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Lexical Diversity in Cantonese Speaking Children with Specific Language Impairment

Yam Kwan Wai, Connie

A dissertation is submitted in partial fulfilment of the requirements for the Bachelor of Science (Speech and Hearing Sciences), The University of Hong Kong, 14 May 1999.
Abstract

Recent studies on lexical diversity in children with specific language impairment (SLI) used type-token ratios as their measure of lexical diversity. SLI children were reported to have fewer verb types and tokens in comparison with age-matched (AM) peers (Fletcher and Peters, 1985; Watkins, Rice, and Moltz, 1993), as well as fewer verb-tokens in comparison with language (LM) peers. However, Watkins et. al (1993) found no difference between SLI and LM groups.

In this study, lexical diversity in children with SLI is investigated and compared with that of language-matched children (LM) by controlling the length of samples (first 100 utterances) and the number of tokens (117). The results indicated that the SLI group has (1) higher noun tokens, but lower ‘other’ tokens and ‘closed’ class tokens; (2) higher ‘open’ types and noun types; higher overall types (NDW) and (3) a lower verb-noun ratio, higher other TTR and higher closed class TTR. Surprising information about verb categories was found in the SLI group. Potential implications of these data for SLI language development are discussed.
Introduction

Words are the basic elements of language. They are used as the building blocks for one’s semantic and syntactic development. Templin’s (1957) data revealed that between the ages of 1 1/2 and 6 years, children learn to comprehend over 14,000 words, or an average of about new words per day. This indicates that children are having a composition of lexical form class categories in their language development milestones. Bates et al’s study (1994) even showed confounded developmental changes in the composition of lexicon. Many studies supported this in finding vocabulary changes in composition, as well as size in the second year (e.g. Bloom et al, 1980; Gentner, 1982; McCarthy, 1954).

However, existing literature suggests that lexical acquisition is a particularly challenging task for children with specific language impairment (SLI). These children are typically late in learning first words, acquisition of lexical items is beyond the norms, and difficulties in word learning persist at least through the early school years (Leonard, 1988; Rice, 1991; Rice, Buhr, & Nemeth, 1990). One study examining the lexical distributions of a group of three year-old SLI children and a group of normal children matched by vocabulary size showed no differences between two groups (Leonard, Camarata, Rowan, and Chapman, 1982). It is also suggested that the lexical abilities of preschoolers with SLI generally parallel those of Mean Length of Utterance (MLU) controls, but with verbs in even greater peril. This coincides with recent findings that acquisition of a main verb lexicon may be particularly vulnerable in children with SLI (Fletcher, 1993, Fletcher & Peters, 1984; Rice & Blode, 1993; Walkins, Rice, & Moltz, 1993.)

In the field of specific language impairment (SLI), most of what we know about these children’s language difficulties has been derived from cross-sectional studies comparing children
In the field of specific language impairment (SLI), most of what we know about these children's language difficulties has been derived from cross-sectional studies comparing children with specific language impairment (SLI) and normal developing children matched by language stages. A naturalistic study of the acquisition of Korean (Choi & Gopnic, 1995; Gopnic & Choi, 1990,) suggested that more data derived from systematic analysis of languages other than English and use of varied methodologies are advantageous to assess the extent to which the overall course of lexical development could be influenced by cross-linguistic or cross-cultural differences.

In English, verbs and adjectives were suggested to lead the child into the discovery of grammar (Bloom, Hafitz, and Lifter, 1980). This is supported by findings of significant changes in the composition of the lexicon, shifting from reference, to predication, to grammar (Bates et al, 1994). This implied that vocabulary development is not drawn randomly from each category as each type showed a different growth function and has its own peak. The resulting temporal asynchronies are suggested to imply a strong cause and effect relationship between grammar and the lexicon (Bates et al, 1994). In addition, grammatical development relies upon the establishment of a critical lexical base (Gerken & O'Grady, 1987). Previous studies have proved that a lexical shift from nouns to verbs correlates with the structural shift from single words to word combinations. This appeared to coincide with the findings of particular difficulties in verb acquisition in SLI children, as well as the suggestion of a particular weakness in SLI children's use of grammatical morphology which is lagging behind other areas of language (e.g. Johnston and Schery, 1976; Steckol and Leonard, 1979; Kahn and James, 1983).

Unlike English, Chinese is one of the best examples of an isolating language, which has little, if any, inflection (Sapir, 1921). Therefore, it is clear that the role of grammatical function is
English in the acquisition of Korean (Choi & Gopnic, 1995; Gopnic & Choi, 1990). The lexical composition of Cantonese children may therefore be different from that in English. In addition, as Chinese shows pro-drop properties (Huang, 1989), the null subject characteristics of the Chinese language may reflect an expected smaller proportion of pronouns. In Chinese, nouns and verbs constitute the majority (about 70%) of the lexicon in the speech of two to four-year-old children, and this is accompanied by a proportional growth in other lexical categories (Wu and Zhu, 1980). Content words constitute the main part of the children's speech; however, conjunctions, prepositions and adverbs increase slowly but steadily (The Cooperation Study Group of Oral Speech of Preschool Children, 1981). These findings give us insights to the relationship between lexical diversity and grammar development. But to what extent can the general course of lexical development observed for English speaking children also be found in Cantonese speaking children with specific language impairment?

In the present study, it is of particular interest to investigate a particular group of Cantonese children with specific language impairment – with a significant deficit in linguistic functioning, for lexical diversity in terms of lexical size (tokens), lexical composition (types) and lexical use (ratio). Studies of lexical diversity not only offer us more data on the development of SLI children's diversity in lexical use, but also give us a better insight to Bates et al's (1994) hypothesis of the relationship between a critical lexical basis and the development of grammar found in English.

The following two research questions summarize the purpose of this study:

1. How diverse are the lexical entries in SLI children in terms of composition of lexical categories?
2. Does the lexical diversity yield a significant relationship with the grammar (MLU) of the SLI children?

Methodology

Subjects

30 children participating in a larger project on language development (Fletcher, Stokes, Weizman & Leung in preparation) served as subjects. Fifteen of the children had been diagnosed as specific language impaired (SLI) with a mean age of 3.5 (MLU 1. - 34; mean 2.2). They were language-matched (MLU) with 15 normal developing children with a mean age of 2.2 (MLU 1.5 – 2.3). All subjects are native Cantonese.

Each of the children with SLI were assessed by the Reynell Developmental Language Scales (RDLS) (Reynell, 1987). All of the children passed a hearing screening and an examination of oral structure and function.

The language -- matched controls had achieved each of the major milestones for motor and social development according to parent’s interviews. As noted above, the level of these children’s linguistic development was measured by utterance length and matched to that of the SLI children.

Procedures

In each session, the clinician served as an interactant and made notes describing the relevant context. The sessions were conducted in a free play or story telling context. Audio recordings were made for each session (Sony mini disc).

Speech samples

The entire session constitutes the speech sample. However, the first 10 minutes of each session were given for the subject and the clinicians to warm up. Speech samples in the
remaining time were taken into analysis. These sessions were designed to obtain a complete sample of each child's lexicon, therefore imitations of the clinician's speech and unintelligible words were not counted. All the transcripts were computerized for more accurate analysis yielding 30 CHAT files. Ten percent of the computerized transcripts were then coded by the investigator of the present study to verify their accuracy. Any disagreements concerning the transcripts were resolved by re-examination until consensus was reached. Each child's MLU was noted for analysis.

The first 100 utterances and 117 tokens were selected for the analysis to ensure the validity of the data. Three groups of variables were analyzed: tokens, types and ratios. Frequencies for open (noun, verb and other tokens) and closed tokens were counted, and likewise for the type class. Type-token ratios (TTR), verb-noun ratios, verb type-token ratios, other type-token ratios and closed type-token ratios were created. All the variables were submitted to ANOVA.

Coding:

a) Utterance: An utterance was defined as a coherent segment of speech beginning and ending with a definite pause, and preceded by a drop or rise in pitch that conveyed complete meaning (but not necessarily a complete sentence) (Lung & Duchan, 1993). Only wholly productive utterances or segments were analyzed.

b) Measure of grammar: mean length of utterances (MLU). As in most cross-linguistic studies of language acquisition, MLU was defined using Brown's (1973) criteria.

c) Measure of vocabulary size: Number of different words (NDW) – a means to understand particular lexical strengths and weakness with grammatical classes.
d) Classification system: Children’s lexicon is mainly categorized into open-class and closed-class. Each of these classes is sub-divided into other grammatical categories. (see Appendix I)

For purposes of reliability, 10% of the 30 transcripts were coded by a second coder, for all measures. Inter-rater reliability, calculated as the number of agreements divided by the number of agreements and disagreements was 95.8%. Disputed items were resolved through consensus.

Results

Tokens

With the number of total tokens controlled in this study, four of the SLI children produced less than 117 tokens in the first 100 utterances (YCF310:109; YHT307:105; HLY305:75; LHH505:108).

There was a statistically significance (p = 0.051, p < 0.05) in the production of open tokens between SLI children (mean = 84) and language-matched children (mean = 75.1) as shown in Fig. 1. The SLI children had significantly higher noun tokens with a mean of 38.07 (33.9% of total tokens) when compared with the language-matched children with a mean of 22.87 (19.54% of total tokens) as shown in Fig. 2.

![Differential Diagnosis](image)

**Fig.1** Mean Plot of open class tokens and closed class tokens.
However, SLI children had a significantly lower other class tokens (mean = 9.13) when compared to the LM children (other class mean = 16.67) The difference is very significant when it is subjected to ANOVA for p = 0.0011 (p<0.05). Similarly, SLI children produced fewer closed class tokens (mean = 26.93) when compared with LM children (mean = 41.3). The total tokens of closed class words produced by the SLI children only comprised 24.0% of the total tokens, compared with LM children (35.3% of the total tokens).

Despite of the significant differences discussed above, there was no difference in verb tokens between the groups as it is shown in Fig. 3. The mean verb tokens produced by SLI children was 36.8 and 36.2 for the LM children.
Fig 3: Mean Plot of tokens produced in different lexical categories
(Noun, Verb, other class and closed class)

Types

The SLI children produced a mean of 48.5 total word types and the LM group produced a mean of 47.4 total word types. Though the SLI children had more overall types (NDW), the difference is not statistically significant with a probability of 0.1608 (p< 0.05). The SLI group had more open types (mean = 36.53) than the language-matched children (mean = 33.40). Patterns similar to the token class resulted. SLI children had significant more noun types (mean SLI= 17.8; LM= 11.3), but fewer other class type (mean: SLI= 5.07; LM= 8.13). The result of types produced in different lexical categories is presented in Fig. 4. In Fig. 5, the trade off between closed class types and verb types was clearly shown.
Differential Diagnosis

Fig. 4 Mean Plot of types produced in different lexical categories.

Fig. 5 Number of types produced in closed class and verb class by each individual SLI.

Ratios

The SLI children produced a higher type-token ratio (TTR) (mean: SLI = 0.44; LM = 0.41) and statistically significant closed TTR (p = 0.0167; <0.05). The SLI children also produced higher other TTR. However, the verb-noun ratio is significantly lower in types (p = 0.023; <0.05) as well as in tokens (p = 0.0110) as shown in Fig. 6 for SLI children than LM children.
Tokens and types in sub-categories of word classes

Verb class

In the verb categories, both SLI and LM children produced the highest tokens and types for transitive verb. However, there was significant difference in the production of intransitive verbs for it comprised 5.6% of the verb tokens produced by SLI children and 14.7% of the verb tokens produced by LM children. The production of ergative verb in SLI children (mean = 2.9) was higher than the LM children (mean = 1.2). Fig 7 and 8 showed the mean tokens and types produced by both groups.
Other class

In other class category, the SLI children produced adjectives the most, following by proper name and none for adverbs of manner as shown in Fig. 9. The LM children produced more sentential adverbs than the SLI children. Other sub-categories were much lower than the LM group leading to a lower overall result of ‘other’ tokens for the SLI children.

Fig. 8 Mean plot of sub-categories verb types produced by SLI and LM children

Fig. 9 Mean Plot of tokens produced in sub-categories of other class.
(adj: adjectives; adf: focus adverb; advi: adverb of intensity; advm: adverb of manner; advs: sentential adverb; nnpp: proper name)
Closed class

In closed class tokens, both SLI children and language-matched children produced negative morpheme the most, following by classifiers as shown in Fig. 10. As for closed class types, both SLI children and language-matched children produced classifiers with the most variety of word types, following by negative morphemes as shown in Fig. 11. As a whole, though SLI children produced fewer closed class tokens than language-matched children, but SLI children produced a similar pattern in closed class tokens as well as closed class types when compared to the language-matched children.

![Mean Plot of closed class tokens](image)

**Fig. 10** Mean Plot of tokens produced in sub-categories of closed class.
(asp: aspect; aux: auxiliary/modal; cl: classifier; com: comparative morpheme; conj: connective; corr: correlative; etc: clitic; det: determiner; gen: genitive marker; neg: negative morpheme; prt: post-verbal partical; q: quantifier; rfl: reflexive pronoun; wh: Wh words; nnpr: pronoun.)
Fig. 11 Mean Plot of tokens produced in sub-categories of closed class.
(asp: aspect; aux: auxiliary/modal; cl: classifier; com: comparative morpheme; conj: connective; corr: correlative; etc: clitic; det: determiner; gen: genitive marker; neg: negative morpheme; prt: post-verbal particle; q: quantifier; rfl: reflexive pronoun; wh: Wh words; nnpr: pronoun.)

Relationship of lexical categories and mean length of utterances (MLU)

<table>
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<th>Lexicon size (tokens)</th>
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<th>MLU (LM)</th>
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<tr>
<td>Noun</td>
<td>-0.29</td>
<td>-0.60</td>
</tr>
<tr>
<td>Verb</td>
<td>-0.10</td>
<td>0.25</td>
</tr>
<tr>
<td>Other</td>
<td>0.38</td>
<td>0.29</td>
</tr>
<tr>
<td>Closed</td>
<td>0.60</td>
<td>0.04</td>
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<th>Lexical types</th>
<th>MLU (SLI)</th>
<th>MLU (LM)</th>
</tr>
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<tr>
<td>Noun</td>
<td>-0.16</td>
<td>-0.04</td>
</tr>
<tr>
<td>Verb</td>
<td>-0.63</td>
<td>0.48</td>
</tr>
<tr>
<td>Other</td>
<td>0.55</td>
<td>0.63</td>
</tr>
<tr>
<td>Closed</td>
<td>0.59</td>
<td>0.59</td>
</tr>
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Table 1: Correlation between tokens, types and ratios with MLU (SLI) and MLU (LM)

In this study, the relationship between the developing lexicon and MLU was examined. Pearson product-moment correlations were computed for all measures of lexical development and MLU. A relatively mild negative correlation (-0.29) was found between noun tokens and MLU with the SLI children, but a moderately high negative relationship (-0.60) for the LM children. For the verb categories, SLI children showed a mild negative (-0.10) correlation with
MLU whereas the LM group showed a mild positive correlation (0.25) with MLU. As for the closed class, a strong positive correlation of 0.60 was shown in SLI children, but a negligible positive correlation (0.04) for LM children. The low positive correlation between closed class tokens and MLU produced by LM children was caused by the individual variability of closed class words. SLI children with higher MLU showed an increasing trend in producing more closed types.

**Discussion**

In this study, the children with specific language impairment produced significant more open types, as well as noun tokens and types. As the total number of words (total tokens) was controlled, the high use of noun tokens is at the expense of other grammatical categories (e.g. adverbs) and closed class categories (function words). Similarly, the high use of open types and noun types was at the expense of other grammatical categories. However, the higher use of types by the SLI children may reflect their age advantage.

The present data supported previous claims that children with SLI have a protracted period of development with particular aspects of language (Jones, Conti-Ramsden, 1997). That is to say nouns being were more obviously well developed, with verbs and closed class being more obviously delayed and difficult for these children. This further supports the notion that nouns are easier to learn, as learning of nouns refers to object-reference concepts (e.g. persons, things) which more consistently map onto the perceptual-conceptual structure of the world (Gentner, 1982). This reflected a cognitive and perceptual predisposition towards learning particular vocabulary types, as suggested by Gentner (1982), with nouns taking a very important role in early lexical development in SLI children.
The present findings of having no differences in verb tokens and verb types between SLI and language-matched children seemed inconsistent with the previous literature. Previous literature suggested that children with SLI used fewer verb types than their age-matched peers (Fletcher & Peters, 1994) and fewer verbs types than normal language learning children of the same MLU level (Conti-Ramsden & Jones, in press). This can mainly be explained by the different role played by verbs in English (involving inflections and morphological learning) and Cantonese. The patterns of verb types and tokens produced by SLI children was similar to that produced by the language-matched children, showing that the SLI children confront similar difficulties with the learning of these verb categories. Despite the absence of difference in absolute number of verb types, the verb-noun ratio was much higher for the language-matched children. This indicates that language-matched children had a greater proportional use of verbs to nouns than the SLI children. In fact, as Tomasello (1992) suggested, verbs refer to relational concepts (e.g. activity of state, instrument, and casual relations) which reflect more variability in how the children map words onto the world. However, this is not sufficient as the sole explanation of the present findings. In Conti-Ramsden et al’s study (1997), SLI children were found to have poor ability to generalize across verbs. This leads to the claims that children with SLI have difficulties extracting patterns from linguistic information. Though the SLI children have produced or reached a similar mass in verb learning, they were not making the types of generalizations that language-matched children were making.

Apart from the generalization factor, pragmatic factors also come into play in the lexical development of SLI children. Olwang, Long & Fletcher (1997) suggested that children’s understanding of the actions of other persons, not words, are engaged in acts of linguistic
These complex and subtle social-pragmatic cues in verb learning actually add more of a load to the SLI children, which makes the learning much more difficult.

Other than these theoretical implications, the use of story telling or free play in collecting speech samples may also contribute to the different results in types produced for verb class and closed class words of SLI children. Diagrams in appendix 2 showed that the languages of SLI children sampled by story telling produced higher verb types, but lower closed types. In contrast, SLI children whose speech samples were collected through free play produced higher closed types but lower verb types. This may be due to the restriction of content and context in story telling.

Other than verbs, the SLI children had a high type-token ratio than the LM children, including higher closed type-token ratio and other type-token ratio. This suggests that either that SLI children had a repetition rate of these word types, or infrequent use of these word classes. Studies with English language impaired children have focused on early action and object words, attribute adjectives and Wh-question. In comparison with these cross-linguistic data, Cantonese speaking children did show similar proportions in these categories. Other than these, results of the present study showed that SLI children produced a similar pattern in closed class tokens, as well as in closed class types. This reflects that there was no significant bias found in any particular sub-category of closed class when compared to the LM children. Despite the pattern resulted, the overall production of SLI children in closed class words lag behind the LM children.

In this study, language-matched children produced more adjectives and sentential adverb (e.g. /kau4 sin1/, /kum2/). However, negative morpheme seems more prominent in Cantonese speaking children. This may due to the cultural differences in saying the concept of absence –
'gone' in English and /mou5/ in Cantonese which is correspondingly coded differently as 'verb' and negative morpheme. The poor ability of generalization skills in SLI children may also affect the infrequent use of the 'other' class.

**Lexical categories and grammar**

An adequate variety of the lexicon across categories of word forms to allow for the emergence of grammar is probably required. (Olswang, Long and Fletcher, 1997) In this study, the SLI children showed a positive correlation between 'other' class and 'closed' class (types and tokens) which means these two categories contributed the most to the increase of mean length of utterances (MLU) in SLI children. This was especially shown by the SLI children with higher mean length of utterances. However, the most distinct characteristic in increasing mean length of utterances between the groups is the contribution of verb category. With the increase use of variety of verbs and other class, the language-matched children increase their syntax.

In Cantonese, closed class and other class words (e.g. conjunction, preposition, aspect, and adjectives) play a very important role in the learning of grammar. The increased use of closed class words is at the expense of other word class. This was shown by the clear tradeoff between verb class and closed class. It is expected that children will increase their mean length of utterance with the increased use of closed class and other class words. The combination of verbs and these classes perform different grammatical functions.

As discussed above, the verb tokens and types used by SLI children had no significant differences from the language-matched children. That means the SLI children may have reached to some extent a minimum level of this verb class. However, why is it that the verb category of SLI children plays no crucial role in the increase of mean length of utterances? And why is that so surprising that the lower the mean length of utterances of SLI children, the higher the verb
types used? One explanation is that SLI children had a smaller proportional use of verbs to nouns. In addition to this, they lag behind in learning the relationship between semantic and syntactic knowledge. In other words, SLI children probably will have difficulties in learning the combinatory rules between lexical classes. They probably proceed from the learning of lexical-semantic stage to a lexical-syntactic stage at a slower rate than the language-matched children do. Therefore, it is especially important for SLI children to learn the relationship between the nature of the words, prior to syntax and the character of the word combinations (Olswang, Long and Fletcher, 1997).

**Implications**

The present study of lexical diversity of Cantonese speaking children is of interest in identification of the diversity of lexical categories in these disordered children as well as their contribution to the learning of grammar. From a therapeutic standpoint, clinicians would like to know if Cantonese speaking children with specific language impairment reached a critical lexical diversity that is ready to boost the learning of grammar. The current study provides some possible explanations that may hinder the development of grammar in SLI children.

The present results suggest that clinicians investigate the child’s developmental profile, not only including the lexical size and composition, but also the proportional use of these lexical categories.

Nevertheless, the present data showed that skills in generalization are one of the important contributing factors in learning vocabulary. Therefore, the data indicate that clinicians might be wise to provide a variety of contexts, which enables a maximum facilitation of lexical production. The emphasis on increasing the lexical foundation for the advancement of grammar, is of course, the most important message from this study.
Further Studies

The present study has described the proportion of different lexical categories in Cantonese speaking children with specific language impairment and the relationship to grammar. Due to a need to limit the scope of this study, neither the detailed relationship in between lexical categories nor the confirmation of the effects different methods of collecting speech samples on lexical categories were addressed.

The results of this study provide valuable data for further investigations of how lexical diversity may affect the acquisition of grammar in Cantonese speaking children with specific language impairment. It is suggested that both a larger subject pool and a longitudinal study be undertaken, so as to determine the contribution of lexical development in enhancing the learning of syntax.

As mentioned in the discussion, relational concepts are not the only factor that hinder lexical development for SLI children. Generalization of lexical use (Conti-Ramsden et al, 1997), social-pragmatic factors (Olwang, Long & Fletcher, 1997), features of input language or the complex interaction of these factors play a very important role in the lexical development of children with specific language impairment. All of these are recommended aspects for further study. Nevertheless, SLI children are suggested to have a slower rate of adding new lexical entries (Leonard, 1988). This serves as another interesting topic for further study as different views on the issue of continuity over time in lexical diversity have been debated.

In addition to observational studies by examining naturalistic speech samples through free play or story telling, several Western studies have used charting of children’s lexical development by mother’s completion of checklists, such as the MacArthur Communicative Development Inventory developed by Bates and colleagues (see Bates, Bretherton & Snyder,
The preparation for this profile in Cantonese may enable researchers to collect complementary information on children's early language development that may advance our understanding in this area.

Conclusion

The present study is a tentative investigation of the lexical diversity of Cantonese speaking children with specific language impairment. It is concluded that Cantonese speaking children with specific language impairment demonstrated similar patterns in verb tokens and verb types, but lower proportional use of verbs to nouns when compared to language-matched children, suggesting that they are poor in generalization of lexical use. The SLI children who moved more successfully to increase of the mean length of utterances (MLU) exhibited a greater quantity and variety of closed class and other class repertoires. The strong negative correlation between verbs types produced by SLI children reflects that lexical mass is not the only contributor to productive syntax to emerge. Understanding of the features of these lexical classes is also important for SLI children to proceed to the learning of combinatorial rules between these lexical classes.

Even though no significant verb bias was found in the early lexicons of Cantonese-speaking children with specific language impairment, a significant lower verb-noun ratio seems to be in agreement with English data where verbs appeared to be hindered in lexical development of children with specific language impairment. However, it is more a problem of verb use rather than acquisition of verbs.
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References


<table>
<thead>
<tr>
<th>Category</th>
<th>Example Words</th>
</tr>
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<tbody>
<tr>
<td>NOUN</td>
<td>nn = common nouns (ball, apple)</td>
</tr>
<tr>
<td></td>
<td>nnioc = locative noun phrase (here, there)</td>
</tr>
<tr>
<td>VERB</td>
<td>dir = directional verb (down, in)</td>
</tr>
<tr>
<td></td>
<td>vd = ditransitive verb (give, put)</td>
</tr>
<tr>
<td></td>
<td>verg = ergative verb (fall)</td>
</tr>
<tr>
<td></td>
<td>vf = function verb ((hai6, jau5, hai2))</td>
</tr>
<tr>
<td></td>
<td>vi = intransitive verb (laugh, see, run)</td>
</tr>
<tr>
<td></td>
<td>vt = transitive verb (push, eat)</td>
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<tr>
<td>OTHERS</td>
<td>adj = adjective (red, big, wet)</td>
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<tr>
<td></td>
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</tr>
<tr>
<td></td>
<td>advi = adverb of intensity (most, very)</td>
</tr>
<tr>
<td></td>
<td>advm = adverb of manner (slowly)</td>
</tr>
<tr>
<td></td>
<td>advs = sentential adverb (together, then)</td>
</tr>
<tr>
<td></td>
<td>nmp = proper name (Ming Fai, SiuMing)</td>
</tr>
<tr>
<td>CLOSED CLASS</td>
<td>asp = aspect (zo2, zyu6)</td>
</tr>
<tr>
<td></td>
<td>aux = auxiliary/modal (will, can)</td>
</tr>
<tr>
<td></td>
<td>cl = classifier (go3, zek3)</td>
</tr>
<tr>
<td></td>
<td>com = comparative (bigger than, redder than)</td>
</tr>
<tr>
<td></td>
<td>conj = connective (or, and)</td>
</tr>
<tr>
<td></td>
<td>corr = correlative (jut6...jut8)</td>
</tr>
<tr>
<td></td>
<td>ctc = dititic (dak1, dou3)</td>
</tr>
<tr>
<td></td>
<td>det = determiner (this, that, dai6)</td>
</tr>
<tr>
<td></td>
<td>gen = genitive marker (ge3)</td>
</tr>
<tr>
<td></td>
<td>neg = negative morpheme (m4, mai6, mou5)</td>
</tr>
<tr>
<td></td>
<td>ppt = post-verbal particle (faan1, sai3, can1)</td>
</tr>
<tr>
<td></td>
<td>perp = preposition (at, to)</td>
</tr>
<tr>
<td></td>
<td>q = quantifier (one, two, three)</td>
</tr>
<tr>
<td></td>
<td>refl = reflexive pronoun (myself)</td>
</tr>
<tr>
<td></td>
<td>wh = wh words (what, why, how)</td>
</tr>
<tr>
<td></td>
<td>nnpr = pronoun (I, you, he)</td>
</tr>
</tbody>
</table>

*expressive utterance and sentence final particle were excluded.*
Appendix 2

Difference in no. of close class types used in story telling Vs free play with SLI children

![Graph showing difference in close class types](image1)

Difference in no. of verb types used in storytelling Vs free play with SLI children

![Graph showing difference in verb types](image2)