Children's Use of Referring Expressions: Some Implications for Theory of Mind[*]

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This paper presents results of corpus analytic investigations of children's use of referring expressions and considers possible implications of this work for questions relating to development of theory of mind. The study confirms previous findings that children use the full range of referring forms (definite and indefinite articles, demonstrative determiners, and demonstrative and personal pronouns) appropriately by age 3 or earlier. It also provides support for two distinct stages in mind-reading ability. The first, which is implicit and non-propositional, includes the ability to assess cognitive statuses such as familiarity and focus of attention in relation to the intended referent; the second, which is propositional and more conscious, includes the ability to assess epistemic states such as knowledge and belief. Distinguishing these two stages supports attempts to reconcile seemingly inconsistent results concerning the age at which children develop theory of mind. It also makes it possible to explain why children learn to use forms correctly before they exhibit the pragmatic ability to consider and calculate quantity implicatures.

1   Introduction

It is a characteristic (and probably unique) feature of human language that the same entity can be referred to in many different ways, using different forms such as *it*, *that*, *the restaurant*, *a restaurant*, *that great restaurant we went to in Berlin*, and so on. Unlike some other characteristic features of human language, syntactic properties such as recursion, for example, this feature appears to be necessarily rooted in the interactive function of language, i.e. in its use for the purpose of communication between two intentional agents.

While accounts of nominal reference and use of referring expressions differ, it is now generally agreed that the particular forms a speaker/writer uses are at least partly constrained by her assessment of the addressee's knowledge and attention state at the point in the discourse when the form is used. Gundel, Hedberg, and Zacharski (1988, 1989, 1993, and subsequent work) take this observation one step further by proposing that individual lexical items, specifically determiners and pronouns, encode, as part of their conventional meaning, information about the cognitive status of the intended referent/interpretation in the mind of the addressee at the point just before the nominal form is encountered. If this account is correct, the acquisition of such forms by children could shed light on the development of their sensitivity to the mental states of others, in particular when these are different from their own – what has sometimes been called 'theory of mind' (e.g. Premack and Woodruff 1978, Baron-Cohen 1995). The present paper reports on an ongoing study that aims to investigate the connection between theory of mind and children's use of referring expression. Section 2 outlines the Givenness Hierarchy framework and some of its assumptions and predictions; in section 3 we report on a corpus study of children's use of referring expression, and in section 4 we conclude with some preliminary implications of this work for issues related to the development of theory of mind.

2   The Givenness Hierarchy

Gundel, Hedberg and Zacharski (1993) propose that determiners and pronouns in natural language conventionally encode information about the cognitive status of the referent/interpretation for the addressee at the point just before the nominal form is encountered. The relevant statuses are listed below in (1) along with the English form that conventionally encodes that status (*it* stands for all unstressed personal pronouns, *SHE* for all stressed personal pronouns, and *N* for an NP complement of a determiner).

(1)   Givenness Hierarchy (GH) (Gundel, Hedberg, and Zacharski 1993)

in focus	>	activated	>	familiar	>	uniquely identifiable	>	referential	>	type identifiable
it		*this/that/this N*		*that N*		*the N*		*indefinite this N*		*a N*

Statuses on the GH encode procedural information about the manner of accessibility[1] of the referent/interpretation, as described in (2).

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[1]   The Givenness Hierarchy is not, however, a hierarchy of **degrees** of accessibility in the sense of Ariel 1988, 1990, for example. This is so for two reasons. First, the statuses are in a unidirectional entailment and are therefore not mutually exclusive. Second, referents of forms that code statuses lower on the hierarchy are not necessarily more difficult to access

(2)   in focus: associate representation in focus of attention
       activated: associate representation in working memory
       familiar: associate representation in memory
       uniquely identifiable: associate unique representation with NP
       referential   associate unique representation
       type identifiable   associate type representation

For example, in the English sentence *That dog next door kept me awake,* the determiner *that* encodes the information that the addressee is expected to already have a representation of the dog in memory (familiar), and so can uniquely identify it (uniquely identifiable); in *The dog next door kept me awake*, the definite article *the* only encodes the information that the addressee is expected to associate a unique representation, however he can do that (by retrieving a representation from memory or by constructing a new one).

Statuses on the GH are in a unidirectional entailment (by definition); they are not mutually exclusive. Anything in focus is also activated, anything activated is also familiar, and so on. Thus, forms that explicitly encode particular statuses are underspecified for higher statuses rather than excluding them. This results in one-to-many mapping between statuses and the forms that explicitly encode them, as illustrated in (3) and (4).

(3)   A: So you've only known the dog how long did you say?
       B: Well, about a year, I guess.
       A: Oh well. Is it, uh, how old is the dog? (Switchboard Corpus)

(4)   Look. A man is hitting a dog/ The man is hitting a dog/ A man is hitting that dog/
       That man is hitting a dog.[2]

In (3), A and B have been talking about B's dog, who is clearly in focus for B in A's second utterance, as it has been the topic of conversation and part of the interpretation of every utterance up to this point. Speaker A could have used a pronoun or a demonstrative determiner to refer to the dog *(How old is it? How old is this dog?)*, but he used a full NP with a definite article instead. In (4), uttering *look*, which would normally be accompanied by a non-verbal gesture (e.g. eye gaze, with or without pointing) would be sufficient to activate both the man

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than referents of forms that code higher statuses. For example, an entity that is at most uniquely identifiable and requires the addressee to construct a new representation may be easier to access than one that is at most familiar (familiar, but not activated) and must therefore be retrieved from long term memory. The Givenness Hierarchy framework does predict, however, in agreement with Ariel and others, that referents of pronouns, which encode the two highest statuses (in focus and activated) are the most accessible.

[2]   Thanks to David Oshima for calling this example to our attention.

and the dog for the hearer, as evidenced by the fact that the sentence *that man is hitting that dog* would have been perfectly acceptable in this context; yet any of the other possibilities listed in (4) would have been acceptable as well, since anything that is activated is also familiar, uniquely identifiable, referential and type identifiable.

Unidirectional entailment of statuses on the GH gives rise to pragmatic inferences, specifically scalar implicatures (Horn 1972), resulting from the first part of the Maxim of Quantity (make your contribution as informative as required, Grice 1967). Just as *some* typically implicates *not all,* the indefinite article is rarely used for statuses higher than referential, and its use typically implicates that the addressee is unable to uniquely identify the referent (and it is also therefore not familiar, activated, etc.). Thus, both occurrences of a student in (5) would normally be interpreted as introducing a new entity into the discourse who is not uniquely identifiable, and therefore also not already familiar to the addressee.

(5)   A student came to see me after class yesterday; a student came to see me today as well.

Similarly, demonstrative pronouns, which encode the status 'activated', often implicate that the referent is at most activated, i.e. not in focus. For example, *that* in (6) is interpreted as referring to the walk-through closet, not the in-focus kitchen.

(6)   Anyway, going back from the kitchen then is a little hallway leading to a window. Across from the kitchen is a big walk-through closet. And next to that is …. (from Gundel et al. 1993)

Within the GHZ framework, then, the non-familiarity interpretation associated with the indefinite article and the focus shift interpretation associated with demonstrative pronouns are treated as implicatures, rather than conventional meanings of these forms. This account is supported by data like those in (7)-(9). As (7) shows, the non-familiarity implicature associated with the indefinite article can be cancelled without contradiction.

(7)   A student came to see me before class today; a student came to see me after class as well. In fact, it was the same student. (adapted from Hawkins 1991)

Also, the implicatures do not arise when the information that would be conveyed by the stronger form is irrelevant, as in (8)-(10).

(8)   I'm not going along; I've been sitting in a car all day. (adapted from Grice 1967).

(9)   Look. A man is hitting a dog.

(10)   I love John's kitchen. It's/That's my favorite room.

In (8), as Grice also points out, *a car* does not necessarily refer to a car that the addressee is unfamiliar with; it could in fact be a car jointly owned by the speaker and addressee. Since it is the property of being a car and not the identity of the particular car that is relevant, use of *a* does not implicate that the car is unfamiliar and not uniquely identifiable. Similarly, in (9) (example 4 above) it is the event of a man hitting a dog and not the identity of the particular man or dog that is relevant; thus, neither *a man* nor *a dog* implicate that the referent is not familiar or not uniquely identifiable; in fact, both have just been activated.

In (10), since there is only one activated entity, it is irrelevant whether or not that entity is focus; use of *that* therefore does not implicate that the referent is not in focus, and either *that* or *it* can be used to refer to the kitchen.

In some cases, the second part of Grice's Quantity Maxim (don't make your contribution more informative than required) blocks the implicature that the cognitive status encoded by a stronger form is not met. Thus, as discussed in Gundel, Hedberg and Zacharski (1993) and Gundel and Mulkern (1998), the definite article doesn't implicate non-familiarity. Since signaling that the addressee can uniquely identify the referent is usually sufficient to allow her to interpret it, given the encoded descriptive content and Relevance-driven pragmatic inferences (Matsui 1992, Sperber and Wilson 1995, Wilson 1992), the definite article typically provides sufficient information about cognitive status, and an explicit signal of familiarity (such a demonstrative determiner) is usually unnecessary.

3   The acquisition and use of referring forms by children

3.1   *What children need to 'know'*

Given the framework outlined above, the ability to correctly produce and understand referring forms involves at least the following kinds of knowledge and abilities.

<u>Linguistic</u>

knowing which linguistic forms encode which cognitive statuses, e.g. determiner *that* means 'familiar' . This must be learned, just as the meanings of other lexical items (e.g. knowing that *dog* means 'dog') must be learned.

<u>Non-Linguistic</u>

- ability to assess whether something has a particular status, e.g. whether it is already familiar to the addressee or not. This is analogous to being able

to assess whether something is a dog or not, i.e. understanding the concept 'dog' and recognizing one when you see one. As with concepts in general, it is unclear if there are already innate predispositions which constrain whether and how this is learned. In any case, the ability to assess whether or not something has a particular status involves 'theory of mind' in some sense, on the part of the speaker as well as the addressee.

- ability to assess when information about cognitive status is relevant , as this determines whether or not the strongest possible indicator of cognitive status will be used and when use of a weaker indicator will give rise to a scalar implicature; similar abilities are required to assess how much descriptive information is relevant, for example when one would say *the black dog* as opposed to simply *the dog*. Like the ability to determine what cognitive status the intended referent has for the addressee, the ability to assess when and how much information about cognitive status is relevant assumes theory of mind.

3.2   Children's Use of Referring Expressions

Gundel and Page (1998), Gundel, Page and Sera (1999), and Gundel, Sera, Kowalsky, and Page (2001) conducted longitudinal investigations of use of referring expressions in dialogues involving 3 preschool children learning English and 2 preschool children learning Spanish, between the ages of 1.5 and 3.5 (CHILDES, MacWhinney 1995, Brown 1973, Bloom 1970). These studies address the following questions:

- When do children 'master' definite and indefinite articles, demonstratives, and personal pronouns?
- Is the appropriate use of these forms acquired idiosyncratically or is there a pattern that holds for all children, both within and across languages?
- If there is a developmental order, does this differ according to the language being acquired or is it the same for all languages?

The studies found that both English and Spanish speaking children use the full range of referring forms (definite and indefinite articles, demonstratives, personal pronouns) appropriately by age 3 or earlier. These findings are consistent with results of corpus-based studies for English as well as other languages reported by various researchers, for example, Bittner (2002, 2007), Bennett-Kastor (1981), Ntelitheos (2004), inter alia. They are at variance with some experimental studies, however, which suggest that children don't master use of referring forms (pronouns, definite vs. indefinite article) until age 7 or even later.

The differences in findings may be due to methodology, as well as other factors. However, one also cannot conclude on the basis of use in spontaneous

dialogue alone that children have mastered linguistic and pragmatic conditions for using these forms in all contexts. As discussion settings tends to be restricted to objects and individuals in the immediate environment, appropriate use of referring forms may be simply a function of the restricted contexts in which the forms are used in the data (see Karmiloff-Smith 1981, Hickman 2003). With this in mind, the English data were reanalyzed, this time asking not only whether or not a form was used and whether its use seemed appropriate, but what cognitive status the interpretation of the form has, whether the full range of statuses that a form could be used for was represented (e.g. in adult use, the English definite article, *the*, is used for at most uniquely identifiable and all higher statuses, including in focus), and were there any forms that would not have been appropriate in the given context (i.e. could the child have made an error by using a different form).

3.2.1 Pronouns: Activated vs. In focus

The order of acquisition of forms that code cognitive statuses seems to parallel the order of forms on the Givenness Hierarchy, with pronouns, both demonstrative and personal, acquired first, and the indefinite article last. Thus, the child data in the earliest transcripts examined contains no articles or demonstratives, but it does contain some personal pronouns, used appropriately.

(11) Eve 1;6 (Brown 1973)

> MOT: put the other one back
> MOT: those break
> MOT: put the two back
> MOT: thank you
> EVE: it break
> EVE: oh it break
> MOT: and those break too

Two things are noteworthy here. First, that the form *it* used by Eve is not simply a repetition of a form used by her mother, and second that the referent is clearly in focus for the mother at the point when Eve uses the form.

The example in (12), also from Eve but five months later, contains both demonstrative and personal pronouns. In line 55, Eve uses a demonstrative pronoun to refer to her father's shoes, which are in the immediate environment and therefore activated, but are not yet in focus at this point as they have not been previously mentioned and there is no reason to believe her father's attention has been focused on the shoes. Use of *it* or *they* to refer to the shoes would have been inappropriate here. In line 64, she uses the pronoun *it* to refer to one of the shoes, which is clearly in focus at this point as it has been mentioned (or is oth-

erwise part of the interpretation) of each of her father's previous three utterances.

(12) Eve 1;11.8 (Brown 1973)

55 EVE:	that Papa shoes
56 %alt:	Papa's
57 EVE:	there
58 %act:	*untied father's shoe*
59 FAT:	what did you do?
60 FAT:	well#you tie that right up
61 EVE:	ok
62 FAT:	right now
63 FAT:	tie that shoe
64 EVE:	Papa tie it

Later in the same transcript, Eve first uses a demonstrative pronoun for a referent that is probably already in focus for her mother and then later uses a personal pronoun for the same referent. Although she could have used a personal pronoun in line 363, the demonstrative is not inappropriate here, since anything in focus is also activated, and an adult might have used a demonstrative here as well. What is especially noteworthy is that Eve uses the weaker form before using the stronger one, not the other way around. It would have been less appropriate (and less adult-like) to use a form that clearly assumes the referent is in focus and then follow it up with a weaker form (i.e. 'it are hot' … 'I better blow that'), and Eve does not do that either.

(13) Eve 1;11.8 (Brown 1973)

362 MOT:	there# that one's just right
363 EVE:	that are hot
364 MOT:	well#it's not very hot
366 EVE:	I better blow it

The other children we investigated are less precocious than Eve, but exhibit the same pattern of development. The examples in (14) and (15) are both from a 43 page transcript from Adam at age 2;5 which contains 24 pronouns (all used appropriately), one demonstrative determiner, and no definite or indefinite articles.

(14) Adam 2;5.12 (CHILDES; investigator Richard Cromer)

ADAM:	screw # please
MOT:	well, get down and get it
ADAM:	daddy back dere # Daddy get screw
ADAM:	daddy back dere?

MOT: what?
ADAM: Daddy say back dere?
MOT: yes # Daddy said don't go back there#didn't he?
ADAM: yep # did he?
MOT: yes # but it's alright if you drop something
ADAM: drop
ADAM: get down
ADAM: drop it

The pronoun *it* in Adam's last utterance in (14) apparently refers to the screw that he dropped behind the couch. The screw is clearly in focus here as it is what this whole segment is about. A demonstrative pronoun (drop *that*), though licit, would not have been as appropriate here, as it would not as clearly pick out the in focus screw.

(15)   ADAM: open dat
         ADAM: open # mommy
         ADAM: sarbaby??
         MOT: sardines
         ADAM: sardines

In (15), the demonstrative pronoun *dat* refers to the can of sardines that Adam wants his mother to open. Since the sardines have not been previously mentioned and there is no other reason to assume the mother's attention is focused on the sardines, the demonstrative is the strongest form that could have been used here, and a personal pronoun (open *it*) would have been inappropriate. The examples in (16) are from Peter at about the same age.

(16)   Peter 2;5.23 (Bloom 1970)

    (a) 362 LOI: all the furniture # the tables and the
                          lights and the beds# you can put in the house
          363 PET: gonna. I'm gonna put them in the house

    (b) (%act: *Peter has long wall in arms in 'guitar' position*)
          4172 PET: This is a guitar
          (%act: holding another wall)
          4173 PET: awoh
          4175 LOI: what's this?
          4176 LOI: is that a guitar?
          4177 PET: hm
          4179 LOI: is that a guitar too?
          4180 PET: yeah
          4181 PET: two three guitars # here one# you
          (%act: *Peter gives one of the 'guitars' to Patsy*)

4183 PAT: oh thank you
4184 PET: that's a guitar

(c)   (%act: *stops playing, looks at Lois' big wall guitar, pointing to wall*
       Lois is holding, then to smaller one he has)
       4245 PET: no. that's my guitar and this is your guitar

3.2.2 Demonstrative determiners

All instances of demonstrative determiner usage in the data we examined were consistent with the minimum cognitive status required of the form in question (familiar for the distal demonstrative determiner *that/those* and activated for the proximal form *this/these).* However, demonstrative determiners are used more frequently than either definite or indefinite articles. This is in contrast to adult usage, where demonstrative determiners are relatively infrequent compared to articles, or bare nominals in languages that lack articles. (Ariel 1988, 1990, Gundel, Hedberg, and Zacharski 1993, inter alia)[3]. Moreover, while demonstratives are more frequent in adult speech to children than in adult speech in general, frequency in the input cannot completely account for the high instance of demonstratives relative to articles in children's speech, as their frequency in the input is still lower than that of definite or indefinite articles (Gundel and Page 1998). Gundel et al. 1993 attribute the relatively low frequency of demonstrative usage across languages to interaction of the Givenness Hierarchy with Grice's Maxim of Quantity: demonstrative pronouns typically implicate 'not in focus', and demonstrative determiners are mainly used only when signaling activation or familiarity is crucial. As noted above, for full noun phrases, signaling (by use of the definite article) that the addressee is able to uniquely identify the intended referent generally provides sufficient information about cognitive status to allow the addressee to assign the intended interpretation, given the descriptive content encoded in the phrase; and an explicit indicator of familiarity is thus usually unnecessary. Gundel and Page (1998) note that the relatively high frequency of demonstratives in child speech compared to adult speech suggests that children acquire the linguistic knowledge about appropriate use of different forms, i.e. the cognitive status meanings conventionally encoded by these forms, before they make referential choices driven by the Quantity Maxim. This is consistent with other findings about sensitivity to scalar implicatures developing relatively late in children (e.g. Noveck 2001, Papafragou and Musolino 2003, Verbuk 2007). It may also explain some apparently anomalous findings related to use of

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[3]   It is of interest here that the definite article often develops from a (usually distal) demonstrative determiner across languages

indefinite article (e.g. Maratsos 1974, 1976). The examples in (17), (18), and (19) are typical of the children's 'overuse' of demonstrative determiners.

(17)   Adam 2;5.12 (CHILDES)

> ADAM: what dat?
> URS: that's a paper clip
> ADAM: what dat paper clip doing

(18)   Peter 2;5.23 (Bloom 1970)

> PET: having trouble. I found another light
> (%act: *pulling out another lamp*)
> LOI: mm# yes you did
> PET: turn this light

In both (17) and (18), the referent of the demonstrative determiner phrase (*dat paper clip, dis light*) is in focus for the addressee at the point where the phrase in question occurs. Use of the demonstrative is therefore licit, as anything in focus is also familiar and activated. However, an adult may have been more likely to use the strongest possible form (*it*) or a weaker form (*the paper clip, the light*).

In (19), each of the individual uses of a demonstrative determiner (or pronoun) are appropriate and adult-like, but the sequence of 8 utterances, 6 of which contain a demonstrative determiner or pronoun, is not.

(19)   Adam 2;6.3 (Brown 1973)

> MOT: no # don't write in your book
> ADAM: look at dat
> ADAM: look at dat pencil (activated)
> ADAM: look at dat
> ADAM: go in there dis way (activated)
> ADAM: what dat noise for
> ADAM: where go?
> ADAM: other side
> ADAM: came from dis side

Example (20) is a more adult-like use of a demonstrative.

(20)   Peter 2;5.23 (Bloom 1970)

> (%act: *looking in bag for another slide*)
> 423 PET: where's that slide?

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Note that a stronger form (*where's that*, *where is it*) would not have been appropriate here, as the referent is not activated for the addressee; it hasn't been recently mentioned and is also not visible). A definite article would probably have been too weak. Although the slide Peter is looking for is likely to be familiar to the addressee, the phrase *the slide* does not contain sufficient descriptive content to allow the addressee to identify it. Use of a demonstrative provides explicit information that this is a familiar slide that Peter is looking for. (21), from a later transcript, provides a similar example.

(21) Peter 2;8.12

> (%*act: putting car down*)
> PET: now I'm gonna get those tools *them/those
> (%act: *walks back to bag, then begins picking up tools*)

3.2.3 Definite article

The definite article begins to appear around the middle of the third year, and somewhat earlier for Eve; though it is not used consistently at first, and not as frequently as the demonstrative determiners. All but one or two uses that we found in the data are appropriate. Though the full range of licit uses are found, from at most uniquely identifiable to in focus, most are for referents that are at least activated, as the children in these transcripts rarely talk about referents that have lower statuses. (22) illustrates an example of an early use of the definite article by Eve.

(22) Eve 1;11.8 (Brown 1973)

> (%act: *looking at photographs*)
> FAT: Eve # please
> EVE: no # let me hold it
> EVE: Eve in the snow

The snow is clearly activated here, as it is visible in the picture; but there is no reason to believe that it is in her father's focus of attention, and a personal pronoun (*Eve in it*) would therefore have been inappropriate. Note that Eve does use *it* in the previous utterance to refer to the photograph itself, which is clearly in her father's focus of attention, given the utterance that she is responding to. Even a demonstrative (*Eve in that*) would have been infelicitous here. Although the snow is activated, there are a number of other things that are activated as well. Two similar examples are provided in (23) and (24), from the same transcript.

(23)   384 MOT: yeah # it's alright to eat
      385 EVE: yeah # it's alright to eat
      387 EVE: I got peanut butter on the paddle

(24)   493 EVE: bowl
      494 MOT: the bowl's right there
      495 EVE: by the sugar

In (25), Adam uses a full determiner phrase with a definite article to clarify the referent that his mother was not able to identify from a demonstrative pronoun alone.

(25)   Adam 2;6.3 (Brown 1973)

    ADAM: monkey get dat
    MOT: what?
    ADAM: monkey get de penny

In (26), from the same transcript, Adam uses a definite article to refer to a fireman that his mother has just introduced into the conversation.

(26)   ADAM: what dat fire engine doing
      MOT: there isn't a fire engine there
      MOT: there's just a fireman on a ladder
      ADAM: what the fireman doing?
      MOT: he may be going to help fight fire

(27) provides a similar example from Peter:

(27)   Peter 2;5.23

    357 PET: what's over there?
    358 LOI: over there behind Jenny?
    359 PET: yeah
    360 LOI: that's a house
    361 PET: who's go in the house
    362 LOI: what [!!] goes in the house??
    362 PET: yeah

In (28), from a later transcript, Peter uses a definite article phrase to refer to the people he is looking for, which, given Pat's response, are clearly familiar and therefore uniquely identifiable to her. Note that a pronoun, either demonstrative or personal would have been inappropriate (*where they/those*?) as there would

be no reason to assume that the people are currently activated, i.e. in Pat's awareness/working memory.

(28) Peter 2;8.12

    PET: where the people?
    PAT: they're in the big bag over there
    PET: bag
    PAT: the big brown bag

(29), from the same transcript, is one of the few examples where a definite article is used for a referent that may be at most uniquely identifiable.

(29) PET: it's a big bulldozer
      PAT: mhm
      PET: a big bulldozer
      PAT: a very big one
      PET: here the wheels

Although the wheels of the bulldozer could be activated for PAT, as they are in the immediate environment, there is no reason to think that all parts of the bulldozer are in her awareness. It is more likely that she would construct a new unique representation via a bridging inference to the in focus bulldozer. In any case, a definite article phrase is the only form that would have been appropriate in this context (*here they/those are*, *here are those wheels*), and this is the form the child used.

The only example of a possible misuse of the definite article was the following.

(30) Peter 2;5.23 (Bloom 1970)

    4300 LOI: that guitar's almost as big as you are
    4301 (%act: *puts her wall back in house*)
    4302 PET: it's the guitar!!
    4303 LOI: well I think's it's gonna be a wall right now
    4304 PET: it's the guitar!!
    4305 (%act: *bringing Lois her guitar*)
    4306 PET: it's the guitar!!
    4307 LOI: oh well # I don't want to play the guitar any more

It's not clear whether Peter was identifying this as the wall he had pretended was a guitar earlier (example 16 above , from the same transcript). If it is not, then Lois cannot assign a unique representation to the phrase *the guitar*, and the definite article is therefore inappropriate. It is possible (in fact likely), however, that

this is the same wall that Peter presented to Lois as a guitar earlier, in which case it is a particularly sophisticated example of definite article usage for an entity that is at most familiar at this point.

3.2.4 Indefinite article

The indefinite article appears to be acquired later than the other determiners and pronouns. (31) is a particularly compelling example of Eve's resistance to using this form, even though she apparently has some understanding of when it should be used.

(31) Eve 1;11.8

> 248 MOT: What do you want?
> 249 EVE: I want sandwich
> 251 MOT: You want what?
> 252 EVE: a sandwich
> 254 MOT: sandwich
> 255 EVE: yeah
> 257 MOT: well# what do you want to drink?
> 258 EVE: I want I want sandwich
> 260 MOT: you want a sandwich?
> 261 EVE: cheese sandwich

Similar omission of the indefinite article is found in the earlier transcripts from Adam.

(32) Adam 2;4.3 (Brown 1973)

> 178 ADAM: truck# look
> 179 MOT: <oh it's a truck>
> 180 ADAM: oh no busy bulldozer
> 181 MOT: <oh no #it's a busy bulldozer>
> 182 ADAM: dat busy bulldozer#truck

(33) Adam 2;6.3 (Brown 1973)

> 538 (%act: *shows to Richard*)
> 539 ADAM: penny in there
> 540 (%act: *shows to Richard*)
> 541 ADAM: look it penny in there
> 542 (%act: *shows to Richard*)
> 543 RIC: do you have a penny in there?
> 544 ADAM: in there
> 545 ADAM: I get it
> 546 ADAM: what that penny in there

When the indefinite article is used, however, it is used correctly, i.e. in contexts where a form that requires a stronger status would be inappropriate.

(34) Eve 2;2

EVE:	I want my spoon
MOT:	well# you have to have your spoon, yes
COL:	(%act *gets spoon for his coffee*)
MOT:	now you want a spoon # Eve
EVE:	Fraser and Colin <have a > has a spoon for he cup
MOT:	that's right

(35) Adam 2;6.3 (Brown 1973)

MOT:	is that your garage?
ADAM:	that's a little garage

In (34), a definite article (*Fraser and Colin has the spoon …*) would have been inappropriate, as this is not a uniquely identifiable spoon, in fact it may not even be used referentially. Similarly, in (35) Adam is saying that the garage that his mother is referring to belongs to the type 'little garage'. He is not equating it with any particular garage.

4   Implications for Theory of Mind

While the research reported here is far from conclusive, it does show that children use the full range of cognitive status encoding determiners and pronouns, and use them appropriately, by the time they are 3. Moreover, these children are capable of using referring forms in a way that suggests they are sensitive to the memory and attention state of their interlocutors.[4] Personal pronouns are used almost exclusively when the referent is clearly in focus, most definite article and demonstrative uses are for entities that are at least activated, though often not in focus, and there are occasional uses of the definite article before the age of 3 for at most uniquely identifiable or familiar entities. While these results are at variance with results of a number of early studies of acquisition of determiner and pronoun use which suggest that children don't master use of different referring forms until relatively late, 7-10 years according to some studies (see, Hickmann 2003 for extensive overview), they are corroborated by other, corpus-based stud-

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[4]   This is not to say, of course, that young children (like adults) can't be so absorbed in something that they ignore the memory and attention states of others, or that they may even be more likely to do so than adults who are more experienced in interacting with others. The interesting thing is not so much that these children sometimes fail to take the mental state of their interlocutors into account, but that most of the time they do.

ies (see section 3.2) as well as by more recent experimental work which shows that children aged 3 and younger are able to appropriately choose and interpret referring forms, based on their interlocutors attention state (e.g. Matthews et al. 2006, O'Neill 1996, 2005, Wittek and Tomasello 2005, inter alia). In some sense, then, they have a theory of mind.

The term 'theory of mind' has been used for a wide range of phenomena, which have in common the ability to view others as mental beings with various mental states that may be different from one's own. It has also been associated more narrowly with the ability to verbally predict the behavior of others based on assessment of beliefs which may be wrong (e.g. Wimmer and Perner 1983). Such 'false belief' studies with children all over the world have shown that 3-year-old children are not able to verbally attribute beliefs to others that are different from their own beliefs. For example, if they know a toy is in the blue box, they will say that someone else thinks it is in the blue box as well, even if the other person has no basis for sharing that belief and actually would have reason to believe otherwise. Children aged 4 and older, however, attribute to others beliefs they would be expected to have based on their own experience even if this is different from what the child knows to be true. Such facts suggest that the kind of 'mind-reading' involved in appropriate use of forms that encode cognitive status is different from what is involved in the false belief tasks. First, in the investigations of children's use of referring forms in naturalistic settings, the mind-reading abilities are implicit and are measured on the basis of the children's behavior (their appropriate use of the different forms), while the abilities involved in the false belief tasks are explicit and measured by asking them what they think about the mental states or likely actions of others. The significance of this distinction is supported by results of studies that don't require children to verbalize beliefs. For example, Clements and Perner (1994) show that while 3-year-olds lack the ability to verbally attribute false beliefs to others, they do show an implicit ability to recognize false beliefs by looking to the place where they think people with such beliefs will look. Similarly, Repacholi and Gopnik 1997 show that children as young as 18 months are able to assess and act on other people's likes and dislikes by watching the expression on their faces. More recent studies of children's suggestibility and ability to assess speaker reliability also provide evidence that 3-year-olds who can't provide a verbal report of sources of their belief can decide who to believe and who not to believe at the time of input (e.g. Robinson and Whitcombe 2003). A related, and also possibly relevant, distinction is that the ability to assess epistemic states such as beliefs involves attributing propositional states to others, whereas the ability to attribute

cognitive statuses such as familiarity, focus of attention, or even ability to construct a unique representation, does not[5].

A final distinction that may be important here is that between conceptual information, typically encoded by open class items, and procedural information encoded by closed class items. Matsui et al. (2006) found that children were better able to make use of information about evidentiality (i.e. a speaker's certainty with respect to some expressed proposition) when it was encoded by sentence final particles than when it was encoded by epistemic verbs such as *know* and *believe*. Matsui et al. note that closed class items typically encode non-representational, procedural information; they only manipulate representations and as such, are less accessible to consciousness and more implicit and automatic. Open class items, on the other hand, are declarative, representational and explicit, and therefore more accessible to conscious awareness and less automatic. Determiners and pronouns which code cognitive status are arguably more like the sentence final particles in this study than like verbs in that they are closed class and the information they encode is more procedural than conceptual (e.g. 'associate a representation from memory').

4   Conclusion

The Givenness Hierarchy theory proposed by Gundel, Hedberg and Zacharski allows a principled account of the distribution of different forms of referring expression both within and across languages and contributes to an explanation of how the intended interpretation of a referring expression is understood, given that the descriptive content encoded in the phrase rarely, if ever, uniquely determines a single interpretation. If this account is correct, the appropriate use of referring expressions involves the ability to take into account the mental states of others in at least two ways: (1) the ability to appropriately assess what cognitive status the intended interpretation has for the addressee at a given point in the discourse, e.g. whether it is in focus, activated, or familiar, and (2) the ability to assess how much information is sufficient and relevant for the addressee, both information about cognitive status (e.g. is it relevant to explicitly signal that the referent is familiar) and information about conceptual content (e.g. is it relevant to refer to an object as 'the red ball' or is it enough to simply simply refer to it as 'the ball'). We have suggested that the ability described in (1), which is necessary for assessing when the use of a particular determiner or pronoun is possible,

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[5]   Cf. Baron-Cohen's steps 3 and 4 in the development of theory of mind. Step 3, the Shared Attention Mechanism (SAM), like the ability to assess cognitive statuses, is not propositional. It's function is to build 'triadic representations', specifying the relations between agent, self, and a third object (p. 44). Step 4, Theory of Mind Mechanism (TOMM) , is a system for 'representing the set of epistemic mental states', such as belief (p. 51).

is implicit, non-propositional and relatively automatic; it corresponds to a kind of mind-reading ability that develops at a relatively early age in children (see Baron-Cohen 1995, Tomasello and Haberl 2003). This would explain why children by the age of 3 are able to use the full range of cognitive status signalling forms more or less correctly. The ability described in (2), on the other hand, appears to require more conscious reasoning about the epistemic states of others, and as such corresponds to a kind of mind-reading ability that is typically not fully developed until after the age of 4. This would explain the relatively late sensitivity to scalar implicatures in children, including the high frequency of demonstratives. If this account is correct, we would also expect younger children to be less competent in making decisions about how much descriptive/conceptual content is necessary in producing referring forms in different situations. Nadig and Sedivy (2002) found that 5- to 6-year-olds show robust evidence for taking the addressee's perspective into account both in production and understanding of referring forms. When presented with 4 objects in an array, they were more likely to use a descriptive adjective when more than one object of the same type (e.g. a big glass and a small glass) was visible to the adult than when they could see that one of the objects was blocked from the adult's view. They also were faster at understanding less descriptive referring expressions (e.g. *the glass* vs. *the tall glass*) when they could see that one of the objects of the same type was not visible to the adult. If the account we have proposed here is on the right track, we would expect children younger than 4 to perform significantly less well on such tasks.

There is clearly much more empirical work to be done in analyzing children's production and understanding of referring forms in both naturalistic settings and controlled experiments. It seems evident however that more fine-grained and primitive notions than salience, accessibility and given vs. new information are needed to serve as a fruitful basis both for investigating the development of children's abilities to produce and understand referring forms and for understanding the role of theory of mind in this development.

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