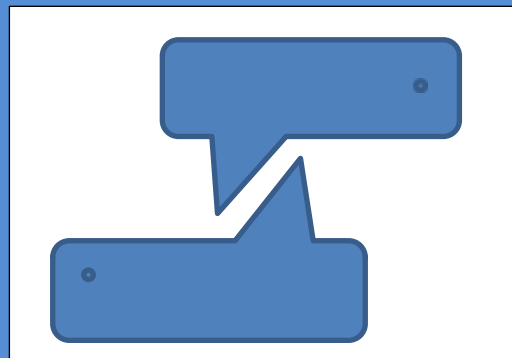


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Is bilingual language development different from monolingual?

Evidence from the use of ellipsis in narrative

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Abstract

The research literature comparing the language acquisition trajectory of monolingual and bilingual speakers has been inconclusive. Some studies have emphasised similarities between mono- and bilinguals. Others have argued for qualitative differences due to bilingual transfer from their participants' other language. Some studies have even claimed that bilinguals' weaker language may not develop fully despite initial similarities. This study revisits these fundamental questions of bilingualism by testing the use of ellipsis in monolingual and bilingual Japanese speakers. Experimental data were gathered by eliciting oral narratives based on a wordless picture book called '*Frog, Where are You?*' from five groups of participants: Japanese monolingual and Japanese-English bilingual children aged 4–5 and 8–9-years-old, and Japanese monolingual adults who formed a control group. The results of this study suggest that the fundamental difference, at least in term of ellipsis usage, between mono- and bilinguals is quantitative rather than qualitative, and that this difference was found at an early stage of acquisition rather than only in the older age group.

Keywords Japanese, ellipsis, bilingual first language acquisition, child language, narrative

1. Introduction

Simultaneous bilingual acquisition is often seen as the same as or similar to monolingual language acquisition; however, differences between monolinguals and bilinguals have also been reported. This study explores the question of how similar or dissimilar Japanese-English bilingual language acquisition is from monolingual Japanese language acquisition, by examining the use of subject ellipsis in referential tracking in Japanese. The use of ellipsis is a quantitative difference between English and Japanese, as the English use of ellipsis is much more syntactically restricted. Ellipsis is also found more frequently in young children's discourse as a natural developmental pathway (Clancy, 1992). Thus, it would be expected that children gradually learn how to use ellipsis as a factor in either syntactic or pragmatic requirements, or for special functions.

In this paper, the use of subject ellipsis in referent introduction, continuity and re-introduction within narrative is investigated in order to compare the Japanese language development of Japanese-English simultaneous bilingual children in Australia with their monolingual counterparts in Japan.

This study poses the following questions:

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- a. What, if any, are the differences between bilingual and monolingual Japanese children (of the same age groups), in terms of the use of subject ellipsis in referential tracking?
- b. What are the possible reasons for the usage or avoidance of ellipsis by bilingual and monolingual Japanese children?

1.1 *Childhood bilinguals; Are they the same as monolinguals?*

Previous studies have concluded that bilinguals who have regular and consistent input in both languages from birth are most likely to become monolingual-like in both languages (Bohnacker, 2016; Serratrice, 2007; Serratrice, Sorace, & Paoli, 2004). There are also reports that bilingual language acquisition is in some cases slower than monolingual (August, Dressler, & Snow, 2005; August & Shanahan, 2006; Hoff & Elledge, 2005; Manis, Lindsey, & Bailey, 2004; Oriyama, 2002; Uccelli & Páez, 2007). The research therefore indicates that bilinguals are qualitatively similar to monolinguals, except for a slower acquisition speed. Moreover, other reports (Kupersmitt, 2004; Oriyama, 2002; Verhoeven, 1990, 1991) indicate that any differences found between mono- and bilinguals tend to occur at a later stage of language acquisition despite initial similarities, these investigators have also claimed that some qualitative differences are to be expected. If these findings are also applicable to the frequency of subject ellipsis, it can be hypothesised that there should be little difference exhibited between the mono- and bilinguals in the 4–5-year-old group. In contrast, more conspicuous differences should be observable between the 8–9-year-old mono- and bilinguals. The bilinguals in this group would be expected to be using more ellipsis than their monolingual counterparts, or possibly even using different forms such as pronouns.

1.2 *The Japanese referential system and the use of ellipsis*

The Japanese referential system is characterised by the combination of the use of grammatical particles following a common noun and ellipsis (Hinds, 1984; Kuno, 1973; Maynard, 1990; Minami, 1996, 2008, 2011). The most basic rules for referential introduction and maintenance in narratives can be summarised using the following sequence (Hinds, 1984);

1. First mention: a common noun plus the particle *ga* (new information marker);
2. Second mention: a common noun plus the particle *wa* (old information marker); and;
3. Subsequent mention: ellipsis.

Therefore, it is expected that ellipsis will be used to maintain referent continuity. The grammatical particles required for the first and second mentions are reported to be acquired by the age of three (Okubo, 1967; Yokoyama, 1998), although the mastery of *wa* tends to occur after *ga* (Hatano, 1979; Iwatate & Inaba, 1987; Tahara & Ito, 1985). However, other outcomes such as a proper noun or first person pronouns are also possible (Clancy, 1980). Nevertheless, the initial introduction of referents is also influenced by environment, circumstances, and previous mutual knowledge,



as well as whether both speaker and listener share visual information (Wigglesworth, 1992).

Subject ellipsis occurs in both Japanese and English; however, the use of ellipsis is considerably different between them. In formal English, ellipsis can appear in the subject position of the non-initial clause of a compound sentence, whereas in Japanese more frequent use of ellipsis in the subject position is observed (e.g. frequent use of ellipsis in the initial clause of a compound sentence or even in simple sentences). In English, the introduction or first mention of a protagonist cannot be achieved by ellipsis, while in Japanese, it may be syntactically possible, that is, ellipsis could appear in the first clause of a compound sentence, where the subject appears in the final clause.

The existence of visual materials may also affect children's introduction of a protagonist by omitting the first mention. However, it is expected that adult Japanese speakers would not use ellipsis as the first mention even when there is visual material in front of the narrator. Styles of discourse are also reported to influence referential marking, i.e. more ellipsis is expected in spoken discourse than in written (Clancy & Downing, 1987). As the methodology of this study is based on oral narratives drawn from a picture book, it was anticipated that ellipsis would appear more frequently than in written narratives. However, in comparison to uncontrolled casual speech, ellipsis may not appear as often in oral narratives, where the grammar is, in general, more formal.

1.3 Children's narratives: Age related factors

Children often display distinct referential patterns when compared to adults. Such differences in Japanese can be represented by use of deictic expressions (Bavin, 1987, 2000; Karmiloff-Smith, 1981, 1983, 1985), omission of grammatical particles attached to common nouns (Iwatate & Inaba, 1987; Miyamoto, Wexler, Aikawa, & Miyagawa, 1999; Nakamura, 1993; Tahara & Ito, 1985), and, most importantly for this study, more frequent subject ellipsis (Clancy, 1992; Nakamura, 1993).

Another commonly found strategy in children's narratives that should be noted is "thematic subject strategy", that is young children tend to rather rigidly organise a narrative around subject pronouns denoting the main character (Bamberg, 1987; Hickmann & Hendriks, 1999; Karmiloff-Smith, 1981, 1985, 1987, 1992; Wigglesworth, 1990, 1997). In comparison, adult speakers tend to use a pronominal form for maintaining reference and nominal forms to switch reference. If this tendency is also present among Japanese-speaking children, ellipsis would be used to mark the main protagonist instead of third person pronouns as third person pronouns are uncommon in Japanese. This strategy indicates that children are sensitive to the "centeredness" of protagonists, and it would be expected for them to use different strategies for the main and other protagonists. As this study focuses on referential introduction, continuity, and re-introduction, it was instructive to see whether children really marked the main protagonist differently from the other protagonists.

Although monolinguals are reported to acquire the basics of the target language in terms of phonology, morphology, syntax and semantics by the age of 3 or 4 (Berman & Slobin, 1994; Clark, 2003; Verhoeven & Strömquist, 2001; Weissenborn & Höhle, 2000), the use of ellipsis cannot be explained in terms of syntax. Moreover, the pragmatic aspects of ellipsis may be achieved after the age of 3 or 4 and it is not clear from the literature when children are able to handle ellipsis at an adult level.

If bilingual acquisition is fundamentally similar to monolingual, we can predict that 4–5-year-old mono- and bilinguals would be using more ellipsis than the other age groups. If the differences found between mono- and bilinguals that tend to occur at a later stage of acquisition (Kupersmitt, 2004; Oriyama, 2002; Verhoeven, 1990, 1991) are applicable to the use of ellipsis, older mono- and bilinguals may use different ellipsis patterns. That is, older monolinguals would rarely use ellipsis, while bilinguals of the same age group would use more ellipsis in a fashion similar to younger monolinguals.

However, there is another issue to consider: transfers from the other language, i.e. English. Bilinguals may be able to use their English language knowledge in a positive manner during acquisition (Cummins, 1979; Minami, Fukuda, & Fujiyama, 2002; Verhoeven, 1994). As English uses subjects more heavily than Japanese, bilinguals may transfer this usage pattern and employ less ellipsis, especially in initial introductions.

1.4 Previous studies of the Japanese referential system

Two previous works on the Japanese referential system that are directly applicable to the current study are Minami's 2011 study using bilingual children in America and Nakamura's 1993 study using monolingual children in Japan, which studied referential markings in narrative by using the same narrative elicitation methodology as used in this study.

Minami (2011) studied referential topic management in narrative among English-Japanese bilingual children by comparing the referential strategies used in both Japanese and English. The relevance to this study lies in the first mentions of protagonists in the children's narratives. Minami found that the participants were predominantly using full noun phrases in both Japanese and English. There were, however, five ellipsis cases in Minami's study; the other 37 cases were all expected full noun phrases in Japanese. Although it is clear that the five out of 42 cases (11.9%) were ellipses to introduce a referent into the story, it was not mentioned whether the ellipsis was used by a particular age group among the 6–12-year-old participants. Moreover, although the referents were coded according to the protagonists, there was no discussion of the possibility of differences between the markings of the main and other protagonists. It is therefore the intention of this study to investigate these two aspects further to see whether there are any age-related factors affecting children's referential introductions and whether young children mark the main protagonist differently from the other protagonists.

Nakamura's study (1993) investigated a total of 100 monolingual participants in six age groups (3, 4, 5, 7, and 9-year-olds and adults), but it did not disclose how many participants there were in each group.



Interestingly, the results indicate that even adults use ellipsis as the first mention in narrative and children aged five or younger tended to use ellipsis to mark first mentions more frequently. A summary of these results is shown below.

Table 1
Relationship between monolingual participants' age and use of ellipsis in the first mention

Age (years)	3	4	5	7	9	Adults
Ellipsis	10%	10.4%	10.4%	3.1%	4.5%	3.3%

Based on Nakamura, 1993

The analysis did not consider the fact that the type of protagonist may influence the referential marking, either, that is, there was no mention as to whether there was a difference between referential markings for the main and other protagonists.

In comparing these two studies, there was a rather clear difference in the rate of ellipsis. Minami's study (2011) had a higher rate of the use of ellipsis (11.9% in average) for 6–12-year-old participants, while Nakamura's study (1993) exhibited a much lower rate of the use of ellipsis for similar age groups (3.1% for 7-year-olds and 4.5% for 9-year-olds, while younger participants were using more ellipsis). As the obvious difference between these two studies is the participants' language background (monolinguals in Nakamura's and bilinguals in Minami's study), it could be hypothesised from the results of these two studies that bilinguals may be using the language patterns found in younger age groups.

2. Methodology

2.1 The participants

In order to explore the fundamental question of how Japanese-English bilingual language acquisition does or does not differ from monolingual Japanese language acquisition, two different language background groups of participants were investigated in this study: mono- and bilingual speakers of Japanese. Both groups were divided into two age groups: 4–5 and 8–9-year-olds. Monolingual adults were also included as a control group, but their bilingual counterparts were not included as it is difficult to control for factors other than bilingualism. In total, there were 71 participants in this study; Table 2 shows the breakdown by age, gender and language background.

Table 2
Participants by age and language background

Age group	4–5 years		8–9 years		Adults	
	male	female	male	female	male	female
Monolinguals	8	6	6	8	8	8
	14		14		16	
Bilinguals	5	6	8	8	N/A	
	11		16			
Totals	25		30		16	

All of the children in this study were attending a kindergarten/nursery or primary school when the data collection took place. As there were reports from some Japanese mothers in Australia that their children's Japanese usage started to decline after they started school (Takeuchi, 2006; Oriyama, 2002), 4–5-year-olds were selected in order to minimise the possible effect of Australian schooling.

The monolingual participants were all recruited in Japan. The adult monolingual participants were recruited from two universities in Japan and were in the 20–22 year age group.

The bilingual participants were raised in Australia and were studying the Australian school curriculum in English during the week. They were also studying Japanese in a school setting for between three and five hours per week during the school term (up to 40 weeks a year). Therefore, the 8–9 year-old bilingual participants had some Japanese literacy skills and the 4–5 year-olds were also familiar with Japanese written texts through the Japanese children's books read to them in school and at home.

All of the bilingual participants were simultaneous bilinguals, who were raised in Australia. They all reported using the 'one person-one language' approach at home, that is, one of their parents was a native speaker of Japanese who spoke Japanese at home, while the other parent spoke English at home. It is reported in the literature that the number of languages spoken at home makes a difference in language maintenance rate (Billings, 1990). From previous studies conducted in Australia, where the one person-one language approach was used, it was expected that the participants' English would be stronger than Japanese, especially from their school experience (Takeuchi, 2006; Oriyama, 2002). Similarly, none of the bilingual participants in this study had received any negative comments with regard to their English competence, and all of them were active bilinguals with various levels of competence in Japanese. However, all of the bilingual participants in this study had noticeable linguistic differences from Japanese monolinguals, typically consisting of phonological, syntactic and lexical differences when speaking in Japanese.

2.2 Experimental material and procedure

In this study, a wordless picture book called '*Frog, Where are You?*' (Mayer, 1969) was used for narrative elicitation.

A procedure similar to that of Berman and Slobin (1994) was employed. Each participant was interviewed by the same investigator in a room at the participant's kindergarten, school, or university. The interview started with mutual introductions and the participants were told that they would be recorded. The participants were asked questions about their background, such as their name, age and school year, as a warm up. For the bilingual children, an additional question about their family language use was also asked, that is, what language(s) the participants used to their parents and what language(s) their parents used when talking to them.

Subsequently, the participants were asked to look through the picture book so they would be familiar with the pictures in order to tell a story. Unlike Berman and Slobin (1994), the cover page was not pointed to in order to avoid the potential establishment of common knowledge between the



interviewer and the participant, which could influence the protagonists' initial introduction in the story (Nakamura, 1993). Additionally, the title of the book, 'Frog, Where are You?' written in English, was concealed as was also done by Berman and Slobin, so that the participants who were able to read the English title would not be influenced by it.

In Berman and Slobin's study (1994), the investigator sat side-by-side with the participants. In the current study, however, the investigator sat opposite the participants so that she could not see the pictures that the participants were looking at, in order to avoid evoking deixis related to the protagonists (e.g. 'this one') and locations (e.g. 'here').

2.3 Analytic approaches

Three types of analytical approach were used in this study:

1. Analysis across age groups (comparison across age groups within the language groups);
2. Analysis between language groups (comparison of mono- and bilinguals in the same age groups); and
3. Comparison across language background and age.
4. Data were analysed at the clause level and the adult referential forms were used as the standard for complete acquisition of the Japanese referential system throughout this investigation.

In the Frog Story there is a single clear-cut main protagonist (a boy) and two other important, secondary protagonists that frequently appear in the storyline (a pet dog and frog), as well as other minor protagonists (other animals in a forest). The following points were employed when coding the data:

- a. How protagonists were initially introduced, maintained and re-introduced, that is, the ratio of the use of ellipsis in the first mention, subsequent mentions and re-introductions; and
- b. The influence of the centeredness of protagonists (the main protagonist, secondary protagonists and minor protagonists) and the ratio of the use of ellipsis as the first mention, subsequent mentions and re-introductions depending on centeredness of protagonists in the story.

3. Findings

3.1 The use of ellipsis in the first mention: Age and protagonist types

The norm expected of a Japanese speaker for the first mention of a protagonist is a non-ellipsis, such as a common noun plus the particle *ga* or a proper noun. However, in this study ellipsis was found in all age and language groups, which is consistent with Nakamura's (1993) study. Table 3 shows the use of ellipsis as the first mention in the five age and language groups used in this study.

Table 3
The Use of ellipsis in the first mention

	4-5-year-olds		8-9-year-olds		Adults
	Monoling. (n = 14)	Biling. (n = 11)	Monoling. (n = 14)	Biling. (n = 16)	Monoling. (n = 16)
Main protagonist	42.9% (6)	9.1% (1)	7.1% (1)	6.3% (1)	6.3% (1)
Secondary protagonists	14.3% (2)	9.1% (1)	0	0	0
Minor protagonists	0	0	0	0	0

All the examples of ellipsis found in this study were in simple sentences, except for one sentence produced by an adult speaker. This was a compound sentence, but all the other subjects used in this sentence were also ellipses (See Example 3 below). Below are some examples of the initial introduction of protagonists using an ellipsis.

Example 1 (4–5-year-old monolingual, using ellipsis for the main protagonist)
(EL = boy) *Kaeru mite ru.*

frog look [progressive]

(EL=A boy) is looking at a frog.

Example 2 (4–5-year-old bilingual, using ellipsis for a secondary protagonist)
(EL = frog) *Na, nai.*

exist [negative]

(EL=A frog) is not there.

Example 3 (Adult, using ellipsis for the main protagonist)

Clause 1: *Eto* (EL = boy) *kyô no hiru ma ni ano,*

um, today [particle] day time [particle] um

totte kita kaeru o bin ni irete

that (he) caught frog PAT jar PAT (he) put, and

Clause 2: (EL = boy) *inu to issho ni ûnto,*

dog PAT together um [incomplete]

Clause 3: (laugh) *tomacchatta*

stopped

Um, (EL=a boy) put a frog that he caught during the day today into a jar, and (EL=he) . . . together with the dog, (laugh) (the story) has stopped.

There are two findings regarding the use of ellipsis as the first mention. Firstly, the use of ellipsis as an initial introduction was predominantly found in data addressing the main protagonist. A small amount of ellipsis was found in the data addressing secondary protagonists, but only in the youngest group (the 4–5-year-olds) for both the mono- and bilingual groups. There were no examples of the use of ellipsis in the data addressing minor protagonists in any age and language group, which indicates that there is a rather clear relationship between the use of ellipsis and the centeredness of



the protagonists. Therefore, young children do not use ellipsis randomly, but only use it for the more central figures in the story.

Secondly, the data indicates that the relationship between the use of ellipsis and younger age is more evident among the monolinguals. It is known that young children tend to omit various elements in a clause, thus it was expected that the 4–5-year-olds would have a higher rate of ellipsis. In fact, six out of 14 monolinguals aged 4–5 (42.9%) used an ellipsis to introduce the main protagonist, whereas their bilingual counterparts, aged 4–5, used ellipsis at as low a rate as the other older groups.

By the age of 8–9 years, both mono- and bilinguals exhibited limited use of ellipsis for the first mention, approximating adult usage. Although some previous studies have reported that differences between mono- and bilinguals tend to develop at a later stage of language acquisition, and bilingual language acquisition resembles that of younger monolinguals (Kupersmitt, 2004; Oriyama, 2002; Verhoeven, 1990, 1991), the results of this study demonstrate that this is not the case with regards to the use of ellipsis. In the case of ellipsis, the results suggest that bilinguals may acquire some aspects of language usage earlier than monolinguals and, once acquired, these aspects may not be lost at a later stage. This is probably why the 8–9-year-old bilinguals do not omit a subject at the initial introduction of a protagonist in a narrative, and the use of subject was learned earlier by bilinguals than monolinguals.

The use of Chi-square (χ^2) analyses confirmed that the language background itself (mono- or bilingual) was not correlated with any statistically significant differences in the use of ellipsis for any of the protagonist types in the initial introduction. This indicates that bilingualism in general is not responsible for any differences in the use of ellipsis (i.e. main protagonist: $\chi^2(1, N = 71) = 1.61, p = 0.205$; and secondary protagonists: $\chi^2(1, N = 71) = 0.03, p = 0.864$). However, the combination of age and protagonist type suggested some statistically significant differences. The results illustrate that there were statistically significant differences across the age groups in the main protagonist data ($\chi^2(2, N = 71) = 6.18, p = 0.046$), but not in the secondary protagonists' data ($\chi^2(2, N = 71) = 5.76, p = 0.056$), although the latter data was at an almost statistically significant level.

Therefore, although age in itself did not provide a clear indication for when ellipsis would be used as an initial introduction; a comparison of the five groups (i.e. 4–5-year-old mono- and bilinguals, 8–9-year-old mono- and bilinguals, and adults) revealed a significant difference in the distribution of ellipsis as the initial introduction for the main protagonist ($\chi^2(4, N = 71) = 11.99, p = 0.017$), but not the secondary protagonists ($\chi^2(4, N = 71) = 6.17, p = 0.187$).

In summary, the use of ellipsis is more evident among the 4–5-year-old monolinguals in the case of the main protagonist's initial introduction, but not for the other four groups. This implies that the 4–5-year-old monolinguals do not use ellipsis randomly; rather they use it when it is clear who is being referred to. This data also indicates that there was a difference between mono- and bilinguals in the 4–5 year-old group only.

3.2 The use of ellipsis in subsequent mentions

In subsequent mentions, the expected and general form of referent is ellipsis (Hinds, 1984). As younger children have a greater tendency to omit subjects, it was expected that there would not be significant differences related to age. This section compares only the data concerning main and secondary protagonists, since the number of subsequent mentions of minor protagonists was limited in comparison to those of the main and secondary protagonists.

Table 4

The use of ellipsis in subsequent mention

	4-5-year-olds		8-9-year-olds		Adults
	Monoling. (n = 14)	Biling. (n = 11)	Monoling. (n = 14)	Biling. (n = 16)	Monoling. (n = 16)
Main Protagonist	83.3%	78.5%	88.4%	80.2%	84.5%
Secondary protagonists	60.0%	63.2%	76.7%	67.6%	75.9%

The results from subsequent mentions confirmed that ellipsis was the most used form for any age/language group, but interestingly, a subject followed by other grammatical particles, *ga* and *wa*, also appeared in all age/language groups. Other patterns were rare. Two tendencies found from the subsequent mentions were:

1. Ellipsis tended to be used more for the main protagonist than for the secondary protagonists; and
2. The particle *ga* following a subject common noun tended to be used more for the secondary protagonists than for the main protagonist.

The above tendencies were not strongly related to age; instead they were associated with different types of protagonists. The first finding could be due to the fact that the main protagonist appeared throughout the story, therefore his actions tended to be maintained in a continuous manner with ellipses.

Secondary protagonists tended to disappear from the story line or to be doing something off stage therefore, their actions were probably marked differently in order to ensure the clarity of narrative even in subsequent mentions, such as using the emphatic function of *ga*. As found in the example below, when the subject might be ambiguous and could be clarified, the subject may appear with the particle *wa* (old information), or *ga* with an emphasis. This type of emphatic *ga* was found among all the age/language groups. A strong tendency with the use of emphatic *ga* was that it was used when there was another protagonist. In other words, it was used to avoid confusion as shown in Example 4 below. In this example there were two protagonists in the scene. In Clause 4, the secondary protagonist was marked by *ga* although it was a subsequent mention. This was probably because the main protagonist was also present, and in order to make it clear



who the subject is, the subsequent mention referent in Clause 4 was *ga*, which emphasised the subject.

Example 4 (8–9-year-old monolingual, using ellipsis for a secondary protagonist)

- Clause 1: *Inu wa nazeka kao o bin no naka ni tsukkonde imasu.*
dog [particle] (Re-introduction)
The dog has somehow thrust (his) face into a jar.
- Clause 2: *Sono mama inu wa otoko no ko ni tsuite itte,*
dog [particle] (subsequent mention)
As he is (i.e. with his face in the jar), the dog followed the boy, and
- Clause 3: *Ø mado e ikimashita.*
EL (subsequent mention)
(he) went to the window.
- Clause 4: *Suru to inu ga ochite shimaimashita.*
dog [particle] (subsequent mention)
Thereupon, the dog fell off.

The multinomial logistic regression test confirmed that there were few statistical differences in the use of ellipsis in the case of the main protagonist. There was only one group (the 4–5-year-old bilinguals) that displayed a difference in the use of ellipsis and a subject followed by *ga*. The 4–5-year-old bilinguals had a tendency to use a subject with *ga* more than the 8–9-year-old monolinguals ($z = 2.03$, $p = 0.043$) and adults ($z = 2.03$, $p = 0.031$) which results in less use of ellipsis.

In the cases of the secondary protagonists, however, less ellipsis was used in comparison to the main protagonist, and the 4–5-year-olds (mono- and bilinguals) and the 8–9-year-old bilinguals used less ellipsis than the 8–9-year-old monolinguals and the adults.

It could be suggested that the higher subject omission rate is not simply related to their young age. When an ellipsis is the norm, it is the older or more established groups which would more strictly follow the norm by using more ellipsis. Therefore, in the case of subsequent mentions, it was the adults and the 8–9 year-old monolinguals who used ellipsis the most.

3.3 The use of ellipsis in re-introduction

A re-introduction referent is generally achieved by the use of a common noun followed by the particle *wa*, however, ellipsis was used 30.5% of the time by participants in this study. As the number of examples for minor protagonists was significantly smaller than those of the other two types of protagonist, only the main and secondary protagonists were analysed.

All of the age/language groups used more ellipsis for the main protagonist than the secondary protagonists, which mirrors the results from the data in the first and subsequent mentions. As shown in Table 5, there were some differences based on age and language, and it was not only the monolingual 4–5 year-olds who used more ellipsis to mark the main protagonist (61.3%); the 8–9 year-old bilinguals also showed quite a high percentage of the use of ellipsis for the main protagonist (52.3%).

Table 5
The use of ellipsis in re-introduction

	4-5-year-olds		8-9-year-olds		Adults
	Monoling. (n = 14)	Biling. (n = 11)	Monoling. (n = 14)	Biling. (n = 16)	Monoling. (n = 16)
Main Protagonists	61.3% (49 of 80)	47.1% (33 of 70)	41.1% (69 of 168)	52.3% (68 of 130)	31.5% (57 of 181)
Secondary protagonists	23.2% (13 of 56)	28.3% (13 of 41)	21.9% (28 of 128)	29.8% (28 of 94)	20.6% (26 of 126)

The use of ellipsis for re-introductions was overall much higher than for first mentions. Three reasons were found for the use of ellipsis:

1. Grammatical constraints;
2. Subject clarity; and
3. Overextension of ellipsis.

In the cases of first mentions, there were no examples of these first two reasons.

Grammatical constraints were only found among the adults. These cases were found in compound sentences, and the subject can appear in the last clause of the compound sentence, rather than the first. Therefore, an ellipsis was used in the re-introduction in Clause 3, and the actual subject appeared in Clause 4 as shown in the example below.

Example 5 (*Adult, using ellipsis for the main protagonist*)

- Clause 1: “*Omae, bin o wacchatara,*
“If you break the jar,
Clause 2: *kaeru o irerarenai daroo.*”
(I) can’t put the frog.”
Clause 3: **Ø** *Soo itte,*
EL (re-introduction)
(He) said that, and
Clause 4: *Tomu wa Jon no koto o namemashita.*
Tom [particle] (subsequent mention)
Tom licked John.

Ellipsis was also frequently used when the subject was clear from the context. This tendency was found among the all the age/language groups, including the adult participants, when the subject could be identified from many possible indications, such as the context or story line, predicates, and possessives used in a previous clause.

In the following example, there is an element in the preceding clause (Clause 2) which suggests the identity of the subject in the following sentence. In this case, it is a possessive *inu no* (dog’s), which indicates the subject *inu* (dog) in Clause 3.

Example 6 (*8–9-year-old bilingual, using ellipsis for a secondary protagonist*)

- Clause 1: *De, sagashita aida ni,*
And, while (the boy) was searching,



Clause 2: *sono, nto, iredeta bin ni inu no kao ga hasamatte,*

dog [particle] (possessive)

the dog's face got stuck in the, um, jar (in which he) put (the frog), and

Clause 3: *Ø mado kara ochite,*

EL (re-introduction)

(the dog) fell from the window, and

Clause 4: *sono bin ga ne, wareta no.*

the jar broke.

However, ellipsis was also used even when it was unclear who the subject was from the context, and there were no syntactic or functional reasons to use ellipsis. Such cases were found not only among the 4–5-year-olds, but also among the 8–9-year-olds, monolinguals and bilinguals both. These overextensions of the use of ellipsis often made the story line unclear.

In the example below, the subject of Clause 2, “bees”, is deprecated. As a result, it reads as if the participant is continuing to talk about the dog's action in Clause 2.

Example 7 (8–9-year-old bilingual, using ellipsis for a minor protagonist)

Clause 1: *De inu wa kocchi de sagashite,*
And the dog looks for (it) here, and

Clause 2: *Ø chase shite ru no.*

EL (re-introduction)

(The bees) are chasing (the dog).

The results from the re-introduction data did not seem to support the assumption that younger children simply omit more subjects than older participants. All of the age/language groups omitted the subject more for the main protagonist than the secondary protagonists. There was also no indication that ellipsis was used more among the younger groups for the secondary protagonists, except for the possibility that the 4–5 year-old monolingual group may have used more ellipsis than any other groups in the case of the main protagonist. The overall tendency suggests that there is a relationship between the types of protagonists and the use of ellipsis, rather than between participant age and the use of ellipsis.

In the case of the main protagonist, Table 5 above implies that the 4–5-year-old monolinguals seemed to use ellipsis more than any other group, while no such tendency was found among the same group in the case of the secondary protagonists. In order to investigate whether this supposition was correct, the multinomial logistic regression test was utilized in order to compare the use of ellipsis and the particles *wa* and *ga* by the 4–5-year-olds with their use by other age/language groups.

Multinomial logistic regression revealed that greater use of ellipsis, that is, significantly more subject omission, was found among the 4–5-year-old monolinguals when comparing the use of *wa* and ellipsis for the main protagonist with the adults ($z = 3.4, p = 0.001$) and the 8–9-year-old

monolinguals ($z = 2.46$, $p = 0.014$). Although Table 5 shows the highest percentage of ellipsis among the 4–5-year-old monolinguals, the multinomial logistic regression test confirmed that there were no statistically significant differences between the other two groups (4–5-year-old bilinguals and the 8–9-year-old bilinguals). These two groups also showed exactly the same tendency as the 4–5-year-old monolinguals, that is, they used significantly more ellipsis than *wa* in comparison with the 8–9-year-old monolinguals and adults. Therefore, all of the three groups (4–5-year-old mono- and bilinguals and 8–9-year-old bilinguals) were using significantly more ellipsis than *wa* when compared to the 8–9-year-old monolinguals and adults in re-introduction.

Table 6

Comparison of the use of EL over Wa in re-introductions in the case of the main protagonist

	The use of more EL than <i>wa</i>	Multinomial logistic regression parameters	
		Z	p
Age/language groups	4–5 mono > 8–9 mono	2.46	= 0.014
	4–5 mono > Adults	3.40	= 0.001
	4–5 bi > 8–9 mono	2.76	= 0.006
	4–5 bi > Adults	3.58	< 0.0005
	8–9 bi > 8–9 mono	2.06	= 0.039
	8–9 bi > Adults	3.30	= 0.001

When comparing the use of *ga* and ellipsis, there was no tendency for young children to use more ellipsis relative to *ga* when compared with the older participants. In the case of the main protagonist, the opposite phenomenon was found, that is, the 4–5-year-old bilinguals used significantly more *ga* than ellipsis when compared with the 8–9-year-old monolinguals ($z = 2.47$, $p = 0.014$) and the adults ($z = 2.28$, $p = 0.023$).

Therefore, although the 4–5-year-old monolinguals appeared to be using more ellipsis than the other groups in the case of the main protagonist, the statistical analysis confirmed that a significant difference was only found between the 4–5-year-old monolinguals and the older monolinguals (the 8–9-year-olds and adults), and not between the 4–5-year-old monolinguals and the bilingual groups (4–5 and 8–9-year-olds). This difference was only significant when considering the use of ellipsis relative to *wa*, and not ellipsis relative to *ga*. This result suggests that the fundamental difference between the more established groups (the 8–9-year-old monolinguals and the adults) and the rest of the participants could be the use of *wa*, as all the participants seem to have good control over the use of ellipsis and *ga*.

In summary, all the age/language groups showed a similar tendency in the use of ellipsis. In other words, more ellipsis was used for the more central figure, and the use of *ga* was greater for less central figures. Thus, the results confirmed that use of ellipsis did not simply reflect the participants' ages; the 4–5 year-old bilinguals were using even less ellipsis and used more *ga* in comparison with the 8–9 year-old monolinguals and adults.



When comparing the usage of *wa* and ellipsis in the data referring to the main protagonist, however, a greater use of ellipsis was found among the youngest groups (mono- and bilingual) as well as the 8–9-year-old bilinguals. The particle *wa* is the expected form of re-introduction, and again the more established groups (adults and 8–9-year-old monolinguals) followed the norm rather than using other forms such as ellipsis.

4. Conclusions and Discussion

This section discusses the findings presented above with respect to the question of how similar or dissimilar Japanese-English bilingual language acquisition is from monolingual Japanese language acquisition with regard to the use of subject ellipsis in referential tracking. It goes on to discuss the possible reasons for the usage or avoidance of ellipsis by mono- and bilingual children speaking Japanese. It also considers the implications of the results for broader questions concerning bilingual language acquisition.

As for the question of the relationship between age, maturity, and the use of ellipsis, there was little evidence to suggest that young children simply use more ellipsis than older speakers, among either mono- or bilinguals. Firstly, in all the three data sets—referent introduction, subsequent mentions, and re-introductions—all the five age/language groups used more ellipsis for the main protagonist relative to the secondary protagonists.

Secondly, although the 4–5-year-old monolinguals demonstrated the strongest tendency to mark the main protagonist with an ellipsis in the first mention, other data sets (subsequent mentions and re-introductions) indicated that the use of ellipsis could not be explained by the age of the speaker alone. In the subsequent mention data, it was the adults and the 8–9-year-old monolinguals who used ellipsis the most, and in the re-introduction data there were no differences in terms of the use of ellipsis over the use of *ga* in all of the five groups. However, more frequent use of ellipsis was evident relative to the use of *wa* in the 4–5-year-old groups, and 8–9-year-old bilinguals only. As the higher rate of ellipsis occurred only when one element (particle *wa*) was still lacking in the participants' language, this could mean that ellipsis was utilised in the circumstances where *wa* was not developed sufficiently in the participants' referential system. Therefore, in the development of speakers' referential system, the use of ellipsis, *ga*, and *wa* are interrelated. The participants used ellipsis and *ga* more often to supplement a lack of *wa*. Therefore ellipsis was utilised in the process of mastering a complex referential system, and it cannot be fully explained from one variable such as age.

The more fundamental question that this study has aimed to shed some light on is the difference, if any, between mono- and bilinguals. The literature has reported that bilinguals often have identical or similar language behaviours to their monolingual counterparts, at an early stage of language acquisition at least (Genesee, 2006; Paradis & Genesee, 1996; Romaine, 1995; Schlyter & Håkansson, 1994). There are also counterarguments that bilinguals diverge from monolinguals at a later stage of language acquisition (Kupersmitt, 2004; Oriyama, 2002; Verhoeven, 1990, 1991).

The results of this study provide mixed support to these contrasting claims. The claim that bilinguals follow the same developmental path as monolinguals cannot be denied in qualitative terms, as the bilinguals in this study used the same referential patterns as the monolinguals, that is, they were able to use a common noun followed by a Japanese particle or an ellipsis rather than a pronoun. However, quantitatively, there was a clear difference between mono- and bilinguals in the 4–5-year-old groups. The 4–5-year-old monolinguals had a noticeably higher rate of subject omission in the first mention in comparison with the other four groups, while the 4–5-year-old bilinguals displayed a low rate of subject omission in the first mention. None of the sentences in the data used by the monolinguals were used to create any special effect or syntactic norm, thus the reason for the use of ellipsis was either developmental or cognitive, that is, young children tend to use ellipsis more. On the other hand, the low rate of subject omission by the bilinguals could be due to positive transfer from English (Cummins, 1979) in that the subject is less likely to be omitted in that language. However, one could also argue that this was not a cross-linguistic transfer, but instead due to the earlier cognitive maturity of bilinguals as reported in some previous studies (Bialystok, 1986, 1988; Bialystok & Martin, 2004; Hakuta, 1986; Hakuta & Bialystok, 1994). There was no concrete evidence to support one hypothesis over the other from looking at the 4–5-year-olds' data regarding first mentions, but the fact remains that the 4–5-year-old bilinguals displayed a greater degree of adult-like referential choices in comparison to their monolingual counterparts with respect to first mentions. On the other hand, the 8–9-year-old monolinguals displayed an adult-like rate of subject ellipsis throughout the study, while the bilingual group in the same age group had many more similarities with the younger monolinguals in subsequent mentions and re-introductions, that is, using more ellipsis where ellipsis is not the norm, and less ellipsis when ellipsis is the expected pattern. The 4–5-year-old bilinguals also displayed an interesting difference: the 4–5-year-old bilinguals used more subjects than the adults and the 8–9-year-old monolinguals for the main protagonist. Thus, in both the younger and older groups of participants in this study, there were some quantitative differences between mono- and bilinguals.

Kupersmitt (2004) suggested that “bilinguals follow a *qualitatively different* path from monolinguals in the construction of grammar” (p. 432), and also suggested that the difference was caused by language transfer. On the other hand, some previous studies reject language transfer in bilinguals (Hulk & Müller, 2000; Müller & Hulk, 2001; Serratrice, 2007; Serratrice, Sorace & Paoli, 2004).

From the results of this study, it could be suggested that qualitatively, there was no evidence to suggest that the English referential system was used in the bilinguals' Japanese (e.g. ellipsis was not replaced by a pronoun as would be done in English). Nevertheless, it is difficult to conclusively reject or accept the possibility that the difference in the quantity of ellipsis was due to transfer from English, a language that has much stricter rules of subject omission than Japanese. It also cannot be denied that the reduced use of ellipsis found among young bilinguals is related to earlier cognitive development.



In conclusion, this study argues that young children, both mono- and bilingual, do not omit subjects indiscriminately. Rather, they omit subjects in a sensitive manner with respect to the type of protagonist, in common with the usage of older speakers.

This study also suggests that the greater frequency of ellipsis is not a direct result of young age. Rather, the frequency of ellipsis, either greater or less, is an indicator of the process of incomplete language development, that is, less developed speakers tend to use ellipsis more when it is not the norm and less when it is the norm.

Furthermore, in relation to mono- and bilingual differences in the use of ellipsis, the differences were found with respect to quantity, rather than quality. Unlike claims in the literature, some differences were primarily found in the younger group, aged 4–5 years in this study, while differences between mono- and bilinguals in the 8–9 year-olds were also evident.

This study also suggests that some elements of language development may occur earlier among bilinguals than monolinguals. As the first mention data indicates, young bilinguals were already able to use a subject, while their monolingual counterparts used a greater number of ellipsis. Whether this is due to earlier cognitive development or language transfer from English could not be determined. The results imply that bilinguals may demonstrate divergent patterns from monolinguals at different stages of language acquisition depending on what aspects of language they have been learning, and many aspects of grammar seem to be learned in an interrelated manner. With regard to ellipsis, although children tend to learn to use subjects relatively early, the presence of grammatical elements that children have not yet mastered influences the frequency of ellipsis in aggregate.

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Phonological skills in low birth weight south Indian children: An exploratory study

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Abstract

The study aimed at examining whether the 3-4 year old children (n=60) with Low Birth Weight (LBW) and Normal Birth Weight (NBW) Tamil speaking children differ in development of their phonological skills. The children were classified into two groups with thirty in each: children with LBW (<2500 grams); and NBW (>2500 grams). The investigator was involved in a general conversation task with each child to elicit a minimum of 100 utterances, which was audio and video recorded. The recorded samples were phonetically transcribed and analysed by two qualified speech language pathologists to estimate the percentage of consonants correct (PCC) and frequency of occurrence of phonological processes. Independent t test and Mann Whitney U tests were used to compare the data between the groups. The results of the study indicated a significant difference ($p < 0.05$) between the children with LBW and NBW children in PCC. Alveolar and palatal phonemes were predominantly compromised followed by velars in both the groups. With respect to manner of articulation, errors on laterals and trill were higher. Further, the percentage of occurrence of cluster reduction (71.27%), stopping (50.61%) and initial constant deletion (39.17%) were twice greater in the children with LBW. The results of the study emphasises on the similarity in the pattern of acquisition of speech sounds between children with LBW and NBW children, however there was a difference in the correct usage of consonants.

Keywords phonological development, low-birth-weight, Tamil language, deaffrication, palatalization

1. Introduction

Phonology deals with the use of sounds and its organization in a natural language (Sloat, Taylor & Hoard, 1978). In order to interpret the meaning of a speech, listeners are concerned about the phonemes in the speech, as phonemes are the basic sound units associated with decisions about meaning (Kent, 1993). Each language has unique sound patterns. The

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development of phonological skills is one of the earliest developments in communication in young children. This development primarily refers to the acquisition and mastery of the speech sounds within a given language. These skills develop with increase in age and exposure (Bauman-Waengler, 2004). During this developmental phase, children begin to vocalise which overtime sounds like adult's speech. Diphthongs, vowels, consonants, double consonant and triple consonant blends are produced in most to least accurate order in early years in typically developing children (Templin, 1957). Order of acquisition of consonants is nasals, plosives, fricatives and semivowels and children produce all sounds correctly by 8 years of age. Further, one main aspect in phonological development is the occurrence and disappearance of phonological processes. Phonological processes are simplified sound classes in which the target sounds are systematically deleted and/or substituted (Bernthal & Bankson, 1993). A child's production errors during the developmental period are classified into various patterns of phonological processes that include syllable structure processes, substitution processes and assimilatory processes (Ingram, 1976).

The acquisition of phonological skills is influenced by a variety of factors which may be intrinsic or extrinsic. One such intrinsic factor reported by literature and clinical practice is the weight of the foetus or newborn obtained immediately after birth. Low birth weight is a term used to describe babies born with less than 2500 grams weight. Studies in the past (Aram, Hack, Hawkins, Weissman & Borawski-Clark, 1991; Jansson-Verkasalo et al., 2004; Samuelsson et al., 2006) have explored language, articulation, reading, writing and numerical skills in children with low birth weight. Results of the study by Jansson-Verkasalo et al. (2004) on language development in very low birth weight children and typically developing children at 2 and 4 years of age revealed lower scores on language comprehension at 2 years of age. These children also exhibited deficiencies in language comprehension, naming and auditory discrimination by 4 years of age. Spek, Franken, Wieringa and Kuperus (2009) reported poor phonological development in very low birth weight children when compared to normal age peers. This was based on the observation of a spontaneous speech recording during mother-child interaction on 20 children with very low birth weight and 20 children with NBW. Few other literature also reports children with LBW tend to exhibit delay in the development of phonological and lexical development (Stolt, Hataja, Lapinleimu & Lehtonen, 2009). Similar results were observed in various other studies by Ross, Lipper and Auld (1985), Largo, Molinari, Kundu, Lipp and Duc (1990), Wolke and Meyer (1999), Lewis et.al (2002) and Rvachew, Creighton, Feldman and Sauve (2005). In contrary to these results, studies by Luoma (1998) and Jansson-Verkasalo et al. (2004) observed no significant differences between children with LBW and NBW. Such varying results could probably be attributed to various factors such as methodology, participant selection criteria, follow up rates, age of assessment and experimental tasks used to elicit the responses. Very few studies have discussed the magnitude of these problems. However, no attempt has been made to explore the phonological development in Indian children with low birth weight (LBW). Profiling the phonological skills in children with LBW may assist in early identification



and intervention in children with phonological delay. The present study aimed at examining whether typically developing Tamil speaking children and children with low birth weight differ in their development of phonological skills. The main objectives of the study were to compare the Percentage of Consonants Correct (PCC) and frequency of occurrence of phonological processes between typically developing Tamil speaking children and the children with low birth weight.

2. Methodology

2.1. Participants

A total of sixty 3-4 year old native Tamil speaking children participated in the study. The children were classified into two groups: children with low birth weight (LBW) (<2500 grams) and children with normal birth weight (NBW) (>2500 grams). Each of these groups comprised of 30 children. These children were selected from private hospitals in Chennai and Thiruvannamalai. Information about the birth weight and APGAR score as presented in Table 1 was collected from the database of the child development units at the hospitals.

Table 1
Demographic data of the participants

	Children with low birth weight (LBW)		Children with normal birth weight (NBW)	
	Mean	S.D	Mean	S.D
Birth weight (in grams)	2182.0	201.193	2715.7	134.720
APGAR Score	7.9	0.662	9.9	0.346
Gestational age (in weeks)	34.7	1.207	38.0	-
Age (in years)	3.7	2.857	3.7	2.857

Children with LBW had normal intelligence and no sensory issues. The birth weight of these children was <2500 grams based on WHO (2008) classification, and had a gestational age of less than 36 weeks and APGAR score of at least 7 at 5 minutes. Children with NBW had a birth weight of >2500 grams with a gestational age of 38 to 42 weeks and APGAR score of at least 8 at 5 minutes. Both of the groups were matched for age and gender. Children in both groups were native Tamil speakers and exposed to English as well. Children with multiple births or multilinguals (exposure to more than 2 languages) or oral structure deficit or history of developmental delay were excluded from the study.

2.2. Procedure

Prior to data collection, consent was obtained from the parents of the 60 children who participated in the study. Data were collected in children's school environment. The investigator and the child were involved in a general conversation task in a quiet room. A picture book "1001 words in pictures"

published by Alka Publications, Mumbai (2010) was used as a facilitating tool for the task. In order to obtain adequate sample for analysis, a minimum of 100 words were elicited during this task. The interaction between the investigator and the child was audio and video recorded using a Sony ICD UX523 voice recorder and a Canon power shot A2200 HD digital camera, respectively. Tamil words used during the interaction were phonetically transcribed by two qualified speech language pathologists and subjected for further analysis.

2.3. *Data analysis*

The transcribed data were analysed by the investigator to estimate the Percentage of Consonants Correct (PCC) and the frequency of occurrence of phonological processes in both groups. PCC was calculated by dividing the total number of the correct consonants by the total number of the intended consonants and multiplying it by 100. The frequency of occurrence of phonological processes was estimated by dividing the occurrence of the process by the total number of possible occurrence of the process and multiplying it by 100. Phonological processes analysed in the current study were language specific, i.e. processes relevant to Tamil such as stopping, fronting, backing, assimilation, gliding, medial syllable deletion, affrication, lateralization, cluster reduction, deaffrication, palatalization, initial consonant deletion, intervocalic deletion, and epenthesis. Inter-rater agreement of the phonetically transcribed sample was calculated to estimate the reliability of the transcription. Inter-rater reliability was estimated on randomly selected 18 samples. The inter-rater correlation co-efficient was obtained using Karl Pearson's product moment correlation. The correlation between the two raters was observed to be good with a score of 0.975.

2.4. *Statistical Analysis*

The data were analysed using Statistical Package for Social Sciences (SPSS) 17.0 version software. Normality was identified using Shapiro-Wilks test. The data were described using the statistical mean and standard deviation. Difference between the bivariate samples was obtained using the independent t-test for the parametric data and Mann-Whitney for the non-parametric data. The probability value of $P < 0.05$ was considered as the significant difference level for the current study.

3. Findings

The results of the current study is discussed based on the Percentage of Consonants Correct (PCC) and the frequency of occurrence of phonological process between typically developing children with normal birth weight (>2500 gms) and children born with low birth weight (<2500 gms).

3.1. *Percentage of consonants correct (PCC)*

PCC was calculated for each group and compared between the two groups.



Table 2
 Percentage of consonants correct (PCC) in children with low birth weight (LBW) and normal birth weight (NBW) children

Variable	Groups	Mean Percentage (%)	S.D	t value	p value
PCC	LBW	95.4	2.081	6.883	0.000*
	NBW	98.2	0.845		

* $p \leq 0.05$

Table 2 indicates that the mean percentage for PCC in children with LBW was 95.4% ranging between 90.72% and 97.77% and in children with NBW the mean percentage was 98.2% ranging between 96.58% and 99.21%. This indicates that the correct usage of consonants is higher in children with NBW when compared to children with LBW. Comparing PCC between the two groups, the difference was significant ($p = 0.000$). This result indicates the possible influence of high risk factors (low birth weight and pre term) on the development of speech and language skills.

3.2. Frequency of occurrence of phonological processes

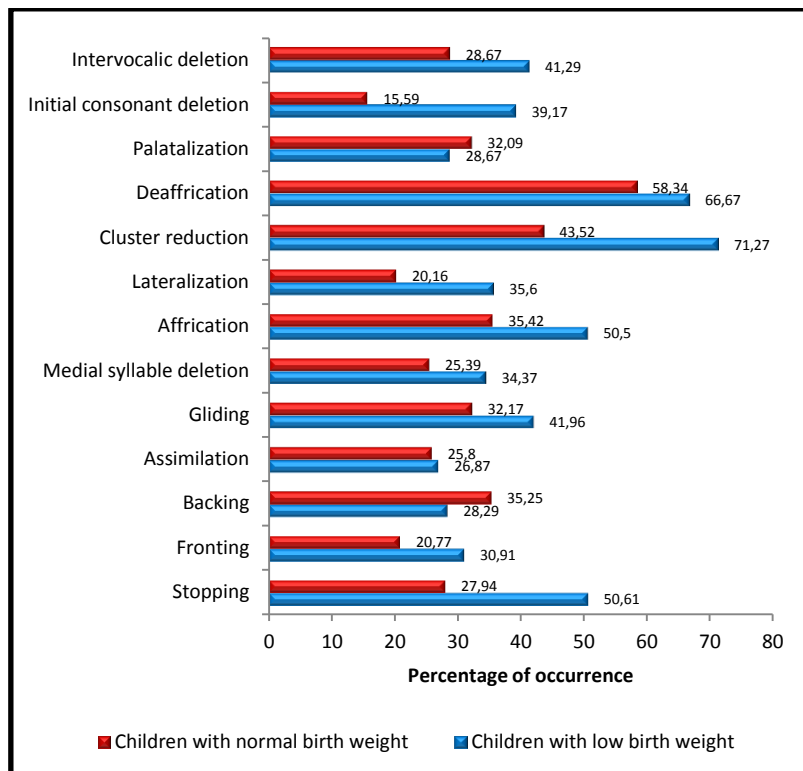


Figure 1. Frequency of occurrence of phonological processes in children with low birth weight and typically developing children

From figure 1, an overall analysis revealed that children with LBW exhibited highest percentage of phonological occurrence compared to TD children.

Cluster reduction and deaffrication were the most frequently occurring phonological processes followed by stopping, affrication and gliding. However, on the contrary children with LBW demonstrated comparatively higher backing and palatalization processes. Frequency of occurrence of phonological processes in children with LBW and NBW was calculated independently and compared using independent t-test and Mann Whitney U test as represented in Tables 4 and 5. Based on the normality of the data explored using Shapiro-Wilks test, independent t-test was used for parametric data and Mann Whitney U test for non-parametric data.

Table 4

Frequency of occurrence of phonological processes between children with low birth weight (LBW) and normal birth weight (NBW) using independent t-test

Variables	Groups	Mean percentage (%)	S.D	t value	p value
Stopping	LBW	50.61	2.356	1.626	0.126
	NBW	27.94		12.511	
Fronting	LBW	30.91	20.284	1.352	0.192
	NBW	20.77		07.167	
Backing	LBW	28.29	21.210	0.727	0.475
	NBW	35.25		26.011	
Assimilation	LBW	26.87	13.768	0.164	0.872
	NBW	25.80		12.545	
Gliding	LBW	41.96	23.640	1.381	0.175
	NBW	32.17		16.169	

* $p \leq 0.05$

Table 5

Frequency of occurrence of phonological processes between children with low birth weight (LBW) and normal birth weight (NBW) using Mann Whitney U test

Variables	Groups	Mean percentage (%)	S.D	Z value	p value
Medial syllable deletion	LBW	34.37	18.479	1.904	0.063
	NBW	25.39		14.206	
Affrication	LBW	50.50	31.970	1.122	0.307
	NBW	35.42		20.830	
Lateralization	LBW	35.60	22.019	1.096	0.291
	NBW	20.16		13.096	
Cluster reduction	LBW	71.27	27.233	2.704	0.007*
	NBW	43.52		10.016	
Deaffrication	LBW	66.67	31.181	0.406	0.857
	NBW	58.34		58.923	
Palatalization	LBW	28.67	13.249	0.128	0.905
	NBW	32.09		23.309	
Initial consonant deletion	LBW	39.17	34.811	1.509	0.143
	NBW	15.59		3.919	
Intervocalic deletion	LBW	41.29	38.214	0.378	0.724
	NBW	28.67		13.249	

* $p \leq 0.05$



Table 5 indicates that cluster reduction was statistically significant ($p = 0.007$) between the children with LBW and NBW. The occurrence was higher in the children with LBW (71.27%) when compared to children with NBW (43.52%). Individual analysis of data revealed that the mean percentage of occurrence of initial consonant deletion (LBW: 39.17%, TD: 15.59%) and cluster reduction were twice greater in children with LBW when compared to children with NBW. Under syllable structure process, the most frequently occurring process in both the groups was cluster reduction followed by intervocalic deletion, initial consonant deletion and medial syllable deletion. Among the syllable structure process, epenthesis was the least occurring process (LBW: 8%, NBW: 0%). Further, the results from Table 4 revealed that stopping occurred twice (LBW: 50.61%, NBW: 27.94%) greater in the children with LBW when compared to children with NBW. Most frequently occurring process under substitution process was deaffrication in both groups followed by affrication. In the children with LBW, the frequently observed processes apart from deaffrication and affrication were gliding and stopping. Children with NBW exhibited backing and gliding as the most commonly occurring processes, apart from deaffrication and affrication. Under substitution process, the less frequently occurring process in children with LBW were fronting and lateralization and in children with NBW, it was backing process. In terms of harmony process there was no significant difference between children with LBW (26.87%) and NBW (25.79%). Velar assimilation was the most commonly observed in both groups and nasal assimilation was present in one child with LBW.

4. Discussion

The results of the study revealed a significant difference between the children with LBW and NBW as indicated in the lower PCC values in children with LBW when compared to children with NBW. The children with LBW were preterm with a range of 32 to 36 weeks and their mean gestational age was 34.7 weeks as compared to children with NBW whose gestational age was 38 weeks. This may be a possible factor contributing to the significant difference in PCC scores between children with LBW and NBW. These results of the current study are similar to the results presented by Spek et al. (2010) which reported that 2 year old children with very low birth weight exhibited less number of consonants than their peers with NBW. Analyzing the results of the current study based on the place of articulation, alveolar and palatal sounds were predominantly affected followed by velars in children with LBW. A similar pattern was observed even in children with NBW indicating that the acquisition of speech sounds in the children with LBW was observed to be delayed but not deviant when compared to children with NBW. Labiodentals and bilabials were least affected in both the groups. During the course of acquisition of speech sounds, bilabials and labiodentals are acquired earlier and the visual cues augmenting for the perception and production for these groups of sounds are greater (Bernthal & Bankson, 1993). These could be the possible reasons for labiodentals' and bilabials' to be the least affected speech sounds in the children with LBW and NBW. Further, with respect to the manner of articulation, laterals were mostly

affected in both groups followed by trills. Plosives, affricates and fricatives were the least affected ones in both groups. The occurrence of the above mentioned error patterns were higher in children with LBW (in the ratio 1:1.5) compared to children with NBW.

The lower percentage of occurrence of cluster reduction in children with NBW may be attributed to the reason that cluster reduction is in the process of disappearing in these children. In Table 5, the mean percentage of occurrence of initial consonant deletion and cluster reduction were reported to be twice greater in children with LBW when compared to children with NBW. This indicates that children with LBW may take longer time to overcome the cluster reduction and initial consonant deletion in their spontaneous speech when compared to children with NBW. The most frequently occurring process in both groups under syllable structure process was cluster reduction followed by intervocalic deletion, initial consonant deletion and medial syllable deletion which can be attributed to the complexity of production of blends rather than isolated consonants. Among the syllable structure process, epenthesis was the least occurring process which indicates that the process may get suppressed before 3 years of age.

Stopping occurred twice greater in children with LBW when compared to children with NBW, this could be because children with LBW tend to substitute stop consonants for fricatives as stop consonants are usually early to emerge during the developmental stage (Bernthal & Bankson, 1993). The most frequently occurring process under substitution process was deaffrication in both groups followed by affrication which may be due to the fact that affricates and fricatives are acquired at a later stage compared to other sounds (Bernthal & Bankson, 1993) and therefore the child may take greater time to master these sounds. In terms of harmony process there was no significant difference between children with LBW and NBW which indicates assimilation processes are persistent in the age group of 3 to 4.

5. Conclusion

This study investigated the phonological processes and percentage of consonant correct in children in the age range of 3 to 4 years. The results of the study emphasize the fact that there is similarity in the pattern of acquisition of speech sounds in the children with LBW and NBW. However, the difference in the correct usage of consonants persists between the children with LBW and NBW. The most commonly observed processes in children with LBW were cluster reduction, deaffrication and stopping whereas in children with NBW deaffrication, cluster reduction and affrication were commonly observed. The least occurring processes in LBW were backing, assimilation and palatalization while in TD the least observed processes were fronting, lateralization and initial consonant deletion. Phonology being one of the earliest developing components of language, profiling its developmental aspects may provide information on possible risk for further language development. Thus, such an indepth analysis of phonological development might facilitate early identification of language delay in young children with low birth weight. Further research can explore such developments in phonology through a longitudinal study design.



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Explaining the Acquisition Order of Classifiers and Measure Words via their Mathematical Complexity

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Abstract

We provide theoretical explanation for the acquisition of numeral classifiers (sortal classifiers) and measure words (mensural classifiers) in Mandarin Chinese. Previous research in various languages separately observed that the general classifier is acquired before specific classifiers and that classifiers are acquired previous to measure words. However no theoretical discussion was fully developed and no study combined general classifier, specific classifiers and measure words in one dataset. We propose to fill these gaps by combining *semantic complexity* (Brown, 1973) and a mathematical approach (Her, 2012): given that the relative complexity of x , y and z is unknown, $x + y$ is more complex than either x or y , and $x + y + z$ is more complex than any of them. By applying the mathematical approach, it is observed that general classifier carries the mathematical value of times one, noted x , while specific classifiers possess x plus a semantic value of y , which highlights an inherent feature of the referent. Finally, measure words detain both x and y , along with a new information of quantity z . Therefore, the acquisition order is expected to start from the simplest semanticity and develop toward the most complex, i.e. general classifiers (x) > specific classifier ($x+y$) > measure word ($x+y+z$). As supporting evidence, we gathered longitudinal data from CHILDES (Child Language Data Exchange System; Zhou, 2008). The participants included 110 children from 1-6 years old, providing a total of 110 conversations of 20 minutes each with 1851 tokens of numeral classifiers and measure words. Our methodology applied the definition of acquisition from Brown (1973) and the equation of Suppliance in Obligatory Context (SOC) cross-checked with Target-Like Usage (TLU) from Pica (1983). The results demonstrated that our model generated correct prediction, serving as theoretical basis for future studies in the field of language acquisition.

Keywords numeral classifier, measure word, Mandarin Chinese, semantic complexity, child language acquisition

1. Introduction

Systems of numeral classifiers have already been discussed by linguists from various approaches, whether in terms of typology (Greenberg, 1990; Aikhenvald, 2007; Gil, 2013) or syntax (Li, 1999; Borer, 2005; Yeung, 2007; Yi, 2011; Her, 2010) among others. The so-called classifiers can generally be

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divided into two categories: *classifiers* (sortal classifiers) and *measure words* (mensural classifiers). As stated by Tai & Wang (1990:37-38): A classifier categorizes a class of nouns by picking out some salient perceptual properties, which are permanently associated with entities named by the class of nouns². An example of Mandarin Chinese is given in (1a), where the classifier 本 *ben* highlights that the following noun has the feature of a volume, e.g. a book, a magazine or a dictionary etc. On the other hand, a measure word does not categorize but denotes the quantity of the entity named by the noun, as shown in (1b) with 箱 *xiang* ‘M-box’, which points out the unit of quantity for the referent.

(1) Sample of classifiers and measure words in Mandarin Chinese

a. Classifier

三	本	書
<i>san</i>	<i>Ben</i>	<i>shu</i>
three	CLF-volume	book
‘three books’		

b. Measure word

三	箱	書
<i>san</i>	<i>xiang</i>	<i>shu</i>
three	M-box	book
‘three boxes of books’		

Various formal syntactic tests have been proposed to verify the categorization of classifiers in Mandarin Chinese, including numeral/adjectival stacking (Cheng & Sybesma, 1998:390; Tsai, 2003; Liang, 2006; Her & Hsieh, 2010: 538), *de* insertion (Chao 1968:555, Paris 1981:32, Zhu 1982:51, Tai & Wang 1990, Tai 1994, Cheng & Sybesma 1998:388 ; Tang, 2005:444; Zhang 2007:49; Her & Hsieh, 2010:541), *ge* substitution (Tai & Wang, 1990; Tai, 1994), among others. First, it is suggested that measure words block numeral and adjectival stacking but classifiers do not, i.e. measure words may accept antonymous adjectives on the classifier and the noun while classifiers cannot, e.g. 一大箱小蘋果 *yi da xiang xiao pingguo* ‘one big M-box little apple’ meaning ‘a big box of small apples’ is grammatical but *一大顆小蘋果 **yi da ke xiao pingguo* ‘one big CLF-round little apple’ is not since an apple cannot be big and small at the same time³. Second, *de* insertion stipulates that measure words can also be used with the genitive marker *de*, while classifiers cannot (Her & Hsieh, 2010:541), i.e. 一箱的書 *yi xiang de shu* ‘one M-box GEN book’ meaning ‘a box of books’ but *一本的書 **yi ben de shu* ‘one CLF-volume GEN book’. Finally, classifiers are expected to be interchangeable with the general classifier *ge* but measure words are

² Accordingly, a noun may be combined with different classifiers depending on which feature of the noun the speaker wishes to highlight, further explanation is provided in Section 1.2.

³ *yi da xiang xiao pingguo* ‘one big M-box little apple’ meaning ‘a big box of small apples’ is grammatical because the first adjective *da* ‘big’ refers to the box while the second adjective *xiao* ‘small’ refers to the apple. No contradiction occurs since the referents are different for the two antonymous adjectives. This is not the case for the classifier construction where both adjectives refer to the same noun ‘apple’.



not, e.g. 三顆蘋果 *san ke pingguo* ‘three CLF-round apple’ and 三個蘋果 *san ge pingguo* ‘three CLF-general apple’ both mean ‘three apples’, however 三箱蘋果 *san xiang pingguo* ‘three M-box apple’ would refer to ‘three boxes of apples’ instead. Even though, such tests do have their respective limitations when facing non-prototypical cases and areal variations of speakers, they still represent an overall differentiation for classifiers and measure words.

Following this distinction, studies in the field of Child language acquisition did provide numerous diachronic data applicable for how this classification is acquired by children in various languages. However it did not propose a theoretical explanation for this phenomenon. The main purpose of this paper is to combine theoretical discussion with empirical evidence and obtain a model capable of correct prediction within the field of numeral classifiers acquisition. Following this logic, Mandarin Chinese was chosen as the language of analysis since it is a rich classifier language (Tang, 2004:391), i.e. syntactically classifiers are obligatory in presence of the numeral and their inventory in Mandarin Chinese reaches nearly one-hundred classifiers (97 according to Her & Lai, 2012:88), which is relatively big compared to other existing classifier languages, e.g. Newar (Tibeto-Burman) is attested to be detaining one of the most fully developed classifier systems in Nepal (Weidert, 1984:185) but only possesses 16 numeral classifiers (Kiryu, 2009:54-55). Moreover, Mandarin Chinese is also the classifier language with the highest amount of speakers in the world as reported by Ethnologue and the database of 491 classifier languages from Professor Her’s research team at the syntax and lexicon laboratory of National Chengchi University.

1.1. Literature Review

In the literature, the acquisition of numeral classifiers has been widely discussed in different languages (Aikhenvald, 2007), including Mandarin Chinese (Erbaugh, 1986; Liu, 2008), Japanese (Sanches, 1977; Matsumoto, 1985, Naka, 1999), Cantonese (Tse et al, 2007), Vietnamese (Matsumoto, 1987; Tran, 2011) among others. Generally speaking, a common ground is attained on the fact that during the development process, children establish the syntactic structure of the classifiers, e.g. (D)-Num-CLF-(N) in Mandarin Chinese (Tang, 1990), memorize the noun-classifier pairing as a chunk and then generalize the pairing to new nouns (Erbaugh, 1986). While they reached the age of three, in terms of comprehension studies, children often correctly select unfamiliar referents on the basis of classifiers, suggesting that they have made appropriate generalizations regarding the semantics of many classifiers (Sumiya & Colunga 2006, Huang & Chen 2009, Li et al. 2010). On the other side in production, children are often more conservative, using a “default” or “general” classifier instead of the correct, specific classifier (Erbaugh 1986, Myers and Tsay 2000). As an example from Mandarin Chinese, when referring to a dog, the speaker may use the specific classifier for animals *zhi*, as in 三隻狗 *san zhi gou* ‘three CLF-animal dog’ meaning ‘three dogs’. Another option is to apply the general classifier *ge*, which does not refer to any specific feature of the following noun, and may combine to nearly every countable entity, as in 三個狗 *san ge gou* ‘three CLF-

general dog' also meaning 'three dogs'. Following this differentiation, it is actually only in later years (four to five years old) that stable and frequent production of specific classifiers then measure words (six to seven years old) would occur (Ying et al, 1983; Tse et al, 2007:512-513). Interestingly, even though replacing specific classifiers remains a strong tendency among children and adults, they do not replace measure words with the general classifier, implying that they are aware syntactically of the distinction between the two categories (Tse et al, 2007:508). To sum up, although children's classifier selection in production may not always be appropriate, they rarely omit a classifier when syntactically required, indicating that syntax of classifier is mastered earlier than classifier semantics (Erbaugh 1986, Wong 1998, Hu 1993); this would also be the main reason to have a general classifier: It is used to fulfill the syntactic obligations when the specific classifier is not acquired yet or memory fails for some reason or the other, e.g. if the noun shares few characteristics with the prototype of a specific classifier, such rule equally applying to children and adults (Myers & Tsay, 2000:87-89). As a result, the order of acquisition would be general classifier > specific classifier > measure word.

However, less consensus are reached when explaining the acquisition process obtained in previous studies. As discussed by Li & Cheung (2015): some researchers (e.g., Sanches, 1977; Uchida & Imai, 1999; Yamamoto & Keil, 2000) combined cognition development with classifier acquisition: since numeral classifiers categorize nouns by their inherent features such as animacy and shape, it was expected that the acquisition order of specific classifiers would yield evidence for the acquisition order of conceptual categories, i.e. the Sapir-Whorf hypothesis suggests that the acquisition of classifiers might influence conceptual development (Muraishi, 1983; Yamamoto & Keil, 2000:380-381). Under such claim, more salient features such as animacy should be acquired earlier if the language primarily distinguished animacy via classifiers (e.g. in Japanese) and the related classifiers were acquired earlier than other classifiers such as shape classifiers. However, further study demonstrated that concepts of salient features were already acquired by children prior to their related classifiers (Hu, 1993), implying that other factors (e.g. frequency of classifiers in the input) also influence the order of classifier acquisition. Following this observation, another theory is proposed by Myers & Tsai (2000) who combined classifier acquisition with the connectionist model (Rumelhart & McClelland's, 1986; McClelland & Cleeremans, 2009): within the connectionist model, information processing in the brain occurs via the propagation of activation among neurons organized in networks. Therefore, learning is based on interactive experience with the environment: the more frequently two items are applied together in language, the stronger their connection will be thus the more easily they will be activated. As an example, children would tend to extensively use the general classifier since it is also more frequent in the adult speech they hear, emphasizing the importance of input. Nevertheless, even if the results do support a connectionist approach, it still does not provide a direct explanation for the acquisition order of numeral classifiers. As a summary, the main gap within previous studies is that besides the converging results in terms of the order of acquisition,



divergence occurs for the theoretical explanation. This issue is the main target of this paper and is developed in the following sections: we first introduce our theory to explain the acquisition of classifiers, and then present the methodology of our experiment and its results as empirical evidence. Finally, we will provide discussion, limitation and conclusion.

1.2. *Theoretical discussion*

On the theoretical side, we combined the *semantic complexity* of Brown (1973) and the mathematical approach of Her (2012) on numeral classifiers. Brown’s theory, also named as cumulative complexity, can be defined as follow: Even if the relative complexity of elements x , y and z is unknown, it may be said that $x + y$ is more complex than either x or y , and that $x + y + z$ is more complex than any of them. This logic is applicable to different grammatical constructions in language (Carroll, 2008:288), e.g. a morpheme that entails knowledge of any element x is less complex than a morpheme that entails knowledge of x plus something else. Taking as an example the comparison between the plural, third-person present and auxiliary in English: the plural morpheme encodes the semanticity of number (x), i.e. the speakers must be able to distinguish if there is one or more of the referent. Second, the third-person present entails number and time ($x+y$), i.e. the speaker knows that there is one referent instead of more than one and he must also be able to differentiate between the present and the past. Third, the auxiliary requires both of these notions plus the concept of temporary duration that an event is currently happening ($x+y+z$), i.e. the usage of *-ing* after the auxiliary. This situation fulfills the comparison of $x + y$ being more complex than y , and $x + y + z$ being more complex than $x + y$. Therefore we can make the prediction that the plural morpheme should be acquired before the third-person singular morphemes, followed by the auxiliary. This fact is proved by the data of Brown (1973) in Table 1, with the average order of acquisition of fourteen grammatical morphemes in English.

Table 1
Order of acquisition of fourteen grammatical morphemes in English

Order	Morpheme	Sample
1	Present progressive	<i>singing, playing</i>
2/3	Prepositions	<i>in the cup, on the floor</i>
4	Plural	<i>books, dolls</i>
5	Irregular past tense	<i>broke, went</i>
6	Possessive	<i>mommy’s chair, Susie’s teddy</i>
7	Copula (uncontractible)	<i>this is my book</i>
8	Articles	<i>the teddy, a table</i>
9	Regular past tense	<i>walked, played</i>
10	Third-person present tense regular	<i>he climbs, mommy cooks</i>
11	Third-person present tense irregular	<i>John has three cookies</i>

12	Auxiliary (uncontractible)	she <i>was</i> going to school
13	Copula (contractible)	I'm happy, you <i>are</i> special
14	Auxiliary (contractible)	mommy's going shopping

This theory alone cannot explain the acquisition of numeral classifiers due to the fact that in previous studies classifiers are either viewed as purely syntactic (Gil, 2013) or bearing various semanticity which are incomparable in terms of semantic complexity (Chen, 2013). We take into consideration a mathematical approach on numeral classifiers (Her, 2010) which can be combined with Brown's *semantic complexity* and clarify the acquisition order of numeral classifiers. Enhancing previous studies proposing that languages with a classifier system tend to not have plural marking (Greenberg, 1990; Li, 1999; Borer, 2005; Yeung, 2007; Yi, 2011 among others), Her (2012) argues that numeral classifiers serve as a multiplicand on a mathematical side: their behavior is similar to the plural marker -s in English and is used to denote that the following noun is a countable unit, as opposed to mass units which are not countable. To be more precise, if classifiers and measure words are to be interpreted as having a mathematical value, then the only possible mathematical function linking the numerals with classifiers or measure words is multiplication, where the classifiers as the multiplicand are necessarily of the value 1. A sample is provided in (2a), where the classifier 朵 *duo* semantically points out that the following noun belongs to the category of flowers, and at the same time carries the mathematical value of *times one*, so that the exact quantity of roses is still the one provided by the numeral 三 *san* 'three'. Measure words, on the other hand, are semantically substantive, and mathematically must have a value that is not necessarily 1 (e.g. *times n*). As demonstrated in (2b), the measure word *da* brings the information of quantity of a dozen, mathematically being equal to *times twelve*. The total quantity referred to here is therefore *three times twelve*.

(2) Sample of classifier and measure word with mathematical approach

a. Classifier

三	朵	玫瑰	
<i>san</i>	<i>Duo</i>	<i>meigui</i>	(3 x 1 flower)
three	CLF-flower	rose	
'three roses'			

b. Measure word

三	打	玫瑰	
<i>san</i>	<i>Da</i>	<i>meigui</i>	(3 x dozen flower = 3 x 12 flower)
three	M-dozen	rose	
'three dozens of roses'			

Less prototypical measure words may carry numerical or non-numerical value, being either fixed or variable; the primary prerequisite being that only



classifiers necessarily assign the value of one⁴. As displayed in Table 2, numeral classifiers belong to the main category of necessarily fixed numeral value of one, while the measure word 打 *da* ‘M-dozen’ is annotated with the fixed numerical value of twelve. Not fulfilling the requirement of numeral classifiers with necessarily the value of one, 打 *da* ‘M-dozen’ is therefore categorized as a measure word, along with 群 *qun* ‘M-group’ which possesses instead a variable numerical value⁵. Other measure words with non-numerical value (whether fixed or variable) such as 瓶 *ping* ‘M-bottle’ and 袋 *dai* ‘M-bag’ would on the other hand denote a simple variable value, e.g. 三瓶水 *san ping shui* ‘3 M-bottle water’ meaning ‘three bottles of water’ specifies that the water is existent as the quantity of times three bottles, the exact amount depending on the type of bottle which is referred to.

Table 2
 Types of Mathematical Value in C/M (adapted from Her & Wu, 2016)

Value		Example	Type
Necessarily numerical	Fixed	1 三朵玫瑰 <i>san duo meigui</i> ‘three CLF-flower rose’	C
		三打玫瑰 <i>san da meigui</i> ‘three M-dozen rose’	M ₁
	Variable	三群人 <i>san qun ren</i> ‘three M-group people’	M ₂
Non-necessarily numerical	Fixed	三升醋 <i>san sheng cu</i> ‘three M-litre vinegar’	M ₃
	Variable	三瓶水 <i>san ping shui</i> ‘three M-bottle water’	M ₄

Beside the mathematical value, classifiers and measure words also carry an added semanticity (Hsieh, 2009; Her, 2011; Her & Lai, 2012). Following the principles of essential & accidental properties (Robertson & Atkins, 2008) and Kant's distinction between analytic & synthetic propositions (Rey, 2003), we can obtain a clarification for classifiers and measure words: classifiers refer to an essential property of the noun while measure words point at its accidental properties, e.g. the classifier 本 *ben* ‘CLF-volume’ in 三本書 *san ben shu* ‘three CLF-volume book’ highlights that the following noun has the feature of a volume, which is at the same time an essential property of a book. However, it is not the case for measure words, e.g. in 三箱書 *san xiang*

⁴ Measure words may also refer to the value of one but not necessarily, e.g. 一袋鳳梨 *yi dai fengli* ‘one M-bag pineapple’ meaning ‘a bag of pineapples’ could equal to one pineapple if the bag contains only one of it, but that is not a necessary condition since the measure word *dai* does not have a fixed value, i.e. a bag of pineapple could contain half, one, two, three, four pineapples (among other infinite possibilities).

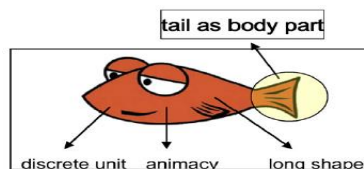
⁵ 一群人 *yi qun ren* ‘a group of people’ could include three, four, five, ten, twenty or more members, the only condition being that the value is numerical, e.g. it could not refer to three and a half people.

shu ‘three M-box book’ the measure word 箱 *xiang* implies that the following noun can be stored in boxes and counted as such unit of quantity, but the fact that books can be contained in boxes is an accidental property (books don’t obligatorily need to be storable in boxes to be accepted as books). In other words, measure words serve to quantify the noun in the phrase, as displayed in (2b) and in the following example: *dun* (M-ton) in *sanbai dun pingguo* ‘300 tons of apples’. They carry their independent semanticity and their mathematical value of *times n*. Regarding classifiers, they serve as a profiler (Fillmore, 1982; Langacker, 1987) and highlights an inherent semantic attribute of N beside their mathematical value of *times one*. By the example from Her (2012:1673-1674) in (3), different classifiers may apply on the same noun by pointing to different features of the referent, e.g. the tail of the fish(3a), its long shape(3b) or its animacy(3c), all three features being inherent properties of a fish.

(3) Sample of classifier semantics in Mandarin Chinese

a. Highlighted the *tail* feature of the fish

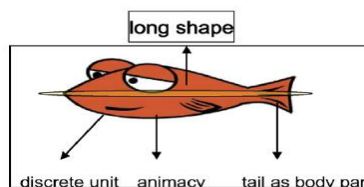
一 尾 魚
yi wei *yu*
 1 CLF-tail fish
 ‘1 fish’



N-fish as frame and *CL*-tail as profile

b. Highlighted the *long shape* feature of the fish

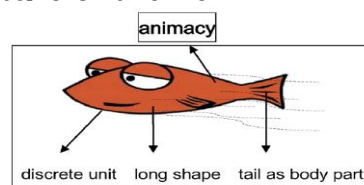
一 條 魚
yi tiao *yu*
 1 CLF-long shape fish
 ‘1 fish’



N-fish as frame and *CL*-long shape as profile

c. Highlighted the *animacy* feature of the fish

一 隻 魚
yi zhi *yu*
 1 CLF-animacy fish
 ‘1 fish’



N-fish as frame and *CL*-animacy as profile

By combining Brown’s semantic complexity and Her’s mathematical approach in Mandarin Chinese classifier acquisition, we generate the result in Table 3, with the different semantic complexity of general classifier, specific classifiers and measure words.



Table 3
Semantic complexity and mathematical value of numeral classifiers

	Sample	Math	Semantic	Total
1	一個書 <i>yi ge shu</i> ‘one CLF book’	x		x
2	一本書 <i>yi ben shu</i> ‘one CLF-volume book’	x	y	$x + y$
3	一箱書 <i>yi xiang shu</i> ‘one M-box book’	$x+z$	y	$x + y + z$

Following previous studies discussed in Section 1.1, there is a distinction between the general classifier *ge* which only carries the semanticity of countable unit (used as a syntactic filler) and more specific classifiers highlighting different features of the following noun (e.g. *zhi* with feature [+anymacy]). The same difference can be seen through semantic complexity: the general classifier *ge* only highlights the countable property of the noun (as times one), thus carry the mathematical complexity of x . Second, more specific numeral classifiers such as 本 *ben* ‘CLF-volume’ not only possess the same mathematical semanticity of times one (x) but also highlight an inherent feature of the following noun, e.g. *ben* highlights that the following noun has the particularity of a volume. This extra feature can be noted as y . Accordingly, we can deduce that the general classifier only has complexity of x , but the more specific numeral classifiers have $x + y$, hence the specific classifier is more complex semantically and acquired later. The same process applies with measure words, since they carry an additional semanticity of quantity z , being able to be numerical as in 打 *da* ‘M-dozen’ or non-numerical as in 升 *sheng* ‘M-litre’. Therefore, we can considerate measure words with a complexity of $x + y + z$, expected to be acquired later than general numeral classifier and specific numeral classifiers. As a summary, we can make the prediction that general classifiers should be acquired first, then followed by specific classifiers and measure words.

Past researches already provide partial evidence for our proposal. The acquisition order between general classifier and specific classifier has been confirmed by studies in various languages, taking as an example Japanese (Sanches, 1977; Matsumoto, 1985; Naka, 1999), Mandarin Chinese (Erbaugh, 1986; Liu, 2008), Hokkien (Ng, 1989) and Cantonese (Tse et al., 2007). The largest of which is Tse et al. (2007), a study of Cantonese-speaking children between 3 and 5 years of age which also attested that classifiers are acquired before measure words. The gap in previous studies is first that they mostly focused on the age range of 3 to 5 years old in participants. Second, they did not include general classifiers, specific classifiers and measure word at the same time in their analysis. To improve this domain is the purpose of our analysis.

2. Methodology

On the empirical side: following the hypothesis developed, we ran an analysis on two combined child corpus data from Zhou (2008) in CHILDES (Child Language Data Exchange System). The selected data included in total 110 children from 1-6 years old. The children were divided by 10 as a group,

each group spaced with an average of 6 months of age. The total data contained eleven groups of ten children, respectively at 14, 20, 26, 32, 36, 42, 48, 54, 60, 66 and 72 months of age, providing a total of 110 conversations of 20 minutes, each conversation originating from a different children. The gap of only four months between 32 and 36 was due to the combination between two study programs of the same author. This data was chosen to represent the longitudinal development sequence of classifier and measure word acquisition with children. The children at each group were different participants, but the quantity of the data was estimated to be sufficiently representative. The main innovation compared with previous studies being that our dataset includes participants from a longer age period, i.e. 1-6 years old, and produce a simultaneous analysis on general classifier, specific classifier and measure word.

The cross-sectional data analyzed here was collected in preschool programs in Nanjing, China, following the design of Harvard Project in the United States (Snow et al. 1996). The participants originated from four preschool programs of the same geographical area and were selected using the criterion as below: The age difference within each of the groups was not exceeding one month and the socioeconomic and educational background of their family was controlled as middle class range, i.e. the mothers either graduated from university or finished their educational program in a technical secondary school; they were generally workings as government offices, teachers, accountants, among others. The parents and teachers confirmed the absence of hearing impairment or developmental delay. There were an equal numbers of girls and boys and all of them were the first born and only child of the family. Data was recorded using the following procedure: A laboratory was set up as a kindergarten with a remote-controlled camera in the corner to record 20 minutes interaction between each parent-child pair. The investigator was in the room but was not involved in the conversation between mother and child. Each recording started with a warm-up period of a few minutes, during which the parents and children were provided with a collection of toys to get accustomed to the setting. Afterward, the semi-structured play period would begin, involving ball play, toy play, picture drawing and book reading.

Our methodology for corpus analysis was as follow: first we checked in the transcription the occurrences of numeral classifiers & measure words and counted the total obligatory context for their occurrence. As in (4a), the numeral classifiers and measure words cannot be omitted or exchanged without an alternation in semanticity, while in (4b)-demonstrative form, (4c)-numeral form and (4d)-skipping of noun the omission of numeral classifier would lead to incorrect syntactic structure⁶.

⁶ Even though syntactic and semantic criteria are available it is observed that these parameters may be transgressed in specific discourse context, e.g. when the speaker emphasizes vagueness on unspecified nouns, a frequent strategy is to apply the general classifier or omit the classifier (Erbaugh, 2013:120-121). They were however rare in our data, therefore we did not develop this subject here.



(4) Obligatory context for classifier and measure word in data

a	三本書	<i>san ben shu</i>	‘three CLF-general book’	three books
	三箱書	<i>san xiang shu</i>	‘three M-box book’	three boxes of books
b	拿這個顏色	<i>na zhe ge yianse</i>	‘take this CLF-general color’	take this color
	*拿這顏色	<i>na zhe yianse</i>	‘take this color’	*
c	劃一個太陽	<i>hua yi ge tai yang</i>	‘draw one CLF-general sun’	draw one sun
	*劃一太陽	<i>hua yi tai yang</i>	‘draw one sun’	*
d	我要三個	<i>wo yao san ge</i>	‘I want three CLF-general’	I want three
	*我要三	<i>wo yao san</i>	‘I want three’	*

Second, the correct/incorrect usage and omission of each classifier & measure word was noted by the following criteria: if it was required syntactically as shown in (4) and if the combination with the noun was semantically appropriate, e.g. the clause *三顆人 *san ke ren* ‘3 CLF-round people’ fulfills the syntactic requirement of Num + CLF + N but it would still be noted as incorrect since the semantics of the classifier ‘round’ does not correlate with the noun ‘people’. As for the comparison between numeral classifier & measure word, we followed previous studies methodology and applied the terms of Brown (1973): we defined the acquisition as the time when the morpheme was supplied in 90 percent of its obligatory context. As a unit of measure, we relied on the calculation of Suppliance in Obligatory Context (SOC) cross-checked with Target-Like Usage (TLU) from Pica (1983), to include into our scope generalization to inappropriate contexts. Detailed equations are listed in Figure 1 and Figure 2.

$$\frac{(\text{Number of correct suppliance} \times 2 + \text{number of misformations})}{\text{total obligatory contexts} \times 2}$$

Figure 1. SOC (suppliance in obligatory context)

The SOC allows us to calculate if the child applied classifiers correctly when he/she had to. As an example, if the numeral classifiers should have been applied in ten occurrences in discourse, but the child only used the classifier correctly three times, the SOC score would be $(3 \times 2 + 7) / 10 \times 2 = 65\%$. Seeing that it did not reach the required 90%, we would estimate that the child in question did not fully acquire yet how to use classifiers. Nevertheless, this formula only tells us if the classifiers were used correctly when needed, but does not include the overused sequences. In other words, a child may over-generalize and apply classifiers in every sentence, resulting in a high SOC score while he/she actually still does not use the classifier properly. Therefore, we added a second formula to cross check, which is the Target-Like Usage (TLU) score in Figure 2.

$$\frac{\text{Number of correct suppliance in obligatory contexts}}{(\text{number of obligatory contexts} + \text{number of suppliance in nonobligatory contexts})}$$

Figure 2. TLU (target-like use)

The TLU score calculates whether a child has applied classifiers in places where it is not supposed to. As an example, if the child applied numeral classifiers correctly in ten obligatory contexts, but also used classifiers in ten other occurrences where he/she should not have. The SOC score would be $(10 \times 2 + 0) / 10 \times 2 = 100\%$, misleading us to conclude that the child fully acquired the system of classifiers. Per contra, the TLU score would be $10 / (10 + 10) = 50\%$, letting us know that the child is actually over-generalizing classifiers, thus did not completely acquire this system yet. Finally, it is necessary to point out that this methodology was not possible for the comparison between general and specific classifiers, since they are interchangeable, i.e. if the child omitted a classifier in an obligatory context, we were not able to count which of the two classifiers is receiving the penalty of points when coding because both general and specific classifiers were possible for matching, as displayed in (5). Therefore, we also followed previous studies (Erbaugh, 1986; Myers & Tsay, 2000) regarding this subject: we focused on the proportion alternation between the two classifier classes.

(5) Similar distribution of general and specific classifiers

- | | | | | |
|----|------|-----------------------|----------------------------|--------------------|
| a. | 三個書 | <i>san ge shu</i> | 'three CLF-general book' | three books |
| | 三本書 | <i>san ben shu</i> | 'three CL-book book' | three books |
| b. | 我要三個 | <i>wo yao san ge</i> | 'I want three CLF-general' | I want three books |
| | 我要三本 | <i>wo yao san ben</i> | 'I want three CLF-book' | I want three books |

3. Results

Our results can be divided in two parts, the first displays the acquisition process of numeral classifiers vs measure words. The second provides the detailed development of general classifier vs specific classifiers. For the acquisition of numeral classifiers, the results of SOC and TLU are in Table 4. Our results are similar to previous studies: between 2-3 years old, the children can already steadily produce the numeral classifiers (Erbaugh, 1986), reaching an average of SOC and TLU above 90%. The correct usage included combination with demonstrative such as 這個 *zhe ge* 'this CLF-general' 那個 *na ge* 'that CLF-general', and with numerals, e.g. 一本書 *yi ben shu* 'one CLF-volume book', 兩個蛋糕 *liang ge dangao* 'two CLF-general cake'. Their detailed distribution ratio will be discussed in the following section about general and specific numeral classifiers. The incorrect usage of numeral classifiers included omission of nouns e.g. *掉在一個 *diao zai yi ge* 'fall at one CLF-general', and incorrect mapping of numeral classifier & noun e.g. 這件小老鼠 *zhe jian xiao laoshu* 'this CLF-clothe little mouse'. It is interesting to point out that no omissions of numerals or numeral classifiers



were attested after the age of 2;⁷, even though they still made other type of errors such as incorrect combination of classifier and noun. These results are in accordance with precedent research showing that the children acquire the syntactic structure quite early and rarely omits the numeral classifier in terms of production (Erbaugh, 1986; Wong, 1998; Hu, 1993).

Table 4
 SOC and TLU score of numeral classifiers

Age	Correct use of CLF	Incorrect use of CLF	Omission of CLF	Obligatory context	SOC	TLU
1;2	0	0	0	0	0%	0%
1;8	24	2	2	28	89%	86%
2;2	180	3	6	189	96%	95%
2;8	100	9	0	109	96%	92%
3;0	191	0	0	191	100%	100%
3;6	165	3	0	168	99%	98%
4;0	159	2	0	161	99%	99%
4;6	253	1	0	254	100%	100%
5;0	225	7	0	232	98%	97%
5;6	226	5	0	231	99%	98%
6;0	222	13	0	235	97%	94%

We are aware that the numbers in our data may seem intriguing when analyzing the SOC and TLU score of the children: both scores changes from 0% to 89% & 86% between 1;2 and 1;8. This fact would seems to be a too abrupt development process, however since the period between each data gathering was 6 months, it is reasonable to assume that within the period 1;2-1;8, an analysis of the SOC and TLU score of the children would show a more gradual increase. Nevertheless, in general a brusque diffusion is still expected by the geyser effect, i.e. “when a new construction enters the child’s grammatical repertoire, we first see only a few examples, but these are followed soon after by regular use and within a few months by an explosion of examples” (Snyder, 2007:70). Moreover the fact that child speech is still limited at the age of 1;2 is also an influencing factor. As an example one of our participant from the group of 1;2 consistently replied questions of his mother using bare nouns constructions, e.g. if the mother asked: 這是什麼 *zhe shi sheme* ‘this is what’? The child answered 球 *qiu* ‘ball’. Such construction is syntactically correct: since the numeral is absent, the classifier is not required either. This part will be discussed further in the

⁷ This observation may also be biased by the fact that children tends to first memorize classifiers as a chunk, even if they did not fully acquire the syntax of classifiers yet (Erbaugh 1986), e.g. demonstrative and general classifier: 這個 *zhe ge* ‘this CLF-general’, which has a high occurrence rate in our data, as further explained in Section 4.

Section 4. Moreover, this is still in accordance with children acquiring classifier syntax at an earlier stage: they know that a slot for numeral classifier is required in the syntactic structure, which also enhance the acquisition of a general classifier to fill the syntactic slot, while the acquisition of specific classifiers is “semantically instigated” and occur at a later stage (Tse et al, 2007:513). A more detailed analysis in terms of quantity of tokens will be provided in the Section 4.

Regarding measure words, the results are written in Table 5: the production of measure words starts to stabilize and steadily increase starting from 3-4 years old. This result also being attested with precedent researches (Tse et al, 2007). The correct usage of measure words included combination with toys such as 一盒積木 *yi he jimu* ‘one M-box lego’, and usage with imaginary food, e.g. 我要兩勺 *wo yao liang shao* ‘I want two M-big spoon’. It is also necessary to highlight that the SOC and TLU ratio gap between 0% and 100% could also be questioned, but as explained with the classifiers data, the long period between interviews should be an influencing factor. Second, based on our prediction of acquisition order, measure words follow numeral classifiers in time. It is then reasonable to propose that when the children acquire measure words, their syntactic and semantic structure already stabilized, so they do not produce errors easily. Additionally, measure words can be combined with a large inventory of nouns, making it harder to perceive an error in production.

Table 5
SOC and TLU of measure words

Age	Correct use of M	Incorrect use of M	Omission of M	Obligatory context	SOC	TLU
1;2	0	0	0	0	0%	0%
1;8	0	0	0	0	0%	0%
2;2	1	0	0	1	100%	100%
2;8	0	0	0	0	0%	0%
3;0	2	0	0	2	100%	100%
3;6	4	0	0	4	100%	100%
4;0	5	0	0	5	100%	100%
4;6	9	0	0	9	100%	100%
5;0	11	0	0	11	100%	100%
5;6	9	0	0	9	100%	100%
6;0	16	0	0	16	100%	100%

As a summary, the analysis through SOC and TLU displayed that the production of numeral classifiers stabilized between 2-3 years old, while the production of measure words occurred between 3-4 years old. Their distribution also demonstrated that in terms of productivity, numeral classifiers outperform measure words before the age of six years old: In Figure 3 with the total quantity of numeral classifiers and measure words,



between the age of 1 to 6 years, numeral classifiers production detains an average of 97%, compared to 3% with measure words. Starting from the age of 3 years old, the usage of measure words steadily increased from 2% to 7%. This distribution change being highly statistically significant in the test of one way ANOVA ($p=0.0003<0.001$), it once more supports the results of previous studies that measure words are acquired later than classifiers.

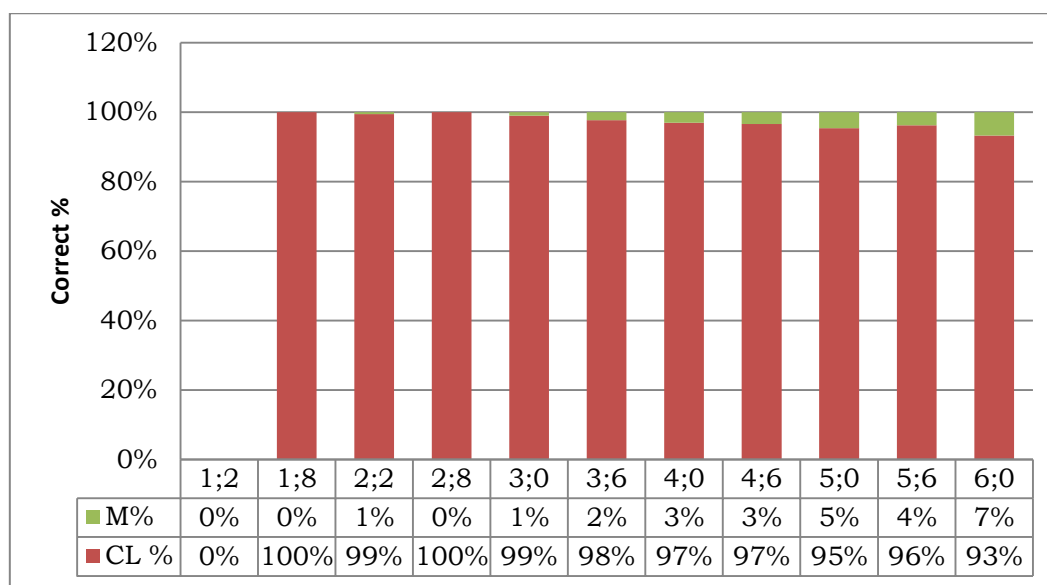


Figure 3. Production percentage of classifiers and measure words

For the comparison between general classifiers and specific classifiers, as explained in the methodology section, we were not able to rely on SOC and TLU due to interchangeability of general and specific classifiers in a clause. Therefore, we used the distribution ratio between the two classes to analyze their acquisition process. In Figure 4, general classifier usage counted as 94% vs 6% with specific classifiers before the age of 4, however after 4 years old, the specific classifiers raise to an average of 10%, reaching 15% at the time of 6 years old, demonstrating that the stable production of general classifier occurs before specific classifiers. This fact also being supported by previous studies: the syntactic structure of numeral classifiers is acquired before the semantic structure, resulting in the general classifier being used to fulfill the syntactic obligations when the specific classifier is not acquired yet or memory (e.g. for which semantic features are encoded by which classifier) fails (Myers & Tsay, 2000). It is also necessary to point out that due to the individual difference of two participants, the statistical tests were not significant for this ratio comparison, further details are explained in Section 4.

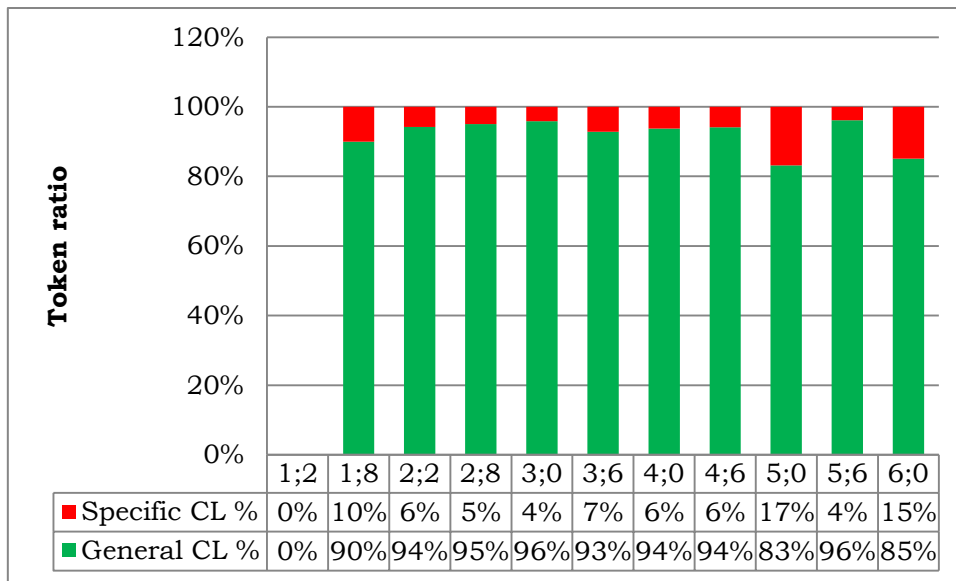


Figure 4. Production percentage of general and specific classifiers

4. Discussion

Within the results of Table 3 and 4, we observed that classifiers were acquired before measure words and in Figure 3 and 4 we demonstrated that within classifiers, the general classifier was acquired before specific classifiers. By combining the two results, we can deduce that general classifiers are acquired first, followed by specific classifiers and then measure words. This order is displayed in Figure 5: in terms of production ratio, between the age of 1-6 years old, general classifiers detain the majority within an average of 90%, followed by specific classifiers with 8% and finally by measure words with 2%. Even after 4 years old, when the measure words production increased, general classifier still retains 87%, specific classifiers 9% and measure words 4%, showing that the production of specific classifier is stabilizing before the production of measure words.

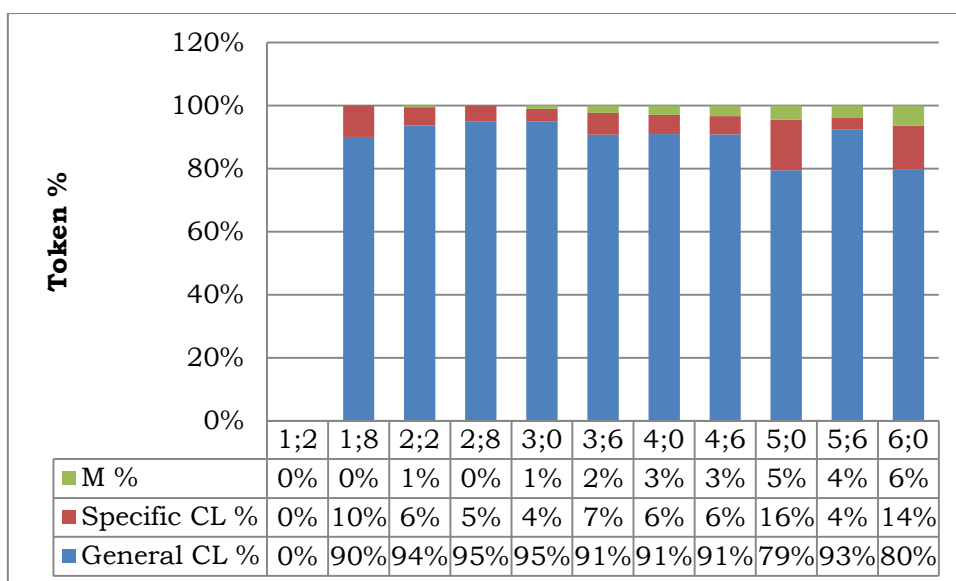


Figure 5. Production of general/ specific classifiers and measure words



In terms of quantity, the steady progression within general/ specific classifiers and measure words is even more transparent in Figure 6. The development process can be divided in three stages (by pointed lines): at 1;2-2;8, the children starts from zero production to reach an average of 7.9 classifiers per conversation of 20 minutes. Then, from 3;0-4;0, the production rate increased to an average of 17.4 classifiers. Finally between 4;6-6;0 the average reaches 23.8 classifiers, the longitudinal correlation between age and usage of classifiers being highly significant in the one way ANOVA test ($p=0.0002<0.001$). The specific classifiers usage also increases starting from stage 2, as colored in red, attaining an average of 4 tokens in stage 3. Contrastingly, measure words only reach an average of 1 per conversation at 5-6 years old. Proving once again that in terms of production, general classifiers are acquired before specific classifiers and measure words.

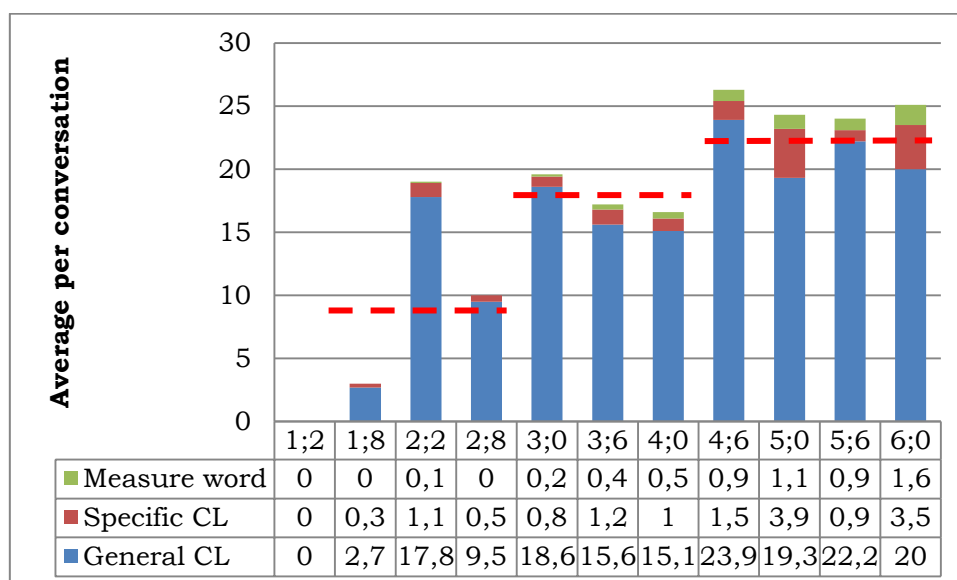


Figure 6. Average quantity of classifiers and measure words per conversation

It is necessary to highlight that the data recorded at the age of 2;2 represents an anomaly compared to the expected tendency. The average of production reached 17.8 classifiers per conversation, which is much higher than the preceding and following period of 1;8 and 2;8. This phenomenon can be explained by individual differences when analyzing the data in details: within two conversations of the group 2;2, two children used 45 and 36 classifiers during their recording. The reason for such production being an ordering of toys: the two children communicated to their mother how to put pieces of toys with different colors together, and during this process they heavily relied on demonstratives such as 這個 *zhe ge* 'this CLF-general'. After explaining this fact, we can realize that the data is following our prediction and previous studies results. Similar observations are attested in terms of total quantity, as displayed in Figure 7.

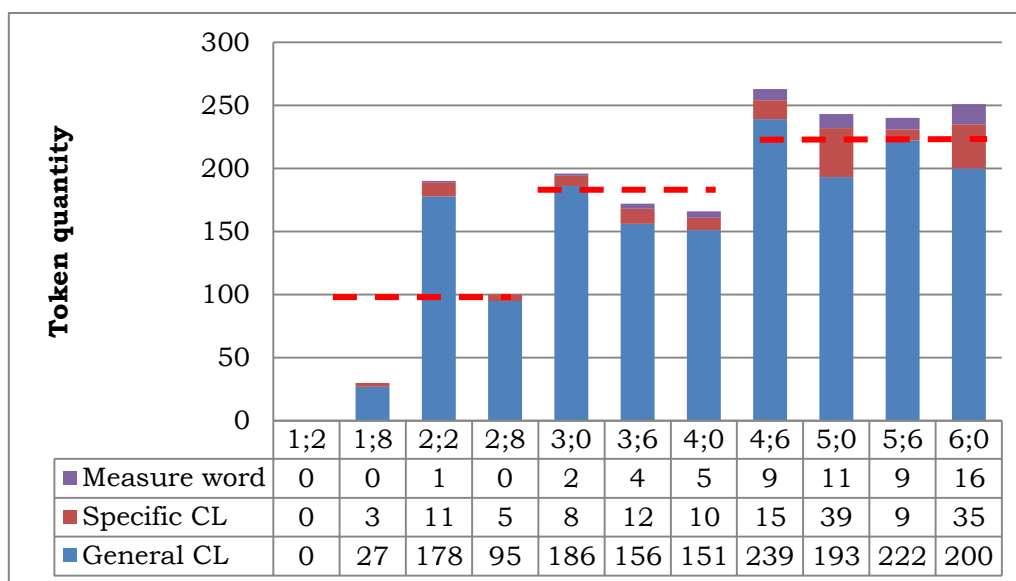


Figure 7. Total quantity of classifiers and measure words

Here also, the overall total increases, with general classifiers detaining the majority constantly. But starting from three years old, the quantity of produced specific classifiers grows steadily, while measure words productively occur starting from 4-5 years old.

5. Conclusion

As a conclusion, through the combination of semantic complexity (Brown, 1973) and mathematical approach to classifiers and measure words (Her, 2012), we provided a theoretical explanation for the development process of classifiers and measure words in child language acquisition of Mandarin Chinese, expecting that the general classifier will be acquired before specific classifiers, then followed by measure words. This order was indeed observed in previous studies (Erbaugh, 1986; Myers & Tsay, 2000; Tse et al, 2007). Moreover, through the analysis of longitudinal data toward 110 Mandarin Chinese speaking children between 1;2 and 6;0, (Zhou, 2008) the predicted acquisition order was also occurring, which provides empirical evidence for our theoretical discussion.

The limitations of our research mainly come from the data side. First, we were able to retrieve longitudinal studies between the age of 1;2 to 6;0, with different children group at each stage. It would be preferable to rely on data from the same 10 (or more) children from 1;2 to 6;0. No research actually constructed such corpora, consequently we chose the alternative option with different children groups. Our second issue lies in the interval between each recording: six months is too long to analyze the developmental sequences of classifiers and measure words. Corpus providing children spoken data between the age of 1 to 2 could be selected to verify the details of the evolution process. A possible source would be the corpus of Tardif (1993) from CHILDES, which targets data of children between 1;9-2;2. However since this part was already analyzed and proved by previous studies (Erbaugh, 1986; Myers & Tsay, 2000), we did not include it into this paper.



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Abbreviations

CLF = classifier; D = demonstrative; GEN = genitive; M = measure word; N = noun; Num = numeral

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Efficacy of Early Intervention Program for Children with Cleft Lip and Palate: A Case Study

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Abstract

Cleft of lip and palate (CLP) is one of the most common deformities seen among children in India. It has been recognized that, in addition to speech impairments such as limited sound inventory, hypernasality, reduced speech intelligibility and compensatory articulation, expressive language delay is also a common feature in children with CLP. Various early intervention models have been put forward over the years and the treatment approaches vary across clinicians. The present study aims to investigate the effectiveness of parent-implemented focused linguistic stimulation approach for a toddler with CLP. A toddler aged 2.6 years who was diagnosed to have Expressive Language Delay secondary to repaired cleft of palate served as the participant for the study. The child had normal cognitive and auditory abilities. While commencing the method, a detailed evaluation was carried out to establish the baseline of the child. This was followed by a total number of 30 therapy sessions lasting 45 minutes each, wherein focused stimulation approach was demonstrated to the mother. The child's progress was documented with audio-video recording every 10 sessions. The parameters assessed were percentage of vowels, percentage of consonants, percentage of proto words and true words in the child's inventory. A single subject time series design was used in order to monitor the changes across the therapeutic sessions. As for the outcomes, the results indicated that there was a significant improvement in the quantity of speech sounds and true words. This provides credibility to the fact that regular intervention using focused stimulation approach is an effective way of expanding the child's inventory in terms of vowels, consonants and vocabulary for children with CLP. The present study highlights the need of implementing the early language intervention program for young toddlers with CLP and also the effectiveness of involving mother/parent in carrying out the program.

Keywords Focused stimulation, early intervention, expressive language delay, sound inventory, vocabulary

1. Introduction

Cleft lip and palate (CLP) is a congenital deformity which encumbers effective communication in young children due to which they may demonstrate speech and language disorders during early childhood. A review

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of literature across the last two decades shows that young children with CLP demonstrate multiple problems such as dental problems, psychological problems along with speech and language impairments (Estrem and Broen, 1989; Scherer, 1999; Chapman et. al., 2003; Salas-Provence et. al., 2003). This condition therefore has a negative impact on the child's social, emotional, and educational well being.

The birth prevalence of CLP in India is approximately 40,000 clefts per year (Shrivatsav, 2013). The Honorable Union Minister for Health and Family Welfare Sri Ghulam Nabi Azad (2010) quoted that "the approximate incidence of cleft lip and palate is 1.4 per 1,000 live births in India", but unfortunately, the rehabilitation of these children has not been paid much attention by the government agencies. A recent statistical survey quoted in Times of India (2013) states that, with an incidence of 7 per 1,000 children, CLP is one of the most common deformities seen among Indian children.

Various studies have highlighted the associated problems seen in speech of children with CLP such as limited sound inventory, limited vocabulary, reduced communication attempts, hypernasality, nasal air emission, reduced speech intelligibility and compensatory articulation (Sunitha, Jacob, Jacob, Nagarajan, 2004; D'Antonio & Scherer, 2008). Expressive language delay is also a common feature in toddlers with repaired cleft lip and palate (RCLP). These multiple associated problems need to be dealt by a team of experts from birth to the age of 18 years to overcome all these problems. Early language intervention is required soon after the surgery for children with CLP and it has been proven that such language intervention programs have been effective in facilitating both language and speech in such children (Scherer & Kaiser, 2007).

As far as early intervention in this population is concerned, treatment approaches vary across Speech-Language Pathologists (SLPs) and there has been no uniformity in the approach taken. Various approaches such as Enhanced Milieu Teaching, Focused language stimulation among others have been widely used for early intervention program in children with CLP.

The Focused Stimulation approach (Girolametto, 1988; Girolametto et. al., 1996, 1997, 1998) is based on a naturalistic intervention model and it places emphasis on modeling and responsive interaction techniques. Very little prompting is given for the child's utterances. This approach emphasizes on varying the environmental arrangement and activities in such a way that functional communication is taught to the child. This model assumes that language is learnt in a meaningful interactive setup with conversational partners who promote vocabulary building of the child (Scherer & Kaiser, 2007).

Hence, the efficacy of treatment in home environment is crucial for successful remediation and thus, educating the mother who is mostly the conversational partner at home is warranted. Maternal speech stimulation and parent-implemented program plays an important role in development of speech and language. The efficacy of speech language therapy and early intervention models have been highlighted in different studies (Scherer, 1999; Pamplona et al., 1999, 2004).

A study was conducted by Pamplona, Ysunza, and Uriostegui in 1996, wherein they examined the effect of participation of parent on intervention



outcomes for children with CLP. The outcome was examined between two groups of children. One group of children received therapy by only SLPs and in the other group parent participation was allowed in the intervention sessions along with SLPs. The results demonstrated that those children whose mothers were involved in the intervention, showed an improvement in language which was significantly superior to their counterparts. It was also observed that, a large percentage of mothers who were involved in the sessions modified the way they interacted with their children. The authors also reported that these mothers showed the tendency to generalize the strategies learned during the treatment sessions to other situations in daily life.

The effect of focused stimulation program on the speech and language of toddlers with CLP was investigated by Scherer, D'Antonio, and McGahey (2008). Two groups of ten mother-child pairs were considered for the study. In one group children had CLP and in the other group children who did not have a cleft (NCLP) participated in the study. Pre and post measures were compared for speech and language characteristics. Each intervention session was videotaped and the language samples were transcribed using Systematic Analysis of Language Transcripts (SALT). Various maternal measures such as total number of words used, number of different words used, mean length of utterance (MLU), percentage of expansions, responsive labels and commands/requests were determined. Also children's measures such as number of total words used, number of different words and MLU were also measured. The results of this study showed that the mothers could be trained to deliver a Focused Stimulation technique in early intervention program successfully. The post-intervention language measures showed that mothers were using a greater number of different words, higher MLU and greater complexity of language when addressing their children. The results further indicated that as a result of intervention features such as sound inventory and speech accuracy increased. It was also found that children used fewer glottal stops in their conversation.

A similar study was carried out by Meinusch and Romonath in 2011 and they reported that an active participation of parents in the intervention sessions lead to better communicative abilities in the children, thereby improving the linguistic abilities of the children with CLP. Thus extensive research in the western context on early parent-implemented intervention has documented the efficacy of the same.

In the Indian scenario, few studies have been carried out highlighting the relationship between early intervention and the speech and language output of children with CLP. Also there is a dearth of studies which investigate the effectiveness of a structured parent-implemented program for young children with CLP. Manocha, Narang and Balda (2008) conducted a study in rural areas of Haryana, India wherein they investigated the nature of stimulation provided by mothers of typically developing (TD) children in the age range of 3-5 years. Control-experimental and pre-post test design was carried out and Mohite's Home Environment Inventory (Mishra, 2004) was administered before and after the intervention sessions in order to judge the stimulation provided by mothers. The mothers in the experimental group were exposed

to the stimulatory intervention package for 16 weeks while the control group sample was not exposed to any kind of program. After exposure of mothers to the intervention sessions for a period of 16 weeks, it was discovered that mothers who were enrolled in the experimental group were seen to be notably better in terms of stimulation level when compared to their counterparts. Therefore, although several approaches have been proposed to improve the language abilities in these children, very few studies have focused on investigating the long term effects of language intervention strategies specifically in children with CLP. Hence, the present study aims to investigate the effectiveness of parent implemented focused linguistic stimulation approach for a toddler with CLP. The objectives of the present study are as follows:

- (1) To investigate whether early language intervention program brings about constructive changes in the frequency of occurrence of vowels and consonants in children with CLP.
- (2) To determine the effect of intervention on the usage of true words in the child.

2. Methodology

1.1. Participants

A child aged 2.6 years male diagnosed as expressive language delay secondary to repaired cleft palate served as participant for the study. The child underwent surgical correction for cleft palate at the age of 1.5 years. Detailed speech and language evaluation was carried out by a qualified speech language pathologist using Receptive Expressive Emergent Language Scale (Bzoch & League, 1971). Results revealed that the child had a Receptive Language Age (RLA) of 27-30 months which was age adequate and Expressive Language Age (ELA) of 12-14 months. Thus the child was diagnosed to have expressive language delay. However, the child's cognition and hearing were reported to be normal.

1.2. Enrollment for Early Language Intervention Programme (ELIP)

The participant was enrolled for the Early Language Intervention Programme (ELIP) with prior informed consent. A pre-orientation questionnaire titled 'Awareness of parents on issues related to cleft lip and palate' (Indu Thammaiah, Jasmine & Pushpavathi, 2012) was administered on mother. This questionnaire assessed the awareness of the mother on various aspects of cleft lip and palate. This was followed by a detailed orientation for the mother regarding the incidence, social stigma, complications, associated problems and management of children with cleft of lip and palate.

1.3. Data collection and processing

A detailed pre-therapeutic evaluation was conducted to establish the baseline of the child. The recordings were carried out in a quiet room during unstructured play sessions between the SLP and the child, with the mother also being involved in the sessions. A total number of 30 therapy sessions were conducted. The child's progress was documented with audio-video



recording using a Handycam recorder (Sony DCR-SR88). The recorder was placed on a tripod stand at a distance of approximately 8-10 feet from the child. After the baseline audio-video recording, every tenth session was recorded. Thus in total, 4 video recordings and analyses were carried out. The parameters assessed were percentage of vowels, percentage of consonants, percentage of proto words and true words in the child's inventory.

1.4. Speech and Language therapy

Speech-language therapy was conducted in the clinical setup for sessions lasting forty-five minutes each. Speech therapy sessions were carried out by a qualified Speech Language Pathologist. This was done by preparing a master lesson plan by taking up the specific goals and activities. Play way method was used to improve vowel and consonant inventory, functional communication skill and to increase the frequency of meaningful utterances. Focused stimulation approach was demonstrated to the mother during therapeutic sessions using low-cost materials and commonly available toys. A multisensory approach was used to increase the oromotor movements. Visual feedback using mirror work and tactile cues with interesting oromotor activities was provided appropriately wherever required. A corpus of vocabulary was prepared which contained the most commonly used functional words by toddlers. This was done with the aim of increasing the child's functional vocabulary. The positive behaviors and behaviors which were attempted correctly by the child were reinforced with token and tangible reinforcements to improve his cooperation and confidence in doing the activity. The mother was told to carry out a similar training program at home in the absence of direct supervision of the SLP.

1.5. Data Analysis

Each of the video and audio-taped session of mother-child interaction during unstructured play was transcribed using International Phonetic Alphabet (IPA) symbols and analyzed. The frequency of occurrence of phonemes, vowels and consonants were calculated. Vowels were classified as high (/i/), mid (/e/, /æ/) and low (/a/) based on the tongue height and their frequencies were calculated. The frequency of occurrence of different types of consonants was calculated based on place of articulation (bilabials, dentals, labiodentals and velars). Also the total number of true words and proto words were obtained and tabulated. A single subject time series design was used in order to monitor the changes across the therapeutic sessions. Also any positive changes in the child's vocabulary and the overall improvement in the child's expressive language have been investigated. The tabulated data was entered in a Microsoft excel sheet and the difference in the percentage of vowels, consonants, true words and proto words were calculated and analyzed for every 10th session.

3. Findings

The present study forms an explorative attempt to elucidate the efficacy of early language intervention program in a child with CLP, by illustrating the

changes in the child’s vowel and consonant inventory. The findings thus obtained have been highlighted below.

3.1. Frequency of occurrence of vowels

Fig. 1 shows the frequency of vowels with respect to tongue height from baseline to 30th session. It shows that the high, mid and low vowels present in the child’s inventory were /i/, /e/, /æ/ and /a/ respectively.

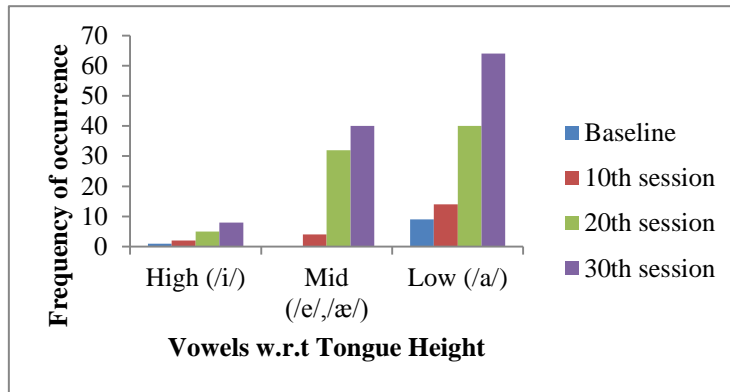


Fig. 1 - Frequency of occurrence of vowels w.r.t. tongue height from baseline to the 30th session

Fig. 1 clearly depicts a trend wherein all the vowels show a steady increase from baseline to the 30th session. The high vowel /i/ showed the smallest increase i.e., from 1 to 10 compared to mid and low vowels. Mid vowels /e/ and /æ/ showed a greater increase than high vowels form 0 to 40. The low vowel /a/ showed the greatest increase in terms of frequency, from around 10 to 60. With respect to tongue height, low vowels were found to be the most frequently occurring, followed by mid vowels. The high vowel /i/ showed the least frequency of occurrence.

3.2. Frequency of occurrence of consonants

Fig. 2 illustrates the frequency of consonants with respect to place of articulation from baseline to 30th session. It shows that the consonants present in the child’s inventory were bilabials (/m/), dentals (/n/), labiodentals (/v/) and velar sounds (/ŋ/).

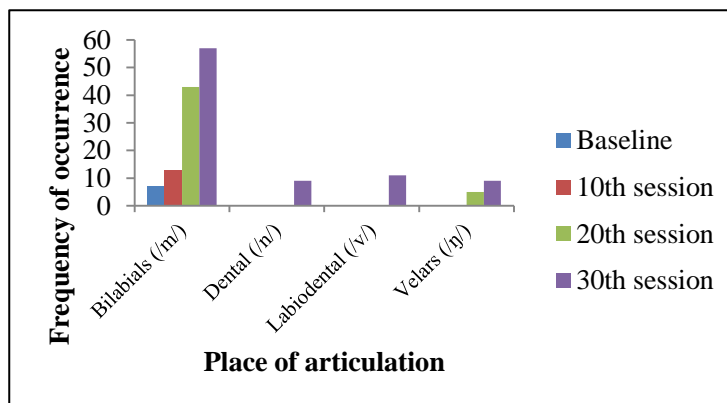


Fig. 2 - Frequency of occurrence of various consonants from baseline to 30th session



Thus Fig. 2 gives a picture of the type of consonants present in the child's inventory from baseline to the 30th session. With respect to place of articulation, the bilabial nasal consonant /m/ was found to be the most frequently occurring compared to the other consonants. Bilabials also showed a greater increase in occurrence than dentals, labiodentals and velars. Other consonants such as dental nasal /n/, labiodental fricative /v/ and velar nasal /ŋ/ showed a gradual emergence towards the 30th session⁴.

3.3. Frequency of occurrence of true words

Fig. 3 depicts the frequency of true words and proto words from baseline to 30th session. The figure clearly shows a trend wherein the frequency of true words show a steady increase and the frequency of proto words showed an even trend with not much increase between baseline and the 30th session. During the baseline recording, the child's repertoire did not consist of any true words.

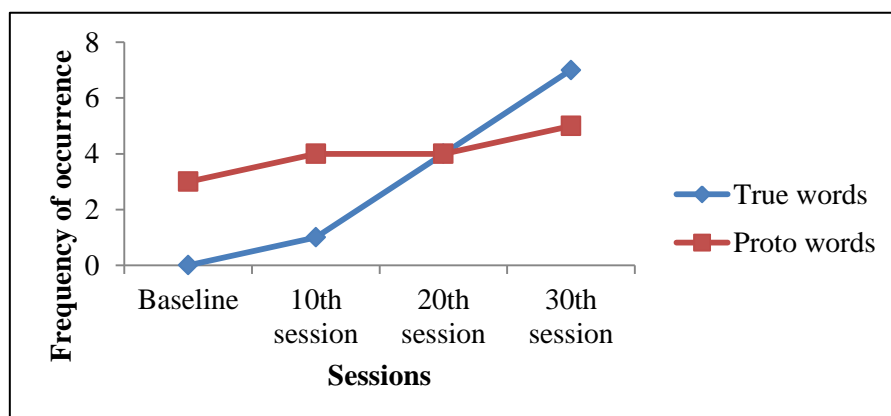


Fig. 3. Frequency of occurrence of True words and Proto words from baseline to 30th session

There was a steady progression in the number of true words acquired, as the sessions progressed. By the 10th and 20th session, the child had acquired 1 and 4 true words respectively. The first true word acquired by the child was /amma/. The total number of true words which emerged by the 30th session were around 6, with words such as /amma/, /mama/, /anna/, /a:ne/, /avva/, /ma:mi/ emerging by the 30th session. Amongst these true words /amma/ was the word most frequently used by the child. Around 3-5 proto words were present in the child's vocabulary which was maintained throughout the 30 sessions. The child used proto words such as /ama/ for /amba/; /mæ/ for 'sheep'; /avav/ for /bau bau/; /mamam/ for 'food'.

⁴ Kannada language is a Southern Dravidian language and is one of the oldest living languages in the world. It has a simple syllabic structure consisting of V, CV and CCV combinations. In Kannada language consonants do not occur in word-final position and CV syllables forms the major portion of the syllabic structure.

4. Conclusions

In essence, the present study highlights the positive changes seen in a child with RCLP which was brought about by a continuing parent-implemented early intervention program. In terms of vowels it was seen that there was a good improvement in the number of mid and low vowels. With respect to consonants a clear increase was seen in bilabials. Other consonant types such as dentals, labiodentals and velars emerged by the end of the program. The child also acquired many true and proto words with CVCV and VCV combinations which could be the result of the acquisition of different phonemes.

Thus the results implicate the necessity to begin intervention at the earliest possible age in this population since adequate attention has not been paid for language acquisition in these children followed by rehabilitation. In this perspective the present study highlights the importance of regular home training and stimulation by parents in order to obtain a positive speech and language output.

5. Discussion

5.1. Frequency of occurrence of vowels

The findings of the present study with respect to vowels are in agreement with the study done by Casal et. al. (2002) who reported that the acquisition of vowels was similar in children with CLP and their typically developing peers in terms of order and quality. The vowel /a/ was present in most subjects whereas vowel /u/ was infrequently present indicating a trend towards neutralization in children with CLP. This pattern has also been observed in the present study wherein low and mid vowels show a greater frequency compared to the high vowels. The high back vowel /u/ has not yet been achieved in the participant of this study. This indicates that toddlers with CLP seem to show a preference for mid and low, front and central vowels during development of speech. There is a significant increase in the frequency of all the vowels from the baseline to the 30th session which establishes the efficacy of the early intervention program.

5.2. Frequency of occurrence of consonants

This limited consonant inventory findings obtained in this child with CLP is in agreement with studies done previously which suggest that the limitations in the oral structures of children with CLP may lead to a small consonant inventory (Sreedhanya, Hariharan & Nagarajan, 2015). It has also been hypothesized that the size of the child's vocabulary may be directly proportional to the number of sounds he or she can produce (D'Antonio & Scherer, 2008). Nasals have been found to be the category of sounds which are most accurately produced by children with CLP only next to glides (Sreedhanya, Hariharan & Nagarajan, 2015; Chapman & Hardin, 1992). This has also been found in the present study wherein nasal sounds form the largest portion of the child's consonant inventory. Chapman and Hardin (1992) have also shown that children with CLP tend to simplify word production by substituting nasal sounds for other sounds. Thus this



effectively shows the direct link between the child's limited consonant inventory and limited vocabulary.

Another significant finding in the present study was the predominance of bilabials compared to the other consonants in the child's repertoire. This greater frequency of bilabials can be attributed to the type of cleft seen in the child. Since the articulatory limitation was only at the level of palate and not at the level of lips, the child was able to produce bilabials consistently. However, Willadsen and Enemark (2000) have revealed that the reduced variety of sounds in children with CLP could also be attributed to their inability to build intraoral pressure required for the production of pressure consonants.

It should also be noted that before attending therapy sessions only bilabials were present in the child's consonant inventory. This could be attributed to various factors such as articulatory limitation, lack of stimulation at home, overindulging of the child by the family members among others. However, there was a noteworthy increase in the child's consonant repertoire post-therapy, with consonants such as dentals, labiodentals and velars emerging by the end of the program. This could be attributed to the parent-implemented focused stimulation as well as to regular training carried out at home and in the clinical settings.

5.3. *Frequency of occurrence of true words*

The findings of the present study with respect to true words are in consonance with the study done by Scherer (2001) who has shown that children with CLP indicate a delayed development of first word and early expressive vocabulary. Focused Stimulation approach has been seen to be an effective means to remediate speech and language problems in children with CLP (Scherer, D'Antonio, McGahey, 2008). The findings of the present study provides credibility to the findings that regular intervention results in gains in terms of vowels, consonants and vocabulary for children with CLP. Pamplona, Ysunza and Uriostegui (1996) reported that children who were accompanied to the sessions by their mothers demonstrated greater linguistic improvement than their counterparts.

Prior to enrollment in the early intervention program, the child had no meaningful words in his expressive vocabulary. He was communicating through meaningful gestures for 'eating', 'drinking', 'calling mother' and 'indicating no'. Non-meaningful gestures such as pointing, head nod, among others were also preferred by the child. He occasionally used other non-verbal modes such as eye gaze and facial expressions to express his needs. However, post-therapy, a reduction in non-verbal behaviors was observed. This could be due to the emergence of true words and increased vocabulary, thereby reducing the frequency of non-verbal gestures.

To summarize, the results of the present study indicated that there was a significant improvement in the quantity of speech sounds with reference to vowels and consonants. The child also preferred to use the words with more of nasals and there was an improvement in the oromotor skills. The improvement in speech and language skills can be attributed to speech and

language therapy along with extensive home training which was monitored systematically. This article thus highlights the need of implementing the early language intervention program for young toddlers with cleft lip and palate and also the effectiveness of involving mother/parent in carrying out the program.

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The Dual Functions of Code-Switching in Cantonese-English Bilingual Children's Conversations with Parents

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Abstract

Adopting the approach of Conversational Analysis, this study investigates the functions of Code-Switching (CS) by young Cantonese-English bilingual children in their conversations with parents at home, focusing on how CS could be employed as a conversational strategy to move the interactions between children and parents forward. In addition, it can present an opportunity to facilitate the language acquisition of children. The database comprises 54 hours of audio recordings of the daily conversations of four preschool children with their parents or caretakers at home. All audio clips are transcribed using a Conversation Analysis (CA) method, and cases of CS are analyzed qualitatively in different sequential locations. In this study, two functions related to the CS of children are proposed and discussed: one is the conversation-related function, when children, as conversation participants, use CS to interact with an adult; and the other is the learning-related function, when children, as language learners, acquire linguistic and pragmatic knowledge of the language, including phonology, syntactic structure, semantic information, or pragmatic usage regarding certain linguistic items. This study also provides some insights into the communicative ability of children and the development of bilingualism, which may have some pedagogical implications for the teaching of language to young learners.

Keywords Code-Switching, conversational analysis, language acquisition, linguistic knowledge, pragmatic knowledge

1. Introduction

Code-switching (CS), defined by Milroy and Muysken (1995) as “the alternative use by bilinguals of two or more languages in the same conversation” (p. 7), refers to a phenomenon of a bilingual or multilingual speaker alternating and mixing different languages or language varieties in the context of a single conversation. It has generated a substantial amount of research over the past four decades (Kharkhurin and Li, 2015). Research on Cantonese-English bilingualism in Hong Kong began in the late 1970s. The first significant attempt to study CS in Hong Kong was made by Gibbons (1979) to investigate “U-gay-wa”, a genre of mixed code used and heard

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commonly among university students (cf. Li, 2000). In the case of Hong Kong, CS, involving Cantonese and English, is very common because Hong Kong is an officially bilingual territory: "English and Chinese" are of equal status as the official languages of the territory. According to the last government Thematic Household Survey in 2015, 41.8% of persons aged 6 to 65 are perceived to have above-average competence using spoken English, which is a phenomenon attributed to the heritage of the city as a British colony (Census and Statistics Department of Hong Kong Special Administrative Region, 2016). As a result, there is a significant number of children living in Hong Kong in a Chinese (Cantonese) and English bilingual environment.

Influential functional approaches for the study of CS include the discourse-related (Myers-Scotton, 1989), socio-linguistic centered (Gumperz, 1982), and conversation-focused (Auer, 1984) approaches. Gumperz's (1982) classified the discourse functions of CS into six categories, i.e., quotations, addressee specification, interjections, reiteration, message qualification, and personalization versus objectivization. The problem with this categorization is that some items fail to explain what could be accomplished by speakers when they switch codes. Auer distinguished between discourse-related CS and preference-related CS, as the former was defined as the use of CS to organize conversation by "contributing to the interactional meaning of a particular utterance" (1998:4) and the latter is related to extra-conversational knowledge. Gysels (1992) stated that CS could be used to achieve two functions, filling a linguistic or conceptual gap, or for multiple other communicative purposes. Some recent research divided the reasons for CS into two types: linguistic and sociolinguistic factors (Vu, Bailey and Howes, 2010). In summary, these linguistic factors may include single-word borrowings that serve as translation equivalents or to fill gaps in lexical knowledge. For sociolinguistic factors, they could be attempts to gain the attention of others or to change speaking roles. Their research indicates that young children have the facility to use two languages strategically for purposes related to both of these factors from a very early age. Boztepe (2003) concluded that the scope of the conversational functions of CS includes a strategic way to create social identities, i.e., "dual membership in two communities" (p. 21), and a tool for emphasizing the message to be conveyed. As noted by Rontu (2007), young bilingual children can use CS as an effective communicative means in triadic child-child-parent conversations, when two children are siblings and bilingual in Finnish and Swedish. Using a conversational analytic approach to sequentially analyze interactions, this study found that the inter-sentential CS of the children had a contextualized meaning in these triadic situations. Additionally, they had two primary functions: one was to gain the attention of the mother and stop the conversation between the sibling and the mother. The other function was to stress the opinion of the child, which could be found in situations when they disagreed or conflicted with other participants in the conversation.

Because there has been limited research devoted to investigating the use of CS by bilingual children from the perspective of a conversational analysis and even fewer studies of the practice of Cantonese-English bilingual



children, a fine-grained study of CS production in the conversation of bilingual children is required. Adopting Bruner's (1983) theoretical framework of the language acquisition of children, this article adds to the current body of research on CS in bilingual children's interactions with family members, aiming to examine the dual functions of CS in diverse cases.

1.1 Literature Review

1.1.1. Language learning of children

Bruner's (1983) introduction of the role that social interaction plays in the language acquisition of a child has had a great impact on studies of language learning in which the social-interactive nature of early language acquisition is described, stating that the earliest linguistic achievements of children are usually in a social context (c.f. Tamis-LeMonda, et al, 2001). Splitting language acquisition abilities into two groups, Bruner (1983) believes that children must attain linguistic competence, knowledge of the language, as well as pragmatic competence, i.e., the ability to use that language to achieve communication goals. To illustrate, learning a language is composed of learning not only its grammar but also how to realize one's intentions through appropriate use of that grammar (p. 38). This argument holds that a direct result of parent-child social interactions is the language learning of children, as parents scaffold learning through joint problem solving and modifying the behaviors of children as their language competence increases (Wells, 1986; Bakhurst and Shanker, 2001). Bakhurst and Shanker (2001) emphasize that the mothers of children provided an aid for their acquisition of language by arranging early interactions in the form of routinized and familiar formats, which constitutes "a continuous bridge between prelinguistic and linguistic interaction" (p.74). Studies in support of this opinion indicate that the best way for children to acquire new linguistic knowledge is through engagement in a joint interaction with a mature language user (Butterworth, Moore, and Dunham, 1995; Kabuto, 2010).

1.1.2. CA for Language Learning

Many researchers believe that conversation contributes to the acquisition of language by children (e.g., Corrin, 2010; Veneziano, 2010; Weisleder and Waxman 2009). Thus, the study of conversation can help us to understand the language learning and use of children, not only for their first language but also for their second language. In other words, the study of the conversations of bilingual children may help us gain insight into language learning and bilingual development of children. Because research on 'conversation analysis for language acquisition' considers language development and interactional development to be strictly social phenomena, that is, 'learning-in-action' (Cromdal, 2013), research adopting this framework attempts to develop the idea of learning as a matter of changing participation in the communities of practice (Firth and Wagner, 2007; Hellermann and Cole, 2009). The second important contribution of CA to studies of language learning is the "focus on interactive practices for

language use that are usually not part of explicit language instruction”, including developing practices for opening and closing classroom task interactions and practice for repair (Hellermann, 2009, p.114).

1.1.3. CS in the language acquisition of children

For bilingual children, language development must be understood in relation to their development of bilingual communicative competence (Genesee, 2002; Reyes, 2001). Reyes (2004) asserted that CS by bilingual children was used as a strategy to extend their communicative competence. Her findings suggested that there was a positive relationship between bilingual CS and language proficiency, which is in line with Genesee’s (2002) conclusion that “the number of instances of CS can be interpreted to reflect the child’s developing communicative competence” (p.190). Ervin-Tripp and Reyes (2004) also described CS as a skill that is part of the developmental bilingual pragmatics of children. Isfahani and Kiyoumars’s (2010) study showed the positive effects of CS on the development of L2 proficiency and on the improvement of reading comprehension ability in Iranian EFL learners. Shin and Milroy (2000) opposed the assumption that CS was a display of linguistic deficit or a communicative problem of bilingual children; instead, they presented data to conclude that CS was a contextualization strategy that bilingual children used as additional means to the changes in tempo or loudness used by monolingual children to organize the interaction. Greene et al. (2013) examined single-word CS produced by bilingual preschoolers to understand their lexical choice patterns. Their findings indicate that linguistic competence in both languages could be necessitated by CS to compensate for gaps in their language knowledge. Ribot and Hoff (2014) investigated the relations between the patterns of conversational CS of Spanish-English bilingual children and their expressive and receptive proficiency in these two languages. This research revealed that there were different profiles of expressive and receptive skills in the two languages of the children, which were related to their language choices in conversation. For example, some of the children who code-switched to English would have greater English skills in the expressive domain. Others, who did not code-switch, were considered to be more balanced bilinguals in terms of both expressive and receptive skills.

1.1.4. The CS of children and language behavior of family members

The section concerns bilingual children’s language behaviors in their conversations with family members. Lanza (1992) recorded a two-year-old Norwegian-English bilingual child, Siri, interacting with either parent, an American mother or a Norwegian father, with the mother acting as a monolingual, while the father was a bilingual who would code-switch to respond to the language mixing of Siri. This research found that the language behavior of Siri accommodated the language needs of her parents because she would be more monolingual with her mother and bilingual with her father. The finding presented by Genesee, Boivin and Nicoladis (1996) was similar to Lanza’s (1992), who found that during communication, the more a parent switched to the other language, the more the child would do the same. In addition, they found that bilingual children were sensitive to the language behavior of the parent with whom they were interacting. They



would use the dominant or native language of the person. Adopting Lanza's (1992) categorization of parental discourse strategies in response to the CS of their child, Juan-Garau and Perez-Vidal (2001) provided evidence of the direct relationship between parental discourse strategies and the levels of CS in the utterances of the child in his weaker language. In this longitudinal study of a Catalan/English bilingual child, his Catalan-speaking mother would impose a bilingual interaction on him, but since he was three, his English-speaking father would establish a monolingual interaction. This change in discourse strategies caused the child to use his secondary language more often. As a result, there was a sharp decrease in the rate of CS. In contrast, through a discussion of the impact of parental input on the output of a Japanese–Chinese bilingual infant, Meng and Miyamoto (2012)'s analysis showed that although parental input had some influence on their children's output in terms of CS, the increased trend of CS in child's output could be better accounted for by language dominance rather than parental input because Japanese was the dominant language in the output of the child, even though Chinese dominated in the parental input.

1.2 Rationale and research questions

To meet the need for insights into functions of the CS of bilingual children during interactions with parents, this study investigates the roles CS plays from the perspective of CA under the children language acquisition framework of Bruner (1983). More specifically, the study attempts to answer the following two questions: first, whether the child could use CS as a strategy to cope with issues during a conversation with parents, that is, to resolve difficulties and move the conversation forward. The second question is how CS can facilitate language acquisition in terms of two aspects, i.e., linguistics competence and pragmatic competence.

2. Methodology

2.1 Participants

Four young children between 2;1 and 5;6 from bilingual families in Hong Kong participated in this project. The reason for choosing children in this age range is that most researchers have chosen children within this age range for the study of language acquisition and bilingual development (e.g., Comeau et al., 2010; Greene et al., 2013; Lanvers, 2001; Ribot and Hoff, 2014). Because children above age 5;8 could attend primary school in Hong Kong, they do not belong to our target group, which only includes preschool children.

The invited children have all been exposed to two languages, i.e., Cantonese and English, since birth, and they can communicate in both languages with adults at home in Hong Kong. To exclude gender as a factor, two boys and two girls are selected. Their background information is recorded in the following table, and their daily conversations with parents/caretakers have been recorded by voice-recorders at home. Table 1 shows the detailed background of the four participating children.

Table 1.
Background of Participating Children

Child	Age	Gender	Parents' languages
Paul	2;1	Boy	Cantonese/English
Anthony	3;4	Boy	Mandarin/Cantonese/ English
Phillis	5;3	Girl	Cantonese/English
Chloe	3;2	Girl	Cantonese/English

Anthony has spoken English when his caretaker takes care of him since he was one year old. However, his older sister speaks Cantonese with him at home, and his father speaks Mandarin with him. His mother speaks both English and Cantonese with him. The parents of the remaining children are local Cantonese, so they are native Cantonese speakers. All four children have been taken care of by domestic caretakers who can speak English; therefore, the children can speak English at a near native level.

2.2 Data collection and processing

Approximately 13-14 hours of conversation has been captured for each child, and a total of 54 hours of audio recordings has been obtained from the four families. All audio clips have been annotated under the framework of Conversation Analysis, and all instances of CS have been marked and analyzed following the CA tradition of qualitative “single-episode analysis” (Schegloff *et al.* 1987).

3. Findings

In the following excerpts, the original statements are recorded in the left column, and the English translation for Cantonese and Mandarin statements are provided in the corresponding right column. In the following five excerpts, C stands for Child, M or Mother, and D for Daddy.

Excerpt 1

Context: The mother and the child, Anthony, are discussing school activities at home. The mother is asking what Anthony has done at school.

- | | | | |
|---|----|-------------------------------------|-------------------------------------|
| 1 | M: | jau5 aa3, gan1 nei5 dei6 gam1 jat6 | what have you done today? |
| 2 | | zou6 zo2 mak7 je4 aa3? | |
| 3 | C: | zou6 zo2, zou6 zo2... | (I) have done, have done... |
| 4 | | → <i>we make police car.</i> | <i>we make police car.</i> |
| 5 | M: | make police car. | make police car. |
| 6 | M: | nei5 hai6 ceot1 bin6 wun6 zo2 gwo2 | you played that police car outside, |
| 7 | | go3 ce1 ce1 hai6 ng4 hai6 aa3? | right? |
| 8 | C: | hai6. | yes. |



In Excerpt 1, the mother asks a question in Cantonese (line 1 to 2) about what the child has done at school today. The boy starts to answer it in Cantonese but has problems finishing his sentence. His repetition of the phrase ‘have done’ (line 3) indicates that he is searching for Cantonese words to express his meaning; however, he then switches from Cantonese to English to complete his statement (line 4).

This case shows that the child uses CS as a strategy to fix his uncompleted statement and continues talking to interact with his mom. Because of CS, the child can overcome his competence barrier in Cantonese and employ his knowledge and competence of English to complete the conversational tasks. It shows that the first function of CS is to help the child continue the conversation. The experience, in which the child has made an effort to search for words in Cantonese but failed to find them, might motivate the child to learn the equivalent words in Cantonese when there is a chance. In line 4, when his mother notices his difficulty in expressing his meaning, she phrases a sentence to help express it and obtains the confirmation of the child. Thus, the CS in this conversation draws the attention of his mother to his difficulties in expressing certain language items, resulting in an increase in the linguistic competence of the child.

Excerpt 2

Context: Mother and Chloe are chatting casually.

- | | | | | | |
|----|----|---|----------------------------------|-----------------------|----------------------------|
| 1 | C: | → | “idea” | hai6 mak7 je4 aa3? | what is “idea” ? |
| 2 | M: | | “idea” | hai6 lan2 faat3 lok6. | “idea” is what you think. |
| 3 | | | “good idea” | zik1 hai6, nei5 lan2 | “good idea” means what |
| 4 | | | dak1 hou2 hou3 o1. | | you think is good. |
| 5 | C: | | sai3 lou2 dim2 gaai2 ng4 sik1 | | why little brother does |
| 6 | | | waak6, sai3 lou2 dim2 gaai2 ng4 | | not know how to draw? |
| 7 | | | sik1 waak6 gaa3? | | |
| 8 | M: | | because he (is) just too small. | | because he (is) just too |
| | | | | | small. |
| 9 | | | he is a little boy, little baby. | | he is a little boy, little |
| | | | | | baby. |
| 10 | C: | → | “happy” | hai6 mak7 aa3? | what is “happy” ? |
| 11 | M: | | “happy” | hai6 “hoi1 sam1”. | “happy” means you are |
| | | | | | joyful. |

In Excerpt 2, Chloe and her mother are discussing the meanings of some words. She code-switches during her question to ask her mother a question about the meaning of some English words (line 1). She uses the sentence structure of interrogation in Cantonese to ask what the English word means. In response, her mother provides the answer to her question (line 2 to 4). The child code-switches here as she is driven by her awareness of a lack of semantic knowledge in one language. Therefore, this CS is a strategy mainly used for language learning because it helps them understand the target expressions because an explanation from the parents provides the child with opportunities to understand the meaning of these specific items.

Excerpt 3

Context: Phillis and her mother are talking about her younger brother.

- | | | | |
|---|----|--------------------------------------------|----------------------------|
| 1 | M: | Johnson is ill. | Johnson is ill. |
| 2 | C: | <i>oh, dear.</i> | <i>oh, dear.</i> |
| 3 | M: | oh, dear. hah hah. | oh, dear. hah hah. |
| 4 | C: | → “oh, dear” hai6 mak7 je5 aa3
? | what is “oh, dear?” |
| 5 | M: | “oh, dear” zik1 hai6 “aa1 aa1, | “oh, dear” means “it is |
| 6 | | zan1 hai6 caam2 laa3!” | really miserable!” |

As shown in Excerpt 3, Phillis has used the phrase “oh dear” (line 2) to express her sympathy for her brother, who is sick, in response to the statement by her mom (line 1) before she code-switches in her next statement to ask her mother about the meaning of this English phrase. It is an interesting phenomenon that differs from the common practice in adult conversation. The speaker does not understand the linguistic expression and has to ask for an explanation from her parents after she has already used it. In this case, of CS, there are two functions: first, when she notices that her mother laughs at her use of this expression, she quickly code-switches to ask her mother what it means, probably because she realizes that her use of this expression triggers the reaction of her mother; second, it enables her to indicate her problem understanding this phrase and her interactions with the parent present her with the opportunity to imitate the language use of the parent, as the child is still in the process of learning the meaning of unfamiliar lexical terms. Thus, it facilitates the acquisition of this term as it raises the awareness of the child of her knowledge gap between her L1 and L2 language. She may even develop a better understanding of this linguistic expression after she could apply it correctly in real conversation, reflecting the division between linguistic competence and pragmatic competence in terms of the acquisition of language by a child. Again, the dual functions of CS are manifested - one for language learning, even though the child may not be aware of it; the other for moving the conversation forward.

Excerpt 4

Context: Anthony and his mother are talking about whether the watermelon they are eating is sweet.

- | | | | |
|---|----|------------------------------------|--------------------------------------|
| 1 | M: | Mommy man6 nei5 aa1? | Mommy is asking
you (a question). |
| 2 | C: | tim4! | sweet! |
| 3 | M: | co5 dai1 sik6 laa1? hou2 ng4 hou2? | (could you) sit
down and eat, ok? |
| 4 | C: | → tim4 is yummy? | sweet is yummy? |
| 5 | M: | tim4 is sweet. | sweet is sweet. |
| 6 | C: | → tim4 is sweet? | sweet is sweet? |
| 7 | M: | yeah. | yeah. |

In Excerpt 4, when the mother asks Anthony whether the watermelon is sweet, he answers with the correct word *tim4* (sweet). It seems he



understands until he switches to English to ask what *tim4* means, even though he has used the word without difficulty. This is similar to Excerpt 3, in which the language acquisition of a child could be divided into two parts, linguistic competence and pragmatic competence. In both cases, the children grasp the usage of the phrase first, through interactions with parents, before they ask about the meanings of these phrases. In the case of bilingual children, they resort to CS to express the knowledge or competence gap between their languages, which is an indicator of the progress of their language acquisition.

Excerpt 5

Context: Chole is talking with her mother about some toys.

- | | | | |
|---|----|----------------------------------------|------------------------------------------|
| 1 | M: | this one, please. | this one, please. |
| 2 | C: | <i>but this is (a) toys.</i> | <i>but this is (a) toys.</i> |
| 3 | | <i>toys.</i> | <i>toys.</i> |
| 4 | → | ne1 go3 yun3 m4 syun3 toys aa3? | is this a toy ? |
| 5 | → | hai6 ng4 hai6 much better than | is this much better |
| 6 | | lei5 go3 aa3? | than that one? |
| 7 | M: | hai6 aa3, much better laa1, aa3. | yes, it is much better. |
| 8 | C: | → <i>much better than mommy.</i> | <i>much better than</i>
<i>mommy.</i> |
| 9 | M: | yep, much better than mine. | yep, much better than
mine. |

In line 3 of Excerpt 5, Chloe code-switches to Cantonese, asking her mother a question. Immediately, without receiving answers from her mother, she asks another question, expecting a confirmation from her mother (line 4). What is noteworthy is that in her question, she uses the English syntactic structure *much better* to express a comparison between two subjects, but the remaining words are Cantonese (line 5 to 6). After her mother confirms the answer in line 7, she code-switches to English so their conversation continues to move forward. However, her mother corrects one word in her answer (line 9) as it should be *mine* instead of *mother*, which provides an opportunity for her to obtain this linguistic knowledge. Therefore, this CS is used as a strategy to move their interaction forward; more importantly, it corrects the grammatical mistake of the child in L2, which facilitates her learning. Therefore, both the conversation-related and language-learning related functions of CS are demonstrated and a mature meta-linguistic awareness is reflected in the response of the child (line 5 to 6), indicating the emerging understanding of syntactic knowledge by the child at this age. In this case, the child clearly has grasped the meaning and application of this English phrase for comparing two things to an extent that she could embed it in a Cantonese sentence to express her meaning.

4. Discussion and Conclusions

Drawing on real-life material, this study analyzes the daily interactions of bilingual in children during a conversation with their parents at home. It has demonstrated that the CS used by Cantonese-English bilingual children can

fulfill dual functions: one is to continue the interaction, and the other is to facilitate language acquisition. On the one hand, it can be concluded that in their conversations with parents, these bilingual children will actively utilize CS as a strategy to fix language errors to resolve difficulties in communication to promote the continuation of the conversation. For instance, when they realize that they are having difficulties finishing the statement in one language, they will attempt to convey their intended meaning in the other language for the purpose of completing their interaction and giving the listener an opportunity to speak, as shown in Excerpt 1.

On the other hand, adopting the theory of language acquisition rooted in Bruner's research (1983), this study could lead to the conclusion that these CSs have been used as a learning opportunity for these children, from the aspect of either linguistic competence or pragmatic competence. As such, the language competence of children increases when parents structure learning through joint problem solving during parent-child social interactions. They will code-switch to one language to ask questions about the semantics, phonology or pragmatic use of a specific phrase in the other language to gain a clearer understanding, as reflected in Excerpts 2, 3 and 4. The best example is in Excerpt 5, when the mother and the daughter work together to correct a problem related to syntactic knowledge, which is triggered by the CS of the daughter. For Excerpt 6, the CS of the child initiates a correction by his father and, after the mistake is corrected, their conversation moves forward.

This observation indicates that CS in young bilingual children plays a dual role, i.e., moving the conversation forward and facilitating language acquisition. Accordingly, a unique classification of the functions of CS is proposed in our research, conversation-related CS and language-learning related CS, which elucidates the features of the language development of the children more than do other classifications, such as discourse-related CS and preference-related CS (Auer's, 1984), or linguistic and sociolinguistic factors (Vu, Bailey and Howes, 2010).

Finally, in our data, the two functions of CS are exhibited in the interaction of children with parents. However, future research on the features and bi- or poly-valent function of the CS used by young language learners is needed due to the limitations of our data.

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Appendix

Transcription convention

- lines that are under discussion in each expert.
- B** code-switched items under scrutiny
- I* English words produced by children that are not translated from Cantonese by researchers
- ... pauses or intervals
- “” words in quotation are expressions under discussion
- () transcriber's notes