The use of context in pragmatic comprehension by specifically language-impaired and control children (1).

Print

Abstract

The purpose of this paper is to explore how a theory of pragmatic comprehension, relevance theory (Sperber and Wilson 1995), can be used to examine contextual processing in pragmatic comprehension. It will present data from a task that explores pragmatic comprehension skills, within this theoretical framework, of 17 SLI children (5;11-10;10), 11 older controls (7;11-9;11) and 30 younger controls (4;0-5;11). The children were asked questions based on a storybook, that required different degrees of contextual processing, as defined by the theory. Reference assignment questions required the children to provide a referent that is verbally/pictorially given, hence the least demanding in terms of contextual processing. Questions that require the resolution of semantic underdeterminations via the process of enrichment are contextually more demanding than reference-assignment question. Questions requiring the resolution of an implicature require the greatest contextual processing, hence these are deemed pragmatically the most demanding questions. A study by Ryder and Leinonen (i.p.) of three-to five-year-old normally developing children has shown that the theory and the characterization of questions in terms of pragmatic complexity have developmental validity. This finding is further supported by the current study. It was found that the pattern of performance across the three question types was very similar for the SLI group and the younger controls and that this reflected the contextual complexity of the question. The older controls had the greatest number of correct answers to all question types when compared to the younger controls and the SLI group, and this difference was particularly evident in relation to the pragmatically more demanding question types (enrichment and implicature questions). When the SLI group was divided into "younger" (5;11-7;11) and "older" (8;0-10;0) groups, it became evident that the older SLI children performed worse than their chronological age peers on all three questions types, most significantly in relation to the enrichment and implicature questions. This shows that the older SLI children had difficulty utilizing the context in the two question types that required the greatest contextual processing. This trend was also evident for the younger SLI children when compared to the younger controls. However, here the differences were less pronounced for the enrichment and implicature questions, showing that the younger children, irrespective of their language functioning, had difficulty with the more complex contextual processing associated with these question types. It was also shown that the SLI children's grammatical language ability was not an indicator of success in answering the questions in this study.

Introduction

Comprehension of language in communication requires the ability to interpret meaning in

context. It is commonly held that linguistic comprehension is one part of understanding and that as children develop toward becoming more competent comprehenders of language, they need to become increasingly skilled at interpreting meaning that arises in context (e.g. Oakhill and Yuill 1986; Milosky 1992; Bishop 1997). Children begin to comprehend what is communicated to them by relying heavily on the physical context in which the communication takes place (Bishop 1997). Young children utilize contextual cues such as nonverbal signals, facial expressions, and the environment in interpreting language that is addressed to them. Children's early comprehension is contextually driven and the early developmental process can be seen to involve an increasing ability to utilize language in the comprehension process. Strohner and Nelson (1974) found that three-year-old children tended to interpret meaning in terms of the likelihood of the meaning occurring in real life, while children of five were able to override the meaning suggested by real life by the meaning given by the linguistic expression. Similarly, Clark (1973) showed that when young children were asked to comprehend prepositional phrases, their knowledge of how objects usually are overrode the message given by the linguistic expression.

As children develop, there is a need for a different, more sophisticated, use of context in the interpretation of language expressions. Children's use of contextual information can be considered more sophisticated when information is no longer exclusively available from the "here and now," but, for instance, from one's world knowledge or previous experience. More advanced comprehension skills are also demonstrated when available information is appropriately integrated and combined to arrive at the intended interpretation of a language expression. In this way, the developmental processes can be said to involve an increasing ability to efficiently manipulate contextual information, from a number of different sources, in a way that results in an efficient recovery of the intended meaning.

Milosky (1992:21) summarizes the developmental process as involving "increasingly sophisticated uses of context" where development is characterized "in terms of increasing fluidity or lack of rigidity in using context and by changes in the amount and kinds of knowledge children acquire and use for dealing with the basic indeterminacy in language." Language is indeterminate in the sense that the same expression can have different meanings in different contexts, hence the linguistic expression itself can be said to be a starting point for interpretation.

There has been relatively little research on the pragmatic comprehension skills of language-impaired children. It has been argued that pragmatic comprehension is intrinsically connected with cognitive processing, and particularly with the ability to make connections (or inference) on the basis of available information (e.g. Sperber and Wilson 1995; Leinonen and Letts 1997; Leinonen et al. 2000). It is maintained that pragmatic comprehension is embedded in cognition. Long- and short-term memory, reasoning skills, knowledge and meta-representation, integration, and thinking are central to the comprehension process, from the construction of linguistic meaning to the arrival at the full (pragmatic) interpretation. Hence, children with cognitive difficulties are likely to experience difficulties with the processing of pragmatic meaning. The work of Johnston and colleagues (e.g. Johnston and Smith 1989; Johnston et al. 1997) suggests that inference construction may be problematic for some language-impaired children. Weismer (1985) found that a group of language-disordered children scored significantly lower on spatial and causal inferences associated with both verbally and pictorially presented information than groups of both language- and cognitive-matched normally functioning children. The findings pointed to difficulties in piecing together information and "reading between the lines" in order to arrive at a full understanding of a message. Crais and Chapman (1987) arrived at a similar conclusion in their study of story recall and inferencing skills of older (nine- to ten-year-old) language-disordered children. The study pointed to difficulties with "on the spot" inferencing in story recall. Similarly, Bishop and Adams (1992) found that a group of 61 SLI

children performed significantly worse than control children on a story-comprehension task that required the children to answer inferential questions. A case study of a language-impaired child by Leinonen and Letts (1997) showed how the pragmatic nature of the input question can affect a child's ability to provide an appropriate answer. The child in this study had particular difficulty answering questions that required her to go beyond verbally stated or pictorially given information.

It is clear, both from the perspective of pragmatic theory (see further below) and from studies of poor comprehenders (note also the work of Oakhill 1984; Oakhill and Yuill 1986; Oakhill et al. 1986) that pragmatic comprehension is intrinsically connected with the processing of contextual information. What has been lacking in research in this field is a way of conceptualizing the processes by which contextual information becomes utilized in the comprehension of pragmatic meaning. Leinonen and Kerbel (1999) have shown how the relevance theory of Sperber and Wilson (1995) enables a meaningful investigation of contextual processing in language comprehension and breakdown. Ryder and Leinonen (i.p.) have utilized the theory in a study that focused on how young children (three to five years old) develop the ability to utilize context in pragmatic comprehension. This study has shown that the theory has developmental validity and lends itself to empirical investigation. The current paper uses the methodology developed in Ryder and Leinonen in exploring how a group of 17 SLI children compare with two control groups of normally functioning children in their ability to answer questions that require different levels of contextual processing. Before examining the study in detail, a brief exploration of the theoretical background to this study is given.

Theoretical background

Relevance theory (RT) provides a way of explaining how it is that an expression can mean more than is linguistically expressed (see also Leinonen and Kerbel 1999). As such, RT provides a means of exploring how context is utilized in language comprehension (and production). How is it that in the following exchange the adult's utterance, "You haven't finished your dinner" can be taken to mean "You cannot have ice-cream until you have finished your dinner"?

(1)

Child: Can I have ice cream?

Adult: You haven't finished your dinner.

Child: But I want it NOW.

To arrive at the intended interpretation, RT proposes that the following linguistic and contextual operations need to take place. This is not a complete representation of how the theory works; rather, the focus will be on a few relevant aspects of it (see Sperber and Wilson 1995 for further information).

Linguistic meaning

The child needs to be able to work out the semantic meanings of the words involved and consider how their grammatical arrangement affects their meaning.

```
(2)    you        3rd person singular pronoun (*)
       have       the verb `have' with a number a possible meanings (*)
       n't        an abbreviation for the word `not'; a negative
       finished   the past tense form of the verb `finish' (*)
```

```
    your      a possessive pronoun; 3rd person singular or plural (*)
    dinner    a singular noun
```

As is apparent from this, much more information is needed in order for one to be able to know what the words themselves mean in this sentence. In this way, the utterance can be said to be indeterminate, and contextual information is required to embellish the given linguistic information. Indeterminacy is marked by (*).

Contextual meaning 1 (explicature)

According to RT, the linguistic expression now needs to undergo a number of processes in order to become contextually viable.

```
(3)    Reference assignment:
       you    the daughter of the speaker
       your   refers to the child in question; A's daughter
(4)    disambiguation:
       have   an auxiliary verb rather than a main verb
(5)    Enrichment:
       `finished your dinner' means `finished eating your dinner' (and
       not, for example, `finished cooking your dinner'.
```

According to RT, we have now arrived at a more explicit meaning (an explicature) and it can be summarized as follows: "You, A's daughter, have not finished eating your, A's daughter's, dinner." Interestingly, the child could comprehend this meaning and yet not understand that this means that s/he cannot have ice cream. Clearly, further processing is needed.

Contextual meaning 2 (implicature)

The meaning arrived at so far is not yet the intended meaning. Further contextual information needs to be brought into the comprehension process. We need to engage in reasoning, such as given below, on the basis of our world knowledge/prior experience.

(6)

Parents want their daughters/sons to finish eating their dinner before having a pudding. Ice cream is a pudding. Therefore, parents do not want their daughters/sons to have ice cream before they have finished eating their dinner.

If this reasoning is then applied to the specific exchange in this example, it is possible to see how we can arrive at the intended meaning of the adult's utterance by combining the first contextual meaning (explicature) with the above contextual information via the process of deduction.

(7)

You, A's daughter, have not finished eating your, A's daughter's, dinner. Parents do not want their daughters/sons to have ice cream before they have finished eating their dinner.-- Therefore you, A's daughter, cannot have ice cream before you, A's daughter, have finished eating your, A's daughter's, dinner.

The outcome of this process is called an implicature. It is important to note here that the contextual operations involved in working out explicatures are less taxing in terms of the type of context utilized and in terms of the level of processing required than the operations involved in working out implicatures. As is apparent from the example above, in the case of an implicature, it is necessary to utilize the already enriched meaning together with stored contextual knowledge in a deduction process. A further differentiation can be made between reference assignment and the other two operations. The theory would predict that the contextual processing in reference assignment is less demanding than in the other two operations as this relies on procedurally encoded information rather than on the accessibility of more fluid contextual operations that are reliant on world/prior knowledge.

In RT terms, cognitive difficulty is determined by processing costs. As implicatures are derived solely via processes of pragmatic inference, the processing costs are said to be greater. For example, some implicatures can function as premises in inference processes, which then undergo logical operations in order that the intended meaning can be derived (an implicated conclusion). In the example above, the utterance interacts with some of the assumptions already in the cognitive system and brings about a result (in this case an implicated conclusion) by interacting with some of these assumptions. A conclusion that is inferred on the basis of a set of premises consisting of both assumptions from world knowledge and new assumptions derived from the utterance (and not derived from either of these alone) is a contextual implication. It is derived from contextual information.

One may ask how it is that one knows which contextual information is relevant for the interpretation of any one particular utterance and furthermore how one knows which interpretation to choose if there are many possible ones. According to RT this is where the principle of relevance has its work to do. This guides the receiver to the interpretation that achieves the greatest contextual support with the least processing effort (see Sperber and Wilson 1995 further). The indeterminacy of language and the language expression itself (direct/indirect, vague/explicit, and so on) have a bearing on the level of pragmatic processing necessary for interpretation. As was shown in the example above, indirect answers often require the processing of implicatures. A direct answer, on the other hand, can be understood as an explicature, as shown in the example below:

(8)

No, you can't have ice cream. Explicature: No, you (the daughter of the speaker) can't have (at the time of this utterance) ice cream.

The nature of some language comprehension difficulties in children with SLI may be characterized by problems with contextual processing, as proposed by RT. The purpose of this study is to explore this proposition further.

The study

This study aims to examine how a group of SLI children answer questions that place differing contextual demands on them as predicted by relevance theory. Two research questions are examined:

Is there evidence of the SLI children performing differently from two control groups as a function of the contextual complexity of the question?

Is the performance of the SLI children related to their language/grammatical ability?

Participants

Three groups of children participated in the study, as detailed in Table 1. The first group consists of 17 SLI children with age range 5;11-10;10 (mean age 8;0). There were fourteen boys and three girls. All children attended a language unit as part of two main stream schools in the UK. All children were monolingual English speakers, from a similar socioeconomic class, and had normal nonverbal intelligence. As can be seen in Table 1, the SLI group was further divided into two groups according to their chronological age. The younger SLI group consists of seven children (age range 5;11-7;11; mean age 6;5) and the older SLI group consists of ten children (age range 8;0-10;10; mean age 9;0).

The SLI children were tested for receptive and expressive grammatical skills by using the Test for Reception of Grammar (TROG, Bishop 1982) and the Renfrew Action Picture Test (RAPT, Renfrew 1971). Table 2 gives the children's performance scores on these tests. The TROG gives an age-equivalent score for comprehension of grammar. The test does not require any expressive skill as children give their answers by pointing to pictures. The RAPT grammar score gives a measure of grammatical accuracy and the RAPT information score focuses on the information content of the given utterances without regard for grammatical accuracy.

Table 2 gives age-equivalence scores for the two tests, TROG and RAPT. While being aware of the psychometric limitations of age-equivalence scores (McCauley and Swisher 1984), it is not possible to have standard scores or other measures of relative standing for the results obtained from the RAPT. Therefore, discussions and comparisons involving the children's performance on the TROG or the RAPT will be based on age-equivalence scores. The mean age-equivalent TROG score for the SLI group as a whole was 6;7 (range 5;4-9;0); the mean age equivalent RAPT grammar score was 5;1 (range 3;6-7;3) and the RAPT information score was 5;9 (range 5;1-7;9). This suggests that the majority of the SLI children had severe expressive and receptive language difficulties. Fourteen out of the 17 SLI children had age equivalence on TROG between two and three years below their chronological age. Sixteen out of the 17 SLI children's RAPT grammar age-equivalent scores were up to three years below the chronological age of the child. The RAPT information scores show the largest discrepancy between chronological age and age equivalence, with twelve out of 17 children scoring up to three years below their chronological age.

There are two control groups. The control children provide a developmental comparison in terms of chronological age to the older and younger SLI groups. The older control group consists of eleven older normally functioning children (range 7;11-9;11; mean age 9;10) matched in terms of chronological age to the older SLI group. These children attended the mainstream school with the language unit attended by the SLI children. They were normally functioning children with no known history of language difficulties.

The younger control group consists of thirty younger normally functioning children composed of two age groups, 15 four-year-olds and 15 five-year-olds (range 4;5-4;8, mean age 4;6, and 5;5-5;7, mean age 5;6). Again, these children were normally functioning with no known language difficulties and attended a school in the same area as that attended by the older control group and SLI children. These children provide a developmental comparison in terms of chronological age to the younger SLI group. This group can also be seen to provide a language-age control group for the whole of the SLI group. It is maintained that the normally functioning children, as reported by their performance at school, function at a language level appropriate to their age. As a consequence, the normally functioning children were not given the TROG and RAPT tests.

Methodology

The methodology follows that developed by Ryder and Leinonen (i.p.) for studying pragmatic comprehension skills of normally functioning children. A children's book (Waddell and Granstrom 1997) deemed suitable for three-to five-year-olds by its publishers was adapted for the study. The book had pictures and text and the story was based around a theme familiar to children, a birthday party. The story was first analyzed in terms of the contextual processing demands placed on a person when comprehending the story, as would be predicted by relevance theory (Sperber and Wilson 1995). Sentences were analyzed according to whether the processing involved reference assignment, enrichment, or recovery of implicatures. Questions were then constructed to target these processes so that there were three reference-assignment, three enrichment, and three implicature questions. The story and the questions can be found in the Appendix.

The questions targeting the process of reference assignment required the child to assign a referent to a pronoun. The referents were both verbally given immediately prior to the question being asked and supported by the picture (e.g. "Who sang Happy Birthday, Dear Ben?"). The referents were not ambiguous. It is worth noting that no processing beyond the given information was required for the answer for these questions.

The enrichment questions targeted the resolution of semantic under-determinations. That is to say that incomplete semantic information had to be enriched, utilizing the context of the story, the picture, and one's world knowledge, in order to arrive at an answer. For instance, to answer the question, "What are special clothes?" in the context of the story, one needs to use one's knowledge of birthday parties and how children tend to wear their best/favorite/fancy-dress clothes to parties, together with the picture that shows the children and the bears dressing up. So, "special clothes" in this context means party clothes. In another context, "special clothes" could mean, for instance, protective clothing.

To answer the implicature questions, contextual assumptions that are not explicitly stated in the verbal or pictorial information need to be accessed and constructed. This necessitates the use of a number of relevant contexts (namely, the story, one's world knowledge, and experience). It is worth noting that the process of recovering implicatures builds on the already enriched underlying form.

While the questions were kept as grammatically simple as possible, the questions requiring the recovery of implicatures were more grammatically complex than the other types of question. However, in order to ensure that the youngest normally functioning children and the SLI children had every chance of processing the grammatical structures involved, the following steps were taken:

1. The questions used the actual words in the book, or near equivalents. The language and the grammatical structures used in the book were designed for three- to five-year-olds.

2. The questions were asked immediately after the relevant text was read, thus minimizing memory load.

Data collection

The story was read to each child individually in a quiet room at their school. The questions were asked after the relevant text had been read, intermittently throughout the story. In the event of the child appearing puzzled, the piece of relevant text was reread once, followed by the question. If the answer was uninterpretable, because of mumbling or some other reason, the child was asked to repeat or clarify the answer once. The sessions lasted no longer than twenty minutes and were audiorecorded. The language tests of the SLI children

were conducted on a different day from the story task.

Results

The data were analyzed for the number of correct answers by question type and participant group. This is represented in Figure 1. Inter-rater reliability was 0.87. This was based on all the answers given by all the SLI children and by twenty control children (ten older control children and ten younger control children).

[FIGURE 1 OMITTED]

As can be seen in Figure 1, reference-assignment questions elicited the highest number of correct answers for all groups except the older control group. They achieved virtually the same number of correct answers for both reference-assignment questions and enrichment questions, whereas for all the other groups, answers to enrichment questions elicited fewer correct answers than reference-assignment questions. The implicature questions elicited the lowest number of correct answers for all groups.

The older control group differed from all the SLI children most markedly when answering implicature and enrichment questions. It was found that correct answers for implicature questions were significantly higher for the older control group than for the SLI group (the Mann-Whitney test: $U = 32.0$, two-tailed $p = 0.002$). This was also the case for enrichment questions ($U = 50.5$, two-tailed $p = 0.02$). Both SLI groups can be seen to perform very similarly to the younger control group in terms of the number of correct answers by question type.

The older SLI children performed similarly to the older control group when answering reference-assignment questions. However, when answering enrichment and implicature questions the older controls achieved a significantly higher number of correct answers (Mann-Whitney $U = 14.5$, two-tailed $p = 0.002$, and $U = 21.0$, two-tailed $p = 0.01$).

The younger SLI children produced fewer correct answers than the younger controls in respect of all question types. The younger controls achieved a significantly higher number of correct reference-assignment questions ($U = 1.5$, two tailed $p = 0.03$) and enrichment questions ($U = 0.001$, two-tailed $p = 0.001$) than the younger SLI children.

It can be seen that the SLI children, irrespective of their chronological age, performed similarly to the younger control group, thus suggesting that the SLI children's performance on this task could be related to their language level. We can examine the relationship of the SLI children's performance in this study and their performance on the language tests further. Table 2 shows the age-equivalent scores for the language tests. As was already noted above, the scores generated on the TROG and the RAPT are not directly comparable as they provide age-equivalence scores. Though the TROG standard score can be converted to centiles, the RAPT test only gives age-equivalence scores. This has been noted as a problem clinically. However, in relation to Table 2 we can observe the following. The age-equivalent scores for TROG and RAPT grammar appear not to affect the answers given in this study. It could have been the case, for instance, that children having difficulty expressing themselves would perform less well on the implicature questions where the answers typically began with "because" and required giving a reason. This suggests that expressive or receptive grammatical difficulty was not the explanation for the SLI groups' poor performance on both the enrichment and implicature questions. For example, child 9 (see Table 2) with the TROG and RAPT grammar scores well below chronological age equivalence, answered all the questions in this study correctly. Similarly, child 5 has RAPT scores well below chronological age, with a TROG score of almost

chronological age-equivalent, but managed to answer all the study questions correctly. Child 14 also has a RAPT grammar score below chronological age with a TROG score almost two years below chronological age. In this case, the child correctly answered reference and enrichment questions but was unable to answer any of the implicature questions correctly. It is worth noting that minimal linguistic answers sufficed to give the right answer to the questions in this study. While it is recognized that this inferred relationship between grammatical ability and the children's performance in this study needs to be statistically validated in a further study, it can be argued, however, that the SLI children are functioning on a similar level to the younger controls on some area of functioning that is required for the processing of pragmatic meaning. It is not possible to determine in this study what exactly this similarity is, but a candidate for this would be some aspect of cognitive functioning that is required in contextual processing in pragmatic comprehension. Further research is required to explore this in more detail.

Discussion

Our first aim was to investigate whether the SLI group performed differently from the two control groups in terms of answering questions with differing contextual/pragmatic complexity. It was found that the pattern of performance across the three question types was the same for the SLI group and the younger controls and that this reflected the contextual complexity of the question. This pattern was much less obvious for the older controls. The older SLI children performed worse than their chronological-age peers on all three question types, but most significantly in relation to erichment and implicature questions. This shows that the older SLI children had difficulty utilizing the context in the two question types that required the greatest contextual processing. This trend was also evident for the younger SLI children when compared to the younger controls. However, here the differences were less pronounced for the enrichment and implicature questions, showing that the younger children, irrespective of their language/grammatical functioning, had difficulty with the more complex contextual processing associated with these question types. While it can be noted that language tests were not found to be an indicator of success in answering the questions in this study, it is recognized that this area needs further investigation. This would suggest that pragmatic processing skills (and operations) are separable from grammatical skills (operations) (as would be predicted by relevance theory). This indicates that the ability to answer questions of differing contextual/ pragmatic complexity is not related to language ability but some other area of functioning that is involved in pragmatic processing. If this were the case, then all the SLI children in this study, irrespective of age, would have difficulty with this area of functioning. Interestingly, the older and younger SLI children performed very similarly in this study, indicating that their poor performance is not simply a matter of developmental language delay but is more likely to reflect some fundamental difference in the way in which the SLI and normally functioning children utilized context in pragmatic processing in this study. Further research is required to explore this in more detail.

This study has also shown that a theory of language comprehension, relevance theory, has enabled a meaningful investigation of children's use of contextual information when answering questions. It has provided a way of characterizing questions in terms of their contextual and processing complexity and hence has provided a psycholinguistically valid way of investigating pragmatic language deficits in language-impaired populations.

University of Hertfordshire

Appendix

Text and questions have been adapted from Waddel and Granstrom (1997).

Ben was having a bring-your-bear birthday party. He told Tom and Maxie and Rosie and Su when they were out at the swings. They said they'd all come and they told their mums and their dads. "I've never heard of a bring-your-bear birthday party before," Maxie said.

Tom and Maxie and Rosie and Su made birthday cards for Ben. Su made a big card shaped like a bear and a much smaller card to give from her teddy bear. Rosie said Ben was having a Big Bear, a real one, at his party. "Ben's making it up," Maxie said.

The bears needed special clothes for the party. Tom and Maxie and Rosie and Su looked in Su's box of old dressing-up clothes for things to wear. "My bear will look best," Maxie said. "Because he's the biggest!"

Su and her mum went shopping for Ben's birthday present. They saw Tom and Maxie and Rosie at the shops. They were all looking for presents for Ben. Rosie said that the Big Bear would do tricks at Ben's party. "Big Bears don't do tricks," Maxie said. "They live in the woods."

At playgroup they all sang "Happy Birthday, Dear Ben" although Ben wasn't four until the next day. Mrs Samara gave Ben a kiss. Ben told Mrs Samara that a big bear was coming to his party. Mrs Samara said she'd once seen a big bear but she'd never met one at a party. She thought a big bear might scare the teddy bears. "Not my bear," Maxie said. "My bear is brave, just like me!"

At the party, Ben was dressed as Paddington Bear, with boots and a hat. There were lots of bear games, and bear eats and bear treats that were hidden. Tom and Rosie and Maxie and Su all had to find them. "Where's Ben's big bear?" Maxie said. "I knew there wouldn't be one!"

Then, the door opened and in came Ben's big bear! He went GRRRRRR! Maxie hid under the table. Rosie told Maxie not to be scared, it was just Ben's dad dressed up. "I know that," Maxie said. "It was my bear who was scared, not me."

Maxie got used to the bear being there. He and Ben helped the Big Bear to do his tricks. They made Rosie's small bear appear out of a hat. "I'll do the magic word," Maxie said.

Tom and Rosie and Maxie and Su sang, "Happy Birthday Dear Ben," and Ben blew out all the candles on his Bear-Cake all by himself. "I like this bear party," said Rosie. "My bear says it's the best bear party ever!" Maxie said.

Questions (asked immediately after the relevant text was read)

(i) Reference questions

Who sang "Happy Birthday, Dear Ben"? What did Tom and Rosie and Maxie and Su have to find? Who made Rosie's small bear appear out of a hat?

(ii) Enrichment questions

What is a bring-your-bear birthday party? What are special clothes? What tricks did the bear do?

(iii) Implicature questions

Where had Mrs Samara seen a big bear? How did Maxie know there wouldn't be a big bear at the party? Why did Maxie say it was his teddy bear who was scared?

Table 1. The participants in the study

Group	N =	Age range	Mean age	Boys	Girls
SLI younger	7	5;11–7;11	6;5	7	0
SLI older	10	8;0–10;10	9;0	7	3
SLI total	17	5;11–10;10	8;0	14	3
Control older	11	7;11–9;11	9;10	6	5
Control younger	15	4;5–4;8	4;6	8	7
	15	5;5–5;7	5;6	5	10

Table 2. The SLI participants' performance on TROG, RAPT, and the current study

Child	Chronological age	TROG age equivalent	RAPT age equivalent	RAPT age equivalent grammar
Younger age group				
1	5;11	5;4	5;1	4;8
2	6;8	9;0	3;11	>3;6
3	6;10	5;4	5;8	3;11
4	7;4	5;6	7;6	4;3
5	7;6	7	5;1	3;10
6	7;8	5;5	6;1	5;5
7	7;8	5;6	5;3	6;3
Older age group				
8	8;4	5 1/2	6;8	5;8
9	8;6	6	8;6	6;8
10	8;10	8	6;0	7;11
11	8;11	7	5;10	7;3
12	9;2	7	5;3	6;3
13	9;6	7	6;6	6;0
14	9;11	8	7;8	5;8
15	10;1	8	6;8	5;4
16	10;10	8	7;9	6;9
17	10;10	8	6;11	6;3

Child	Storybook: number of correct answers			Total correct
	Ref	Enrich	Implic	
Younger age group				
1	R 1	E 1	I 0	2
2	R 1	E 0	I 0	1
3	R 2	E 1	I 0	3
4	R 3	E 2	I 2	7
5	R 3	E 3	I 3	9
6	R 1	E 1	I 2	4
7	R 3	E 1	I 0	4
Older age group				
8	R 2	E 0	I 0	2
9	R 3	E 3	I 3	9
10	R 3	E 3	I 2	8
11	R 3	E 2	I 2	7
12	R 2	E 2	I 1	5
13	R 2	E 1	I 1	4
14	R 3	E 3	I 0	6

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15      R 3           E 1           I 2            6
16      R 3           E 2           I 3            8
17      R 2           E 1           I 0            3
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Key: Ref = reference assignment, enrich = enrichment,
implic = implicature questions.

Note

(1.) Correspondence address: Dr. Eeva Leinonen, Department of Psychology, University of Hertfordshire, Hatfield Campus, College Lane, Hatfield AL10 9AB, UK. E-mail: e.leinonen@herts.ac.uk.

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