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The effect of input frequency and linguistic complexity on the learning of *bei2* constructions in Cantonese preschoolers

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Abstract

This training study experimentally manipulated two important factors on children's language acquisition, input frequency and linguistic complexity. Twenty-four monolingual Cantonese-speaking children aged between 2;06 to 3;10 participated in the study. Before the training, they did not have any knowledge on the target constructions. They were then exposed to either the simpler Permissive or the more complex Passive *bei2* constructions with high or low input frequency in three training sessions within two weeks. After training, qualitative as well as statistical analyses supported the effect of complexity on children's language acquisition. Although a significant effect of input frequency was not found due to the small sample size, its large effect size supported that it played a role in language learning. Findings from this study suggested that input frequency and complexity together determined the development of *bei2* constructions.

INPUT FREQUENCY VERSUS COMPLEXITY

Scholars have been interested in identifying factors that determine the course of language development. Some of them presented evidence that supported input frequency as the main factor governing children's language learning. Nelson (1977) carried out an experimental study with 12 English-speaking young children aged around 2;04. In his study, the children were engaged in five one-hour intervention sessions with experimenters across a two-month period. Through recasting and reworking their productions by the experimenters in conversations, the children were given extra exposures to complex question forms (e.g., tag question) or complex verb forms (e.g., single verbs in future or conditional tense). The results revealed that such additional input enabled the children to learn the target constructions significantly earlier than they would normally do. Similar findings were found in Brooks and Tomasello (1999)'s study. They conducted an experimental study with 56 English-speaking children aged between 2;09 and 3;08. They provided these children with 24 sequences of models of full Passive involving two nonce verbs in two 30 minutes sessions. The results found that these children were able to produce full passives with nonce verbs much earlier than age-matched children who did not receive additional input. Jarmulowicz (2002) performed an experiment to study the effect of stress-changing suffix (e.g., *-tion* and *-ic*) frequency on children's stress judgment abilities. In English, such suffix had predictable effects on stress placement in multisyllabic words. For example, in words with suffix *-tion* (e.g., production) and suffix *-ity* (e.g., continuity), stress was placed in the syllable just prior to the suffix. Jarmulowicz (2002) first determined the frequency distribution of the suffixes, to which children were often exposed, from children's literature corpus. It was observed that suffix *-tion* was more frequent than suffix *-ity*. Then, she asked 40 English-speaking children aged between 6;06 and 10;06 to indicate their preference for correct stress placement in 24 real and nonsense words. After comparing the results with the derived suffix frequency, it

was found that input frequency of suffix influenced children's awareness of stress placement in English. Unlike the above mentioned scholars who used an experimental design, Naigles and Hoff-Ginsberg (1998) investigated the nature of input of 25 selected verbs from adults and the order of acquisition of these verbs by 57 Stage 1 (Brown, 1973) monolingual English-speaking young children in an observational study. They achieved this by comparing and analyzing the maternal input language samples and their Stage I children's language productions obtained in two times across a ten-week period. The results showed that input frequency was related to children's order of acquisition of verbs. In summary, these works showed that input frequency did influence children's language acquisition in a range of linguistic areas, including prosody, lexical items and syntactic structures.

On the contrary, other scholars proved the influence of linguistic complexity on children's language learning. In his pioneer work on language development in English-speaking children, Brown (1973) studied the language development of three children in a longitudinal study across five years. He observed that children's acquisition order of inflectional morphemes was mainly governed by their respective complexity. For instance, the progressive -*ing* morpheme was acquired much earlier than the third person singular -*s* morpheme added to the end of verbs, as the former was comparatively simpler than the latter in terms of both semantic and grammatical complexity. Bloom, Merkin, and Wootten (1991) also conducted a longitudinal study with seven English-speaking children aged between 1;10 and 3;00. They were seen in three-weeks or six-weeks time. Their interactions with their mothers and the investigator were recorded and analyzed in order to study their use and development of wh-questions. The results found that the complexity of the syntactic functions of the wh-forms (e.g., who-question, which asked for the subject constituent, was easier and acquired earlier than why-question, which asked for a reason) and the semantic complexity of the verbs used in the questions contributed to their order of acquisition of wh-

questions. With reference to the results of these works, it was supported that linguistic complexity also governed children's language acquisition.

In his elaboration of the usage-based account of language learning, Tomasello (2003) suggested that "input frequency and structural complexity interact in complex ways in the developmental process" (p. 175). Rowland, Pine, Lieven, and Theakston (2003) studied the order of acquisition of wh-questions by analyzing the naturalistic data obtained from 12 English-speaking children aged between 1;08 and 2;00 and their mothers. While the data clearly showed that input frequency was a powerful predictor of the order of acquisition, they also suggested the possibility that children's acquisition was a result of the interaction between input frequency and complexity. However, the notion of structural complexity was not explicated in either of these works, and the nature of the interaction between structural complexity and input frequency was not discussed.

THE COMPETITION MODEL

In the latest version of the Competition Model, MacWhinney (2001) proposed that language acquisition was accomplished through the interaction between three main factors. The first factor was linguistic input, including frequency, syntax, semantics, phonology and morphology of the ambient language. MacWhinney (2001) suggested that children processed the incoming sentences in terms of cues detection and interpretation. These cues, which marked the grammatical structures of sentences, competed with one another during comprehension. Those who had the strongest reliability (i.e., consistency in occurrence) and availability (i.e., frequency of occurrence) would control comprehension and would be acquired first in language learning. For example, the word order in English was a strong cue for comprehension as it was consistent and was available in nearly all sentences. Thus, English speakers mainly comprehended sentences based on the word order cue.

The second factor of the model was the cognitive abilities of learners. Under this

factor, several facts of human brain, such as its interactive nature, plasticity and automaticity, were emphasized. For example, it was restated that when children grew older, the plasticity of their brain declined, which resulted in less capacity for language learning. In turn, people encountered more difficulties in acquiring new forms when they grew up. The third factor was the social interactional context in which language learning took place (e.g., classroom context versus naturalistic context). MacWhinney (2001) suggested that a rich interactional context with high quality language input from adults would promote children's language learning. In the Competition Model, these three factors carried different relative strengths in competition. They competed and interacted with one another to determine the level of language input, which affected children's language acquisition.

WONG (2003)'S STUDY

The interaction of factors in language development in Cantonese-speaking children was examined in Wong (2003). In particular, Wong (2003) examined how input frequency and complexity together determined the order of development of five types of *bei2*(give) constructions. (Cantonese transcriptions were presented in Romanized form in this paper, following the system adopted by the Linguistic Society of Hong Kong (1994). Those grammatical morphemes that had no direct English equivalents were presented in abbreviations in capital letters, and they were aspect marker = ASP, classifier = CL, particle = PRT and sentence final particle = SFP.) They were Transfer, Dative, Permissive, Extended Dative and Passive. He studied the use of these constructions in eight monolingual Cantonese-speaking children, aged between two and five, and in their communication partners during conversations in naturalistic contexts. A modified version of the Cantonese corpus CANCORP (Fletcher, Leung, Stokes, & Weizman, 2000) provided longitudinal language sample data for the analysis.

Building on MacWhinney's (2001) Competition Model, Wong (2003) proposed that

the complexity of linguistic structures could be analyzed in terms of syntax, semantics and cognitive demands. Syntax referred to the number of noun phrases and the number of additional verb phrases besides *bei2* in the constructions. Semantics concerned whether the meaning of *bei2* constructions could be represented by a physical act of giving. Cognitive demands, which included perspective-shifting, specification and reanalysis, concerned whether the children had to mentally manipulate the perspective of the event from one entity to another or to re-analyze sentence position (subject/object) and case role (agent/patient) relations in order to find out the meaning of the target constructions. Wong (2003) suggested that constructions that had more noun phrases, had additional verbs other than *bei2*, did not convey the meaning of giving and required perspective-shifting, specification and reanalysis were more complex. For illustration, Transfer (e.g., *bei2*(give) *go3*(CL) *bo1*(ball) *nei5*(you) = Give the ball to you) involved two to three nouns but no additional verb other than the verb *bei2*. Semantically, it demonstrated the act of giving things by oneself to another as encoded by the verb *bei2*(give). It did not require any mental manipulation when understanding the construction with reference to its word order cue. That is, the subject was the agent in the sentence, and perspective-shifting, specification and/or reanalysis were not necessary in its comprehension. Therefore, Wong (2003) suggested that it was the simplest *bei2* construction.

The Passive construction (e.g., *di1*(CL) *bao1*(bread) *bei2*(passive) *ngo5*(I/me) *sik6*(eat) *zo2*(ASP) = The bread is eaten by me), however, was considered the most difficult *bei2* construction. In terms of syntax, it usually involved between one to three noun phrases. Also, it required one additional verb in the linguistic structure, and it did not convey any meaning of giving an object by one participant to another. In addition, it required the greatest cognitive demands. It was necessary for people to mentally manipulate the case role relations with the sentence positions when understanding Passive, as the subject was the patient instead of the agent of the sentence. Thus, it was not possible to understand Passive without perspective-

shifting and reanalysis.

With reference to these notions of syntax, semantics and cognitive demands, Wong (2003) formed a scale of complexity: Passive/Extended Dative > Permissive/Dative > Transfer. Passive and Extended dative were the most complex, while Transfer was the simplest *bei2* construction. Based on 4248 adult utterances in CANCORP, Wong (2003) reported the following order of frequency of use of the constructions: Extended Dative > Transfer > Permissive > Dative > Passive. Extended dative was found to be the most frequent, while Passive was the least frequent construction in the adult input. Based on 769 child utterances, he reported the following order of emergence of the different *bei2* constructions: Extended Dative/ Passive > Dative/ Permissive > Transfer. Children were observed to develop Transfer the earliest, and Extended dative and Passive the latest. By examining these three scales together, it appeared at first sight that the complexity effect was the only factor affecting the order of acquisition of *bei2* constructions. However, language learning would not be possible without a certain frequency of input and input frequency was consistently reported to play a role in language learning. As Wong (2003) concluded, input frequency and complexity converged and competed with each other to determine language outcomes. Neither the input frequency nor the complexity of *bei2* constructions alone could independently affect children's order of development of the linguistic constructions. For instance, Transfer was acquired first as it had the simplest syntactic structure and relatively high input frequency. On the contrary, the late-acquisition of Passive was most probably attributed to its lowest input frequency and highest complexity.

However, such argument was preliminary and was drawn from the analysis of language samples obtained in naturalistic contexts, where confounding variables, such as the variability in interactional contexts in which the language samples were obtained, might be present. The current study was thus set up as a training experiment in which input frequency

and linguistic complexity were manipulated to replicate findings reported in Wong (2003). Children were trained on two *bei2* constructions, Permissive and Passive, at two levels of input frequency. As discussed, Passive was the most complex of *bei2* constructions. Permissive (e.g., *maa1mi4*(mother) *m4*(not) *bei2*(let) *ngo5*(I/me) *waan2*(play) = Mother does not let me play) was simpler than Passive and fell somewhat in the middle among the five *bei2* constructions. Wong (2003) analyzed that Permissive was simpler than Passive because it often demonstrated the meaning of giving, and it required less cognitive demands.

PREDICTIONS

Based on the results of earlier works, it was predicted that a main effect of input frequency and a main effect of linguistic complexity would be obtained. Based on the Competition Model, an interaction effect between input frequency and linguistic complexity would be found.

METHOD

Research Design

There were two independent variables in this study. They were input frequency and linguistic complexity of the target constructions. Each was further divided into two levels. The former consisted of high and low frequency, and the latter consisted of high and low complexity. The two constructions, Passive and Permissive, were included as training targets, with the former construction being more complex than the latter. Four experimental conditions were set up. They were High-Permissive (H-Per), Low-Permissive (L-Per), High-Passive (H-Pa) and Low-Passive (L-Pa). The dependent variable in this study was the gain scores obtained by the children, which were measured by the percentage changes between the pre- and post-training test scores. Besides, production of relative clause was chosen as the control variable in this study, as children generally had not acquired this structure by 3;06 (Paul, 2001). Data were collected across three phases, in the chronological order of baseline

(one session), training (three sessions) and testing (one session).

Participants

A total of 60 monolingual Cantonese-speaking children from four different nurseries in Hong Kong were seen. All of them had no report of language learning difficulties. To determine their appropriateness for this experiment, the investigator saw these children in a baseline session, during which they were screened with the "Transfer baseline" followed by the "Pre-training baseline" of one of the target constructions. Purposes and details of these baselines were discussed in the Procedure section. Twenty-one of the 60 children were screened out because they were reluctant to respond during the baseline session. Five of them either failed to meet the Transfer baseline or did not understand the test, as shown by giving irrelevant responses or repeating the investigator's utterances for all trials, and were therefore discontinued. Another ten of the children were excluded from the study because they were already using the target constructions that they were tested on in the pre-training baseline. They scored at least three correct on the eight items presented. Eventually, 24 children, including 14 boys and 10 girls, were included and completed the study. These children ranged in age from 2;06 to 3;10 (mean = 3;0, *SD* = 4 months). They were randomly assigned into the four experimental conditions, with each condition comprised of six children. The random assignment procedure was discussed in the Procedure section.

Procedure

A distributed exposure, instead of a massed exposure, was adopted in this study in order to maximize the children's production of the newly learned structures (Childers & Tomasello, 2002). Thus, the training sessions were scattered across 2 weeks and all phases of the study were completed in 3 weeks. In each of the sessions, the children's performances were audio-taped for later reliability measurement and for detailed analysis.

Baseline Phase

As discussed above, 60 children were seen in the baseline session. They were listed initially according to the time that they were going to be seen with the order of H-Per, L-Per, H-Pa and L-Pa for future experimental conditions assignment.

Transfer Baseline

The children were first screened with a Transfer baseline. The purpose of screening them with a Transfer baseline was to ensure that children recruited in this study were developing normally. Children at this age should have acquired Transfer as children at around two years old were reported to be using this form already (Wong, 2003). The children were required to use Transfer (e.g., *bei2*(give) *sing1sing1*(star) *ngo5*(I/me) = Give star to me) to ask for some snacks from the investigator in the beginning of the session. Only those children who produced two Transfer constructions out of three trials were considered having passed and continued to the pre-training baseline measurement.

Pre-training Baselines

Children who passed the Transfer baseline continued with the pre-training baseline measurement. The pre-training baselines were given to ensure that only those children who had no previous knowledge of Permissive or Passive were included in the study. The pre-training baseline, that is, Permissive or Passive, that the children were tested on corresponded to the experimental conditions that they were initially assigned to. However, if a child failed in the Transfer baseline and was therefore excluded, the next child on the list would not be tested with the originally assigned target construction. Instead, he/she would substitute the failed child's place and be given the baseline test of the target construction that had been initially assigned to the failed child. For instance, child A was initially assigned to L-Per and child B was in H-Pa. When A failed his Transfer baseline, B, instead of being tested on the use of Passive, he was placed into the condition of L-Per and was tested with Permissive. Children who achieved less than two points out of eight trials in the test passed the baseline

and were included in the study. In addition, they were assigned to the experimental condition that they were tested on. The activities adopted in the pre-training baselines were discussed below.

Pre-training baseline of Permissive. For the Permissive conditions, 11 animal puppets were used. One adult (E1) first introduced the characters and the background of the activity to the child. The child was told that he/she was going to be the King in the forest. The King was so authoritative that the other 11 animals could do nothing without asking for his/her permission. E1 then manipulated the animals one by one, and asked the King, for example, *daai6ban6zoeng6*(elephant) *seong2*(want) *sai2*(wash) *sau2*(hand) = Elephant wants to wash hands. The King would have to reply by using the target construction (e.g., *dai6wong4*(King) *bei2*(let) *daai6ban6zoeng6*(elephant) *sai2*(wash) *sau2*(hand) = King let elephant wash hands). The eight verbs used in the pre-training baseline test were *sai2*(wash), *zaa1*(drive), *maai5*(buy), *teng1*(listen), *cai3*(put together), *caai2*(ride), *daai3*(wear) and *zoek8*(wear).

Pre-training baseline of Passive. For the Passive conditions, three puppets were employed. E1 first introduced the characters and the background of the activity to the child. He/She was told that he/she was a nice child living with a mother and one naughty brother and one naughty sister. One afternoon, the mother was so tired that she went to have a nap. They were left to play on their own. At this time, the naughty brother and sister fooled around in the house. The child decided to be good and sat there and observed the whole situation. E1 then manipulated the naughty sister and caused an accident. Another adult (E2) manipulated the naughty brother and complained to the child (e.g., *mui4mui2*(sister) *tek8*(kick) *zau2*(away) *zo2*(ASP) *go3*(CL) *bo1*(ball) = Sister has kicked away the ball). Whenever the naughty children messed up something in the house, the mother, manipulated by E1, woke up from her nap to find out what happened. She asked the child by saying, for example, *go3*(CL) *bo1*(ball) *dim2joeng2*(how) *aar3*(SFP)*?* = How's the ball? The child would have to reply

with the target construction (e.g., *go3*(CL) *bo1(*ball) *bei2*(passive) *mui4mui2*(sister) *tek8*(kick) *zau2*(away) *zo2*(ASP) = The ball is kicked away by the sister). The eight verbs used in the pre-training baseline test were *tau1*(steal), *dam2*(throw), *sau1*(hide), *teoi1*(push), *coeng2*(take), *zoek8*(wear), *caai2*(step) and *deng3*(throw).

Control Baseline

Each child's production of relative clause, which did not receive any training, was collected as a control baseline. This baseline was taken in order to make causal inferences that any change in the dependent variable was truly induced by the independent variables (Shaughnessy, Zechmeister & Zechmeister, 2003) rather than resulted from maturation. In the testing of the control construction, 11 pairs of puppets were used. Each pair of puppets looked exactly the same except one contrastive item. In each trial, E1 introduced the two puppets to the child. Their contrastive item was pointed out to him/her. For example, the investigator told the child that *nei1dou6*(here) *jau5*(have) *loeng5*(two) *go3*(CL) *naam4zai2*(boy). *jat7*(one) *go3*(CL) *daai3*(wear) *luk9sik7*(green) *mou2*(hat). *jat7*(one) *go3*(CL) *daai3*(wear) *hung4sik7*(red) *mou2*(hat) = in translation, "Here are two little boys. One is wearing a green hat, and the other one is wearing a red one." E1 then manipulated the puppets and the child was required to observe what the puppets did. After that, the puppets were put out of sight in order to discourage pointing response. The investigator asked the child about the actions performed by the puppets with who-questions. For example, the investigator asked *bin1 go2*(who) *sik9*(eat) *gan2*(ASP) *hon3bou2baau1*(hamburger)*?* = Who is eating hamburger? Relative clauses in subject noun phrase were the optimal responses to the questions (e.g., *daai3*(wear) *luk9 sik1*(green) *mou2*(hat) *ge2*(PRT) *naam4zai2*(boy) = The boy wearing a green hat).

In the tests of Permissive, Passive and Control, three trials were given in the beginning of the activity to show children the expected responses. In the trial items, if the

children did not give the expected response, they were required to repeat after the investigator once. During the experimental trials, the children were not asked to repeat after the investigator when an appropriate response was not given. Instead, the investigator complimented the child for his/her interest and attention in order to keep him/her motivated. None of the verb phrases adopted in the training stimuli was used in the testing stimuli.

Training Phase

In the training phase, children were exposed to either Permissive or Passive with varied input frequencies according to the experimental conditions that they were assigned to. In each session, children in high input frequency conditions received six exposures of the target constructions, whereas those in low input frequency conditions only received two. In the end, children in high input frequency conditions were exposed to a total of 18 exposures of the targets. On the contrary, those in low input frequency conditions only received a total of six exposures after training.

Snow (1995) argued that social interactional contexts where both adults and children engaged in would enhance language acquisition. The target constructions were therefore introduced to the children in an interactive communication context. The contexts of the activities used in the training of Permissive and Passive were similar to those adopted in baseline measures, except that the verbs and the materials used in training were all different from those used in baseline testing. Unlike the baseline test, it was not necessary for the children to respond to the investigators during training. They were only asked to watch what was going on and listen to the target constructions produced by the investigator. Each training session lasted for about five to ten minutes. Two different verbs were used in each session in order to facilitate the children's induction of abstract linguistic patterns (Fey, 1986). Differences in activities for baseline test and training for each of the two target constructions were highlighted below.

Training of Permissive

For the Permissive conditions, eight puppets were employed in the training. Instead of talking about animals in the forest as in the baseline measure, a family involving parents and six kids were used as the characters of the training activity. The parent puppets took on the role of the one who gave permission as the King in the baseline test. They were referred to as the subject of the Permissive *bei2* constructions (e.g., *ma1mi4*(mother) *bei2*(let) *siu2koeng4*(Siu Keung) *sik9*(eat) *daan6gou1*(cake) = Mother let Siu Keung eat cake). The six verbs employed in the training were *sik9*(eat), *jam2*(drink), *tai2*(watch), *waak9*(draw), *waan2*(play) and *taan4*(play).

Training of Passive

For the Passive conditions, four animal puppets (a lion, a monkey, a cat and a dog) were employed in the training. The cat and the dog were the naughty ones who did all kinds of mischief. They were referred to as the agent-object in the Passive constructions (e.g., *go3*(CL) *min6baau1*(bread) *bei2*(passive) *maau1zai2*(cat) *sik9*(eat) *zo2*(ASP) = The bread is eaten by the cat). The lion played the role of the mother in the testing activity, and the monkey demonstrated the use of the constructions. The six verbs used in the training were *daa2 laan6*(break), *jam2*(drink), *sik9*(eat), *waak9*(drawn), *mit1*(tear) and *dou2*(pour).

Additional Transfer

Referring back to the Competition Model, MacWhinney (personal communication, October 2004) suggested that children could have problems learning new language forms which were similar to those that they had already acquired. But such negative effect could be reduced when the new forms were introduced together with the known forms. Based on this argument, the children in this study could be inhibited in the learning of Permissive and Passive because of their confusability with other acquired *bei2* structures, such as Transfer. In order to minimize such inhibition, all the children were also exposed to Transfer in addition

to the target constructions they heard during each training session for comparison. The Transfer constructions were given when it was situationally appropriate. For instance, in session one of Permissive conditions, after the puppets had asked their parents for permission, E1 manipulated one of the puppets and said, for example, *siu2koeng4*(Siu Keung) *bei2*(give) *daan5gou1*(cake) *siu2fan1*(Siu Fun) = Siu Keung gives the cake to Siu Fun. The mother and the father puppets were not involved as agent or recipient in the Transfer *bei2* construction in order to prevent the child from confusing this with the Permissive construction. Similarly, the dog and the cat puppets were not involved as agent or recipient in the Transfer *bei2* construction so as to prevent the child from confusing this with the Passive construction. Each session, children in high frequency conditions received six exposures of Transfer; whereas those in low frequency conditions only received two (i.e., the same number of exposures as target constructions).

Testing Phase

In the testing phase, the children were tested on the production of either Permissive or Passive with reference to the conditions that they belonged to. In addition, a post-training baseline of the control was collected as well. These were achieved by administering the tests used in the baseline measures once again.

Scoring

Training Constructions

Children's responses were only scored as correct when they were complete sentences with the subject noun phrase present. One point was given to answers such as *dai6wong4*(King) *bei2*(let) *daai6ban6zoeng6*(elephant) *sai2*(wash) *sau2*(hand) = King let elephant wash hands, in the Permissive conditions and *bui1*(CL) *hei3seoi2*(coke) *bei2*(passive) *mui4mui2*(sister) *tau1*(steal) *zo2*(ASP) = The coke is stolen by the sister, in the Passive conditions.

Incorrect answers were either given a zero point or classified as “non-scorable (NS)”. Zero point was given to those incorrect answers which revealed that the child understood the task. For example, no point was given to answers such as *dai6wong4*(King) *bei2*(give) *daan1ce1*(bicycle) *ma5zai2*(horse) *caai2*(ride) = King gives the bicycle to the horse to ride, in the Permissive conditions as it was a Transfer construction. Similarly, no point was given to responses such as *bei2*(passive) *mui4mui2*(sister) *tau1*(steal) *zo2*(ASP) = Is stolen by the sister, produced by children in the Passive conditions because of the omission of the subject noun phrase. Incorrect answers were, on the other hand, classified as NS when they suggested that the child did not understand the task, for example, when the child answered by repeating the stimuli given by the investigator only. No children had more than three non-scorable answers for the eight trials.

One child in H-Per replaced the word *bei2*(let) with *ceng2*(invite) in all his responses. For example, his answered with *dai6wong4*(King) *ceng2*(invite) *wu1gwai1*(turtle) *teng1*(listen) *jam1ngok9*(music) = King invites the turtle to listen to music, instead of the expected answer *dai6wong4*(King) *bei2*(let) *wu1gwai1*(turtle) *teng1*(listen) *jam1ngok9*(music) = King let the turtle listen to music. These responses were considered as correct. This was because the researcher aimed at investigating the effect of input frequency and linguistic complexity on the learning of Permissive and Passive in this study. The word *bei2* was only considered as the prototypical lexical item for the targeted constructions. It was believed that other words like *ceng2*(invite) or *giu3*(ask) would also be appropriate for these constructions as long as their language functions were maintained. This child’s responses were therefore marked as correct as their language functions were appropriate.

Control Constructions

One point was given to noun phrases that were modified by a relative clause, which included a verb phrase preceding the particle *ge2* or the demonstrative + classifier *go2 go3*

(e.g., *zaat8*(braid) *bin1*(ponytail) *ge2*(PRT) *neoi5zai2*(girl) = Girl who has a ponytail, or *zaat8*(braid) *bin1*(ponytail) *go2*(that) *go3*(CL) = That one with a ponytail). No mark was given to responses such as *go2*(that) *go3*(CL) = That one.

Reliability

Thirty-three percent of the data (two samples from each experimental condition) were randomly selected for inter-rater reliability check. The samples were re-transcribed and re-scored according to the scoring scheme presented in the Method section by a final year student studying Speech and Hearing Sciences in the University of Hong Kong. Pearson's correlation coefficient, *r*, was used to measure the reliability. A positive correlation ($r = .99$, $p = .00$) was calculated, suggesting a strong correlation between the scores from the raters.

RESULTS

Training Constructions

The raw scores obtained by the children in each task were transformed into percentages for further statistical analysis. This was achieved by dividing the number of correct responses by the total number of scorable responses in a single task. Comparisons between experimental conditions, and between target and control constructions were made based on "gain scores". Gain scores were measured by the percentage changes between the pre- and post-training test scores.

ANOVAs were run on the gain scores to examine the experimental main and interaction effects. Table 1 presented the means and the standard deviations of the gain scores of the training constructions. Cohen's *f* (Cohen, 1988) was used to measure the effect size. Based on Cohen's guidelines, *f* value of .10, .25 and .40 were interpreted as small, medium and large effect sizes respectively.

Table 1

The Mean (and Standard Deviations) of the Gain Scores of the Training Constructions in Each Experimental Condition

Frequency	Complexity		Mean
	Permissive	Passive	
High	65.00 (35.25)	12.80 (31.63)	38.90 (41.99)
Low	31.25 (40.12)	0.00 (7.91)	15.63 (32.04)
mean	48.13 (40.09)	6.40 (22.98)	

Children made more gains with constructions presented in high (mean = 38.90, *SD* = 41.99) than in low frequencies (mean = 15.63, *SD* = 32.04). They generally made more gains with the simpler construction, that is, Permissive (mean = 48.13, *SD* = 40.09) than with the more complex construction, that is, Passive (mean = 6.40, *SD* = 22.98). In general, the effect of input frequency was present for both constructions. The complexity effect was also present for both input frequency conditions.

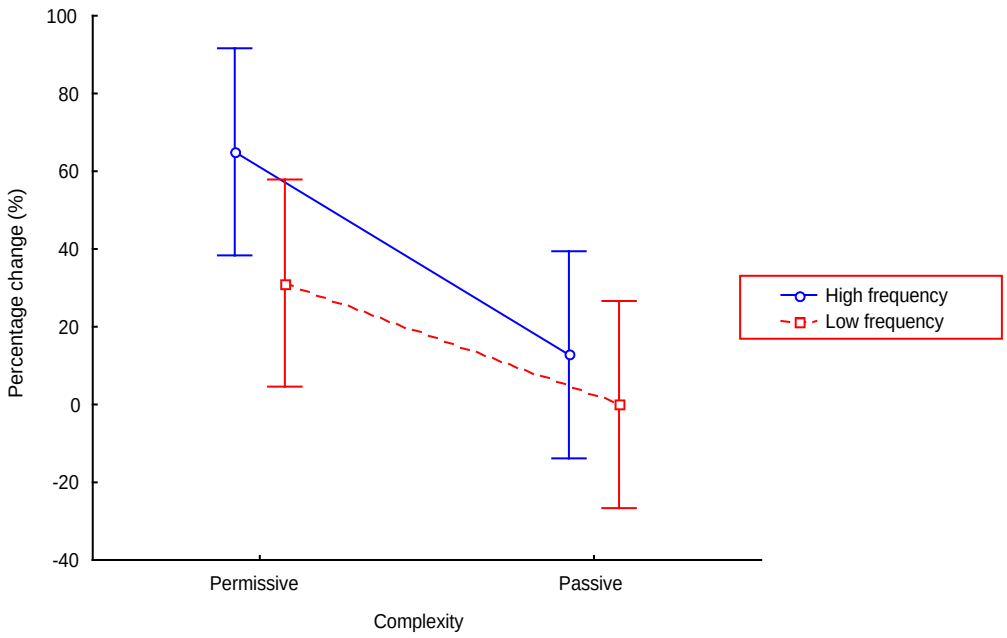

Figure 1. The plot of interaction between input frequency and linguistic complexity.

In a two-way ANOVA, the independent variables were entered as frequency of input (high *v*. low) and linguistic complexity (Permissive *v*. Passive). The dependent variable was the gain score of the target constructions. The interaction between the two independent variables was presented in Figure 1.

Interaction effect between the two independent variables was not significant ($F(1,20) = 0.67$, $p = .42$, $f = .18$). Main effect of complexity was statistically significant ($F(1,20) = 10.67$, $p = .00$, $f = .73$). Main effect of input frequency was not significant ($F(1,20) = 3.32$, $p = .08$, $f = .41$). Since the main effect of frequency and the interaction effect were not significant, power analysis was performed. Power for the frequency effect was .26. Although it was relatively small, input frequency had a large effect size (i.e., $f = .41$). This suggested that a significant effect would likely be found if the sample size was increased. On the contrary, Power for the interaction effect was .09, which was small as well. However, as interaction effect only had a small effect size (i.e., $f = .18$), it was unlikely for the investigator to obtain a significant result even the sample size was increased.

In order to confirm the observations obtained above, a child-by-child analysis was performed. Children who received a gain score that was higher or equal to 60% was considered “pass” in the task. The number of children who passed the training was examined for each experimental condition. The results were presented in Table 2.

Table 2

The Number of Children who Passed the Training in Each Experimental Condition

	Complexity		
Frequency	Permissive	Passive	Mean
High	5	1	3
Low	1	0	0.5
mean	3	0.5	

More children made gains with constructions presented in high (mean = 3) than in low frequencies (mean = 0.5). More children made gains with the simpler construction, that is, Permissive, (mean = 3) than with the more complex construction, that is, Passive (mean = 0.5). Such pattern was consistent with the observations made previously from the group analysis, that is, the mean number of children measured was consistent with the group findings where large effect sizes were found in both frequency and complexity.

Control Constructions

The gain scores for the training constructions of each of the four experimental conditions were compared with their gain scores for the control constructions. This served as a measure of training effect. A significant difference between the two scores suggested the presence of training effect for the training constructions. Nonparametric Wilcoxon matched pairs test was used as the scores were not normally distributed. Comparison was made for each condition separately as the four conditions would not have the same training effect because of the differences in their training conditions.

Significant difference between gain score obtained in the target construction and in the control construction was obtained for the H-Per condition ($T = 0.00$, $p = .04$). Thus, training effect was present for H-Per. But the differences were not significant for the conditions of L-Per ($T = 1.00$, $p = .29$), H-Pa ($T = 2.50$, $p = .79$) and L-Pa ($T = 0$). This showed that there was generally no training effect in these experimental conditions.

DISCUSSION

Interaction of Input Frequency and Linguistic Complexity

Wong (2003) concluded from his language sample data analysis that input frequency and linguistic complexity interacted with each other and determined language learning. However, the interaction between these two independent variables was not significant in this study. This lack of an interaction effect, in fact, was not interpretable. This was because

seven out of 12 children in the two Passive conditions obtained zero gain score after training. Another two children obtained a negative gain score which was no lower than -15%. These children did not produce any passive construction in the post-training test and one to two of these constructions in the pre-training test. Such low instances of use pre-training could be a consequence of surface imitation of the constructions presented in the trials. Such a floor effect prohibited the interpretation of interaction (Shaughnessy et al., 2003).

Effects of Input Frequency and Linguistic Complexity

As mentioned in the introduction, some scholars proposed that input frequency was the main factor governing children's language acquisition. Although the main effect of input frequency was not significant in the current study, its large effect size suggested that it played a role in language acquisition. Power was small, however, given this sample size. Shaughnessy et al. (2003) explained that sample size was the main factor governing the sensitivity of an experiment (i.e., the power). Given the small sample size, this study did not have enough power to report a significant effect. A research into some of the training studies published in journals suggested that the average number of subjects recruited for each experimental group should be around 20 (Brooks & Tomasello, 1999; Nelson, 1977; Tomasello & Jeffrey, 1986). In the present study, each group only comprised of six children. Hence, an increase in the sample size of this study would probably raise its power, which in turn would reveal the main effect of input frequency, and support the above point of view.

This study provided experimental evidence which confirmed earlier works on the importance of linguistic complexity on language development. A significant main effect and a large effect size suggested that complexity had a large effect on the acquisition of *bei2* constructions.

An examination of the children's error patterns confirmed such a complexity effect on language learning. Among the six out of 12 children who had not achieved the pass score in

the Permissive conditions, none of them produced an incomplete Permissive construction, or a Permissive construction that was syntactically appropriate. Instead, these children used alternative constructions to accomplish the same function of giving permission. For example, some of them responded with imperatives *cai3*(put together) *laa1*(SFP) = play. For Passive conditions, among the 11 out of 12 children who did not achieve the pass score, seven of them either produced a truncated Passive or Passive constructions that were syntactically inappropriate. An example of the former was *bei2*(passive) *mui4mui2*(sister) *tau1*(steal) *zo2*(ASP) = Is stolen by the sister, in which the subject noun phrase was omitted. An example of the latter was *zeung1*(CL) *dang3*(chair) *bei2*(passive) *dit8*(fall) *zo2*(ASP) *li1dou6*(here) *zeung1*(CL) *toi2*(table) = The chair by fallen here the table. The rest of them gave answers that did not serve any "passive" meaning, for example, *mui4mui2*(sister) *tau1*(steal) *zo2*(ASP) *go3*(CL) *hei3seoi2*(coke) = Sister has stolen the coke, which was an active construction.

It could be argued that truncated Passives should be scored as correct. This was because the omission of the subject noun phrase was acceptable in spoken Cantonese (Li & Thompson, 1976, 1981; cited in Matthews & Yip, 1994). Also, patient-focused questions (e.g., *bui1*(CL) *hei3seoi2*(coke) *dim2yoeng2*(how) *aar*(SFP)*?* = How is the coke?) were used in this study to elicit Passive responses from the children. In such a question context, the head noun became shared information between the investigator and the children, and thus could be left out (Brooks & Tomasello, 1999) in English as well as in Cantonese. However, the current scoring criteria were appropriate for the following reasons. The children were trained on the use of full Passives. During the trials before the experimental items, they were given models on full Passives only. As far as Passive construction was concerned, given that they had no knowledge of this construction, it was assumed that they were not aware that truncated Passive construction was acceptable. Therefore, it was only appropriate that truncated Passive responses were considered incorrect and errors in this particular experimental context.

In summary, examination of the error patterns suggested that children had more difficulty with the learning of Passive than Permissive constructions and, hence, supported the findings of significant main effect in complexity from statistical analysis.

Given a small sample size of 24 children, this study identified a significant effect of complexity with a large effect size. Although the effect of input frequency was not significant, it might be revealed when a larger sample was recruited, as its effect size was large. This study suggested that it was likely that both input frequency and linguistic complexity together determined the development of *bei2* constructions.

Passive in Cantonese

Visual inspection of the data obtained revealed that the frequency effect on the learning of Passive was not as salient as that on Permissive. Furthermore, children in L-Pa actually showed a mean of zero gain score in the training constructions. This probably suggested that Passive was too difficult for children to learn, although the investigator had made it easier with the use of inanimate patient and optimal training setting.

In the training, an inanimate patient and an animate-agent were adopted in Passive. This was contrary to Permissive, which involved the use of both animate-agent and animate-patient. Such distinctive animacy minimized the possibility of role-confusion for children learning Passives, and hence made it easier to learn. Besides, an optimal discourse context for Passive was set up to give models of Passive to the children during training sessions. Such pragmatic contexts were considered as optimal for learning and producing Passive. This should have maximized the possibility of children's acquisition and production when compared with that in naturalistic contexts. However, given the floor performance of children in the condition of L-Pa, it was believed that Passive was very difficult for children to learn, especially with low frequency input.

CONCLUSION AND FUTURE DIRECTION

A body of literature had accumulated which identified input frequency and linguistic complexity as two important factors governing children's language learning. MacWhinney (2001) even proposed that these two factors interacted and competed with each other to determine language acquisition. However, studies investigating these two variables so far either examined them individually (Brooks & Tomasello, 1999; Nelson, 1977) or based mainly on the analysis of naturalistic data (Rowland et al., 2003; Wong, 2003). This study, on the contrary, experimentally manipulated these two factors together at the same time in order to investigate the interaction effect between them. Although the interaction found in this study was uninterpretable, and its effect could not be determined, the convergence effect between input frequency and linguistic complexity was still advocated.

In order to reveal the interaction, a few modifications could be made in future studies. In the first place, the number of exposure of the target constructions for children in all experimental conditions should be increased in order to avoid floor effect. The numbers of exposure during training were arbitrarily chosen in the current study (i.e., 18 exposures for high frequency conditions and six exposures for low frequency conditions). These numbers were not enough for some children to begin to learn the target constructions, particularly for those learning Passive in low input frequency condition. The numbers of exposure were therefore suggested to increase. For instance, children in low frequency conditions would be given a total of nine exposures; whereas children in high frequency conditions would be given a total of 24 exposures in training. However, it had to be aware that the numbers of exposure chosen for high frequency conditions should not be too high in order to prevent ceiling effect.

Besides, children were recruited based on their performance in the pre-training tests on the production of Permissive or Passive in this study. Only those children who did not have knowledge on these target constructions were included. In future studies, formal

language test, for example, Cantonese version of the Reynell Developmental Language Scales (Reynell & Huntley, 1987), would be recommended in subject recruitment exercise in addition to the pre-training tests administered. This would enable the researcher to control the children's general language ability, which might affect their ability in learning a particular language form, and thus might severed as a confounding variable to the current study.

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Appendix A

Stimuli Used in Baseline and Testing Phases

Table A1

Stimuli for Permissive Conditions

Trial Stimuli			Expected Responses		
Chinese	Transcription (LSHK, 1994)	English Translation	Chinese	Transcription (LSHK, 1994)	English Translation
雞仔想摺飛機	*gai1zai2 seong2 zip8 fei1gei1.*	Chicken wants to fold aeroplane.	大王俾雞仔摺飛機	*dai6wong4 bei2 gai1zai2 zip8 fei1gei1.*	King let chicken fold aeroplane.
牛牛想切蘋果	*ngau4ngau2 seong2 cit8 ping4gwo2.*	Cow wants to cut apple.	大王俾牛牛切蘋果	*dai6wong4 bei2 ngau4ngau2 cit8 ping4gwo2.*	King let cow cut apple.
豬仔想搽麵包	*zyu1zai2 seong2 caa4 min6baau1.*	Pig wants to spread bread.	大王俾豬仔搽麵包	*dai6wong4 bei2 zyu1zai2 caa4 min6baau1.*	King let pig spread bread.
Experimental Stimuli			Expected Responses		
Chinese	Transcription (LSHK, 1994)	English Translation	Chinese	Transcription (LSHK, 1994)	English Translation
大笨象想洗手	*daai6ban6-zoeng6 seong2 sai2 sau2.*	Elephant wants to wash hands.	大王俾大笨象洗手	*dai6wong4 bei2 daai6ban6zoeng6 sai2 sau2.*	King let elephant wash hands.
老虎想	*lou5fu2*	Tiger wants	大王俾老	*dai6wong4 bei2*	King let

zaa1 車	*seong2 zaa1 ce1.*	to drive car.	虎 *zaa1* 車	*lou5fu2 zaa1 ce1.*	tiger drive car.
狗仔想買玩具	*gau2zai2 seong2 maai5 wun6geoi6.*	Dog wants to buy toys.	大王俾狗仔買玩具	*dai6wong4 bei2 gau2zai2 maai5 wun6geoi6.*	King let dog buy toys.
烏龜想聽音樂	*wu1gwai1 seong2 teng1 jam1ngok9.*	Turtle wants to listen to music.	大王俾烏龜聽音樂	*dai6wong4 bei2 wu1gwai1 teng1 jam1ngok9.*	King let turtle listen to music.
熊貓想砌積木	*hung4maau1 seong2 cai3 zik1muk9.*	Panda wants to put blocks together.	大王俾熊貓砌積木	*dai6wong4 bei2 hung4maau1 cai3 zik1muk9.*	King let panda put blocks together.
馬仔想踩單車	*ma5zai2 seong2 caai2 daan1ce1.*	Horse wants to ride bicycle.	大王俾馬仔踩單車	*ngo5/dai6wong4 bei2 ma5zai2 caai2 daan1ce1.*	King let horse ride bicycle.
鴨仔想戴眼鏡	*aap8zai2 seong2 daai3 ngaan5geng2*	Duck wants to wear glasses.	大王俾鴨仔戴眼鏡	*dai6wong4 bei2 aap8zai2 daai3 ngaan5geng2*	King let duck wear glasses.
熊仔想著褲	*hung4zai2 seong2 zoek8 fu3.*	Bear wants to wear trousers.	大王俾熊仔著褲	*dai6wong4 bei2 hung4zai2 zoek8 fu3.*	King let bear wear trousers.

Table A2

Stimuli for Passive Conditions

Trial Stimuli			Expected Responses		
Chinese	Transcription (LSHK, 1994)	English Translation	Chinese	Transcription (LSHK, 1994)	English Translation
細佬踢走左個波	*sai3lou2 tek8 zau2 zo2 go3 bo1.*	The brother has kicked away the ball.	個波俾細佬踢走左	*go3 bo1 bei2 sai3lou2 tek8 zau2 zo2.*	The ball is kicked away by the brother.
妹妹整斷左條頸鏈	*mui4mui2 zing2tyun5 zo2 tiu4 geng2lin2.*	The sister has broken the necklace.	條頸鏈俾妹妹整斷左	*tiu4 geng2lin2 bei2 mui4mui2 zing2tyun5 zo2.*	The necklace is broken by the sister.
細佬剪爛左張紙	*sai3lou2 zin2 laan6 zo2 zoeng1 zi2.*	The brother has cut the piece of paper.	張紙俾細佬剪爛左	*zoeng1 zi2 bei2 sai3lou2 zin2 laan6 zo2.*	The piece of paper is cut by the brother.
Experimental Stimuli			Expected Responses		
Chinese	Transcription (LSHK, 1994)	English Translation	Chinese	Transcription (LSHK, 1994)	English Translation
妹妹偷左杯汽水	*mui4mui2 tau1 zo2 bui1 hei3seoi2.*	The sister has stolen the coke.	杯汽水俾妹妹偷左	*bui1 hei3seoi2 bei2 mui4mui2 tau1 zo2.*	The coke is stolen by the sister.
細佬	*sai3lou2 dam2 zo2 go3*	The brother has thrown	個蕃茄俾	*go3 faan1ke2 bei2 sai3lou2*	The tomato is thrown

dam2 左個蕃茄	*faan1ke2.*	away the tomato.	細佬 *dam2* 左	*dam2 zo2.*	away by the brother.
妹妹收埋左隻杯	*mui4mui2 sau1 maai4 zo2 zek8 bui1.*	The sister has put away the cup.	隻杯俾妹妹收埋左	*zek8 bui1 bei2 mui4mui2 sau1 maai4 zo2.*	The cup is put away by the sister.
細佬推跌左張凳	*sai3lou2 teoi1 dit8 zo2 zeung1 dang3.*	The brother has pushed down the chair.	張凳俾細佬推跌左	*zeung1 dang3 bei2 sai3lou2 teoi1 dit8 zo2.*	The chair is pushed down by the brother.
妹妹搶左條雪條	*mui4mui2 coeng2 zo2 tiu4 syut8tiu2.*	The sister has taken the ice cream.	條雪條俾妹妹搶左	*tiu4 syut8tiu2 bei2 mui4mui2 coeng2 zo2.*	The ice cream is taken by the sister.
細佬著左件褸	*sai3lou2 zoek8 zo2 gin6 lau1.*	The brother has worn the jacket.	件褸俾細佬著左	*gin6 lau1 bei2 sai3lou2 zoek8 zo2.*	The jacket is worn by the brother.
妹妹踩爆左個波	*mui4mui2 caai2 baau3 zo2 go3 bo1.*	The younger sister has burst the balloon.	個波俾妹妹踩爆左	*go3 bo1 bei2 mui4mui2 caai2 baau3 zo2.*	The balloon is burst by the younger sister.
細佬掟走左個公仔	*sai3lou2 deng3 zau2 zo2 go3 gung1zai2.*	The brother has thrown away the doll.	個公仔俾細佬掟走左	*go3 gung1zai2 bei2 sai3lou2 deng3 zau2 zo2.*	The doll is thrown away by the brother.

Table A3

Stimuli for Control Constructions

Trial Stimuli			Expected Responses		
Chinese	Transcription (LSHK, 1994)	English Translation	Chinese	Transcription (LSHK, 1994)	English Translation
邊個食緊漢堡飽？	*bin1 go2 sik9 gan2 hon3bou2-baau1?*	Who is eating a hamburger?	著黃色衫既女仔	*zoek8 wong4 sik7 saam1 ge2 neoi5zai2*	The girl wearing a yellow T-shirt.
邊個睇緊書？	*bin1 go2 tai2 gan2 syu1?*	Who is reading a book?	戴手錶既男仔	*daai3 sau2biu1 ge2 naam4zai2*	The boy wearing a watch.
邊個坐 o 係凳度？	*bin1 go2 co5 hai2 deng3 dou6?*	Who is sitting on a chair?	戴眼鏡既男仔	*daai3 ngaan5geng2 ge2 naam4zai2*	The boy wearing glasses.
Experimental Stimuli			Expected Responses		
Chinese	Transcription (LSHK, 1994)	English Translation	Chinese	Transcription (LSHK, 1994)	English Translation
邊個睇緊電視？	*bin1 go2 tai2 gan2 din6si6?*	Who is watching TV?	紮辮既女仔	*zaat8 bin1 ge2 neoi5zai2*	The girl with a ponytail.
邊個畫緊圖畫？	*bin1 go2 waak9 gan2 tou4waa2?*	Who is drawing a picture?	著褲既女仔	*zoek8 fu3 ge2 neoi5zai2*	The girl wearing trousers.
邊個跑緊	*bin1 go2*	Who is	拖住隻狗	*to1 zyu6 zek8*	The boy

步？	*paau2 gan2 bou6?*	running?	既男仔	*gau2 ge2 naam4zai2*	trailing a dog.
邊個踢緊波？	*bin1 go2 tek8 gan2 bo1?*	Who is kicking a ball?	揹住個背囊既女仔	*me1 zyu6 go3 bui3long4 ge2 neoi5zai2*	The girl with a backpack.
邊個講緊電話？	*bin1 go2 gong2 gan2 din6waa2?*	Who is talking on the phone?	戴頸鏈既女仔	*daai3 geng2lin2 ge2 neoi5zai2*	The girl wearing a necklace.
邊個飲緊水？	*bin1 go2 jam2 gan2 seoi2?*	Who is drinking water?	*zaa1* 住本書既男仔	*zaa1 zyu6 bun2 syu1 ge2 naam4zai2*	The boy holding a book.
邊個玩緊啤牌？	*bin1 go2 waan2 gan2 pe1paai2?*	Who is playing cards?	戴住耳環既女仔	*daai3 zyu2 yi5waan2 ge2 neoi5zai2*	The girl wearing earrings.
邊個訓緊覺？	*bin1 go2 fun3 gan2 gaau3?*	Who is sleeping?	攬住熊仔既女仔	*laam2 zyu6 hung4zai2 ge2 neoi5zai2*	The girl holding a teddy bear.

Appendix B

Stimuli Used in Training Phases

Table B1

Stimuli for Permissive Conditions

Session no.	Training Stimuli		
	Chinese	Transcription (LSHK, 1994)	English Translation
1	媽咪俾 (A/B/C) 食蛋糕	*ma1mi4 bei2 (kids A/B/C) sik9 daan6gou1.*	Mother let (kids A/B/C) eat cake.
	爸爸俾 (D/E/F) 飲橙汁	*ba4ba1 bei2 (kids D/E/F) jam2 caang2zap1.*	Father let (kids D/E/F) drink orange juice.
2	媽咪俾 (A/B/C) 睇電視	*ma1mi4 bei2 (kids A/B/C) tai2 din6si6.*	Mother let (kids A/B/C) watch TV.
	爸爸俾 (D/E/F) 畫圖畫	*ba4ba1 bei2 (kids D/E/F) waak9 tou4waa2.*	Father let (kids D/E/F) draw pictures.
3	媽咪俾 (A/B/C) 玩波波	*ma1mi4 bei2 (kids A/B/C) waan2 bo1bo1.*	Mother let (kids A/B/C) play ball.
	爸爸俾 (D/E/F) 彈鋼琴	*ba4ba1 bei2 (kids D/E/F) taan4 gong3kam4.*	Father let (kids D/E/F) play piano.

Note. Kids A to F = Siu Fun, Siu Ming, Siu Lai, Siu Keung, Siu Fa, Siu Bo

Table B2

Stimuli for Passive Conditions

Session no.	Training Stimuli		
	Chinese	Transcription (LSHK, 1994)	English Translation
1	隻杯/碗/碟俾貓仔打爛左	*zek8 bui1/wun2/dip2 bei2 maau1zai2 daa2 laan6 zo2*	The glass/bowl/plate is broken by the cat.
	杯水/橙汁/碗湯俾狗仔飲左	*bui1 seoi2/caang2zap1/ wun2 tong1 bei2 gau2zai2 jam2 zo2*	The water/orange juice/soup is drunk by the dog.
2	o 的薯條/個麵包/蛋糕俾貓仔食左	*di1 syu4tiu2/ go3 min6baau1/daan6gou1 bei2 maau1zai2 sik9 zo2*	The French fries/ bread/cake is eaten by the cat.
	本書/件衫/個書包俾狗仔畫花左	*bun2 syu1/ gin6 saam1/ go3 syu1baau1 bei2 gau2zai2 waak9 faa1 zo2*	The book/ the clothes/ the schoolbag is drawn dirty by the dog.
3	本書/張報紙/個公仔俾熊仔 mit 爛左	*bun2 syu1/ zoeng1 bou3zi2/ go2 gung1zai2 bei2 hung4zai2 mit1 laan6 zo2*	The book/newspaper/ doll is torn by the bear.
	杯水/橙汁/碗湯俾狗仔倒瀉左	*bui1 seoi2/caang2zap1/ wun2 tong1 bei2 gau2zai2 dou2 se2 zo2*	The water/orange juice/soup is poured by the dog.

Appendix C

Recording Sheet

Name: _____ Age: _____ D.O.B.: _____

Class: _____ Group: _____

Transfer

1	2	3

Permissive/Passive

Transcription	Score	Transcription	Score
T1		T2	
T3			
1		2	
3		4	
5		6	
7		8	

Control

Transcription	Score	Transcription	Score
T1		T2	
T3			
1		2	
3		4	
5		6	
7		8	