Normal and Language-impaired children's use of reference: syntactic versus pragmatic processing

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Abstract

The present study investigates children's syntactic and pragmatic processing when specifying referents presented in short video clips. Within Relevance theory, the assumption of 'optimal relevance' implies that utterances are intended to involve the least processing effort on the part of the listener. In the present context, lexically specified NPs are assumed to be more in line with optimal relevance than pronouns. Subjects were 48 normally developing children aged 3;4-8;10 and 30 SLI children aged 5;1-8;9, divided into a low and a normal MLU group. Children's responses were coded according to levels of pragmatic processing and syntactic positions. Normally developing children' referent specifications were found to be increasingly relevant with increasing age. Differences between SLI and normal children were only found for the low MLU group with SLI who used fewer pronouns than the younger children, thereby showing that syntactic limitations alone cannot account for children's specification of referents.

Introduction

Choosing an appropriate linguistic form for a particular referent in conversation is a complex skill that involves different kinds of linguistic and cognitive skills. The current study looks at children's referencing skills both in terms of syntactic as well as pragmatic processing. While possible syntactic restrictions are evidenced by a relatively low mean length of utterance (MLU), as well as omissions of particular syntactic categories or word classes within these categories, pragmatic processing is more difficult to measure. In addition, there is the question to what extent there is an interaction between the two, affecting linguistic choices for particular referents.

Pragmatic processing has been examined in terms of the co-operation between speaker and listener in a conversation (Grice, 1975), the ordering of given and new information (Clark and Haviland, 1977) and more recently within the framework of Relevance Theory (Sperber and Wilson, 1995). The latter framework makes an assumption that speakers try to be 'optimally relevant'. Optimal relevance involves the production of utterances that can be interpreted in the way intended with the least processing effort on the part of the listener. Part of this effort is the location of referents, either within the previous discourse, or within the shared 'cognitive environment' of speaker and listener. The theory, however, does not attempt to describe the cognitive processes involved in terms of existing language processing models to show at which stage the processing effort of the listener is taken into account and how this relates to the speaker's efforts to produce an utterance. The latter is important when the speaker is a young child.

 From a developmental perspective, most previous research has established that young children are not very competent at assessing the needs of the listener. Research on children's referential communication skills (Krauss and Glucksberg, 1969; Leinonen and Letts 1997) as well as Theory of Mind tasks (Wimmer and Perner, 1983) all show that linguistic ability in children is ahead of the ability to take into account the listener's mental state and referencing requirements. On this basis, it would be expected that the ability to adjust the linguistic form of an utterance to reduce the processing for the listener is a gradually developing ability in children. The central claim of Relevance Theory, that speakers strive to be optimally relevant, would therefore be a skill that children develop gradually with increasing age.

Pragmatic processing in terms of the "given-new strategy" (Haviland and Clark, 1974) involves the identification of what is already known and the integration of this information with what is new in the utterance. Both, given and new information are syntactically marked, such that given information is often encoded in the subject of the utterance and new information is marked as the object. This means that in terms of the given-new strategy, syntactic marking and pragmatic processing interact. Therefore, this aspect of pragmatic processing might be available to children at an earlier stage. If this were the case, their utterances would encode different syntactic positions to reflect their status in terms of the given-new continuum. In the present study, the linguistic form of referents is therefore distinguished in terms of subject versus object position. According to the given-new strategy, it would be expected for the linguistic form of the subject to be less specified linguistically than that of the object.

Finally, the present study also addresses pragmatic processing in two groups of language-impaired subjects with mainly morphological and/or syntactic deficits. The aim of such a comparison is to evaluate pragmatic processing as a function of age versus language skills.

Method

Subjects

Forty-eight normally developing children, thirty children with specific language impairment and six adults took part in the study. Their mean ages and age ranges are given in table 1, together with their MLU value in this task.

(Table 1 about here)

The normally developing children were all monolingual English speakers as well and were attending local primary schools or nurseries. The SLI children were recruited from special schools for language-impairment as well as language units and were diagnosed by a speech and language therapist as having a language disorder. They were all receiving language intervention at their local school and were monolingual English children. Furthermore, only children were selected that conformed to the usual exclusion criteria for SLI (no known neurological disorder, non-verbal IQ within normal limits, no hearing problems). In addition, no children with speech problems were included. On the other hand, language disorder was not restricted to purely grammatical problems. The group of adults consisted of students of Linguistics at the University of Reading.

Task Demands

In the task employed in the present study, children were required to describe actions that involved different referents. The actions were presented to them in the form of short video clips. All referents were new and involved people (children and adults) as well as objects (toys, items in the house and garden). From a psycholinguistic point of view, the task demands were to store the referents as well as the action in memory and to encode both in a linguistically appropriate form for a listener, using a prompted verb. The demands are somewhat different from natural conversation, in that there was no particular topic that followed on from previous utterances and all of the referents had a an equal status on the given-new continuum, except where a child happened to be familiar with the people depicted. Given that the video was specifically filmed by the original research team, using the researchers as well as children known to them as actors, there were individual children used as subjects that knew some of the actors in the video. This was restricted to a minority of the children though.

Following Relevance Theory, different levels of specification with associated processing demands on the listener can be distinguished. While the viewing of the video clips results in a certain degree of familiarity with the referents, the listener still needs to link the forms with the respective referents presented. This is easier if the referent is lexically specified as it reduces the amount of ambiguity. Therefore, it is assumed that the use of a pronoun requires a greater processing effort in terms of referent identification on the part of the listener in this particular task and is referred to as level 1. Definite NPs assume that the referent has been introduced before and therefore require some processing effort on the part of the listener, but less than would be required for pronouns. They are assigned to level 2. Indefinite NPs make no assumption of prior knowledge and hence carry the least processing load. They are assigned to level 3.

From the point of view of the speaker, however, degree of processing effort is likely to be different. Lexical NPs require the retrieval of a specific lexical form from the mental lexicon as well as a choice of determiner if the referent is singular. The processing effort involved for the speaker is therefore likely to be greater than for non-anaphoric pronouns where the same form can be applied to a variety of referents and no choice of determiner is required.

Therefore, if young children's responses are purely based on the minimal processing effort of the speaker, a preponderance of pronouns in all syntactic positions would be expected initially. With increasing age, there should then be a developmental increase in the number of referents encoded lexically and a decrease of pronouns. While such an increase may be due to an increase in syntactic and lexical abilities, it would also be pragmatically motivated and support the assumption that children's ability to produce optimally relevant utterances increases with age. If however, it can be shown that the use of pronouns and lexical NPs differs as a function of syntactic position, such that subjects are less specified than objects, even in the younger age group, then pragmatic awareness in terms of the given-new strategy can be assumed to develop at an early stage in linguistic development.

Procedure

All subjects were shown a number of short video clips depicting different referents carrying out different actions. The subjects were prompted to repeat particular verbs before the video clip was shown ('can you say "give"?'). After the viewing they were asked to say what happened in the clip and, where necessary, reminded to use the prompted verb form ('can you say it with "give"?'). The video task was originally devised for an ESRC-funded project on verb argument structure at the University of Reading and results are published in Ingham et al. (1998) and Schelletter et al. (1999).

Included in the present analysis were the clips relating to two different verb types: causative/inchoative verbs bounce, wave, open and move and locative/contact verbs load, bump, rub and scrape. For each verb, two different clips were presented. For the causative/inchoative verbs, the first clip depicted only the theme of the action and no agent. The second clip included both, the subject and theme involved in the action. For the remaining verbs, both clips showed three referents, agent, theme and goal.

However, before the action was shown, the clip focused on either the theme or the goal for a few seconds.

For the purpose of the present analysis, subjects' description of referents was grouped according to three levels of specification: pronouns, definite NPs and indefinite NPs. In addition, it was noted where a subject omitted an obligatory referent and the specification or omission of referents was linked to the respective syntactic position.

Results

Normally Developing Children

A first analysis of the data focused on the overall levels of specification and omissions. These are given in Table 2.

(Table 2 about here)

Table 2 clearly shows that omitted referents decrease sharply from 3/4 to 5/6. For specified referents, there is a decrease of pronouns used from 3/4 through to 7/8 and at the same time an increase of definite and indefinite noun phrases. The difference between the child groups is significant for all three levels of specification. A Kruskall-Wallis test shows that chi-square = 77.5 , $p < 0.001$ for pronouns, chi-square = 170.5, $p < 0.001$ for definite NPs and chi-square = 60.7, $p < 0.001$ for indefinite NPs. The adults differ from the oldest children in terms of further reduced pronominal referents, yet they used a higher percentage of definite NPs than indefinite NPs. It seems that the adults make use of the fact that the referents have been introduced through the video clip and therefore the use of indefinite NPs is not as necessary.

(Table 3 about here)

Regarding omissions, table 3 shows that both, subject and object omissions decrease from 3/4 through to 7/8. A Kruskall-Wallis test shows that chi-square = 152.2, $p < 0.001$ for subject omissions and chi-square = 76.2, $p < 0.001$ for object omissions. This result ties in with a significant increase in the MLU value for the task from 3/4 to 7/8. A Kruskall-Wallis test shows that chi-square = 685, $p < 0.001$ for MLU. At the same time, MLU values significantly correlate with the use of definite NPs. A Spearman-rank correlation shows that $r = 0.37$, $p < 0.001$. These results support the view that the younger children are restricted by limitations of syntactic length. However, it seems that their resources are not equally distributed across both syntactic positions.

Regarding the specification of referents according to positions, table 3 shows that a higher proportion of pronouns were used in subject position compared to object position for all groups, whereas definite and indefinite NPs were used more frequently in object rather than subject position. This difference is significant for pronouns for all

groups and for lexical NPs for all groups except for the adults. It shows that even the younger children make different choices for the linguistic form of subjects as opposed to objects which are in line with the pragmatic requirements of subjects and objects in terms of given and new information.

Children with SLI

Regarding the SLI children, table 4 gives a summary of their overall level of referent specification in relation to the normal children.

(table 4 about here)

Table 4 shows that although the SLI children in the low MLU group should be equally restricted by syntactic limitations, given that their mean MLU is lower than that of the 3/4 year olds, these children deploy significantly fewer pronouns and significantly more level 2 and level 3 referents than the younger children. A Mann-Whitney test comparing the Low MLU language-impaired children and the 3/4 year-olds shows that $Z = -9.3$, $p < 0.001$ for pronouns, $Z = -6.7$, $p < 0.001$ for definite NPs and $Z = -4.8$, $p < 0.001$ for definite NPs. At the same time, the rate of omissions is similar in the two groups. This result shows that syntactic limitations alone cannot explain young children's choice of referents.

The SLI children with normal MLU specify referents very much in the way their normal peers do. In fact, their level 1 referents are even lower than the mean for the 7/8 year-olds and their level 2 referents are higher.

Table 5 gives the pragmatic specification of referents by syntactic position for both normal and SLI children.

(Table 5 about here)

Table 5 gives more details of how referents are specified according to syntactic position for normal as well as SLI children. Similar to the normal children, both SLI groups show the same difference in the specification of subjects and objects to the normal children.

 While the SLIs with a low MLU are similar to the younger normal children with regard to the specification of the subject, the main difference lies in the specification of the object position. The SLI children with a low MLU use significantly fewer pronouns in object position than the younger normal group and significantly more lexically specified NPs. A Mann-Whitney test shows that $Z = -7.6$, $p < 0.001$ for pronouns in object position, $Z = -4.5$, $p < 0.001$ for definite NPs and $Z = -3.3$, $P < 0.01$ for indefinite NPs in object position.

The SLI group with a normal MLU looks very similar to the normal children with regard to their specification of referents in different positions, yet they have a higher proportion of omitted objects, compared to their normal peers.

Discussion

This paper investigated normal and SLI children's specification of referents in a video task where all referents are newly introduced. The finding that in this task children's referent specifications develop from a high proportion of pronouns to more lexically specified NPs supports the assumption that children's utterances are increasingly optimally relevant with increasing age.

The decrease in pronouns and increase in lexical NPs was found for both, subject as well as object positions. At the same time, all children's referent specifications differed according to the syntactic position, such that objects were more likely to be specified lexically, whereas a higher proportion of subjects were realised as pronouns. This finding is in line with assumptions about the given-new strategy that speakers and hearers follow in conversation. Although the task employed here did not require a different treatment of different syntactic positions, the strategy was still operative in the child groups, but less so in the adult subjects, thereby showing that the adults approached the task differently by not adhering to the requirement to take the conversational context into account.

The inclusion of two groups of language-impaired children, one with a low MLU, the other with a normal MLU value, allowed comparisons in the deployment of resources between normal and SLI children. The referent specifications of the SLI group with a normal MLU did not differ significantly from the normals, thereby showing no obvious syntactic or pragmatic deficit. The comparison between the low MLU group and the younger normal children with a similar mean MLU was an interesting one, as it showed that the low MLU group was better at specifying the object position lexically, despite the same syntactic length limitations as the younger, normally developing children. This shows that the syntactic limitations alone are not sufficient to account for the way young children specify referents, but pragmatic awareness also has an influence on the linguistic form used to specify referents.

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Tables

Table 1: Participants

Subjects	N	Mean Age	Range	MLU (verb video task)
Normal Children				
3/4	18	4;0	3;6 - 4;10	4.82
5/6	16	5;11	5;1 - 6;11	6.84
7/8	14	7;10	7;0 - 8;10	8.21
SLI				
MLU Low	14	6;9	5;1 - 8;2	4.4
MLU normal	16	7;1	5;8 - 8;9	7.56
Adults	6			6.65

Normal and LI children's use of reference

Table 2: Referent specifications for normal subjects

%	3/4 (N=928)	5/6 (N = 866)	7/8 (N = 805)	Adults (N = 326)
Omissions*	22	5	1	1
Pronouns	44	27	20	10
Definite NPs	22	51	50	67
Indefinite NPs	12	17	29	21

*only subject and object omissions are included here

Normal and LI children's use of reference

Table 3: Referent specifications by syntactic position

%	3/4	5/6	7/8	Adults
Subject	(N =431)	(N =380)	(N = 334)	(N = 144)
Object	(N =379)	(N =341)	(N = 283)	(N = 121)
Omissions				
Subject	29	6	1	2
Object	21	5	2	1
Pronouns				
Subject	57	42	40	22
Object	33	18	6	2
Definite NPs				
Subject	13	41	40	56
Object	25	53	52	74
Indefinite NPs				
Subject	2	11	19	20
Object	21	23	39	22

Table 4: Levels of specification for normal and language-impaired subjects

%	3/4 (N=928)	MLU Low (N =700)	5/6 (N= 866)	MLU Norm (N = 886)	7/8 (N = 805)	Adults (N = 326)
Omissions*	22	22	5	4	1	1
Pronouns	44	29	27	12	20	10
Definite NPs	22	30	51	58	50	67
Indefinite NPs	12	19	17	25	29	21

* only subject and object omissions are included here

Table 5: Specification by syntactic position for normal and SLI children

% Subject Object	3/4 (N =431) (N =379)	MLU Low (N = 329) (N = 302)	5/6 (N =380) (N =341)	MLU Norm (N = 383) (N =329)	7/8 (N = 334) (N = 283)	Adults (N = 144) (N = 121)
Omissions						
Subject	29	30	6	3	1	2
Object	21	18	5	8	2	1
Pronouns						
Subject	57	47	42	23	40	22
Object	33	10	18	4	6	2
Definite NPs						
Subject	13	15	41	52	40	56
Object	25	42	53	58	52	74
Indefinite NPs						
Subject	2	7	11	22	19	20
Object	21	30	23	30	39	22