness is, at this young age, typically realized in mutual co-presence. But an overestimation of the shared perceptual space is also possible when the other is physically absent—namely when social engagement is created through verbal communication from a distance. For example, people sometimes provide visual gestures for others whom they are talking to on the telephone—presumably because the social engagement established via communication wrongly suggests a shared perceptual space, including a shared visual space. In accord with this view, 2-year-olds have been shown to use pronouns, such as "he" instead of nouns (such as "a clown"), in their description of events to an adult who communicated with them, even though the adult was physically absent and therefore could not have known what "he" might refer to (Matthews, Lieven, Theakston, & Tomasello, 2006).

We thus investigated the separate and combined effects of co-presence and verbal communication on children's recognition of another's ignorance of an object. The basic design was similar to that of Moll and Tomasello (2007), but we manipulated what happened with the *last* object, not the first two. In each of four conditions, 24-month-old children shared two novel objects in turn with an adult in joint engagement, making those objects mutually familiar. Then, in all conditions, the third object (the target) was presented to children in such a way that the adult never saw it. What was varied across conditions was the social situation in which children experienced the target object: the adult was either co-present (behind a barrier) or not and communicated verbally with children or not, in a 2×2 design. We hypothesized that when the adult remained co-present and communicated with the child as the target object was presented, the child would

incorrectly assume that the sharing of experiences continued and that the adult became acquainted with this third object too. Thus, later in the test phase, children should not recognize the third object as new for the adult and should consequently not be able to disambiguate her request. In contrast, in the condition in which the adult was not socially engaged with the child at all—was both absent and not communicating—we hypothesized that children would correctly assume that the adult was ignorant of the target object and thus perform correctly at test. We also expected that co-presence or verbal communication alone would lead children to tend to assume mutual knowledge of the objects—but possibly to a lesser degree than the combination of both these factors. We chose to test 2-year-olds because it would be more impressive to show any hampering effects of these factors when children's ability to distinguish between knowledge and ignorance is otherwise robust.

METHOD

Participants

One hundred and twenty children (60 males, 60 females) of 24 months of age (M age $=$ 23.27 months, range $=$ 23.00–25.00 months) participated in this study. All participants were obtained from a registry of parents from a German city who had volunteered to participate with their children in studies of child development. An additional 17 children were tested but excluded because they did not pass the pretest ($n = 4$), they were fussy or unwilling to play with the toys ($n = 5$), they refused to choose an object at test ($n = 6$), or because of experimenter error ($n = 2$).

Materials and design

Three familiar toys were used for the pretest (see below): a ball, a plush teddy bear, and a toy car. For the main test, three novel objects were used as toys: a modified top, a transparent plastic ball filled with little plush balls connected to a base via a wire, and a cylinder-shaped pump (see Figure 1). They could easily be distinguished by color and shape. Each of them could be manipulated in a particular way, and none of them made a sound when manipulated. A preference test conducted prior to the study revealed no significant preferences among these toys. One object was designated as the target for a given participant on the basis of a counterbalanced schedule. The order of the toys in the sequence of play and their spatial position in the tray at test were counterbalanced. A black wooden barrier (39 cm high, 59 cm wide, 1.5 cm thick) was used to block experimenter 1's (E1's) view in those

Figure 1   The three novel objects and the tray used in the study.

two conditions in which she remained co-present for the third object (Silent Presence and Communicative Presence Conditions, see below).

Children were randomly assigned to one of four conditions, yielding 30 children (15 males, 15 females) in each condition. Each child received a single trial.

Procedure

The parent and child visited the child laboratory for one session of approximately 20 min. Prior to the study, the two experimenters (E1 and E2) played with the child in a room outside of the testing room until the child seemed comfortable. Then the parent, child, and the two experimenters entered the testing room (680 × 280 cm). The child was seated at a table on the parent's lap. The height of the parent's chair was adjusted so that the child's eyes were 23 cm above the table. E2 sat to the child's left and E1 sat across from the child. Figure 2 is a schematic depiction of the set-up from an aerial perspective.

To ensure that children were generally willing and able to comply with an adult's request, a pretest was conducted. E1, E2, and the child played with a ball, a teddy bear, and a toy car in turn for 30 sec each (always in that order). E2 then placed the toys in randomized positions on the tray and held the tray in front of the child. Without looking at the objects, E1 asked the child to hand her the toys by name. For children to pass the pretest, they had to give the first and/or the second requested object to E1 (ideally by
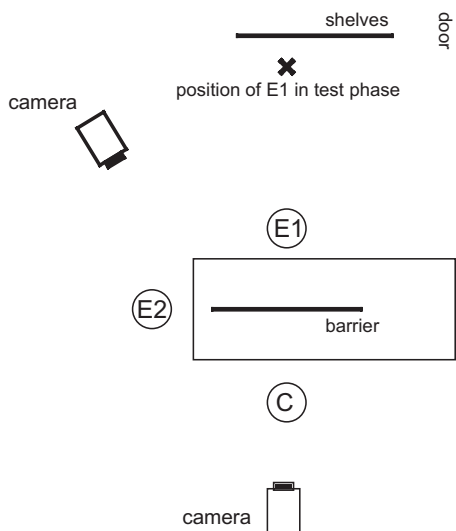
Figure 2   Aerial view of the experimental set-up. Note that the barrier was used in the Silent Presence and Communicative Presence Conditions only.

handing it over, sometimes by rolling it to E1). If they did not respond correctly, they were excluded from analyses. This was the case for four children.

After the pretest, E2 brought out the first novel object on the schedule and handed it to the child. In all four conditions, as the child played with the object, E1 alternated gaze between the child and the object, emoted positively and commented on the object very generally ("Look, that's nice! What can you do with it?"). E1 kept her arms folded naturally on the edge of the table and never manipulated or touched the object. E2 did not actively engage in the play, but held the object on a predetermined spot on the table as the child manipulated it. After 30 sec, E2 put that object away and brought out the second novel object for the child, who then shared it with E1 in the same manner and for the same amount of time as they had done with the first object. What happened next depended on the experimental condition (see Table 1 for a summary of the main procedural points in each condition).

In the Silent Absence Condition, E1 announced that she would leave. She said good-bye to the child and left the room. E2 then commented on E1's absence by saying "[*Name of E1*] is gone now. But we'll keep playing!" and brought out the third, final object on the schedule (the target) for the child to play with, holding it on the table silently as before. After 30 sec, E2 placed that object on a tray along with the other two novel objects, and held the tray containing all three objects in front of the child. At this point the

TABLE 1
Main Procedural Events in Each Experimental Condition

Condition	Procedure		
	Object 1	Object 2	Object 3
Silent Absence	Child and E1 share Object 1 and Object 2 in turn		E1 leaves and does not communicate
Communicative Absence			E1 leaves but communicates
Silent Presence			E1 stays but does not communicate
Communicative Presence			E1 stays and communicates

Note. When making the excited request in the response phase, E1's behavior was identical in all conditions.

response phase began: E1 returned to the room, fixated the tray with the objects from afar, and exclaimed excitedly, "Wow, look! Look at that! I don't know that one yet! (*Das kenne ich noch gar nicht*!)." She then looked up to the child and made an ambiguous request, "Can you give it to me, please?" while approaching the child and holding her hand toward the center of the tray. Importantly, from the moment she entered the room, E1 looked only at the objects as a group or at the child; she never gazed at, pointed to, or directed her hand at a specific object—the request was behaviorally ambiguous and was identical across all conditions.

In the Communicative Absence Condition, having shared the second object with the child, E1 announced that she would leave and said goodbye. Instead of leaving the room, however, she went behind a high row of shelves by the door, where she could not be seen by the child. As in the Silent Absence Condition, E2 said "[*Name of E1*] is gone now. But we'll keep playing!" and brought out the third object and held it for the child. As the child played with the object, E1 talked from behind the shelves, making only very general comments like, "Oh, how nice! Great! Super!" After 30 sec, E2 placed the object next to the other two on the tray and held the tray in front of the child. At this point, E1 returned from behind the shelves and made the same excited request as in the Silent Absence Condition.

In the Silent Presence Condition, after sharing the second object with the child, E1 briefly turned away from the table and faced the wall to her left. During that time, E2 placed the barrier in front of the child on the table. E2

then brought out the third object and held it for the child. At this point E1 turned back around and looked at the barrier in front of her. As the child played with the object, E1 remained silent, looking at the part of the barrier behind which the object was located. E2 assured that the child did not lift the object up in the air, so that E1 never saw the object. As children played with the object, they could see E1's forehead but not her eyes—which were obstructed by the barrier. After 30 sec, E1 turned around and silently walked away toward the light switches near the door. During this time, E2 removed the barrier from the table and placed the tray containing all three objects in front of the child, at which point the response phase began, exactly as in the other conditions.

In the Communicative Presence Condition, everything was identical to the Silent Presence Condition, with one difference: instead of being silent, E1, looking at the barrier, communicated as the child played with the third object. The words she used were the same ones she used in the Communicative Absence Condition ("Oh, how nice! Great! Super!"). Again, the response phase was as described above.

Thus, in all four conditions, E1 did not experience the target with children; what differed across conditions was just where E1 was and whether or not she communicated while children explored this object themselves.

Coding and reliability

E1 coded which of the three objects children chose based on a live judgment immediately after the test. If children gave more than one object to E1, the object given first was coded. If no object was given to E1, the object which children took for themselves was coded (this was the case for one child). In order to assess interobserver reliability, a random sample of six children per condition (20%) was coded by an observer who was unaware of which experimental condition children were in. The two observers agreed in 100% of the cases, yielding a Cohen's Kappa of 1. Two-tailed p-values are reported throughout.

RESULTS

There were no effects of gender, toys, or the spatial position of the target on the tray (left, middle, right), and choices of the first and second object (the distractors) were equally frequent. Figure 3 shows the number of children who chose the third, target object—who correctly attributed ignorance of the target to the adult—in each of the four experimental conditions. As a first step, we compared the number of children who chose the target in each
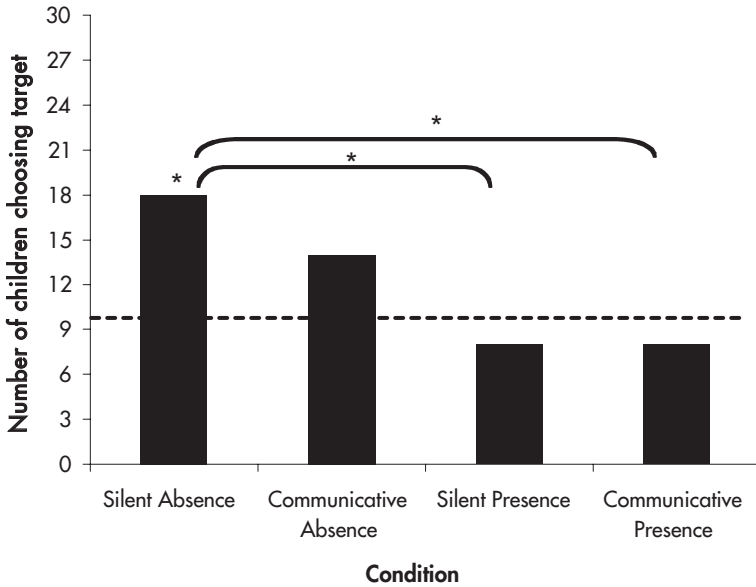
Figure 3 Number of children who correctly chose the target (correctly attributed igno-
rance to the adult) as a function of condition. The dashed line indicates chance level, and
the asterisk symbolizes statistical significance at the 5% level.

condition to the number of children who would be expected to choose the
target by chance ($n = 10$) using the binomial procedure. As predicted,
significantly more children than would be expected by chance chose the
target in the Silent Absence Condition ($p < .01$). In contrast, the number of
children who chose the target did not differ significantly from the number
expected by chance in any of the other three conditions (all $ps > .16$). Thus,
when the adult remained socially co-present or communicated to the
children as they explored the target, children did not know which object was
new for her—which object she was ignorant about.

We also compared the number of children who chose the target in the
Silent Absence Condition in which the experimenter left the room—as a
baseline condition in which ignorance detection should be intact—to the
number of children who chose the target in each of the other conditions
using Fisher's Exact Tests. Children in the Silent Presence Condition
($p < .02$) and in the Communicative Presence Condition ($p < .02$) were sig-
nificantly worse at attributing ignorance to the adult (chose the target less
often) than were children in the Silent Absence Condition. There was no dif-
ference between the Communicative Absence Condition ($p > .43$) and the
Silent Absence Condition.

One possible explanation for the lower performance in the Silent and Communicative Presence Conditions may be that children were distracted by the barrier and/or E1's presence and therefore encoded the target less deeply in the familiarization phase than children in the other conditions. We coded the percentage of time infants visually fixated the target in each condition (the quality of the video material for one child was not good enough to be used). In the Silent Absence Condition, children attended to the target 86% of the time, compared to 76%, 82%, and 78% in the Silent Presence, Communicative Presence, and Communicative Absence Conditions, respectively. An analysis of variance showed a main effect of condition, $F(3, 115) = 3.89$, $p = .01$. Post-hoc tests (Fisher's least significant difference) revealed that the difference between the Silent Absence and Silent Presence Conditions was not significant ($p = .19$), but children in the Silent Absence Condition looked significantly longer at the target than children in the Communicative Absence and Communicative Presence Conditions ($ps < .02$). In other words, when E1 was communicating, children looked less at the target object than when E1 was not communicating. Importantly, however, there was no difference in visual attention to the target for children who chose correctly versus incorrectly at test (80% and 81%, respectively), and no correlation between success at test and the time spent looking at the target during presentation (Spearman's $\rho = -.03$, $p = .73$). It is thus not the case that our pattern of findings is a result of the intensity with which infants processed the target object.

DISCUSSION

In the current study, we found that just as being socially involved with others facilitates young children's recognition of others' acquaintance with things (as has been shown by past research; see, e.g., Moll & Tomasello, 2007), it can also impair their detection of others' ignorance. When an adult remained co-present after having shared the experience of two objects with children, 24-month-olds behaved as if she also perceived a third object which only they could see. They treated the adult as being acquainted with the new object just as she was acquainted with the two previously shared ones—and this was true whether or not the adult additionally communicated to the child. Co-presence thus clearly disrupted 2-year-olds' recognition of another's ignorance. When the adult disengaged entirely by leaving and ceasing to communicate children had no difficulties discerning the adult's ignorance. When she left but continued to communicate, their understanding of her ignorance was slightly impaired (as is evidenced by the fact that performance did not exceed chance), but not significantly different from the "ideal situation" of an entirely disengaged adult.

We argue that our finding is consistent with an extended version of Moll and Tomasello's (2007) sharing hypothesis. When young children are socially engaged with another person, they tend to presume a shared perceptual space: we both have perceptual access to "these things right here." This "simple heuristic" (Gigerenzer & Todd, 2000) works well when the child and adult truly share attention to an object in joint engagement: their assumption of a shared perceptual space is warranted. It also works well in the opposite direction, when children are not socially engaged with another person at all—most obviously when the other is physically absent and not communicating—in which case children do not assume shared experiences. Where it breaks down is when a co-present other is available for social interaction and physically oriented toward the object in question, but, for a reason, such as a barrier, lacks visual access to it. In short, registering another's experience of an object is easy when one is socially engaged, as is registering the ignorance of a person who is entirely disengaged. But recognizing ignorance in a socially engaged, co-present person is difficult (as it apparently is even for adults; Epley et al., 2004; Keysar, Lin, & Barr, 2003) because it leads to an overestimation of what is mutually perceived. As a corollary, we must also add to this hypothesis that young children tend not to overestimate what is shared when the other provides a clear expression of her ignorance, for example by covering her eyes ostensibly and explicitly noting that she can not see (O'Neill, 1996), or by searching for an object and explicitly saying that she can not see it (Moll & Tomasello, 2006).

This modified sharing hypothesis seems to account for the findings of other studies quite well. Most importantly, it helps to solve the puzzle of why knowledge-ignorance understanding develops before level 1 visual perspective-taking. In most knowledge-ignorance tasks the adult's ignorance is made obvious by having the adult leave the scene entirely or turn her back (e.g., Akhtar, Carpenter, & Tomasello, 1996; O'Neill, 1996; see also Onishi & Baillargeon, 2005; Southgate et al., 2007). In these scenarios, the adult gives a very strong sign of "disengagement" by moving out of sight or turning away. It is thus made very clear to the child that the sharing of experiences has come to an end and that no shared perceptual space can be presupposed from that point on. When the child later witnesses the critical object or event, there is no co-presence that wrongly suggests a shared experience. In level 1 visual perspective-taking tasks, in contrast, the adult is necessarily co-present at the critical moment: she is bodily and visually oriented toward the object in question—and yet she does not share the child's perception of it. Recognizing another's inability to see a given object in the here and now, despite her co-presence, is thus much harder.

It can not be determined on the basis of this study alone whether 2-year-olds positively registered the adult as sharing the target with them or if they

failed to register her ignorance of it. The difference is subtle. According to the first version, children were confident that the adult became familiar with the target, whereas according to the second, they did not notice the lack of perceptual "contact" between the adult and the target. Both interpretations seem equally compatible with children choosing objects randomly because they can not determine which object the adult "missed" earlier. Our findings can not settle this issue unequivocally, and so future attempts to disentangle these two interpretations would be desirable.

Furthermore, it may be seen as a limitation of this study that the conclusions are based to a large degree on negative findings. As with any null result, there can be multiple reasons why children chose objects at chance level in three of the four conditions (such as not understanding the request, being overwhelmed with the overall task demands, etc.). However, we do not interpret the negative data in isolation but in comparison to the Silent Absence Condition in which children were successful. Because the conditions differed only with respect to the critical dimensions "communication" and "co-presence," it seems plausible to assume that children's difficulties are related to these factors.

A seeming complication to the current story is that in three familiarization studies even 12- and 15-month-old infants were sensitive to the fact that a present adult sitting across from the could not see the same things they saw (Luo & Baillargeon, 2007; Luo & Beck, 2010; Sodian et al., 2007). But in these studies the adult did not jointly engage with the infants to nearly the same degree as in the current study; the infants mostly just watched her carry out actions individually, without much (or any) social contact. Similarly, in a word learning study, 18- to 20-month-old infants knew that an adult uttering words from outside of their visual field was not speaking about an object they were engaged with at that time (Baldwin et al., 1996), which might seem to conflict with our findings as well. But in this study the adult was not socially engaged with the infants at all at the time she uttered the new word—in fact it was explicitly pointed out to the child that the adult was engaged in a phone conversation with someone else (see also Baldwin, 1995).

One could argue that perhaps children had difficulty in our study because they do not yet understand the critical role of informational access for knowledge formation (Wimmer, Hogrefe, & Perner, 1988). For example, 24- and 30-month-old children did not understand that a blindfolded adult could not know where an object was hidden while a nonblindfolded person did possess this knowledge (Poulin-Dubois, Demke, & Olineck, 2007). In a variation of O'Neill's (1996) paradigm, Dunham, Dunham, and O'Keefe (2000) had parents close their eyes during an unimportant moment but open them at the moment of the hiding event—nonetheless

the 2.5-year-olds "informed" their parent about the location of the desired object as if she was ignorant of it. The same phenomenon has been established with 16-month-olds using the habituation paradigm (Sodian & Thoermer, 2008). But note that children in the Silent Absence Condition knew exactly which of three objects an adult was ignorant of—they did not question her familiarity with the first two objects because the adult left the room later. We think that children at this age understand that some engagement with an object has to take place for a person to know it. A person's proximity and orientation to an object seem to be the primary indicators. But children only gradually learn about the specific conditions that enable and defeat perceptual access and the epistemic role and functioning of the different senses (O'Neill & Chong, 2001). Our results suggest that when using interactive measures to investigate very young children's understanding of knowledge formation, the social engagement may get in the way. This research should thus be complemented with habituation methods, in which children tend not to be engaged with the agents and so may more readily show an (implicit) understanding of how knowledge is acquired (see Poulin-Dubois, Sodian, Metz, Tilden, & Schöppner, 2007; Sodian & Thoermer, 2008).

In the current study, the adult's vocal communication disrupted the children's understanding of her ignorance only to a small degree—there was no difference between the conditions in which an adult was absent and silent versus absent and communicating. This may reflect the fact that the "primordial sharing situation" (Werner & Kaplan, 1963) involves the mutual visibility and co-presence of adult and child who act on objects together in close proximity (see also Carr, Dabbs, & Carr, 1975). It is conceivable that some months later, as the child's productive verbal abilities increase so that instances of joint attention may be formed on the basis of verbal communication alone (e.g., while talking on the phone), communication by itself may suggest shared perceptual experiences to the same degree as co-presence does.

Current research suggests that sharing experiences with others plays a key role in young children's ability to understand others' actions and experiences. Even "theory of mind" capacities developed in the preschool years profit from the sharing of experiences with others during infancy (Nelson, Adamson, & Bakeman, 2008). In the current study, however, we found that another person's co-presence, a key feature of social engagement, can hinder 2-year-olds' recognition of what has *not* been shared. Just as the "curse of knowledge" (see, e.g., Birch & Bloom, 2007) can compromise the ability to reason about others' false beliefs, so can the "curse of social engagement" compromise the ability to reason about others' ignorance.

ACKNOWLEDGMENTS

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