Children with SLI's Answers to Wh-questions

[1]Kelly Rombough and Rosalind Thornton

1. Introduction

Children with specific language impairment (SLI) are generally reported to develop language in a similar manner to their typical language developing peers, but with a pace of development that is considerably slower (Rice, 2012; Rice, 2013). SLI is reported to affect various components of language such as vocabulary knowledge, phonology, morphology, syntax and pragmatics (see Bishop, 1997; Conti-Ramsden and Durkin, 2007; van der Lely 2005; Leonard, 2014). To date, there is little research studying the various components in a single group of children. In this paper, we investigate children's answers to various types of wh-questions in order to study certain morphological, syntactic and pragmatic properties of the language component in a group of children with SLI. As we will illustrate, a grammatical and pragmatically appropriate answer to a question brings together a great deal of complex yet subtle knowledge of language. Our experiment tests whether or not all these various grammatical components are in place in a group of children with SLI.

The research questions were designed to investigate whether children with SLI have difficulty with particular components of the grammar, or whether difficulties extend across components. In particular, we were interested in which aspects of answers to wh-questions were accomplished without difficulty, and which aspects differentiated the group of SLI children from the control groups. The research questions follow:

Research Question 1: How do children with SLI answer wh-questions?

This first question is intended to provide descriptive information about the range of answers children give to wh-questions.

Research Question 2: Do children with SLI answer wh-questions using an appropriate syntactic category?

This investigation asks what syntactic category children use in their answers to wh-questions. When asked a wh-question that targets the subject position of the sentence ('NP-questions'), such as '*Who's reading a book in the library*?' do children know that the question can be answered with a noun phrase, i.e., '*The boy'* or with verb phrase ellipsis '*The boy is'*? Or, do children with SLI give

[1] * **Macquarie University, Sydney, kelly.rombough@mq.edu.au. Macquarie University, Sydney, Rosalind.thornton@mq.edu.au**

illicit answers (e.g., '*The boy is reading*' or '*Reading a blue book*')? Similarly, do children know that questions targeting the verb phrase such as '*What's the boy doing*?' (i.e., 'VP-questions') can be answered with a full sentence, or a verb phrase starting with an aspectual verb but not a verb phrase with a bare verb, or a noun phrase alone?

Research Question 3: What is the status of children's use of finiteness?

Do children have difficulty providing morphemes related to tense? In particular, do children provide the verb 'BE' in obligatory contexts in their answers to questions? How does this compare to use of the *ing* morpheme that expresses aspect not tense? Do children's use of pronouns support Schütze & Wexler's (1996) proposal, or are they incompatible with their proposal that children productions will not use an accusative pronoun when they provide a form of BE (e.g. *Him is wearing a beanie*)?

Research Question 4: Do children with SLI adhere to pragmatic norms in their answers to questions?

Do children adhere to the Gricean Maxim of Quantity (Grice, 1975) and answer questions with an appropriate amount of information? That is, do children provide full sentence answers that are grammatical but over-informative, or do they provide shorter fragment answers, as would be natural for adults? Second, do children know that when a person has already been introduced into the discourse it is appropriate to make reference to them using a pronoun?

2. Methodology

A total of 54 children participated in experiment[2]. The participants were eighteen children with SLI with a mean age of 5;3 (range 5;2-5;11), 18 language equivalent (LE) children with a mean age of 3;4 (range 3;2-3;11) and 18 age equivalent (AE) children with a mean age of 5;3 (range 5;0-5;10). All of the children included in the study were drawn from Australian English speaking homes. Table 1 displays the descriptive information for participation groups.

Children with SLI were recruited from early intervention centres for students with language impairment. The children had been diagnosed as language-impaired by a speech language pathologist and recommended for enrolment in the school program. Children in the LE and AE groups were recruited through a paid participation pool of children as well from preschool centres on the university's campus. Children who had a diagnosis of autism, behavioural problems, hearing loss or articulation problems were excluded from the study.

In order to be included in the study, children in the SLI group scored 84 standard score or below on the CELF-P2 language assessment and scored 85 standard score or above on the Kbit-2 IQ assessment. To be included in the control groups, children scored 85 standard score or above on the CELF-P2 language assessment and scored 85 standard score or above on the Kbit-2 IQ assessment. The children in the AE group were within 1 month of age to at least

[2] The study was approved by the Human Ethics Committee.

one child in the SLI group. The children in the LE group had MLU values that were within +/= one SD of the mean expected for age based on Rice et al., 2010 norms, where M=100 and SD=15. In order to ensure equivalent groups based on language abilities, each subject in the MLU group (LE) was within .10 morphemes of at least one child in the SLI group.

Table 1: Mean and standard deviations of group data by group

Group	N	Age	MLU	SD	CELF-P2	SD	KBIT	SD
SLI	18	5;38 (0.3)	3.43	0.5	76.39	7.9	99.33	13.1
LE	18	3;45 (0.3)	3.72	0.3	118.11	9.4	N/A	N/A
AE	18	5;33 (0.3)	4.76	0.6	111.94	11.8	103.33	10.9

Note: KBIT-2=Kaufman Brief Intelligence Test, Second Edition; CELF-P2=Clinical Evaluation of Language Fundamentals-Preschool-2; MLU=mean length of utterance; SLI=Specific Language Impairment; LE=language equivalent; AE= age equivalent.

The spontaneous language sample required for calculation of the MLU sample was collected by a speech pathologist in a naturalistic play environment. The sample was gathered using the same sets of toys as stimuli for all three groups of children. Each elicitation session lasted approximately 25 minutes, with 200 complete and intelligible utterances collected for each child. All language samples were coded and entered into SALT software for analysis (Miller, Gillon, & Westerveld, 2012).

The child's task was to verbally produce an answer to each of the questions posed during the course of a game presented on an iPad. Three types of wh-questions formed the stimuli:

Question Type 1: What's [the boy/girl doing]? (VP-question)
Question Type 2a: Who's [wearing a beanie]? (NP-question with BE)
Question Type 2b: Who can [jump on the boxes]? (NP-question with modal)

During the course of the activity, a total of 29 wh-questions were presented to each of the children. These questions included 15 '*Who's VP*' NP questions; 10 '*What's*' VP questions; and 4 '*Who can'* NP questions. The stimuli were controlled across the activity and presented to all the children in the same order. The verbs which were chosen as part of the experiment were familiar, high frequency verbs (MacArthur Communicative Development Inventory). The verbs which were used were: *take, eat, sing, hold, buy, fish, cuddle, wear, play,*

dance, paint, make, shoot, help, read, sing, bake, hug, kick, watch, jump, run, walk, and drive. [3]

Children's answers to questions were elicited in appropriate discourse contexts (Crain & Thornton, 1998). By eliciting answers during the course of a structured activity, a robust sample of data was gathered from every child in the group. In the present experiment, children were presented with scenarios on an iPad, and an animated character in various scenarios posed a wh-question. A lapel microphone was attached to the child to record the child's productions, which were captured on an Olympus digital voice recorder. The child's productions were later transcribed for analysis.

The child was introduced to an animated character named Zac who explained that he had broken his glasses and needed the help of the child to tell him what his friends were doing throughout the story. For each scene within the story, one of Zac's two friends was always engaged in some activity while the other character was present but not participating. The two characters both took turns at being engaged in the activity in different scenes of the movie. The characters were clearly identifiable for the child, one being a female green animated character and the other a male grey character.

The activity took approximately 15 minutes to complete. There was no specific time limit given to the child and no feedback was provided during the activity. If the child did not answer the question, pointed or did not attend to the question, the experimenter provided the question again, either verbally or by replaying the question on the iPad. The use of the iPad added an interactive component while allowing for a high number of structured trials. The task was aesthetically appealing and interesting for the child.

3. Reliability

To ensure reliability, all experimental utterances were transcribed by a speech pathologist. The transcriptions were then double scored by a second speech pathologist. Reliability was calculated across morphemes. The agreement was 97.7%, with a range of agreement between the transcribers of 88%-100%. Any differences were resolved by further discussion.

4. Results

1. How do children with SLI answer wh-questions?

For both the NP and VP questions all three groups of the children produced a variety of answers. The form of children's answers to each type of wh-question is provided in Tables 2, 3 and 4. Table 2 displays the total raw number of answers for each of the three questions type. Across the three questions, each of

[3] Five of the verbs: *bake, shoot, fish, cuddle and wear* are not included in the CDI. There was not a difference in the type of answer provided by the children for these verbs compared to the verbs included in the CDI.

the three groups of children had a total of 522 opportunities to produce an answer the wh-question presented in the experiment.

Table 2: Total number of answers for each question type by group

Question type	SLI	LE	AE
Who's VP?	268	266	268
Who can?	71	67	72
What's NP doing?	171	179	179
Total	510	512	519

Children's answers for the '*Who's VP*?' questions are summarised in Table 3 for each of the 3 groups of children. The lefthand column of the table shows the range of answers, from full sentence answers to fragment answers of various types. The mean percent and standard deviation for each type of answer is given for each of the participant groups. 'Full Sentence' answers recorded answers with a subject noun phrase (full NP or pronoun) and a verb phrase, but included sentences with an omitted auxiliary verb. The table reveals that children with SLI produced more full sentence answers compared to their peers. The children with SLI primarily give full Noun Phrase responses to '*Who's VP?*' questions rather than pronoun answers, as do the AE children; these formed over 65.6% of both groups' answers. Responses with ellipsis of the verb phrase ('VP ellipsis') are ones like '*The boy is*', or with a pronoun '*He is'*. The children with SLI used VP ellipsis less often than the control groups, especially compared with the younger LE children who used VP ellipsis close to 50% of the time. Another type of response is what is termed a 'Cleft elided response'. An example of this type of response was '*It's him'*. Another type of response observed in 1 child with SLI were utterances with the lexical verb DO in which the '*ing*' form takes on the status of a noun rather than a verb. An example of this is, 'The boy did eating'. These utterances made up 2.2% of the 'Other' category in table 3.

Table 3: Mean percent and standard deviation of children's answers by group for 'Who's VP?' question.

'Who's VP?'	SLI (18)	SD	LE (18)	SD	AE (18)	SD
Full Sentence	7.4%	13.3	0.4%	1.6	1.1%	2.6
Noun Phrase	65.6%	36.8	32.2%	39.8	67.4%	40.6
Nominative Pronoun	7.8%	22.3	4.1%	6.5	5.2%	15.1
Accusative Pronoun	1.9%	5.0	14.3%	23.9	6.3%	22.2
VP Ellipsis	11.9%	27.9	47.7%	43.9	19.7%	37.2
Cleft Elided	2.6%	11.0	0.0%	N/A	0.0%	N/A
*Verb Phase	0.4%	1.6	0.0%	N/A	0.4%	1.57
Other	2.6%	11.0	0.7%	2.2	0.0%	N/A

Table 4 displays the answers for the '*Who can'* questions. The data are classified in the same way as the other '*Who's VP?'* questions. The data show similar distributions to the '*Who's VP?'* questions. The children with SLI produce more full sentence responses than their peers in this kind of wh-question targeting subject position as well.

Table 4: Mean percent and SD of children's answers by group for '*Who can'* question

Who can?	SLI (18)	SD	LE (18)	SD	AE (18)	SD
Full Sentences	13.0%	23.4	1.4%	5.9	0.0%	N/A
Noun Phrase	65.3%	40.3	30.6%	43.3	68.1%	42.7
Nominative Pronoun	5.6%	17.2	4.6%	13.8	1.4%	5.9
Accusative Pronoun	1.9%	7.9	12.0%	29.0	5.6%	23.6
VP Ellipsis	11.6%	29.0	51.4%	48.1	25.0%	39.3
Cleft Elided	2.8%	11.8	0.0%	N/A	0.0%	N/A
*Verb Phrase	0.0%	N/A	0.0%	N/A	0.0%	N/A
Other	0.0%	N/A	0/0%	N/A	0.0%	N/A

Table 5 displays the answers for the VP-questions of the form '*What's NP doing*?' All three groups of children produced more full sentences for VP-questions than for NP-questions. The children with SLI produce more full sentence answers than the children in the control groups for VP-questions. Verb phrase answers refer to ones such as '*Driving' or 'Driving a car'*. There were less than 1% ungrammatical noun phrase responses by the SLI group, as indicated in the table, and none at all produced by the control groups of children.

Table 5: Mean percent and standard deviation of children's answers by group for '*What's NP doing?'* question

What's NP doing?	SLI (18)	SD	LE (18)	SD	AE (18)	SD
Full Sentence	43.4%	35.9	29.4%	33.9	17.2%	20.2
Verb phrase	49.3%	34.5	68.3%	34.7	81.1%	21.1
*Noun phrase	0.6%	2.4	0.0%	N/A	0.0%	N/A
Other	6.7%	9.7	2.2%	5.5	1.7%	3.8

2. Do children with SLI answer wh-questions using an appropriate syntactic category?

Children's answers to wh-questions were examined and classified by syntactic category. The prediction is that their answers would not consistently reflect a legitimate syntactic category if they had not understood the original question.

Responses were classified as an error if the child's answer was an illicit fragment.

For the wh-questions (*'Who's VP?*' and *'Who can VP?'*), an answer that is of the category NP (e.g., '*The boy*') is grammatical, whereas an answer that is a VP (e.g. '*Driving a car')* is ungrammatical. The SLI group produced 339 answers to the '*Who's VP' and 'Who can VP*' questions and of these, 338 were grammatical NP answers. One child with SLI produced an ungrammatical VP answer '*Playing drum*s' on one occasion. Of the 333 answers produced by the LE group, all 333 were grammatical NP answers. Of the 339 answers produced by the AE group, 338 were correct NP answers with 1 ungrammatical VP answer '*Wearing a beanie*'. These data can be seen in table 3 under the 'verb phrase' category.

For wh-questions that target the VP *('What's NP doing?'*), answers of various syntactic categories are grammatical; full sentences, or VP answers with a verb in progressive aspect (e.g. *'Driving a car'*). It is not grammatical to answer with a bare VP (e.g. *'Drive the car'*) or an NP. The main finding was that all 3 groups of children were very accurate in answering questions using a permissible syntactic category. Of the 171 answers produced by the SLI children, there was just 1 ungrammatical NP answer. The LE and AE groups both produced 179 answers to VP questions with no errors of syntactic category.

3. *What is the status of children's use of finiteness?*

Our study examined finiteness by comparing children's provision of BE morphemes with their use of the aspectual *ing* grammatical morpheme. Provision of these morphemes were examined in children's full sentence answers. Table 6 illustrates the mean percent that the verb BE and the *ing* aspect marker were provided for each group. The finding replicates the result from the literature; children with SLI do not provide the BE morpheme for either question type as frequently as the control groups of children, whereas the *ing* morpheme was almost never omitted by any of the participant groups. To assess the BE omission rates across all full sentence answers across groups of children a K-W test was used. This test showed that there is a main affect of group X^2 (2)=9.98, P<.05. A Mann-Whitney test was used to evaluate the three groups against each other. There was a significant difference between the SLI group and the AE children Z=3.14, P<.005. This test showed there was not a significant difference between the SLI group and the 3 year old group Z=1.51, P=.13. We also compared BE omissions with *ing* omissions. Further statistical analyses showed that SLI children produced significantly more BE omissions than *ing* aspect marker omissions. A Wilcoxon Signed Ranks Test showed a significant difference between the two variables Z=2.27, P<.005.

Table 6: Mean percent and SD of children's provision of BE and *ing* aspect marker in full sentences by group

Omission	SLI (18)	SD	LE (18)	SD	AE (18)	SD
Provision of BE morpheme	70.2%	33.3	81.4%	38.0	100.0%	N/A
Provision of *ing* aspect marker	97.4%	7.0	100.0%	N/A	100.0%	N/A

Our results were also examined to test Schütze and Wexler's (1996) theory about children's use of pronouns in subject position. The prediction is, that when BE is missing, the pronoun in subject position may be either nominative or accusative, but that when a form of BE is present in the sentence, children will always use a nominative pronoun. We would expect to see sentences such as '*She is singing a song'* but not '*Her is singing a song'*. When the BE is missing, either the nominative *'She singing a song'* or the accusative *'Her singing a song'* are expected. Our experimental findings provide strong support for Schütze and Wexler's prediction. When the BE form was present a nominative pronoun was used without exception. When the BE form was missing our findings showed that across both question types there were 16 incidences of nominative pronouns. This made up 56.2 percent of the subject types. The remaining were accusative pronouns productions with BE morpheme omission.

4. Do children with SLI answer questions with the appropriate pragmatics?

Our first analysis investigated the Maxim of Quantity by examining whether children provided full sentence answers to questions, or whether they were more likely to provide just the information requested by answering with a sentence fragment. While both response types are grammatical, the shorter fragment answers are more natural and in keeping with the Maxim of Quantity. The first analysis compared fragment answers to full answers across all 3 groups of children for the three question types. For NP questions targeting NP answers (*'Who's VP?' and 'Who can VP?'*), a fragment answer included any kind of NP (full noun phrase or pronominal answer, irrespective of nominative or accusative Case) or an answer with VP ellipsis, such as '*He is'* (again, ignoring Case). Full sentence answers were ones like '*He is eating ice cream*'. For wh-questions targeting the VP, fragment answers included verb phrase answers, such as '*Walking*'. Full sentence answers were classified as such if they had an NP subject with an articulated VP, whether or not the auxiliary verb provided.

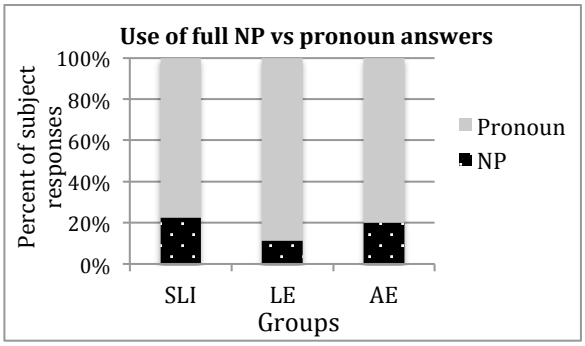
The table reveals that all groups of children produced the most full sentence answers to the VP questions '*What's NP doing*?'. The children with SLI produced more full answer responses to the 'What's NP doing' questions than the children in the control groups. For the 'What's NP' question a K-W test was used to assess the differences across groups. This test showed that there is a main affect of group X^2 (2) = 6.47, P <.05. A Mann-Whitney test was used to evaluate the three groups against each other. This test showed a significant

difference between the SLI group and the AE children. Z=2.62, P=.009. There was no significant difference between the SLI and the LE control children Z= 1.29, P = .203. When comparing the fragment answers to the full sentence answers in the 'Who' question types, a K-W test showed that there is a main affect of group X^2 (2) = 6.110, P<.05. A Mann-Whitney test showed there is no significant difference between the SLI group and the AE control children. Z=1.86, P=.062. There was a significant difference between the SLI group and the LE children Z=2.12, P<.05.

Table 7: Mean percent and SD of full sentence answer and fragment answers by group

Question Type	Full answer/ Fragment answer	SLI (18)	SD	LE (18)	SD	AE (18)	SD
What's NP doing?	Full answer	48.2%	36.4	31.1%	35.0	17.8%	21.6
	Fragment answer	49.8%	34.5	68.8%	35.0	78.2%	28.9
Who's VP &Who can	Full answer	10.3%	17.8	0.6%	1.8	0.9%	2.0
	Fragment answer	89.7%	17.8	99.4%	1.8	99.1%	2.0

A second investigation evaluated children's knowledge that given information that has already been introduced in the conversational exchange does not need to be repeated in full. This was examined by investigating whether children answered VP-questions like '*What's the boy/the girl doing?',* with a full NP or a pronoun. For our analyses we only looked at the 'What's NP' question because these introduce a full NP in the question. Figure 1 shows the percentage of pronoun and NP answers for each group of children. The children with SLI produced full NP answers 22.5% of the time as compared with their LE peers who produced NP answers 11.5% of the time and the AE children who provided full NP answers 20.0% of the time. Overall, our finding is that children with SLI are sensitive to this pragmatic knowledge, and do not repeat the full NP in their answers.



5. Discussion

This study investigated three components of grammar involved in answering wh-questions. The wh-questions investigated children's aspects of children's syntax, morphosyntax and pragmatic abilities in order to investigate whether specific components were more challenging than others for children with SLI. The results from the current investigation replicated previous experimental findings showing that children with SLI face particular challenges with morphosyntax. Our case study of children's use of the verb BE confirmed that the children with SLI find morphemes associated with finiteness challenging, as compared with morphemes that do not express tense. Children with SLI frequently omitted BE, but never the aspectual marker *ing*. Thus our experimental findings are consistent with previous research by Rice and colleagues that have illustrated this contrast (e.g., Rice et al., 1998).

Our investigation also examined Schütze and Wexler's (1996) claim that the form of pronoun in subject position relies on the information about tense and agreement that is represented in the sentence. Our study found that on those occasions when children with SLI used the default version of the pronoun instead of the correct nominative form, the BE morpheme was always omitted in their production. However, it was not the case that BE omission always evoked an accusative pronominal form. Productions with a nominative pronoun and omission of BE ("*He wearing a beanie*") as seen within our data are also consistent with the theory.

In contrast to children's difficulty using overt morphemes that express tense, children did not have any difficulty representing the syntactic structure of questions and their answers. The study found that children did not produce fragment answers that were not of a syntactic category permitted for the relevant wh-question. As noted, although our study elicited answers to questions, the range of possible answer forms depends on the question form itself. Therefore, consistent successful production of answers that fall within the range of legitimate answers suggests that children had no difficulty comprehending and computing the syntactic structure of the original wh-question. This finding is consistent with Deevy and Leonard's (2004) study which found that children do not have difficulty with 'short' wh-questions, which were similar to ours. They found that children had difficulty with 'long' wh-questions, when extra adjectives were added into the question to increase the distance between the question word and the gap. They take this finding to show that the syntactic representation for questions is not impaired, but rather, children with SLI experience more limitations in their processing ability than typical language developing children. Our study does not address processing limitations but it supports the Deevy and Leonard finding that the syntactic representation for wh-questions is not impaired. Our finding contrasts with the proposal in van der Lely & Battell (2003) that the impairment for wh-questions lies in the hierarchical syntactic representation itself.

Turning to pragmatic knowledge, our experimental findings showed that pragmatic competence varies, depending on the particular aspect at issue. Our focus was on two aspects of pragmatic knowledge related to the Gricean Maxim of Quantity. We take these in turn. The first aspect investigated the 'quantity' of children's answers to wh-questions, to see whether they produced full sentence answers, which were grammatical but provided redundant information, or, alternatively, whether they provided a fragment answer that provided only requested information. This aspect of pragmatics interacts with syntactic knowledge. The finding was that children with SLI produced more full answer responses than the control groups of children for both question types.

One interpretation of the finding that children with SLI give more full answers is that the children's school environment is responsible for the elevated number of complete answers to wh-questions. It is possible that teachers instruct the SLI children to always answer their questions using a whole sentence. Recall that, we found that in the '*Who's VP'* question the AE children were significantly different to the SLI group. In the '*What's NP'* questions, however, the LE children were similar to the SLI group. These parallels with different control groups suggest that the school environment is likely not to be responsible for the high incidences of full sentence productions seen in the SLI data. If schooling were the key factor, we would expect the AE children to be similar, but not the 3-year-ld LE children. We might also ask why children with SLI have the ability to attend to instruction to provide a full sentence answer, but not be able to comply with instruction to provide tense-related morphology. While the school environment cannot be excluded as a contributing factor, in our view, there are other factors that may also be implicated in the greater proportion of full sentence answers in the SLI children.

Another possibility worth considering is that children are not sensitive to the Maxim of Quantity. However, this seems unlikely, because the 'size' of children's answers can also be argued to stem from children's knowledge of certain language-specific properties of answers in English. This is because, from the perspective of linguistic theory, full sentence answers are, in some sense, 'easier' than fragment answers. This proposal is admittedly counterintuitive, as the common-sense expectation is that shorter utterances will be favoured over long ones in children with language difficulties. The common-sense expectation is no doubt true for some sentence structures, but question/answer pairs have a special status in syntactic theory. As we have already noted, the possible forms of an answer depend on the form of the question itself. According to the theoretical proposal by Merchant (2004), fragment answers to questions are more complex to derive than full sentence answers to questions (see also Merchant, Frazier, Clifton, & Weskott, 2013). To appreciate this, consider the wh-question "*What's the boy doing*?" that featured in our study. To answer this question, the hearer must represent the interlocutor's question, and use this as the basis for their answer, filling in the missing information, as illustrated in 6.

(6) Question: What's the boy doing?
Answer: The boy's driving a car

In order to give the fragment answer, *Driving a car*, two extra operations are required. First, the fragment that becomes the answer is focused in the structure, and the remaining part of the sentence is deleted so that it is not pronounced. A full sentence answer is more economical because it does not require these extra focus and deletion operations. If we follow this line of reasoning, then the greater number of full sentence answers that are observed in the SLI group may be because they prefer the more economical answer, either due to more limited processing resources, or because they haven't yet figured out that elliptical fragment VP answers are permitted in English.

Fragment answers to questions with VP ellipsis (e.g., "*He is*") are derived in the same way in linguistic theory. The experimental data from our study show that once more, children with SLI are using a smaller proportion of VP ellipsis answers than the children in the control groups. As shown in table 3, for example, the children with SLI give only 11.9% VP ellipsis answers, while the LE children use 47.4% VP ellipsis and the AE children 19.7%. This finding supports the proposal that shorter fragment answers to wh-questions may be more challenging for children with SLI. It will be useful to follow up on this finding in future research as there are few, if any, reports on this area in the literature for children with SLI.

One further aspect of pragmatic knowledge that is related to the Gricean Maxim of Quantity was investigated in our study. This pragmatic knowledge is unrelated to the syntactic operations available in English, and here we find that children with SLI are performing well. We inquired whether or not children with SLI know that once a person has been introduced into the discourse, they can referred to in the next mention with a pronoun. So if the wh-question asked about 'the boy' children could answer with "He…" The finding was that children with SLI showed that they knew when it was pragmatically appropriate to use a pronoun in their answer rather than a full NP, and there was little difference between the children with SLI and the children in the control groups. This aspect of pragmatics is clearly not problematic for children with SLI.

6. Conclusion

The present study investigates aspects of children's morphological, syntactic and pragmatic knowledge as realized in their answers to wh-questions.

The first analysis investigated whether children with SLI are able to compute the syntactic representations for wh-questions and their answers. This was probed by investigating whether children provided the correct syntactic category in answering wh-question. The finding in this domain was that children with SLI had no difficulty providing the correct syntactic category to answer both types of wh-questions. While it should be noted that these were simple one-clause wh-questions, children appeared to have no difficulty computing the

hierarchical structure required for wh-questions, and forming a dependency between the wh-word and the gap. This positive finding does not support van der Lely's proposal that such Extended representations should be problematic (van der Lely, 1998; van der Lely & Battell, 2003).

Our investigation of the pragmatic abilities of children with SLI investigated the Maxim of Quantity and related information about information structure. Here too, our finding was positive. The children with SLI performed well, with the caveat that one aspect of pragmatic knowledge we tested interacted with English-specific syntactic operations that were not completely mastered by the children with SLI. We found that children with SLI tended to provide full sentence answers to wh-questions when a fragment answer was sufficient. (When asked, *'Who's reading books in the library?'* the children answered with '*The boy's reading books in the library'* rather than just '*The boy'* or *'He is'*.) Here our interpretation of the data was that the full sentence answers are more economical than short answers because they do not require knowledge of the syntactic operations that are required for fragment answers in English. Lastly, we investigated children's sensitivity to whether or not a referent has already been introduced in the discourse. This aspect of pragmatic knowledge is not tied to knowledge of syntactic operations in English and our results showed that children with SLI are as sensitive to this factor as the children in the control groups.

Children's ability to compute sentence representations contrasted with their knowledge of morphosyntax, in particular, finiteness. Children with SLI omitted the BE morpheme which expressed tense in their answers to wh-questions at higher rates than their peers, in contrast to the aspectual *ing* marker which posed no difficulty. We also found that whether or not children represented information for tense and for agreement in their sentence representations affected the form of the pronoun used in subject position of the sentence.

Overall, our study of children's answers to wh-questions has been an informative method of investigating children's knowledge of various components of language. We have found that children have knowledge of the hierarchical sentence structure and the wh-question movement operation in the syntax. They may not have been competent with the range of fragment answers that are allowed for English, however, which encouraged full sentence answers when fragment answers were more acceptable for adults. Although this aspect of pragmatic knowledge related to the Maxim of Quantity was not adult-like in children with SLI, their use of pronouns rather than full NPs in their answers did not differ from typically-developing children. Finally, our findings showed that the most affected component of language is the morphology, as children tended to omit BE. These findings replicate previous findings in the literature (Rice & Wexler, 1996; Rice et al., 1998; Rice, Wexler, Marquis, & Hershberger, 2000; Schütze & Wexler, 1996).

References

Bishop, D. V. M. (1997). *Uncommon Understanding: Comprehension in Children with Specific Language Impairment*. Psychology Press, Howe, UK.

Conti-Ramsden, G., & Durkin, K. (2007). Phonological short-term memory, language and literacy: developmental relationships in early adolescence in young people with SLI, *Journal of Child Psychology and Psychiatry, 48* (2), 147-156.

Crain, S., & Thornton, R. (1998). *Investigations in Universal Grammar: A Guide to Experiments on the Acquisition of Syntax and Semantics*. Cambridge: MIT Press.

Deevy, P., & Leonard, L.B. (2004). The Comprehension of Wh-Questions in Children with Specific language impairment. *Journal of Speech, Language, and Hearing Research, 47*, 802-815.

Grice, P. (1975). Logic and conversation. In Cole, P.; Morgan, J. Syntax and semantics. 3: Speech acts. New York: Academic Press. pp. 41–58.

Leonard, L. B. (2014). *Children with specific language impairment, (2nd edition*). Cambridge, MA: MIT Press.

Merchant, J. (2004). Fragments and Ellipsis. *Linguistics and Philosophy*, *27*, 661-738.

Merchant, J., Frazier, L., Clifton, C., & Weskott, T. (2013). Fragment answers to questions: A case of inaudible syntax. In L. Goldstein (ed.), Brevity, 21-35. Oxford University Press: Oxford.

Miller, J., Gillon, G., & Westerveld, M. (2012). Systematic Analysis of Language Transcripts (SALT), New Zealand Clinical Version 2012 [Computer Software]. Middleton, WI: SALT Software, LLC.

Rice, M. L., & Wexler, K. (1996). Toward tense as a clinical marker of specific language impairment in English-speaking children. *Journal of Speech and Hearing Research, 39,* 1239-1257.

Rice, M. L., Wexler, K., Hershberger, S. (1998). Tense over time: the longitudinal course of tense acquisition in children with specific language impairment. *Journal of Speech, Language, Hearing Research, 41 (6*): 1412-31.

Rice, M. L., Smolik, F., Perpich, D., Thompson, T., Rytting, N., & Blossom, M. (2010). Mean length of utterance levels in 6-month intervals for children 3 to 9 years with and without language impairments. *Journal of Speech, Language, and Hearing Research*, *53*(2), 1-17.

Schütze, C.T. & Wexler, K. (1996). Subject case licensing and English root infinitives. In A. Stringfellow., D. Cahana-Amitay., E. Hughes. & A. Zukowski. (Eds.), BUCLD 20: Proceedings of the 20th annual Boston University Conference on Language Development (pp. 670-681). Somerville: Cascadilla Press

van der Lely, H.K.J. (1998). SLI in children: movement, economy and deficits in the computational-syntactic system. *Language Acquisition, 7*, 161-192.

van der Lely, H.K.J. (2005). Domain-specific cognitive systems: Insight from grammatical specific language impairment, *Trends in Cognitive Sciences, 9*, 53-59.

van der Lely, H.K.J, & Battell, J. (2003). Wh-movement in children with grammatical SLI: A test of the RDDR hypothesis. *Language*, *79*, 153-181.