Mindreading and Verbal Communication

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Abstract: In this paper, I illustrate how children's mentalizing abilities interface with both implicit and explicit aspects of communication. I use two examples to make this point. First, I argue that some understanding that other people have mental states which can be affected by communication is present already in infancy. I show that this early sensitivity to intentionality is responsible for early communicative successes. Second, I suggest that mindreading is involved in learning the meaning of evidentials and other mental terms. I present some cross-linguistic evidence for the acquisition of evidential morphemes and relate those findings to young children's ability to reason about beliefs, evidence and information.

The idea that verbal communication involves a species of mindreading is not new. Among linguists and philosophers, largely as a result of Grice's (1957, 1967) influence, it has long been recognized that the act of communicating involves on the part of the communicator and the addressee mutual metarepresentations of each others' mental states. In psychology, the coordination of common ground and attention in conversation has been pursued in a variety of studies (e.g. Clark and Marshall, 1981; Bruner, 1983).

A number of recent developments, however, have opened up the possibility of looking in new ways at the connections between linguistic communication and mentalizing. Within linguistic pragmatics, advances in the theory of communication have allowed for a more explicit and psychologically natural role for mindreading than Grice's original insights (see Sperber and Wilson, this volume; cf. Sperber and Wilson, 1986; Sperber, 2000; Wilson, 2000). Within cognitive psychology, a series of important experimental findings have greatly enhanced our understanding of the nature, development and breakdown of mindreading abilities; many of these results directly address the way mindreading mechanisms impact on verbal interaction in both children and adults (see Bloom, this volume; also Bloom, 2000).

In this paper, I want to use insights from both these strands of research to discuss how the ability to metarepresent mental states is involved in the development of communicative skills. My goal is to show that such an interdisciplin-

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ary approach is essential for any serious attempt to understand the mechanics of early communication. I will focus on two major contributions of mindreading to early verbal interaction. First, as I have already mentioned, every communicative act invites inferences about the speaker's intended meaning. To take a clear case, in order to comprehend 'It's hot in here', on one salient interpretation, the hearer needs to construct complex inferences about the speaker's intentions (and conclude that the speaker implies that she wants the hearer to open the window). The first part of the paper discusses ways in which mindreading can scaffold the ability to calculate implicatures in infant communication; it also argues against alternative proposals which handle early communicative successes without crediting infants with a sensitivity to mental states.

Perhaps a less studied aspect of the involvement of metarepresentation in verbal interaction is the fact that communicators often explicitly talk about mental states. Terms such as *belief, idea, thought*, *inference*, encode aspects of our mental life and, in order to understand them, one must be able to map them onto the appropriate mentalistic concepts. The second part of the paper focuses on how children come to grasp the meaning of a subclass of mental terms known as evidentials: these are terms which indicate the relative strength (or the source) of the speaker's belief (cf. the English *probably, certainly, allegedly*, etc.). Specifically, I discuss the link between the acquisition of the semantics of evidentiality and the ability to reason metarepresentationally about evidence and information.

1. Inferring the Speaker's Meaning: Implicatures

1.1 Early Understanding of Implicatures

Studies of early communication have documented that some ability to handle implicatures is present very early on. Consider a widely studied class, that of indirect requests: even two-year-olds have been shown to both understand and produce what from the adult's point of view would be considered as indirect requests for action. Below are some examples from children's speech (taken from Newcombe and Zaslow, 1981):

(1) I can't sit anywhere. (2;6; child is standing at a table and wants a place to sit)
(2) Where's a place for me? (2;5)

Children of this age are also flexible enough to spontaneously reformulate their requests if they fail to obtain the desired response (e.g. they move from an interrogative to an imperative form: Bates, 1976). Moreover, infants respond appropriately to a variety of requests for action regardless of how subtly the request is expressed (for instance, mother asks 'Are there any more suitcases?',

and her two-year-old goes on to find another toy suitcase; Shatz, 1978). Two-year-olds can even give different paraphrases of an utterance (e.g. 'Would you like to play on the train?') depending on its intended implications (e.g. whether it has an 'offer' or a 'request' interpretation; Reeder, 1980).

How are these early communicative successes to be explained? According to one proposal, the explanation lies with children's increasing familiarity with conversational routines, i.e. appropriate pairings of linguistic form and function. Once children establish that a certain form can be successfully used to bring about a response on the part of their addressee, they can use this knowledge to attain their goals. For instance, in the case of (1), the child need only realize that a statement of inability to perform some desirable action will cause a parent to come to her help; therefore, a routinized pairing between the form ('I can't…') and a behavioral response on the part of the adult underlies the child's ability to produce what on the surface looks like an implicature. Similar routines, it is claimed, are responsible for children's ability to respond appropriately to implicated requests. Other apparent indications of communicative sophistication, such as the repair of failures in miscommunication episodes, could be explained in terms of efficient and standardized pairings between linguistic forms and functions.

On this view, successful communication in young children does not necessarily imply a meeting of minds: the child need not represent that her interlocutors have mental states, much less try to affect these states by her verbal behavior, in order for her utterances to interface smoothly with those of her interlocutors. Proponents of this view argue that this explanation of early successes is more parsimonious than one which grants a deeper understanding of the mechanics of communication to young interlocutors. In the words of Shatz and O'Reilly (1990, pp. 144–5):

> An alternative to the view that children under three know what it takes to be an effective communicator is that their behaviour in repair situations is based primarily on the more easily attainable knowledge of observable conversational patterns and sequencing, and on the desire to fulfil overt behavioural goals via others. This view is more consonant with our present knowledge of what two-year-olds understand about the mental representations of others…

This position is a popular one within developmental pragmatics, where it is frequently claimed that early communicative performance builds on recurrent and only partially understood pairings of utterances and their interpretations in context. I want to argue that, as a general account of early communicative successes, the 'conversational routines' hypothesis has serious flaws. Furthermore, I want to demonstrate that, in fact, it seriously underestimates the metarepresentational abilities of two-year-old children.

Notice first that the idea that children produce and interpret utterances on

the basis of learned routines is a return to associationist views about language development. There are good arguments against associationism in other areas of language learning (e.g. the acquisition of word meaning—Gleitman, 1990; Bloom, 2000), and most of them carry over to the case of early communication. The main objection to any associationist account of learning how to speak and communicate is that such an account ignores the fact that utterance interpretation is crucially an attempt to establish what the speaker *meant*. Even in order to construct routinized string-interpretation pairings, the child must be able to extract from the communicative situation those dimensions which are relevant for the interpretation of the string—and this presupposes a nontrivial degree of inferencing. In addition, given the variety of possible utterance-interpretation mappings, it is reasonable to conclude that assumptions about what the speaker might have intended somehow inform the child's choice of interpretation by narrowing down the hypothesis search space.

Further problems for the 'conversational routines' view are raised by evidence showing that young children are attentive to subtle aspects of communicative situations which go well beyond simple form-function correspondences. For instance, it has been repeatedly demonstrated that children as young as two adjust their conversational contribution depending on properties of their interlocutors. To take an example from Read and Cherry (1978), toddlers have been noted to use statements with *want* or *need* ('I need my cup') with adults but not with peers—presumably because peers are less likely to attend to their desires and needs. This is consonant with other available evidence for infants' conversational adjustments. Tomasello, Farrar and Dines (1983) showed that children in their second year respond differentially to nonspecific requests for clarification ('Huh?') from their mothers and from strangers: while they reformulate their utterance for strangers, they simply repeat it for their mother (cf. also Golinkoff, 1986). It is a reasonable conclusion that children of this age are able to discriminate between familiar and unfamiliar interlocutors and consider familiar interlocutors more likely to have simply misheard (rather than misunderstood) them.

One may still argue, of course, that infants' successful verbal adjustments to the status of their interlocutor do not necessarily imply that they entertain thoughts about their interlocutors' mental states. However, there is some rather striking evidence that infants show genuine sensitivity to cues about their interlocutors' knowledge state: O'Neill (1996) has shown that infants differ in their requests for a hidden object depending on whether the adult addressee knows the location of the object or not. Her general finding is that two-year-olds are more likely to name the object, name its location and gesture to its location when the addressee has not seen where the object was hidden than when he/she has. These experiments show that infants can adjust their communicative behavior on the basis of cues (e.g. visual access to an object) which affect their interlocutor's beliefs about the world.

Finally, notice that the associationist view cannot handle cases of truly cre-

ative communicative behavior, where routinization is implausible. There is evidence that even two-year-olds can understand and produce genuine implicatures, as the following example from Newcombe and Zaslow (1981) shows:

> (3) Dat enough people. (2;8; child wants the hearer to stop putting 'people' in a container)

There is a more general point to be made here. Recall that the 'conversational routines' view is based on the idea that two-year-olds' purpose in communicating is to achieve immediate practical goals. This assumption, however, is itself fatally flawed. Beyond requesting, early utterances are also used to inform, warn, display and pretend: it is hard to see how the 'routinization' theory could account for the diversity of functions children's early utterances are used to perform.

1.2 Perspectives from Mindreading

An alternative view about early communication is to attribute two-year-olds' successes to increasing sensitivity to cues about other people's mental states. There is independent evidence that such sensitivity exists by the second year of life. We know, for instance, that some awareness of the emotional reactions and perceptual vantage points of others is present at this age (Baldwin and Moses, 1994). More relevant perhaps for the demands of communication is the ability to appreciate intentionality cues at about the same period. For example, it has been convincingly argued that word learning involves metarepresentational skills (Bloom, this volume; Happé and Loth, this volume), especially since children seem to be taking into account the attentional focus of the person labeling an object in deciding what to call it (Baldwin, 1991).

Naturally, two-year-olds are not capable of complex mindreading and it is an open question when and how children arrive at adult-like metarepresentational sophistication. However, the above evidence gives us reasons to believe that early communicative steps are supported by at least some understanding that other people possess mental states that can be affected by verbal stimuli. This opens up the way to the study of the contribution of metarepresentation across developmental periods and places nontrivial constraints on the shape of developmental pragmatic theory. According to this perspective, the goal of the theory is to provide an explanatory account of how different combinations of linguistic and contextual cues are processed by a pragmatic device with an increasingly sophisticated ability to handle metarepresentation.

Adopting this perspective on developmental pragmatics has several implications. To begin with, it is now possible to trace a continuum between prelinguistic and linguistic communication by exploring children's ability to use a variety of stimuli in their attempts to make contact with adults. Consider the behavior of Paul, a 14-month-old infant (Lock, 1980, pp. 95–6):

> Mother enters the room holding a cup of tea. Paul turns from his playpen in her direction and obviously sees it. He cries vestigially and so attracts his mother's attention; immediately, he points towards her and smacks his lips concurrently.
> Mother: No, you can't have this one, it's Andy's.
> Mother gives me (the observer) the cup of tea and I put it on the mantel-piece to cool. Paul crawls across to me and grasps my knees. I turn to look at him; he looks towards the mantelpiece and points, turns back to me, continues to point, and smacks his lips.

Paul uses a repertoire of ostensive devices (vestigial crying, pointing, lipsmacking) to attract attention and request a desirable object. The use of such devices by infants has been the topic of extensive work. We know, for instance, that infants only point when there is an addressee present; they also point for purposes of sharing information and not only for purposes of obtaining an object (Franco and Butterworth, 1991). These results are consistent with the assumption that infants have a grasp of the mechanics of communication even before language begins.

Another straightforward consequence of the metarepresentational approach to early communication is that, other things being equal, advanced mindreading abilities should correlate with greater communicative sophistication. Inversely, breakdown of mindreading abilities should create difficulties in computing implicitly conveyed aspects of the speaker's meaning. Relevant data are provided by autistic individuals whose mindreading abilities are deficient or delayed: in studying the comprehension of indirect requests in autistic adults, Paul and Cohen (1985) found that their subjects had trouble computing those requests which relied more heavily on inference (e.g. 'I'd love to see the circle colored blue').

Finally, the metarepresentational approach to communication sketched above implies that there is fundamental continuity between very young children and adults, since both rely on some form of mentalistic understanding in approaching communicative situations. The 'continuity' view differs radically from proposals which adopt qualitative changes in the nature of communicative behavior across developmental stages.[1] For instance, the continuity view contrasts with the position that infants start out as associationist agents, using stimulus–response pairings to match utterances with behavioral responses in context, and only later come to acknowledge that their interlocutors entertain intentions, desires, beliefs and attitudes which affect and are affected by linguis-

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[1]   The view that early communication involves sensitivity to intentionality does not commit one to the version of continuity thesis I have presented. It is possible to argue that, even though infants possess mentalizing abilities, these differ in deep and qualitative ways from the full-blown adult mindreading capacities (see, e.g., Gopnik and Wellman, 1994).

tic communication. On the continuity thesis, normally developing infants are much closer to adults in terms of their communicative and cognitive behavior than to autistic children (who have truly weak mentalizing abilities).

2. Constructing the Speaker's Meaning: Mental Terms

2.1 The Acquisition of Evidential Vocabulary

As I mentioned in the Introduction, mentalistic concepts also contribute to communication on the level of lexical information, since a variety of linguistic expressions have mental, abstract referents. Previous studies have traced the emergence and development of several mental terms such as propositional–attitude verbs (e.g. *know, think*, *believe*; see Bretherton and Beeghly, 1982; Shatz, Wellman and Silber, 1983), and epistemic modals (e.g. *must* and *may*; see Moore, Pure and Furrow, 1990; Papafragou, 1998, 2000). Here I want to concentrate on a little-studied class of mental terms known as evidentials. These include a collection of formally diverse elements whose function is to assess the propositional content of an utterance in terms of its informational source (e.g. perception, inference, or hearsay) and/or the degree of speaker commitment to that content (strong/weak).

In English, evidentiality is encoded mostly lexically (by adverbs such as *allegedly, reportedly*, etc.), or occasionally through syntactic means (cf. the contrast between 'I saw John come', which indicates direct evidence, vs. 'I saw that John came', which indicates indirect access to the event). In other languages, the source of information and/or speaker commitment are grammaticalized in extended and elaborate morphological systems.

There is some evidence on the acquisition of evidential expressions, mostly from languages with grammaticalized evidentiality. Aksu-Koç (1986) reports on the acquisition of two evidential suffixes in Turkish, *–dI* (direct experience) and *–mIş* (indirect experience: hearsay/inference). All past tense verbs in Turkish are obligatorily marked by one of these suffixes, depending on the informational source of the event described by the verb. In one of her experiments, Aksu-Koç asked children to judge whether a doll who had reported an event using either *–dI* or *–mIş* had seen the event or was told about it. She found that learners of Turkish do not acquire the 'direct experience' marker until the age of 3;0, while the indirect experience marker is understood about a year later.

Korean also has a system of evidential morphemes which is part of a larger class of sentence-final (SE) morphemes. These SE morphemes are obligatory and form part of the wellformedness conditions for sentences; they are frequent in informal speech; and they are perceptually salient (largely as a function of their sentence-final position). Choi (1995) presents longitudinal evidence which shows that several of these evidential SE morphemes are acquired very

early by Korean children. According to her data, *-e* (a declarative marker, which indicates direct evidence) is acquired between 1;8 and 1;10; *-tay* (a hearsay marker) is acquired in the beginning of the third year; and *-ta* (a declarative marker, which, like *-e*, encodes direct access to evidence) appears steadily by the end of the third year.

Interestingly, both Aksu-Koç and Choi take the use of evidential markers as an index of children's successful evidential reasoning. This is in line with previous research which generally assumes that the appearance of mental terms is a window onto the child's mentalizing activity (e.g. Bretherton and Beeghly, 1982). Moreover, both authors leave open the possibility that children learning languages with different evidential systems might diverge in their reasoning about different sources of information. Aksu-Koç concludes that, in order to establish the precise connections between linguistic and conceptual development in this domain, 'it is necessary to make comparative studies between languages with and without evidentiality contrasts' (1986, p. 203).

The use of data from language acquisition to trace conceptual development leaves us with a number of problems. The most frustrating is that there is no clear way of comparing results across different languages. For instance, on the basis of the evidential data above, one might be tempted to conclude that Korean-speaking children have come to appreciate informational perspective earlier than Turkish- (or possibly English-) speaking children. However, in the absence of independent evidence, this conclusion would have to remain a speculation.

Rather than assuming that language development directly reflects cognitive development, I propose to relate the acquisition of evidential expressions to children's performance in nonlinguistic tasks testing evidential reasoning. Several such tasks have been developed recently within research on mindreading, as I discuss below. This approach has a number of advantages. First, it holds promise for uncovering the conceptual underpinnings of linguistic evidentiality using nonlinguistic cognitive tasks. Second, it offers an independent means of comparing children learning languages with different evidential systems in order to establish whether they diverge in their evidential thinking. In the next section, I lay out this approach and show how it can be used to shed light on these questions.

2.2 Perspectives from Mindreading

It seems obvious that the ability to reason evidentially about the origins, strength and reliability of our beliefs is part of our ability to reason about mental states in general. There is by now a small literature on how and when children develop an understanding of the causal origins of belief. In one experiment, Pratt and Bryant (1990) presented three-year-olds with a scene in which two characters took turns in handling a container: one of the characters looked inside the container, while the other lifted it. When asked which character

knew what was in the container, three-year-olds succeeded in selecting the participant who had visual access to its contents.[2]

In another experiment, O'Neill and Gopnik (1991) allowed preschoolers to find out what was inside a container in one of several ways (by feeling its contents, by looking into the container, by getting information from the experimenter, or by inferring the contents from a clue). Even though afterwards children could correctly identify the contents of the container, their justifications for their belief improved considerably between 3;0 and 4;0 years. Other recent results confirm that there is a significant difference between three and four-year-old children in reasoning about sources of belief (Sodian and Wimmer, 1987; cf. Whitcombe and Robinson, 2000). According to these studies, some types of informational evidence such as communication seem particularly taxing for 3-year-olds. Other types of information sources may not be understood until much later (e.g. the fact that inference leads to knowledge may not be properly appreciated before the age of six).

Such evidential reasoning tasks can be very usefully related to the linguistic data reviewed in the previous section. An immediate observation is that the nonlinguistic data from English-speaking children seem to converge with Aksu-Koç's data from Turkish. Recall that, by the age of three, Turkish-speaking children have acquired the direct experience marker; around that age, their English-speaking peers show evidence of knowing that perception leads to knowledge. The indirect experience marker is acquired around the age of four by Turkish learners; English-speaking children of the same age have been shown to appreciate communication as an information source. More informative comparisons could be made if linguistic and nonlinguistic data were available for the same group of speakers. Overall, however, the available evidence on children's reasoning about informational sources roughly agrees with the timetable for the acquisition of linguistic evidentiality in Turkish.

The Korean data present more of a puzzle. Recall that, if Choi's data are reliable, children learning Korean acquire evidential morphology much earlier than the age at which English-speaking children pass nonlinguistic evidential tasks (and much earlier than the age at which evidential morphology is acquired in other languages, e.g. Turkish). These facts raise several interesting questions. One would first want to know whether very young Korean children have assigned the correct (adult) semantics to evidential morphemes (since this cannot be established solely on the basis of observational data). Second, one would want to know whether the presence of grammaticalized evidentiality could encourage Korean children to use the relevant conceptual distinctions at an earlier age and with greater reliability than their English-speaking peers (whose language does not regularly grammaticalize evidential distinctions).

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[2] It is worth pointing out that autistic subjects fail the Pratt and Bryant task (Perner, Frith, Leslie and Leekam, 1989). It should come as no surprise that massive difficulties with mindreading directly affect evidential reasoning.

In joint work with Peggy Li (Papafragou and Li, 2001), we recently started probing further into these questions. In one of our experiments, we gave a version of Pratt and Bryant task to a group of 3- and 4-year-old English learners and we compared their performance to a group of Korean-speaking peers. In this task, two characters took turns in handling a container which contained a secret object. In some cases, one of the characters looked inside the container, while the other knocked on its surface. In other cases, one of the characters was told by the experimenter what was inside the container, while the other was given a kiss. Children were then asked to pick which of the characters knew what was in the container; they were also asked whether the character saw what was inside or was told by the experimenter. According to some preliminary results, English-speaking 4-year-olds are reliably better than 3-year-olds in this task (which is what one should expect given the previous experimental literature). But our studies came up with an unexpected result: Korean-speaking children are significantly better than English-speaking children in linking perception and communication to knowledge. The crucial difference came up with Korean 3-year-olds, who succeeded in evidential tasks where their English-speaking peers failed.

These results combined with Choi's findings might seem to suggest that the time-course of evidential reasoning is subject to linguistic effects. Specifically, one may assume that the systematic marking of evidential distinctions in the Korean input leads very young learners to attend to aspects of the environment which they may have otherwise not been specially attended to and to extract what is common across situations that involve access to information. This then would lead to an early development of evidential morphology as well as to early successes with evidential reasoning tasks.

However, some further experiments give us reasons to doubt that this picture is correct. We presented the same set of 3- and 4-year-old Korean speakers with a new task to test whether they have acquired the correct semantics for evidential morphemes. In this experiment, two characters made the same statement about the contents of a container (e.g. 'There's a ball in the box') but with different evidential marking (either the 'direct experience' marker -*ta* or the hearsay marker -*tay*). Children were then asked which of the characters had seen what was in the container. Adults have no problem picking the character who has used the direct experience marker in this case. It turns out that both 3- and 4-year-olds fail on this task (cf. also Aksu-Koç, 1986, for similar results for Turkish).

Their linguistic performance shows that Korean children have not fully acquired the system of evidential markers by 4;0 (since they cannot discriminate accurately between the two morphemes). In other words, even though young Korean learners successfully reason about informational access and belief, they have not yet mapped the relevant evidential concepts onto the sentence-final morphemes in their language. These findings further suggest that linguistic maturity cannot be the driving force in Korean children's success

in evidential reasoning tasks and that some other explanation should be sought for the Korean-English difference (e.g. performance factors, cultural differences, etc.).

Other accounts of the data may be offered at this stage.[3] Nevertheless, this research establishes a number of important points. It shows how research on mindreading allows us to seriously address the development of early communication and its relation to conceptual development. Specifically, it shows how learning the semantics of so-called mental, evidential and related terms is connected to our ability to think about mental states, evidence and information. Finally, it shows how cross-linguistic work on the acquisition of word meaning can be linked to nonlinguistic findings about the development of metarepresentational abilities.

3. Conclusion

The purpose of this short note was to illustrate how children's mentalizing abilities interface with both implicit and explicit aspects of communication. I have used two very diverse examples to make this point. I have argued that infants' ability to go beyond what was said and to retrieve subtle aspects of what the speaker *meant* by an utterance should be attributed to their remarkable ability to take into account intentionality cues. I have also suggested that mindreading is heavily involved in aspects of vocabulary acquisition, especially for morphemes which encode mentalistic concepts (such as evidence, or source of information). Several hard questions remain open about both the developmental timetable and the precise architectural connections between pragmatic and broader metarepresentational mechanisms. What I hope to have shown is that an approach which combines insights from both linguistic pragmatics and cognitive psychology can shed light on both the mechanics and development of successful communication and the nature of human mindreading capacities more generally.

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[3] For instance, one might argue that the difference in performance between the English- and Korean-speaking children is due to linguistic influences from a semantic neighborhood other than the Korean evidential morphemes (e.g. some other class of mental predicates). Alternatively, or in addition, it may turn out that our linguistic task underestimates the linguistic sophistication of our young participants and that a more accurate test of semantic knowledge should be devised. We are currently exploring these directions in ongoing work.

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