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Children's Understanding of Certainty and Evidentiality: Advantage of Grammaticalized Forms Over Lexical Alternatives

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Abstract

In verbal communication, the hearer takes advantage of the linguistic expressions of certainty and evidentiality to assess how committed the speaker might be to the truth of the informational content of the utterance. Little is known, however, about the precise developmental mechanism of this ability. In this chapter, we approach the question by elucidating factors that are likely to constrain young children's understanding of linguistically encoded certainty and evidentiality, including the types of linguistic form of these expressions, namely, grammaticalized or lexical forms. © Wiley Periodicals, Inc.

The question of how children's understanding of linguistic expressions of a speaker's epistemic states, such as belief, knowledge, ignorance, and certainty, interacts with their nonlinguistic understanding of other's knowledge has become a central topic in current research on theory-of-mind development (Astington & Baird, 2005). On the one hand, classic studies of children's source monitoring ability have focused on investigating their understanding of others' epistemic states in a noncommunicative domain. These studies show that three and four year olds spontaneously understand that a person who has seen the inside of a container will have knowledge about the container's contents, while a person who has touched the container but not looked into it will not (Pillow, 1989; Pratt & Bryant, 1990). At the same time, it has been repeatedly shown that children are unable to report the sources of their belief until they are five or six years of age (Gopnik & Graf, 1988; O'Neill & Gopnik, 1991).

A number of studies using linguistic tasks have tested when children begin to understand linguistic expressions of the speaker's epistemic states. In theory-of-mind research, children's production and comprehension of mental state verbs such as *think* and *know* has generally been considered a strong indicator of their understanding of others' mental states (Bartsch & Wellman, 1995). Importantly, functional analyses of the same mental state verbs revealed that they can also be used as expressions of speaker certainty or uncertainty (Shatz, Wellman, & Silber, 1983; Diessel & Tomasello, 2001). Indeed, Moore, Bryant, and Furrow (1989) showed that four year olds, but not three year olds, start to reliably differentiate the degree of speaker certainty associated with each of the two verbs.

While classic studies on children's understanding of mental state terms have focused on English-speaking children, more recent investigations address languages other than English (Choi, 1995; Lee & Law, 2001; Lee, Olson, & Torrance, 1999; Papafragou, Li, Choi, & Han, 2007; Shatz, Diesendruck, Martinez-Beck, & Akar, 2003; Shirai, Shirai, & Furuta 1999; Tardif, Wellman, & Cheung, 2004). Typically two types of epistemic vocabulary are distinguished in these studies: expressions of speaker (un)certainly, which convey speakers' attitudes or degree of commitment to the truthfulness of the propositions expressed, and expressions of evidentiality, which concern the evidential basis of a speaker's belief for the states of affairs described in the propositions expressed (Chafe & Nichols, 1986; Fitneva, 2001; Lyons, 1977). The main findings concerning expressions of speaker certainty and evidentiality in English and other languages may be summarized as follows: that understanding of linguistically encoded speaker (un)certainly and of false belief appears to have the same watershed age, roughly around age four (Moore et al., 1989), and that children's awareness of linguistically encoded information sources, by contrast, seems to develop relatively slowly (Papafragou et al., 2007).

These findings, however, need to be interpreted with some caution. First, little attention has been paid to the forms of linguistic expressions in

question. In most studies, children's understanding of encoded speaker certainty has been exclusively studied by using verbs as target stimuli, while children's understanding of encoded evidential quality has been tested by use of particles as target stimuli. This may be unavoidable when working with some languages, but a full account of children's understanding of encoded evidentiality and speaker certainty needs to address the issue of the possible influence that different linguistic forms may have on developmental understanding of linguistic expressions of epistemic states.

Second, in existing studies, no clear conceptual distinction has been made between spontaneous, online assessment of speaker knowledge, on the one hand, and more reflective, or offline, understanding of source of knowledge, on the other (for a similar suggestion, see Robinson & Whitcombe, 2003). Although some tasks employed by researchers require children's reflective and metalinguistic understanding of linguistically encoded speaker certainty or source (as in Aksu-Koc, 1988), and others require only spontaneous and unconscious assessment (as in Moore et al., 1989), the difference has not always been clearly acknowledged.

In this chapter, therefore, after a brief clarification of the relevant conceptual distinctions, we will discuss our recent studies that directly compare children's understanding of linguistically encoded speaker certainty and evidentiality within the same language (Japanese), while taking account of the issues of linguistic forms (particles versus verbs) and processing types (online versus offline). We have three main findings:

- Children process verbs and particles that encode speakers' epistemic states differently, only the first of which is significantly related to false-belief understanding.
- The ability to make an online assessment of a speaker's commitment to the informational content of the utterance develops earlier than the ability required for offline reasoning about how and why such an assessment has been made.
- An understanding of linguistically encoded speaker certainty precedes understanding of linguistically encoded evidentiality.

We discuss the implications of these findings in the final section.

Speaker Certainty and Evidentiality

English verbs such as *think* and *know*; adverbs such as *certainly*, *definitely*, *maybe*, and *perhaps*; and modal verbs such as *must* and *may* are among the many linguistic expressions indicating the speaker's degree of certainty about, or commitment to, the truthfulness of the informational content of the utterance. In English, such expressions are exclusively lexical, as opposed to being grammaticalized, for example, in the form of suffixes or particles. In Japanese, the language discussed in detail in this chapter, by

contrast, the most frequently used expressions of speaker certainty are sentence-final particles *yo* (certainty) and *kana* (uncertainty), although lexical alternatives are also available. Japanese sentence-final particles also include *tte*, which indicates that the speaker obtained the main information communicated by the utterance by hearsay. Conceptually the hearsay particle belongs to a larger category of evidentiality, that is, the source of knowledge, whereas the particles of speaker certainty belong to a category of epistemic modality, certainty of knowledge (for a discussion, see Dendale & Tasmowski, 2001; Fitneva, 2001). As is the case of expressions of speaker certainty, there are also lexicalized expressions of evidentiality, including English adverbs *allegedly* and *reportedly*, and Japanese adverbs *-rashii* and *-souda* (both correspond to “I heard that” in English). In Japanese, there is no particle to encode that the speaker acquired a piece of knowledge by visual observation.

Although speaker certainty and evidentiality are conceptually distinct, both relate fundamentally to the speaker’s knowledge states and therefore make an important contribution to the understanding of folk epistemology and psychology—that is, our commonsense view about knowing and thinking (Burr & Hofer, 2002). In communication, the hearer can assess the reliability of the information on the basis of expressions of certainty and evidentiality used by the speaker. In this chapter, we focus on the process through which the hearer takes advantage of those expressions to understand the speaker’s epistemic states, or how committed the speaker is or might be to the truth of the informational content of the utterance, and uses that understanding to assess the trustworthiness of the information.

Currently our hypothesis is that understanding speaker certainty, whether it is encoded in sentence-final particles or in predicates, requires less cognitive processing than does comprehension of evidentiality for the hearer to assess the speaker’s commitment to the truth of the informational content. Essentially we suggest that there are extra steps required to ascertain how likely it is that the speaker is committed to the content of the expressed proposition when the type of evidence that the speaker has is presented. With the former (understanding speaker certainty), one needs to understand the meaning encoded in the linguistic forms used to convey that attitude. With the latter (understanding evidentiality), one needs to understand not only the quality of evidence (direct versus indirect) encoded in the linguistic indicators (sentence-final particles or predicates), but also how the quality of evidence is likely to affect the speaker’s commitment to the truthfulness of the content of the proposition. Moreover, a hearer cannot simply base a judgment in such cases on a determination of how committed the speaker may be to the truth of the proposition, but needs to calculate (at least implicitly) how likely the proposition is to be true according to heuristics about what it means for someone to hear or see that something is the case and then consider the result in conjunction with what it means when someone says something. The interactions among these knowl-

edge and belief sets, we believe, are complicated and at least partially explain differences that we observe in the behavior of child comprehenders. We will come back to the issue again in the final discussion.

Children's Assessment of Speaker's Commitment to the Truthfulness of Information

In this section, we summarize findings of our own recent studies on how children make use of encoded speaker certainty and evidentiality to assess a speaker's commitment to the truthfulness of the utterance content. In these studies, special care was taken to distinguish between the two basic types of linguistic form, grammaticalized versus lexical expressions of the speaker's epistemic states, and between online understanding of the speaker's knowledge and offline and reflective reasoning about source of knowledge.

Children's Online Comprehension of Linguistically Encoded Speaker Certainty and Evidentiality. Adopting Moore et al. (1989)'s methodology, Matsui, Yamamoto, and McCagg (2006) presented preschoolers with hidden object tasks that prompted them to make decisions based on two conflicting utterances, each of which was marked with a different degree of speaker certainty or different quality of evidence. Linguistic stimuli chosen to convey speaker certainty and quality of evidence are shown in Table 5.1. A set of eight utterance types using the linguistic stimuli were created for experimental stimuli, which are shown in Table 5.2. As there is no particle to indicate that the information was obtained by visual observation in Japanese, the certainty particle *yo*, which pragmatically indicates that the speaker has compelling evidence (stronger than hearsay) to support his or her certainty, was selected to be contrasted with the hearsay particle *tte*. Let us note here that although sentence-final particles are extremely common in conversational Japanese, they are not grammatically obligatory, unlike equivalent particles in Korean.

All stimuli were presented on a laptop computer screen by animated characters. In the target task, two animals gave conflicting remarks about the location of the object in question. For example, in the *yo-kana* contrastive pair tasks, one of the two animals said, "The car is in the red box

Table 5.1 Contrastive Pairs Used in Hidden-Object Task

<i>Linguistic Form</i>	<i>Epistemic States</i>	<i>Contrastive Pairs</i>
Particles	Certainty Evidentiality	<i>Yo</i> versus <i>kana</i> <i>Yo</i> versus <i>tte</i>
Verbs	Certainty Evidentiality	<i>Shitteru</i> (know) versus <i>omou</i> (think) <i>Mita</i> (saw) versus <i>kiita</i> (heard that)

Source: Matsui et al. (2006).

Table 5.2 Illustrative Stimulus Utterance Examples

Contrastive Pairs	Degree of Speaker's Certainty and Quality of Evidence	
	Relatively Stronger	Relatively Weaker
1	The one the apple is in is the red box <i>dayo</i> .	The one the apple is in is the blue box <i>kana</i> .
2	I <i>know</i> the car is in the yellow box.	I <i>think</i> the one the car is in is the green box.
3	The one the hat is in is the blue box <i>dayo</i> .	The one the hat is in is the pink box <i>datte</i> .
4	I <i>saw</i> it. The one the socks are in is the white box.	I <i>heard</i> [of] it. The one the socks are in is the orange box.

Source: Matsui et al. (2006)

dayo,” while the other said, “The car is in the blue box *kana*.” Once the two conflicting remarks were presented, the experimenter asked the child the following target question: “Which container is the car in?” For each contrastive pair, a child was given four trials, which yielded sixteen trials in total. The order of the contrastive pairs was counterbalanced. After the first eight trials, the procedure was interrupted to administer two types of false-belief test.

Results showed that generally children comprehended the certainty contrasts better than evidentiality contrasts and that they understood the speaker’s epistemic states better when they were conveyed by particle than verbs. The results indicated that three year olds already had a fairly good understanding of particles of speaker certainty *yo* and *kana*, but their understanding of equivalent verbs remained poor. Another intriguing finding was that children’s understanding of epistemic particles did not correlate with their false-belief understanding, unlike their understanding of epistemic verbs, which did relate significantly to whether they pass false-belief tasks. The overall results thus seem to indicate that an understanding of a speaker’s epistemic states conveyed by particles may involve different mechanisms from those involved in understanding the equivalent verbs.

Children’s Offline Explanation for Their Choice of More Trustworthy Informant. Matsui et al.’s (2006) findings are based solely on the result of an online assessment task, and therefore the question of when children acquire more reflective understanding of the same concepts remained to be examined. In a new study, Matsui and Miura (2009) took up this issue and addressed the following question: With respect to information acquired by linguistic communication, at what age do children begin to be able to verbally express awareness of the sources of their beliefs by referring to the utterance of the more reliable speaker? The overall goal of the study was to directly compare children’s spontaneous assessment of speaker knowledge

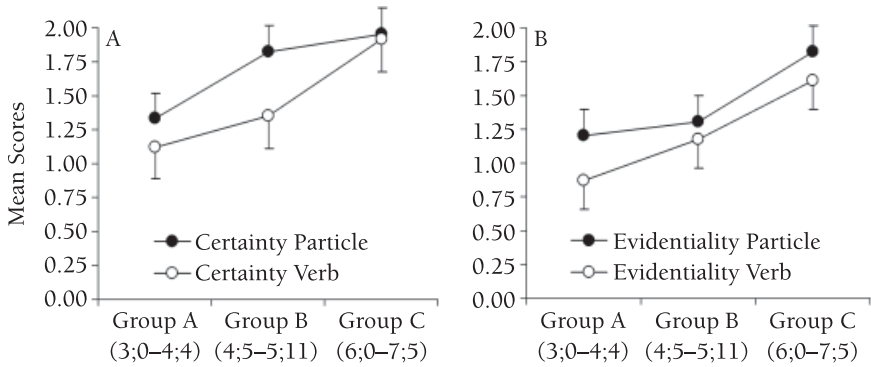
with their reflective evaluation of the resulting belief formation. It was also of interest to see if earlier understanding of particles and later understanding of verbs, demonstrated in children's spontaneous assessment of speaker reliability, will also be manifested in their more reflective understanding of knowledge formation: that is, whether children's metalinguistic awareness of what is encoded in particles proceeds their awareness of the meaning of equivalent verbs.

Eighty-one children, aged between 3 and 7, who spoke Japanese as their mother tongue, participated in the study. They were divided into three age groups for analysis. Group A consisted of twenty-three children aged 3;0 to 4;4 ($M = 3;8$), group B of twenty-three children aged 4;5 to 5;11 ($M = 4;11$), and group C of twenty-four children aged 6;0 to 7;5 ($M = 6;7$). The stimuli were the same four contrastive pairs: *yo* versus *kana*, *shitteru* (know) versus *omou* (think), *yo* versus *tte*, and *mita* (saw) versus *kiita* (heard that). Two trials with each contrastive pair were given to each child. After a child heard two contradicting statements about the location of a hidden object, the experimenter asked the child two questions: the first was about the location of the object (the location question): "Where is the x [hidden object]?" The second was about how the child worked out the location (source question): "How did you come to know the location of the x?"

Given that each utterance contained a linguistic indication of an epistemic attitude, we expected that children's answers to the source questions may be of two types: (a) answers referring to the utterance of the more reliable speaker and (b) answers referring to the relevant linguistic items used by the more reliable speaker. To maximize the possibility of obtaining both types of answers, we used an open-ended source question. Our hypothesis was that in order for a child to be able to remember an utterance or a speech act of a more reliable speaker as the source of knowledge, perception-based source awareness is sufficient, but to be able to refer to a relevant linguistic clue, a full metalinguistic awareness is required. It has been shown that such full metalinguistic ability starts developing around six years of age (Karmiloff-Smith, 1992), while perception-based source memory develops between four and five years of age (Perner & Ruffman 1995). Thus, if our hypothesis was on the right track, our source-monitoring task would show that the type (a) answers precedes the type (b) answers. To test this, we included six to seven year olds in our sample—older children than those tested in a typical source-monitoring task. We also carried out an additional study with adult participants in order to establish a baseline adult response pattern to the specific stimuli and questions that would be used in our main study.

For the children's performance in identifying the object location (the online task), our findings were consistent with those reported in previous studies: children showed developmental understanding of expressions of speaker certainty and information sources, starting from certainty particles at their earliest stage of development. The mean scores for the location question are shown in Figure 5.1.

Figure 5.1 Mean Scores of the Location Questions in the Certainty Pairs (A) and the Evidentiality Pairs (B)



For the development of the source-monitoring ability, however, unlike adults who consistently provided appropriate explanations for their choice of the location of the hidden object by referring to the relevant linguistic items in the baseline experiment, children younger than five years of age turned out to be largely unable to account for their beliefs properly. Answers to the source questions were judged as appropriate if they gave any sign of awareness of relevant utterances as the source of their judgment. Any other answers were judged as inappropriate—for example, referring to order, characters, or colors of containers as a clue or attributing the judgment to a child’s own action. The answers coded as appropriate were categorized further into two types according to the specificity of the answers: reference to the suggestive speech act of the reliable speaker (“The rabbit said” or “The rabbit told me”) and direct or indirect reference to relevant linguistic item(s) (“I know because the speaker said he knows it” or “I know because the speaker used *yo*”). Answers that do not directly refer to the relevant linguistic item but are considered to be based on a child’s correct interpretation of the specific linguistic item are coded as “indirectly referring to” the specific linguistic item. This category includes, for example, answers referring to the speaker’s current knowledge state (“The bear knows better”) or answers depicting how each speaker acquired the information (“The mouse looked inside by himself” or “He only heard from someone”).

The proportions of answers in each category are presented in Table 5.3. In the youngest group, none of the children referred to the specific linguistic items, and only 24 percent of their answers referred to utterances, while in the middle group, more than half of their answers were appropriate general explanations. Nearly half of the answers provided by the oldest group referred to the exact linguistic items.

In order to see the developmental change in children’s responses, answers to the source questions were scored according to the two separate

Table 5.3 Proportions of Three Types of Answers to the Source Questions

	<i>Group A</i> (3;0–4;4)	<i>Group B</i> (4;5–5;11)	<i>Group C</i> (6;0–7;5)
Appropriate			
Reference to the relevant utterance	.24	.42	.26
Reference to the relevant linguistic items	.00	.15	.48
Inappropriate	.76	.42	.26

criteria: generous criterion (whether they refer to either the utterances or to the relevant linguistic items) and) stringent criterion (whether they refer to the relevant linguistic items—the more adult-like explanation). Mean scores under each criterion are presented in Table 5.4.

Under the stringent criterion for both the certainty and the evidentiality pairs, there were significant differences between the oldest group and the other two groups, but not between the youngest and the middle group. For the particle pairs, there were significant score increases across the age, while for the verb pairs, there was a significant increase only between the middle and the oldest group. This suggests that for the source-monitoring skills, children start to develop their understanding of particles before verbs. A detailed look within each age group revealed that children in the middle group and the oldest group showed higher scores for the particle pairs than for the verb pairs, but the youngest group did not show any difference across linguistic forms. Under the generous criterion, there was no significant mean difference between the middle and the oldest group, but the youngest group scored significantly lower than the other two groups. When we look at details in each age group, children in the middle and the oldest group scored significantly higher for the certainty pairs than for the evidentiality pairs,

Table 5.4 Mean Scores for the Answers to the Source Questions Under the Two Criteria (Maximum Score = 2)

<i>Epistemic States</i>	<i>Age</i>	<i>Generous Criterion</i>		<i>Stringent Criterion</i>	
		<i>Particle</i>	<i>Verb</i>	<i>Particle</i>	<i>Verb</i>
Certainty	3;0–4;4	.50	.46	.00	.00
	4;5–5;11	1.26	1.26	.52	.26
	6;0–7;5	1.78	1.70	1.26	1.00
Evidentiality	3;0–4;4	.63	.38	.00	.00
	4;5–5;11	1.22	.87	.35	.09
	6;0–7;5	1.61	1.39	1.04	.91

while children in the youngest group showed no significant difference between the two.

Thus, the results confirm the previous findings that the source-monitoring ability in children begins functioning between five and six years of age. Even the performance of six to seven year olds in the study was still far from that of adults, which indicates that development of metalinguistic ability continues into early school age. Our detailed analysis of coding and analysis of the answers to the source questions, however, revealed something previously unnoticed: those who were able to explicitly identify the relevant linguistic item in answering the source questions referred to sentence-final particles more often than verbs. This tendency was particularly strong in the middle group (4;5 to 5;11). Thus, it appears that in both spontaneous and reflective judgment of the reliable speaker, sentence-final particles seem to be more easily processed and used as the basis of their judgment than equivalent predicates by preschoolers. Moreover, our result shows that as children's metalinguistic ability develops more fully, the difference between understanding of particles and that of verbs gradually disappears.

Summary and Discussion

In this final section, we briefly discuss the implications of our main findings in a broader context of linguistic and conceptual development and consider how they may shed light on the remaining issues.

Particles Are Understood Earlier Than Verbs. Our studies on Japanese children's understanding of speaker certainty and evidentiality have revealed that both particles that indicate speaker certainty about the proposition and particles that indicate the quality of evidence available to the speaker are understood about one year before the basic verbs that encode roughly the same meaning. Furthermore, children were more successful in providing adequate explanations about why they trusted one informant over the other when they could refer to the epistemic particles rather than the epistemic verbs the informants used

That particles are understood earlier than verbs can be accounted for in a number of ways. Many developmental psychologists and language acquisition specialists have suggested that input frequency is the main cause of earlier understanding. The analysis of Japanese corpus data in Matsui et al. (2006) confirmed the high frequency of sentence-final particles in the mother's speech.

A second possible factor is the different communicative function presumably carried by the particles and the predicates. The intuition that particles and morphemes have a somewhat distinct function from that of verbs and nouns in verbal communication is widely shared. In addition, our recent study comparing children's understanding of German adverbials of speaker certainty and equivalent Japanese particles also suggests that children may

process epistemic adverbials and particles differently (Matsui, Rakoczy, Miura, & Tomasello, 2009).

Typically particles are seen as encoding nonrepresentational (procedural) information that facilitates the manipulation of representational (conceptual) information (Blakemore, 1987; Talmy, 2001; Wilson & Sperber, 1993). Other linguistic items that have been considered to encode procedural information include discourse connectives, pronouns, and mood indicators. It has been suggested that the function of procedural encoding in general is to guide the hearer to go through the inferential phase of utterance comprehension by making particular range of assumptions more salient and accessible to the hearer (Blakemore, 2002; Wharton, 2003). In the case of epistemic particles, their main function probably is to facilitate the hearer's inferential construction of particular propositional attitude intended by the speaker by making the relevant epistemic state or attitude mentally more accessible to the hearer (Matsui, 2000).

Currently little is known about acquisitional process of procedural meaning. Does it involve cognitive mechanisms distinct from those involved in acquisition of conceptual information? Existing studies on acquisition of regular morphology suggest it may be the case. For example, Ullman (2004) has proposed that the acquisition of regular morphology, such as English past tense inflection), involves different neural bases from that of lexical words: the former is stored in a procedural memory system and the latter in a declarative memory system. Notwithstanding clear functional differences between Japanese epistemic particles and English past tense inflection, hypothesizing analogous mechanisms for acquisition of the particles may be an interesting start for future investigation.

Online Comprehension Precedes Offline Explanations. The second main finding of the studies reported here is that children's online comprehension of epistemic expressions starts a couple of years before they become capable of reasoning reflectively about a speaker's knowledge state on the basis of the particular epistemic expression used by the speaker. The cognitive difference between the two types of understanding may be captured by the distinction between implicit linguistic knowledge and explicit metalinguistic knowledge. Typically, and most extensively in the studies of bilingual language processing, implicit linguistic knowledge is associated with procedural memory system and metalinguistic knowledge with declarative system (Paradis, 2004). Although currently little is known about the overall developmental course of the two systems in childhood, developmental dissociation between procedural and declarative systems in middle childhood has often been proposed: that the former emerges and stabilizes early in childhood and the latter continues to develop well into adolescence (Tulving, 1985; Digiulio, Seidenberg, O'Leary, & Raz, 1994). The results of our studies, together with previous findings, provide further evidence for the dissociation. This in turn suggests that what is crucial for the future investigation of children's developing knowledge of evidentiality and speaker certainty is

to take the likely developmental difference between the two knowledge systems well into consideration in order to choose an adequate experimental design (for example, offline versus online tasks) for the particular type of question in concern (for example, declarative versus procedural knowledge).

Our novel finding that older preschool children were much better at answering source questions when the relevant information was conveyed by particles rather than predicates indicates that particles may have a cognitively rather privileged status in the declarative knowledge system in terms of both encoding and retrieval. Currently we do not know why that is the case. One might speculate that at least for Japanese children, epistemic particles, which typically play essential roles to maintain desirable interpersonal relations with conversational partners, are highly salient information. If this line of explanation turns out to be on the right track, it may further indicate that the degree of salience attached to a variety of information types is determined not only by the nature of universal human cognition but also by individual cultures.

Encoded Speaker Certainty Is Understood Earlier Than Evidentiality. Finally, let us briefly consider the implications of the remaining main result of the studies by Matsui and her colleagues: that speaker certainty is understood earlier than evidentiality. Recall that among the three particles we used—*yo* (certainty or direct evidence), *kana* (uncertainty), and *tte* (hearsay)—the hearsay particle *tte* was understood last, at around five years of age.

The difference between understanding speaker certainty on the basis of a speaker's own claim (through the use of the certainty particle *yo* or the use of the predicate *know*) and on the basis of the information about how the speaker acquired certain knowledge might be explained by the cognitive demands of evidential reasoning. The former simply requires the child to understand the meaning of the epistemic vocabulary and to accept what the speaker said. The latter additionally requires at least some deductive reasoning (for example, "If someone actually saw P, then he knows that P"). Existing studies of children's understanding of knowledge formation indicate that three year olds are capable of grasping that seeing leads to knowing. They are also known to have spontaneous and implicit understanding that hearsay evidence is less reliable by default than direct perceptual evidence (Robinson, Mitchell, & Nye, 1995). Their understanding of evidential quality in general, however, still seems fragile. Thus, several possible causes for those young children's failure to pass evidentiality tasks can be suggested. For example, for three-year-old children, reasoning about the knowledge state of someone with hearsay evidence ("If someone just heard that P, then he does not really know that P") may be difficult. Alternatively, even if all the premises required for such reasoning are accessible, they may not be able to do the computation right.

Furthermore, young preschoolers may have a rather naive conception of the speaker's intentions. If so, both direct and indirect evidence may be

seen to be equally reliable, and it is impossible to distinguish between them. Young children's tendency to accept what other people say as a true statement unless children have access to evidence to suggest otherwise is well known. Such a tendency may have an important role to play in young children's early knowledge acquisition: monitoring the reliability of each information source can be rather cognitively demanding (Wimmer, Hogrefe, & Sodian, 1988). Here we suggest that this early strategy to accept new information as true by default may be in part related to late development of evidential reasoning in verbal communication. Even when the speaker indicates that the information being presented is acquired by hearsay, children, by default, may take the information as something worth believing.

We also speculate that young children's difficulty in evidential reasoning may relate to their inability to understand second-order representation of mental states. In order to understand someone's thinking about the thought of someone else ("John knows that Mary doesn't know that chocolate is in the box"), an ability to construct doubly embedded mental representations, that is, second-order representations, is required (Perner, 1988; Perner, & Wimmer 1985). Moreover, for the hearer of an utterance to understand the speaker's intentions or propositional attitudes (in the case of a simple assertion P, "The speaker intends that the hearer believes that the speaker believes that P"), higher-order mental representation is needed (Sperber, 2000). Addition of the hearsay particle to an utterance indicates that the information is based on indirect evidence, and so the hearer may conclude that the speaker may not believe the information. Such a causal reasoning about evidence and belief formation and the resulting propositional attitude attributed to the speaker ("The speaker intends that the hearer believes that the speaker may not believe that P") are likely to involve second-order representation (Astington, Pelletiera, & Homerb, 2002). The results of our studies strongly suggest that robust representational ability is also absolutely necessary for proper reasoning about linguistically encoded evidentiality, and investigation of the exact relation between the two is warranted.

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