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The role of adult input on the usage of Cantonese aspect markers in young Cantonese-speaking children

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Abstract

This research investigates whether the frequency and properties of adult input influence the usage of aspect markers and verb-aspect collocations in young Cantonese-speaking children. The Hong Kong Cantonese Child Language Corpus (CANCORP, Lee et al., 1996) database was used, which consists of 128 longitudinal spontaneous language samples of eight children aged 1;01 to 3;04. All comprehensible adult and child utterances containing the aspect markers *zo2*, *zyu6* and *gan2* were identified. The verbs that co-occur with these aspect markers were classified into one of the four semantic types according to Vendler's categorisation (1967). The results showed that frequency of adult input was a factor that influenced the order of acquisition and the usage of aspect markers in young Cantonese-speaking children. However, the influence of input properties on verb-aspect collocations was only partially supported. Other factors such as cognitive competence and semantic proficiency may also influence how children combine verbs with aspect markers.

Introduction

In Cantonese, inflections for lexical categories, agreement marking and tense distinctions are absent. However, there are bound morphemes that occur immediately after a verb or an adjective to denote completed, ongoing or habitual events. These aspect markers enable the same event to be viewed and described in different ways. According to Matthews & Yip (1994), there are six grammatical aspect markers in Cantonese as shown in Table 1 below:

Table 1: Six grammatical aspect markers in Cantonese

Perfective	perfective aspect	咗 /zo2/*
	experiential aspect	過 /gwo3/
Imperfective	continuous aspect	住 /zyu6/
	progressive aspect	緊 /gan2/
Delimitative aspect		吓 /haa5/
Habitual aspect		開 /hoi1/

Aspect markers have simple syllable structures which are similar to monosyllabic members of lexical categories. Aspect markers are not grammatically obligatory and their use is mainly semantically or pragmatically driven. The following three utterances illustrate how the use of different or no aspect marker influences the temporal meaning of an event:

(a) ngo5 sik6 faan6 (I eat)

I eat rice

(b) ngo5 sik6 *zo2* faan6 (I have eaten)

I eat ASP rice

(c) ngo5 sik6 *gan2* faan6 (I am eating)

I eat ASP rice

* Throughout the dissertation, Cantonese morphemes are presented in romanized form, and tones are indicated by numerals, following the system adopted by the Linguistic Society of Hong Kong (1994).

When no aspect marker is attached to a verb, as in (a), the utterance is grammatically acceptable, although it sounds incomplete unless there are other elements in the utterance that makes it clear that the speaker remains clearly neutral in the expression of the temporal contour of the event, as in the assertive sentence "*ngo5 sik6 faan6 gaa3*!" ("I eat rice SFP"). When an aspect marker is used, the speaker assigns an explicit perspective on the temporal contour to specify the meaning of the verb. For example, when the perfective marker *zo2* is used, as in (b), the speaker emphasizes the termination of the action "*sik6*" ("eat"). When the progressive aspect marker *gan2* is used, as in (c), the speaker emphasizes the ongoing-ness of the action "*sik6*" ("eat").

Grammatical and lexical aspects in Cantonese

According to Comrie (1976), aspect represents "different ways of viewing the internal temporal constituency of a situation" (p.3). There are two kinds of aspects, grammatical and lexical aspects. Grammatical aspect refers to aspectual distinctions that reflect different ways of viewing the temporal contour of a situation (i.e. perfective vs. imperfective), while lexical aspect describes an inherent property of an eventuality (Li & Bowerman, 1998; Shirai & Andersen, 1995). Vendler (1967) classified the inherent lexical aspect of English verbs into four types, namely state, activity, accomplishment and achievement. State verbs encode situations that involve indefinite duration with no inherent endpoint and situations that continue without any change during their course (e.g. love, hate); achievement verbs encode instantaneous events without duration (e.g. die, arrive, break); activity verbs encode durative situations that have successive phases over time without an inherent endpoint (e.g. sing, run); accomplishment verbs also encode durative situations but have a single obvious inherent

endpoint (e.g. read a book, brush the teeth). Shirai and Andersen (1995) claim that these four types of verbs can be characterized in terms of the semantic features of telicity, punctuality and dynamism (Appendix 1). Telicity denotes bounded and goal-directed events with natural completion; punctuality denotes instantaneous situations that take place at a point of time and dynamism signifies the need of continuous energy input to maintain the situations.

Grammatical aspect interacts with the inherent lexical aspect of the verb. The "naturalness of combination" principle (Comrie, 1976) says that there are natural combinations between grammatical and lexical aspects. For example, perfective aspect markers are naturally associated with telic verbs (e.g. *dit3 zo2,* "fall-ASP") as both grammatical and lexical aspects denote a situation as a simple whole with no internal structure. On the contrary, imperfective aspect markers are naturally associated with atelic verbs (e.g. *waan2 gan2,* "play-ASP") as both denote the internal structure of an event with no fixed temporal boundary. The study by Li and Bowerman (1998) on children learning Mandarin Chinese provided support for this natural combination. They found a consistent association of perfective markers with telic verbs and imperfective markers with atelic verbs. However, these natural combinations do not only occur in young children who are acquiring grammatical and lexical aspects. Li and Shirai (2000) claimed that this association continues to persist in adults. Since there is a natural relationship in the expression of telicity of an event with the use of a specific aspect marker in reality, adults are still likely to associate telicity of an event with perfective aspect markers and atelic event with imperfective aspectual forms.

To account for children's development of grammatical aspects in relation to verb semantics, Shirai and Anderson (1995) claim that children apply perfective and imperfective

aspects to a restricted set of verb semantics first before extending their use to a broader range of verbs. For example, initially they use perfective aspects with verbs that denote telic, punctual and resultative events, and imperfective aspects with verbs that denote durative and continuous events. Gradually, they expand their use to less prototypical cases, e.g. perfective aspect markers with activity verbs and imperfective marker with achievement verbs.

The longitudinal study by Lee, Wong and Wong (1996) on two young Cantonese-speaking children from the Hong Kong Cantonese Child Language Corpus (CANCORP) database provides evidence for the "naturalness of combination" principle. They found that in the Cantonese language samples they examined, children before 2;02 tend to combine telic verbs with perfective marker *zo2*. In a later stage, events without an endpoint were also marked by the perfective *zo2*, though this only constituted a small percentage of verb-aspect combinations observed.

Chan's (2000) study on the role of lexical aspect in the acquisition of the aspect markers *zo2*, *zyu6* and *gan2* provided further evidence for this morphological pattern. A total of 24 preschoolers aged 2;06 to 4;11 were divided into three age groups. Li and Bowerman's (1998) classification of lexical aspects was adopted, which classifies verbs into achievement, accomplishment, activity, state, semelfactive and mixed telic-state. Chan found that the perfective and imperfective aspect markers were initially restricted to a limited set of lexical semantics, and then gradually expand to other verb semantics. For example, the perfective marker *zo2* was predominantly associated with telic verbs, which gradually expanded to other verb types as age increases (i.e. percentage use of atelic verbs with *zo2* increasing from 2.3% to 3.3% from age 2 to 4).

A review of studies on aspect markers

Several research studies have examined the acquisition of aspect markers in young typically-developing Cantonese-speaking children. Leung (1995) conducted a longitudinal study to investigate the development of aspect markers *zo2*, *zyu6* and *gan2* in a Cantonese-speaking child in Hawaii from 21 to 45 months of age. He recorded the interactions between the child and her parents at home once a week for approximately 30 minutes. He found that the order of acquisition was *zo2* at 21 months, *zyu6* at 24 months and *gan2* at 39 months. In addition, he found that the overall distribution of the three aspect markers in the child's samples were *zo2* with 76%, *zyu6* with 23% and *gan2* with 1%.

In the study reported earlier, Lee, Wong and Wong (1996) also confirmed the order of occurrence of aspect markers *zo2*, *zyu6* and *gan2* for two boys (MHZ and CKT) from the CANCORP database. They used the acquisition criterion that "an aspect marker is considered acquired if it co-occurs with at least three different verbs in successive sessions" (p.161). They found that for MHZ, *zo2* was acquired at 1;09 and *zyu6* at 2;03; and for CKT, *zo2* was acquired at 1;11, *zyu6* at 2;01 and *gan2* at 2;06.

Effects of adult input frequency on language acquisition

According to the usage-based model (Tomasello, 2003), children do not possess innate access to linguistic representations and thus language acquisition is more related to active analysis and processing of the input pattern in communicative events. The model emphasizes the indispensable role of input in the emergence of particular syntactic constructions. Based on accumulated exemplars heard in adult speech, children initially use concrete item-based constructions. For example, if adults frequently use certain verb-aspect combinations (e.g.

dit3 zo2, “fall ASP”), children also prefer to use these concrete combinations more often. Gradually, they form abstract constructional schemas through the abstraction and schematization of linguistic components from the more concrete item-based constructions. Abstraction and schematization depend on exemplar learning in which “permanent abstract schemas gradually emerge and are immanent across the summed similarity of exemplar collections” (Abbot-Smith & Tomasello, 2006, p.275). By generalization of abstract schemas, children create new yet canonical utterances that they have not come across in adults input.

With regard to the usage-based model (Tomasello, 2003), input frequency and structural complexity are crucial factors in language acquisition. For input frequency, the more a particular linguistic structure is heard from adult input, the more likely this linguistic structure is produced by children. Tomasello (2003) suggested that this accumulated linguistic experience facilitates entrenchment, in which the production of that particular linguistic structure becomes a well-rehearsed routine. Derived from the usage-based model (Tomasello, 2003), Chan (2003) proposed the input properties factor and suggested that children’s acquisition of particular linguistic constructions was influenced by the consistency of that construction in the adult input pattern. In other words, the more consistent adults use a functional item in a particular position, the easier it is for children to abstract and acquire that functional item.

Several research studies have investigated the role of linguistic exposure on Chinese children’s language acquisition. Hon (2005) studied the effect of input frequency on the development of the coverb *hai2* (at) locative constructions in 101 Cantonese-speaking children between 3;01 and 4;07. She found that children and parents used different types of

hai2 (at) locative constructions in the same order of frequency, thus supporting the input frequency hypothesis.

Erbaugh (1992) conducted a comprehensive study on the acquisition of Mandarin syntax in four Taipei children. The use of aspect markers in these children was also reported. She found a distributional bias in the use of each aspect marker. The children produced, in 64 hours, 2294 *–le* (perfective), 108 *–zai* (progressive), 50 *–zhe* (state progressive) and 34 *–guo* (experiential). She hypothesised that adult input frequency also showed a similar disparity, with frequency of perfective *–le* far surpasses the frequency of other aspect markers.

On the contrary, Wong, Chow and McBride (in press) studied the relationship between parental input and children's usage of *bei2* dative constructions in 53 Cantonese-speaking children aged between 3;01 and 4;07. There are ditransitive (including double-object and inverted double-object constructions) and prepositional *bei2* dative constructions to express object or information transfer. They found that despite a high frequency of use of prepositional constructions in adult input, children seldom used this construction and instead they used syntactically simpler ditransitive constructions more often. They suggested that children's preference for ditransitive over prepositional datives was not determined by adult input frequency. They hypothesized that syntactic complexity is another, perhaps more influential factor in the production of dative constructions in young children.

Additionally, Wong and Ingram (2003) examined question acquisition longitudinally in eight Cantonese-speaking children from the CANCORP database. They found a low correlation between the order of the children's acquisition of the three question types and the frequency of these types in the adult input. Thus, they concluded input frequency alone is

insufficient to explain the order of question acquisition. They suggested that a combination of linguistic factors, cognitive ability and input frequency contribute to question acquisition.

Purpose of the Present Study

Although the sequential emergence of acquisition of aspect markers in Cantonese-speaking children has been well documented, little research has been done on the development of aspect markers in relation to lexical semantics. Language input from adults should be one of the major factors that contribute to the developmental course of aspect markers in children. However, no research has provided explanations on the developmental patterns or examined whether frequency and properties of the adult input interact or influence the usage of aspect markers and verb semantics in young Cantonese-speaking children. To fill these research gaps, this study aimed at investigating how the nature of input frequency and pattern relate to children's acquisition and use of aspect markers.

Research questions

The present study addressed the following research questions.

1a. What is the age and order of acquisition of the six aspect markers in each of the children?

1b. For each of the children, does the order of acquisition of *zo2*, *zyu6* and *gan2* reflect their frequency of use in the adults' input?

2a. For each child, what are the first three different verbs used with each aspect marker?

2b. How often do these specific verb-aspect marker pairs appear in the adult's speech?

3. Do the first three different verbs that appeared with each of the acquired aspect marker come from the same lexical semantic class for each of the children? Do the input each child receives reflect the same preference for a lexical semantic class for each aspect

marker?

4. After they acquire an aspect marker, how many more different verbs will they use before they will attempt to use it with a different lexical semantic class? Do the eight children show a similar order and pattern of development of aspect markers?

Methodology

Nature of the data

Data for this study came from the Hong Kong Cantonese Child Language Corpus (CANCORP, Lee et al., 1996) which was downloaded from Child Language Data Exchange System (CHILDES). The corpus consists of longitudinal data taken from eight Cantonese-speaking children (four males and four females) in Hong Kong. Appendix 2 summarizes the background information of the eight children. The youngest child was 1;10 and the oldest was 2;04 when language sampling began and it ended when the children were between 2;07 and 3;04. During each sampling, which was taken every 2-3 weeks for an hour, the child interacted and conversed with a research assistant and family members who were present at the time. Although there were some extra files for some children, only 16 files were accessible for each child (A total of 128 files available). All sample files were previously transcribed in Chinese orthography and organized in the CHAT (Codes for the Human Analysis of Transcripts) format.

Procedures of Generating Target Utterances

All 16 language samples for each child were analysed. All comprehensible utterances from children and adults (including investigator, mother, father and/or grandparents) containing the aspect markers *zo2*, *zyu6* and *gan2* were first identified by the CLAN (Child

Language Tools for Analyzing Talk) commands (MacWhinney, 2000).

Utterances from siblings and domestic helpers were excluded as they might not provide accurate input. Utterances that were incomplete, partly un-transcribed (unintelligible) and immediate (within one communicative turn) or delayed (within three communicative turns) repetition of the adult utterances were also excluded from subsequent analyses. English verbs that combine with aspect markers (e.g. "*lock zo2*" and "*close zo2*") and incorrect usage (e.g. *m4 wan4 zo2;* NEG-find-ASP) or incorrect placement of aspect markers (e.g. *bat1 jip6 zo2*; graduate-ASP) were also excluded from subsequent analyses.

Responses to questions were counted since the omission of aspect markers would be inappropriate in these contexts, e.g. "*nei5 sik6 zo2 fan6 mei6*?" ("you eat ASP rice SFP") ➔ "*sik6 zo2*" ("eat-ASP"). For verb phrases such as "*laam2 zyu6 zo2*" ("hug-RC-ASP"), *zo2* rather than *zyu6* was identified as the grammatical aspect marker. According to Cheung (1972), "*zyu6*" in the above example is a resultative complement, indicating the success of the action "*laam2*" ("hug"), but not the continuity of an activity.

Inter-rater reliability

Inter-rater reliability on the classification of lexical verb types was measured. Ten percent of the total verb types were randomly selected from all children and adults. Based on the frequency of occurrence of each aspect marker, the ratio 4:2:1 was used to select verbs that combine with each aspect marker. For each target verb, the context in which the verb occurs was given but the aspect marker was removed from the sentence, e.g. for the target verb "爬" (crawl), the sentence "邊個喺度爬呀？" ("Who is crawling?") was given. Target verbs were coded by two raters into one of the four verb semantics according to Vendler's

categorization (1967). Each rater's ratings were compared with the investigator's ratings. Spearman's rank-order correlation coefficient was used to calculate the inter-rater reliability. The coefficients were, r_s= 0.811 and 0.865.

Results

Age of acquisition

Part (a) of the first research question was related to the age and order of acquisition of aspect markers in each of the eight children. The age and order of acquisition of the aspect markers *zo2*, *zyu6* and *gan2* were identified. The age of acquisition (AOA) criterion reported in Lee, Wong and Wong (1996) was adopted. It was defined as the use of the aspect marker "with at least three different verbs in successive sessions" (p. 161). The first and the first-in-the-set verb were identified from the child utterances. The first verb was the very first verb that was used with the aspect marker in the samples. The first-in-the-set verb was the first of the three different verbs used in successive sessions which contributed to the determination of the AOA. Table 1 illustrates the AOA of each aspect marker for each child.

Table 1: Age of acquisition of each aspect marker for each child

	Age of acquisition of aspect marker		
	zo2	**zyu6**	**gan2**
CCC	1;11;21	2;01;10	---
CGK	1;11;22	1;11;22	---
CKT	2;00;16	2;01;08	---
HHC	2;04;08	2;06;24	2;08;08
LLY	2;08;10	3;00;22	3;00;22
LTF	2;02;10	2;04;27	---
MHZ	2;01;01	---	---
WBH	2;09;19	2;09;26	---

The majority of children (except CGK) acquired aspect markers in the order of *zo2* and

z*yu6*, with *zyu6* being acquired at around two months after *zo2*. For CGK, he acquired *zo2* and *zyu6* at the same time. One possible reason for this pattern may be due to sampling error. As the first sample on CGK was at 1;11;22, the AOA of *zo2* may have occurred before sampling began. Thus the data could not capture the actual AOA of *zo2* for this child. Only two children showed the acquisition of later-developing aspect marker *gan2* during the sampling period. Nevertheless, the AOA of each aspect marker for HHC and LLY provided evidence that aspect markers are acquired in the order of *zo2*, *zyu6* and *gan2*.

The relationship between adult input frequency and order of acquisition

Part (b) of the first research question looked at how adult frequency input relates to the order of acquisition of the aspect markers. The frequency of use of each aspect marker at the AOA session was counted for both children and adults. As the main communication partner for each child was the investigator and other adults' input was more sporadic, these adults were collectively referred to as one adult in the results and discussion sections. The same two trends were observed in the adults and the children: 1) at the AOA of *zo2*, the frequency of use of *zo2* is greater than *zyu6*; 2) at the AOA of *zyu6*, the frequency use of *zyu6* is greater than *gan2*. The performance of each child and his/her adult partner illustrating the two trends was summarised in Appendix 3.

Seven out of eight children (with the exception of CKT) followed trend (1) and used more *zo2* than *zyu6* at the AOA of *zo2*. For child CKT, at the AOA of *zo2*, the child produced more *zyu6* than *zo2* despite the higher frequency of *zo2* in the adult input. Similarly, seven out of eight adults (except the adult of CGK) followed trend (1). For the adult of CGK, at the AOA of *zo2*, adults produced more *zyu6* than *zo2*, but the reverse pattern was observed in the

child. All the eight children and their adult partners followed trend (2). These patterns indicated that the more often an aspect marker was heard, the earlier it was acquired.

The total frequency of each aspect marker in all 16 sessions for each child and his/her adult partner was calculated. In general, for both children and adults, the perfective marker *zo2* was used more frequently than *zyu6*, and zyu6 was in turn used more frequently than *gan2*. On average, in the adults' utterances, the frequency of *zo2* (4772) was about twice the number of *zyu6* (2231) and around 9 times the number of *gan2* (546) (Figure 1. in Appendix 4). However, in the children's utterances, the frequency of *zo2* far surpassed the number of both *zyu6* and *gan2*. The frequency of *zo2* (1647) was around 4 times the number of *zyu6* (444) and around 28 times the number of *gan2* (58) (Figure 1. in Appendix 4). This proportion revealed that the usage of the perfective marker *zo2* was dominant over imperfective markers *zyu6* and *gan2* in both children and adults.

The first three-in-the-set verbs in children and their occurrence in the adults input

The second research question looked at the first three-in-the-set verbs with each aspect marker used by each child and the occurrence of these specific verb-aspect combinations in the adult input. Using a child-by-child analysis, the first three-in-the-set verbs contributing to the determination of the AOA of the aspect marker *zo2* and *zyu6* were identified respectively. The presence of each of the child's first three-in-the-set verbs with the aspect markers *zo2* and *zyu6* in the adult utterances was identified from the sample of the sessions before and at the AOA of the specific aspect marker of concern. Appendix 5 illustrates the first three-in-the-set verbs for the acquisition of *zo2* and *zyu6* for each child and their presence in adult utterances.

For each child and for each aspect marker, the percentage of the first three-in-the-set

verbs that also appeared in adult inputs was calculated. For the aspect marker zo2, when averaged across the eight children, 71% of the first three-in-the-set verbs used by children also occurred in the adult inputs. For the aspect marker *zyu6*, when averaged across the eight children, 67% of the first three-in-the-set verbs also appeared in adult inputs. Hence, the majority of verb-aspect marker combinations used by the children were found in the adult input, suggesting a relationship between adult input and children's usage. The absence of some verb-aspect combinations in the children's samples could be explained by factors such as cognitive competence and linguistic complexity.

Interface between verb semantics and aspect markers

The third research question examined the interaction between lexical semantics and aspect markers. For each child, each of the first three-in-the-set verbs was classified into one of the four lexical aspect types according to Vendler's categorisation scheme (1967). As only two children (LLY and HHC) acquired the aspect marker *gan2* during the sampling period, its usage frequency and pattern were not examined. The percentage of telic and atelic verbs with aspect marker *zo2* and *zyu6* were calculated respectively using the formula below:

$$\text{Percentage of telic/atelic verb-aspect combination} = \frac{\text{Telic/atelic verb-aspect combinations}}{\text{Total number of verb-aspect combinations}} \times 100\%$$

For each adult, all the verb-aspect combinations that occurred before and at his/her child partner's AOA for the specific aspect marker were identified and categorised into one of the four inherent lexical semantics. The percentage of telic and atelic verb-aspect combinations were calculated using the formula above. Appendix 5 illustrates the percentage of telic and

atelic verbs with the aspect markers *zo2* and *zyu6* respectively in child and adult samples.

Although the children were already combining both telic and atelic verbs with the aspect marker *zo2*, there was a clear dominance of telic-*zo2* combinations (77.0%) over atelic-*zo2* combinations (23.0%). Seven of the eight children (except CGK) followed the "naturalness of combination" principle (Comrie, 1976) and used more telic verbs with the perfective marker *zo2*. However, the reverse pattern was found for CGK, i.e. more atelic verbs with the perfective marker *zo2*.

MHZ did not acquired the aspect marker *zyu6* during the sampling period, thus the usage pattern of *zyu6* was not examined for this child. Similar to verb-*zo2* combinations, a similar trend was obtained for verb-*zyu6* combinations. Children used the imperfective marker *zyu6* with both telic and atelic verbs early in the acquisition of the aspect marker, with an obvious dominance of atelic-*zyu6* (78%) over telic-*zyu6* collocations (22%). For the usage of the imperfective marker *zyu6* in the remaining children, six of them (except LLY) followed the "naturalness of combination" principle (Comrie, 1976) and used more atelic verbs with *zyu6.* However, for LLY, she used more telic verbs with the imperfective marker *zyu6*.

For verb- *zo2* combinations in adults, five of the eight adults (except the adults of CCC, CGK and LLY) used more telic verbs with perfective marker *zo2.* For verb- *zyu6* combinations in adults, five of the seven adults (except the adults of CCC and LLY) combined more atelic verbs with imperfective marker *zyu6*. As compared to the usage pattern in children, the verb-aspect combinations in adults followed the "naturalness of combinations" to a lesser extent and they tended to use more uncommon associations, i.e. atelic verbs with perfective marker *zo2* and telic verbs with imperfective marker *zyu6*.

Table 4a: Percentage of telic verbs with aspect markers *zo2*

	CHI			Adults		
	Telic		Trend	Telic		Trend
CCC	77.8%	(7/9)	T > A	33.3%	(5/15)	A > T
CKT	100.0%	(10/10)	T > A	67.5%	(160/237)	T > A
MHZ	60.0%	(3/5)	T > A	55.7%	(68/122)	T > A
CGK	33.3%	(1/3)	A > T	44.4%	(4/9)	A > T
LTF	85.7%	(6/7)	T > A	77.8%	(21/27)	T > A
WBH	92.6%	(25/27)	T > A	75.4%	(46/61)	T > A
LLY	66.7%	(2/3)	T > A	17.6%	(3/17)	A > T
HHC	100.0%	(14/14)	T > A	95.0%	(19/20)	T > A
Mean	77.0%			58.3%		
SD	23.1			25.8		

Table 4b: Percentage of atelic verbs with aspect markers *zyu6*

	CHI			Adults		
	Atelic		Trend	Atelic		Trend
CCC	66.7%	(2/3)	A > T	40.7%	(11/27)	T > A
CKT	100.0%	(16/16)	A > T	77.4%	(113/146)	A > T
CGK	100.0%	(4/4)	A > T	80.0%	(8/10)	A > T
LTF	75.0%	(3/4)	A > T	69.2%	(27/39)	A > T
WBH	88.9%	(8/9)	A > T	89.8%	(44/49)	A > T
LLY	16.7%	(1/6)	T > A	49.5%	(98/198)	T > A
HHC	100.0%	(7/7)	A > T	57.4%	(58/101)	A > T
MHZ	---		---	---		---
Mean	78.2%			66.3%		
SD	30.2			17.7		

The descriptive analysis revealed a difference in the usage pattern between children and adults. For verb-*zo2* combinations, on average, children used telic verb with perfective marker *zo2* with 77%, whereas adults used such pattern with 58%. This 19% disparity implies that the usage pattern between children and adults were different and children were more likely than adults to combine telic verbs with perfective marker *zo2*. Likewise, for verb-*zyu6* combinations,

on average, children used atelic verb with imperfective marker *zyu6* with 78%, whereas adults used such pattern with 66%. Although children used more atelic-*zyu6* combinations than adults, the percentage difference (i.e. 12%) was less than that in verb-*zo2* combinations (i.e. 19%).

Non-parametric Mann-Whitney U test was used to determine if there was a significant difference between the means of verb-aspect combinations in children and adults for *zo2* and *zyu6* respectively. Although the mean percentages of telic-*zo2* and atelic-*zyu6* combinations of the children were superior to the adults by 19% and 12% respectively, there was no statistically significant difference between the group means in terms of the telic verb-*zo2* ($U=17.5$, $p>0.05$) and atelic verb-*zyu6* combinations ($U=15$, $p>0.05$).

Summary of finding

The children acquired aspect markers in the order of *zo2*, *zyu6* and *gan2*. Both the children and the adults used the perfective marker *zo2* significantly more than the imperfective markers *zyu6* and *gan2*. Based on descriptive analysis, the majority of children followed the "naturalness of combination" principle (Comrie, 1976) in verb-aspect formations; whereas some adults followed this principle less often. However, inferential statistics revealed no statistically significant difference between the children and the adult means in verb-aspect combinations.

Discussion

Age and order of acquisition

Results of the present study showed a large variability in the age at which children acquired the aspect marker *zo2*, ranging from 1;11 to 2;09. For a majority of the children, the imperfective marker *zyu6* was acquired at around two months after the perfective marker *zo2*, ranging from 1;11 to 3;00. These findings imply individual differences at which aspect markers

were acquired and it is more appropriate to consider acquisition as an age range rather than a specific age. Nevertheless, these findings support the notion that the initial expression of the temporal contour of an event occurred in the late 2nd and 3rd years of life (Leung, 1995; Lee, Wong & Wong, 1996).

Despite using the same acquisition criterion, the current study could only partially replicate the findings reported in Lee, Wong and Wong (1996). While the present study reported the same AOA of the imperfective marker *zyu6* for CKT at 2;01, CKT's AOA for the aspect marker *zo2* was different for this and Lee et al.'s (1996) study. Lee, Wong and Wong (1996) found that the perfective marker *zo2* was acquired at 1;11 whereas the present study showed that the perfective marker *zo2* was acquired at 2;00. By double-checking the files around 1;11, CKT did not use three different verbs in those samples and thus there was no evidence that the perfective marker *zo2* was acquired at 1;11. Moreover, the present study found no evidence for the acquisition of the progressive marker *gan2* for CKT from the samples included for the analysis.

In addition, Lee, Wong and Wong (1996) found that MHZ acquired the aspect markers *zo2* and *zyu6* at 1;09 and 2;03 respectively. However, the present study found that MHZ acquired the perfective marker *zo2* at 2;01 and the imperfective marker *zyu6* was not acquired during the sampling period. One reason for the discrepancy in the AOA of *zo2* may be due to the unavailability of files before age 2. Thus, the actual AOA of the aspect marker *zo2* for this child could not be ascertained in the present study. For the aspect marker *zyu6*, there was no evidence that the child used more than three different verbs in successive sessions throughout the sampling period, which was confirmed by a classmate of the investigator. Thus, MHZ did not acquire the imperfective marker *zyu6* during the sampling period.

For the general order of acquisition of aspect markers, the findings of the present study were consistent with the studies by Leung (1995) and Lee, Wong and Wong (1996). This provided further evidence that aspect markers were acquired in the order of *zo2*, *zyu6* and *gan2*.

Effect of adult input: order of acquisition and frequency of use

Results showed that at the AOA of *zo2*, the majority of adults produced far more *zo2* than *zyu6* and *gan2* when speaking to the children. Similarly, at the AOA of *zyu6*, all adults used more *zyu6* than *gan2*. Resembling patterns were observed in seven out of the eight children (except CKT). In sum, the present study generally supports the input frequency effect, which says that accumulated linguistic exposure facilitates the acquisition of aspect markers and influences the order of their acquisition. Thus for the majority of children, the more frequent an aspect marker was heard from the adult input, the earlier and the more often the aspect marker was used in the their utterances. For CKT, at the AOA of *zo2*, more *zyu6* than *zo2* was used despite a higher frequency of *zo2* in the adult input. One possible reason for this phenomenon may be due to the context of that sample. Upon review of all the verb-aspect combinations in the sample, only the verb *zaa1* (“hold”) was combined with *zyu6*. Thus, the context itself provided many opportunities for this specific verb-aspect combination (i.e. *zaa1 zyu6*, “hold-ASP”) to occur, leading to a higher frequency of occurrence of *zyu6* than *zo2*.

Data on the total number of each aspect marker used in all 16 sessions offered support for the usage-based model (Tomasello, 2003). The frequency of use of the three aspect markers (*zo2*, *zyu6* and *gan2*) generally agreed among both the children and the adults. It was found that the aspect marker that was used the most often in the children’s utterances was the one that occurred most frequently in adult speech. In the children, the perfective marker *zo2* was used

predominantly, followed by the imperfective maker *zyu6*, and the progressive marker *gan2* was used the least often. A similar pattern was observed in the adults. The adults produced an overwhelming number of the perfective marker *zo2* over the imperfective markers *zyu6* and *gan2*. This usage pattern was parallel to that found by Leung (1995), in which children used the perfective marker *zo2* proportionally more than the imperfective marker *zyu6,* which was in turn more than *gan2*. This usage pattern suggested that children initially developed the perfective marker *zo2,* and the second one (i.e. *zyu6*) is learned while the child is mid-way through the mastery of the first one. In addition, the resemblance of patterns in the children and the adults provides further evidence that adult input frequency is likely to be one key factor on the child's use of a particular aspect marker. With accumulated exposure, children processed the patterns from the adult input to learn how to express the temporal meaning of an event.

Results showed that not all verbs used by the children occurred in the adult input. Children did use verbs with an aspect marker that were not found in the adult input prior to the acquisition of that specific aspect marker. This suggested that linguistic input plays a part, but is not the sole factor, in determining the emergence of each verb. Other factors, such as cognitive competence or lexical ability may also affect the choice of verbs for use with an aspect marker.

Effect of adult input: verb semantics and aspect marker combinations

For the perfective marker *zo2,* a majority of the children (except CGK) followed the "naturalness of combination" principle (Comrie, 1976) and combined more telic than atelic verbs with the perfective marker *zo2*. For CGK, more atelic verbs were combined with the perfective marker *zo2*. There were two possible reasons for this phenomenon. Firstly, the AOA of *zo2* occurred in the first sample, it was possible that the actual AOA of *zo2* for CGK occurred

before sampling began and she was already forming uncommon combinations (i.e. atelic verbs with *zo2*). Thus, even in the first sample, CGK was already expanding the use of *zo2* with atelic verbs and this may indicate her increased awareness of the grammatical potential of *zo2* without considering the inherent lexical semantics. Secondly, the prominence use of atelic verbs with *zo2* may be due to its high frequency of occurrence of such combinations in adults input (i.e. 56% of atelic-*zo2* collocations).

For the imperfective marker *zyu6*, a majority of the children (except LLY) followed the "naturalness of combination" principle (Comrie, 1976). Children seemed to know which type of verbs should combine with the imperfective marker *zyu6*. For LLY, more telic verbs were used with the imperfective marker *zyu6*. By reviewing the adult input pattern, it was found that the adults used around 50% of the marker zyu6 with telic and atelic verbs. This atypical usage pattern in LLY suggested that by categorising patterns heard in adult speech, the child schematized how different verbs could combine with the imperfective marker *zyu6* and then self-generated less prototypical combinations to reach adult-like linguistic competence.

The finding of the current study was consistent to Chan's (2000) study on verb semantics. She suggested that all four types of verb semantics (achievement, accomplishment, activity and state verbs) were compatible with the perfective marker *zo2*. Therefore, children at the age of 2;06 already used both telic and atelic verbs with the perfective marker *zo2*. In the present study, it was found that from the very early usage of verb-aspect constructions, a majority of the children were already using both telic and atelic verbs with the aspect marker *zo2*. Initially, the children used the perfective marker *zo2* predominantly with telic verbs and only occasionally with atelic verbs. Similar tendency was observed for the imperfective marker *zyu6*. The use of

atelic verbs was prominent, with telic verbs only taken up a small proportion of use.

Relationship between verb-aspect formations in children and adult usage pattern

Descriptive analysis showed that there were 19% and 12% differences between the children and the adults' use of telic-*zo2* and atelic-*zyu6* combinations respectively. However, this difference was not statistically significant to conclude that the verb-aspect combinations in children and adults were significantly different. One possible reason for this phenomenon was a small sample size and a large standard deviation. With a small sample size, percentages that are particularly low or high can skew the distribution. Moreover, the larger the standard deviation, the less likely the mean as a typical value of the distribution. As a result, the differences of the means between children and adults were not large enough to yield a significant difference.

The current study partially supports the importance of input properties in young children's language acquisition. Results on verb-*zo2* and verb-*zyu6* combinations showed that the usage pattern of a majority of the children resembled that of the adults', with the exception of CCC (for both verb-*zo2* and verb-*zyu6* combinations) and LLY (for verb-*zyu6* combinations). Although CCC produced more telic-*zo2* combinations, the usage pattern was the other way round for the adults (i.e. more atelic-zo2 combinations). Moreover, despite the fact that CCC and LLY used more atelic verb-*zyu6* combinations, their adult partners used more telic verb-*zyu6* combinations. For this reason, in the current study, not all children's usage patterns support the input properties hypothesis. The less prototypical usage patterns observed in CCC and LLY suggested that although a particular verb always occur consistently before a particular aspect marker in adult speech (e.g. telic verbs occur predominantly with aspect marker *zo2*), some children do not schematise and abstract these linguistic patterns for their usage.

Although findings suggested that input properties did play a role in children's usage of verb semantics and aspect markers, they are not the only factor contributing to children's grammatical organisation. If children's learning of verb-aspect combination is influenced solely by adult input, then it is speculated that all verb-aspect combinations used by children can be found in the adult input prior to the children's usage. However, since not all verb-aspect combinations used by a child occurred in the adult input, there is no absolute one-to-one correspondence between adult input and children output. Other factors, such as cognitive competence and linguistic complexity (e.g. semantic complexity) may also contribute to the learning of verb-aspect combinations in children. With regard to cognitive competence, in order to learn combinations of the same aspect marker with different verb semantics, children must be able to conceptualise that the same event can be represented with different temporal meanings.

For semantic complexity, it is speculated that the more abstract the meaning of a verb, the later the children will acquire them and the less frequently they will use them. Abstractness or imageability refers to "the ease with which a word gives rise to a mental image" (Bird et al., 2001, as cited in Ma, Golinkoff, Hirsh-Pasek, McDonough & Tardif, 2009, p. 407). Ma et al. (2009) hypothesised that the imageability of a verb is closely related to how children learn and acquire that specific verb. A highly imageable verb is easier to learn as it refers to a concrete and substantial action or event, hence the process of abstraction of that specific action is simplified by minimising the probable range of actions to which a verb refers (Ma et al., 2009). For example, the highly imageable verb "*hoi1*" (open) provides a clear referent to the action, while a low imageability verb "*gei3*" (remember) refers to an internal mental state that is harder to substantiate. For this reason, imageability affects the rate of semantic development and

children do “select and pick” from the available lexicon for verb-aspect combinations.

Conclusions

The present study supports the claim that input frequency is related to the order of acquisition and usage of aspect markers in young Cantonese-speaking children. The more frequently a child is exposed to a particular aspect marker, the earlier and more frequently the child produces that aspect marker. The “naturalness of combination” principle (Comrie, 1976) is also generally supported. Children make natural associations between lexical and grammatical aspects. However, the input properties effect is only partially supported. Cognitive competence and linguistic proficiency may also contribute to the use of different verb-aspect constructions.

Limitations

Although a longitudinal database was collected from some children as early as 1;08, the AOA of some aspect markers already appeared in the first sample for some children (e.g. CCC, LTF). It is possible that they could have acquired the aspect markers before sampling began. Thus, the use of sampled language limits the investigation of the earliest age for the emergence of each aspect marker and its usage with verb semantics. Usage frequency and pattern prior to the stage at which sampling began may be of importance. Further studies should consider the alternative of starting sampling prior to the acquisition of the earliest aspect marker found in the previous studies.

Although some family members did interact and converse with the children during sampling, the proportion of utterances by the research assistants far exceeded that by family members. It is not certain about the language input of family members in daily life. As a result, investigator-child interaction does not provide direct information on how language

input in daily living affects the children's acquisition and usage of aspect makers.

Clinical implication of this study

Although the use of aspect markers is grammatically optional in Cantonese, they are important in expressing the temporal relation in specific syntactic contexts and pragmatic situations. As results from this study showed that children are sensitive to the adult input in their acquisition of aspect markers and the use of verb-aspect combinations, increasing the frequency use of aspect markers and varying the diversity of verb types in adults' input could facilitate children's aspectual development and learning. The manipulation of adult input brings about therapeutic purposes especially for children with language impairment who experience significant difficulty in learning the use of aspect markers and extending the use of markers to various verb types. In addition, the natural combination of lexical and grammatical aspects serves as a starting point in intervention of verb-aspect formation. This natural association facilitates the understanding of how an event can be expressed using an aspect marker that denotes similar temporal properties of the situation.

Further studies

According to Matthews & Yip (1994), there are six grammatical aspect markers in Cantonese. However, the present study only addressed the usage frequency and pattern of only two of them as the remaining aspect markers were not acquired during the sampling period. Therefore, further study can look at all the Cantonese aspect markers to find out if the "naturalness of combination" principle (Comrie, 1976) applies to other aspect markers and how adult input frequency and pattern affect usage of these aspect markers in children.

The present study only examines the effects of adult input frequency and patterns on the

usage of aspect markers in normally developing children. Studies have shown that adults' interactional behaviours are influenced by children's language abilities (Conti-Ramsden, 1990, Pelligrini et al., 1985, & Petersen & Sherrod, 1982, as cited in Hammer, Tomblin, Zhang & Weiss, 2001). Adults compensate children's language difficulties by adjusting the frequency of specific communicative behaviours, such as the increase use of recasts when children are in the early phases of learning and demanding of teaching strategies, etc. Therefore, further study of usage frequency and pattern of aspect markers in adult inputs directed to children with language impairment will be of great interest.

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Appendix 1: Semantic features of the four verb classes

	State	Activity	Accomplishment	Achievement
Punctuality	-	-	-	+
Telicity	-	-	+	+
Dynamism	-	+	+	+

- : absence of feature + : presence of feature

Appendix 2: Background information of the eight children in CANCORP database (Lee et al., 1996)

Name	Sex	Age at which recording began and ended	Language used at home	Main caregiver	Sibling
CCC	M	1;11.21- 2;09.07	Cantonese	Grandparents	---
CGK	F	1;11.22- 2;08.18	Cantonese	Mother	---
CKT	M	1;10.30- 2;07.02	Cantonese, with occasional introduction of English terms	Grandmother	---
HHC	M	2;04.08- 3;04.14	Cantonese	Thai helper	1elder brother & 1 elder sister
LLY	F	2;08.10- 3;04.22	Cantonese, Filipino helper speaks some Cantonese & English to the child	Filipino helper	1 elder sister
LTF	F	2;02.10- 3;02.18	Cantonese except when speaking to the Filipino helper	Mother and Filipino helper	1 elder sister
MHZ	M	2;00.03- 2;08.06	Cantonese	Grandmother	---
WBH	F	2;04.15- 3;02.20	Cantonese	Grandmother	1 younger brother

Appendix 3: The performance of each child and his/her corresponding adult according to the two trends for the order of acquisition of the aspect markers *zo2* and *zyu6*

	Trend (1)*		Trend (2)**	
	Child	Adult	Child	Adult
CCC	✓	✓	✓	✓
CKT	*zyu6* > *zo2*	✓	✓	✓
MHZ	✓	✓	---	---
CGK	✓	*zyu6* > *zo2*	✓	✓
LTF	✓	✓	✓	✓
WBH	✓	✓	✓	✓
LLY	✓	✓	✓	✓
HHC	✓	✓	✓	✓

* Trend (1): At the AOA of *zo2*, the frequency use of *zo2* is greater than *zyu6*

** Trend (2): At the AOA of *zyu6*, the frequency use of *zyu6* is greater than *gan2*

Appendix 4: Frequency of use of each aspect marker in children and adults

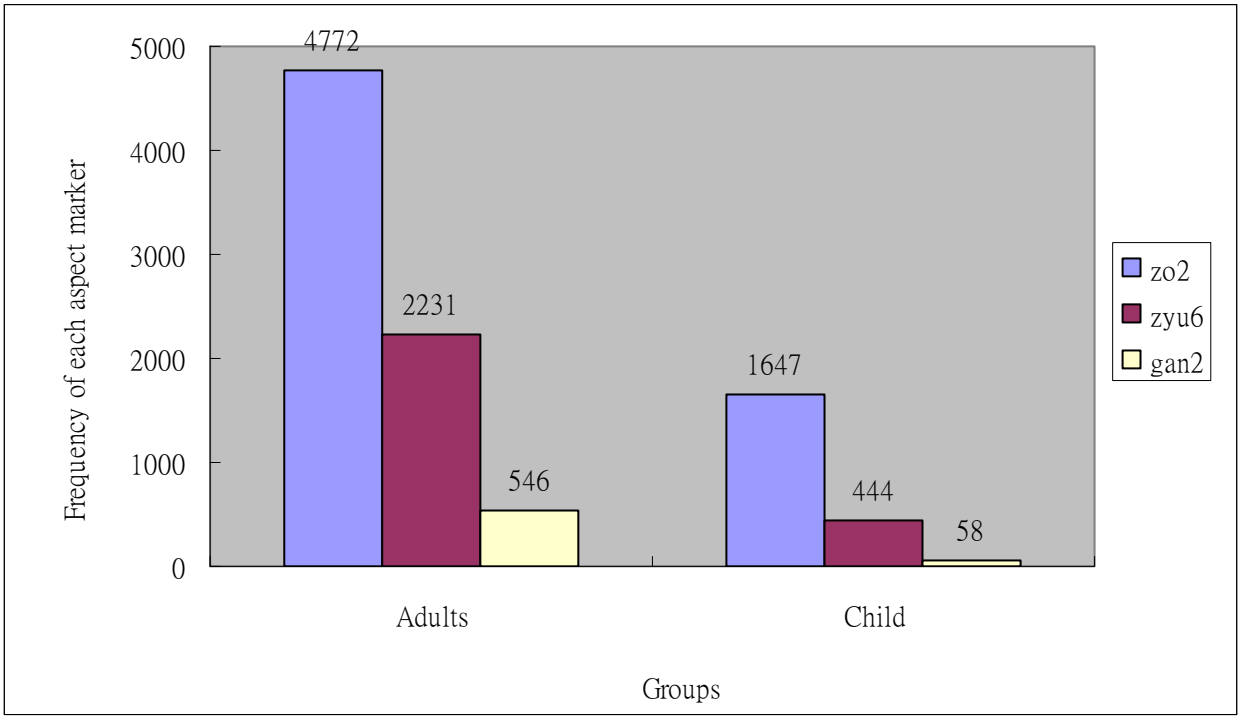

Figure 1. Frequency of use of each aspect marker (*zo2*, *zyu6* and *gan2*) in children and adults

Appendix 5: The first three-in-the-set verbs for the acquisition of *zo2* and *zyu6* for each child respectively and their presence in adult utterances.

Table (5a). The first three-in-the-set verbs for the acquisition of *zo2* and the percentage of occurrence of these verbs in adults

Child	First verb	Presence in adult samples	Second verb	Presence in adult samples	Third verb	Presence in adult samples	Percentage of verbs that also occurred in adults
CCC	dit3	✓	laan6	×	sik6	✓	67%
CGK	waai6	✓	laan6	✓	waan1	×	67%
CKT	dit3	✓	m4 gin3	✓	laan6	✓	100%
HHC	laan6	✓	dit3	✓	mou5	×	67%
LLY	faan1	✓	cung1	✓	bong1	×	67%
LTF	m4 gin3	✓	ci4	×	dak1	✓	67%
MHZ	m4 gin3	✓	sai2	×	caat3	✓	67%
WBH	m4 gin3	✓	lo2	×	sei2	✓	67%

Table (5b). The first three-in-the-set verbs for the acquisition of *zyu6* and the percentage of occurrence of these verbs in adults

Child	First verb	Presence in adult samples	Second verb	Presence in adult samples	Third verb	Presence in adult samples	Percentage of verbs that also occurred in adults
CCC	zaa1	✓	kap1	✓	sik6	×	67%
CGK	zo2	✓	gap1	×	zaa1	✓	67%
CKT	zaa1	✓	lo2	✓	laam2	✓	67%
HHC	lo2	✓	daai3	×	zaa1	✓	67%
LLY	zip3	✓	kam2	✓	lik1	×	67%
LTF	zaa1	✓	ze1	✓	zaat3	×	67%
WBH	zaa1	✓	zuk1	✓	ze1	×	67%
MHZ	---		---		---		---

Appendix 6: Classification of verb semantics by Vendler's categorisation scheme (1967)

Achievement: instantaneous events with no duration

Accomplishment: events with duration and single endpoints

Activity: events have duration with successive and dynamic phases over time with no endpoint

State: encode situations that has indefinite duration and no endpoint, it continues without any change during course

Examples of classification of verbs used in inter-rater reliability

Target verb	Context in which the verb occur	Telicity	Verb type
熄 (switch off)	不如熄電視，好唔好啦 ？	Telic	Achievement
插 (insert)	原來呢個可以插把遮架	Telic	Achievement
切(chop)	我幫你切先 aa1	Telic	Achievement
除 (take off)	我除襪	Telic	Accomplishment
著 (wear)	黃色就係你而家著呢件衫衫嗰啲色	Telic	Accomplishment
剪 (cut)	你係咪剪頭髮 aa3?	Telic	Accomplishment
瞓覺 (sleep)	我瞓覺	Atelic	Activity
落雨 (raining)	---	Atelic	Activity
轉 (revolve)	數住佢轉幾耐 aa1 嘛	Atelic	Activity
肥 (fat)	好明顯係肥咗啦佢	Atelic	State
濕 (wet)	睇吓件衫衫濕 aa3	Atelic	State
扁 (flat)	扁喇	Atelic	State