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Passive Structure Features in Mandarin-Speaking Children with Specific Language Impairment: Optional Movement

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Abstract

Based on the comprehension and production of passives by normal children and children with SLI (Specific Language Impairment), this paper describes the acquisition features of passives by Mandarin-speaking children with SLI. Results show that: 1) The type of passives that both normal Mandarin-speaking children and children with SLI produced most was the patient subject sentence, namely, "Noun (Patient) + Verb + Complement". Children with SLI were not as good as TDA (Typically-Developing Age Matched children) both in the production and comprehension of passives. 2) One of the important linguistic features Mandarin SLI children hold is that syntactic movement in complex sentences is optional, not obligatory.

Keywords

Specific Language Impairment (SLI), Passive Structures, Mandarin-Speaking Children

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1. Introduction

Children with Specific Language Impairment (SLI) refer to those who show a significant impairment in language ability whereas there are no accompanying language learning problems, such as hearing impairment, low nonverbal intelligence, mental retardation, or neurological damage (Bishop, 1992). SLI is also called developing acalaphasia, developing aphasia, or developing speech disorder, and its prevalence in English-speaking countries is around 7% (Leonard, 1998).

Both the production and comprehension abilities of children with SLI have been investigated in lots of research, and SLI children's language deficits are shown in different aspects, such as the deficits in phonetics (Marshall, Marinis & van der Lely, 2007), morphology (Hansson & Nettelbladt, 1995) and word order (Rothweiler & Clahsen, 1993). In syntax, SLI children exhibit problems in the acquisition of complex syntactic structures, especially those involving movements from canonical to non-canonical sentences, such as passive structures (Friedmann & Novogrodsky, 2007; van der Lely, 1996, 1998; van der Lely & Battell, 2003). These difficulties reflect weakness in grammatical computation and phonological short-term memory from a wide variety of cross-language studies, such as Romance languages, Germanic languages, Uralic languages and Chinese languages (Bedore & Leonard, 2001; Wexler, Schaeffer & Bol, 2004; Lukacs, Leonard, Kas & Pleh, 2009; Fletcher, Leonard, Stokes & Wong, 2005).

Previous studies on complex structures have mainly focused on SLI children in western countries, such as Britain, the U.S., Italy, Germany, Sweden and Spain (Hansson & Nettelbladt, 1995; Rice, Wexler & Redmond, 1999; van der Lely & Ullman, 1996; van der Lely, 1998; van der Lely & Battell, 2003), and a few studies have devoted to Cantonese-speaking SLI children (Cheung, 2008; Leonard, Wong, Deevy, Stokes & Fletcher, 2006). However, little systematic research on

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complex sentences such as passives has ever been carried out for Mandarin-speaking SLI children. The present study attempts to describe the grammatical features of Mandarin-speaking children with SLI and to provide an in-depth theoretical exploration of their acquisition of passive structures.

2. Acquisition of Passives in Mandarin

2.1. Passives in Mandarin

BEI-constructions differ from the canonical SVO structures in word order, whose patient arguments usually occupy the sentence-initial positions. Different from English, Chinese is not rich in its morphology. This can be seen from the Chinese passive structures, in which no morphological changes occur in verbs, and the passive meanings need to be expressed through auxiliary words, called 'lexical marker' (Lv, 2002). The main lexical markers are *BEI*, *JIAO*, *RANG*, *GEI* in modern Chinese passives (Li, 1993; Zhu, 1982). The basic structure is NP_1+*BEI*+NP_2+*Verb*+*Complement*. All the noun phrases before *BEI* are called NP_1, and those after *BEI* are called NP_2. Here the subject NP_1 is a patient argument semantically, and the object NP_2 refers to an agent of action, which can be overt, covert, or deleted (Ding, 1999). Given that the agent is optional, Chinese passives can be divided into two categories, long passives and short passives (Lu, 2004). The former refers to a structure with a passive marker and an overt agent, in which the patient argument acts as a subject in sentence-initial position, such as (1), while the latter refers to a structure with a passive marker but no overt agent, such as (2).

(1) Men *BEI* Xiaoming guan shang le. (Long passive sentence)

Door *BEI* Xiaoming close up ASP

'The door was closed by Xiaoming.'

(2) Men *BEI* guan shang le. (Short passive sentence)

Door *BEI* close up ASP

'The door got closed.'

According to Huang (1999), the typical passive structure NP_1+*BEI*+NP_2+*V*+*Complement* involves a null operator movement. He further argues that Chinese long passives are similar to English tough constructions, such as *John is easy to please*. The detailed analysis is indicated in (3a), in which *BEI* selects a clause as its complement. And the patient argument in the embedded clause is a null-operator, which undergoes A′-movement. Then it gets bound by the matrix subject under the process of predication. With regard to short passives, Huang proposes that they are not an agent-deleted version of long passives, but structures somewhat parallel to English *get*-passives. As presented in (3b), *BEI* selects a VP as its complement, while a PRO, the complement of VP, undergoes A-movement to [Spec, VP], and then it gets controlled by the base-generated subject.

(3) a. Men_i [$_{VP}$ *BEI* [$_{IP}$ OP_i [$_{IP}$ Xiaoming guan shang le $_{ti}$]]] (A′-movement)

Door *BEI* Xiaoming close up ASP

'The door was closed by Xiaoming.'

b. Men_j [*BEI* [$_{VP}$ PRO_j [guan shang le $_{tj}$]]] (A-movement)

Door *BEI* close up ASP

'The door got closed.'

Although both Mandarin long passives and short passives cover movements in syntactic processing, null operator movements in long passives are attached to A′-movements while PRO movements in short passives belong to A-movements.

Moreover, one type of unaccusative sentences is similar to passives in several aspects. Syntactically, the subject is the underlying logic object of the verb, and the verb can be used in a passive structure without any violation of constraints (Huang, 2007; Pan & Han, 2005); semantically, the sentence expresses strong passive meaning without a passive marker, such as (4). In short, three types of passives in Mandarin Chinese are studied in this paper, namely, long passives, short passives and patient subject structures.

(4) Men guan shang le. (Patient subject sentence)

Door close up ASP

'The door closed.'

2.2. Acquisition of Passives by Typically Developing Children in Mandarin

There are many studies on children's acquisition of passives in recent decades, which have produced some important findings: 1) Passive structures occur around the age of two. Children cannot fully grasp passives before the age of three (Li, 1995; Li, Zhou & Kong, 1990). 2) Short passives are easier to acquire than long passives (Chang, 1986). The most common passives are unaccusatives (Zhou, 1997; Liu, 2009). 3) Children most often use resultative complements in passives with the aspect marker LE (Zhou, 1997; Li, 1991).

2.3. Acquisition of Passives in Children with SLI

In the acquisition of complex sentences, errors of omission are frequently made by SLI children, especially on functional categories as well as major syntactic categories, such as nouns, verbs, and embedded sentences (Morehead & Ingram, 1973).

Previous studies on the acquisition of passives by SLI children have shown that they are not as good as TDA (Typically-Developing Age Matched) children, but similar to TDY (Typically-Developing Younger) children (Bishop, 1979; Marshall, Marinis & van der Lely, 2007). And SLI children have more difficulties with long passives than short passives, and they prefer to interpret those short passives as adjectival structures (Deen, 2011; Demuth, Moloi & Machobane, 2010; Kirby, 2010; van der Lely, 1996). In addition, the insufficiency of grammatical competence makes it difficult for SLI children to master passives (Zhang, 2010).

2.4. Interpretations on Delay of Passive Structures by SLI Children

Several theoretical accounts have been proposed to account for the relative delay in the acquisition of passive structures by children. Borer and Wexler (1987, 1992) proposed the A-chain deficit hypothesis (ACDH) to interpret difficulties early English-speaking children have in acquiring passives. It assumes that passive sentence is derived by moving the object to subject position (an optional extra positioning of the subject to a by-phrase), and since the moved element arrives at an argument position, this process is called argument-movement. ACDH claims that children cannot interpret and apply the argument movement correctly before 5 years old, failing to form the argument chains, so they have difficulties in acquiring passive structures.

Considering problems encountered by SLI children, three accounts are usually adopted to interpret the delay of complex structures by SLI children. The first is Surface Hypothesis, which claims that SLI children have difficulties in handling inflections. They have more difficulties processing morphemes that are shorter in duration than adjacent morphemes (Leonard, Eyer, Bedore & Grela, 1997). The second is Morphology Deficit Hypothesis, which assumes that SLI children extremely depend on canonical sentence order, thus easily neglect morphological markers (Leonard, 1998). And the third is Representation Deficit for Dependent Relations Account (RDDR), claiming SLI children have difficulties with structure-dependent representations, thus preventing them from moving verbs in a hierarchical representation (van der Lely, 1996, 1998).

3. Methods

The present study adopted both controlled experiments and naturalistic recordings to investigate Mandarin SLI children's comprehension of *BEI*-constructions (Since passives with markers *GEI* and *RANG* are not typical in Mandarin Chinese, this paper only focused on passives with the marker *BEI*). Specifically, we addressed the following three research questions: 1) Are there differences in the acquisition of passives between Mandarin-speaking children with SLI and typically developing children? 2) Which theory can account for passive acquisition by Mandarin SLI children, Surface Hypothesis, Morphology Deficit Hypothesis or Representational Deficit for Dependent Relations?

3.1. Instruments for Selecting SLI Subjects

In order to find out Mandarin-speaking SLI children, several tools were used to assess children's language ability in this study. First, Specific Language Impairment Checklist for Pre-school Mandarin-speaking Children was adopted to screen suspected Mandarin-speaking children with SLI. This checklist covered items relating to phonetics, vocabulary, syntax, semantics, pragmatics, interpersonal communication, and integrated language capability. Second, Growth Information Investigate Table was employed, which included the essential information of children, parents, caretakers, as well as the history of mother's pregnancy, the children's development, and the children's health condition. Third, Peabody Picture Vocabulary Test (Revised Chinese Version 1990) was used to test an individual's receptive vocabulary. Fourth, Rating Scale for Pre-school Children with Language Disorders (Lin, Huang, Huang & Xuan, 2008) was selected to test children's language production, comprehension and development. Finally, McCarthy Scale of Children's Abilities (MSCA, Revised Chinese Version 1991) was adopted to assess vocabulary, arithmetic, memory, common sense, similarity, and comprehension ability of children. A child was identified as an SLI child, if among five language testing items, scores of two or more than two items were below 1.25 standard deviation for his age. At the same time, his score was above 80 points in the McCarthy Scale of Children's Abilities Test (MSCA) (Norbury, Nash, Baird & Bishop, 2004; Tomblin, Records & Zhang, 1996).

3.2. Subjects' Information

Three subject groups participated in this study: a group of children with SLI, and two groups of typically developing children who were matched in age and mean length of utterance (MLU) respectively. All the children were from public kindergartens serving working-class families. Subjects were distributed in four cities in Mainland China, namely, Hefei, Changsha, Xinxiang and Guangzhou. In each city, three SLI children, along with three typically developing age-matched children (TDA), and three typically developing younger children (TDY) were selected as the subjects. Totally, 12 children with SLI were confirmed, whose ages were from 3; 11 (year/month) to 6;1. Each child showed obvious disorders in both language comprehension and language production, however, they all scored above 80 points on the test of MSCA,

excluding mental retardation. Besides, the information from kindergartners and children's parents provided further evidence that none of the children had emotional or behavioral disorders, neurological damage, hearing impairment or autism. SLI children's basic information is displayed in Table 1.

Table 1. Basic Information of the 12 SLI Children.

Subjects	Gender	Age	MSCA	PPVT	LC	LP	LD	MLU	MLU (SD)
SLI-1	Male	4;00	84	11	8	5	13	3.50	1.44
SLI-2	Female	4;01	85	13	10	10	20	2.81	0.74
SLI-3	Male	5;10	154	44	22	36	58	5.76	2.45
SLI-4	Male	4;11	82	33	19	24	43	3.75	1.79
SLI-5	Male	5;09	83	46	17	32	49	5.91	2.55
SLI-6	Male	4;07	85	35	16	26	42	5.28	2.03
SLI-7	Male	3;11	119	9	6	6	12	3.92	1.76
SLI-8	Male	5;02	103	24	8	13	21	4.30	1.82
SLI-9	Male	6;01	105	29	16	20	36	4.81	1.90
SLI-10	Male	5;04	81	41	24	30	54	4.14	2.51
SLI-11	Male	5;00	82	20	23	22	45	3.50	1.93
SLI-12	Female	5;01	85	40	25	17	42	3.30	1.72

Notes: MSCA: McCarthy Scale of Children's Abilities; PPVT: Peabody Picture Vocabulary Test; LC: Language Comprehension; LP: Language Production; LD: Language Development; MLU: Mean Length of Utterance.

There were totally 24 normal kids in the control groups. Among them, 12 kids constituted the TDA group (Month Age: Mean=59.67, SD=8.69), and they were similar to the children with SLI in age within the range of 15 days. TDA children also participated in the language tests, and their scores fell into the range of typically developing children (Table 2).

Table 2. Basic Information of the 12 TDA Children.

Group	Age		PPVT		LC		LP		LD	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
SLI	59.75	8.69	28.75	13.20	16.17	6.77	20.08	10.16	36.25	15.85
TDA	59.67	8.69	81.00	20.02	31.58	3.15	39.08	4.83	70.67	7.22

Notes: PPVT: Peabody Picture Vocabulary Test; LC: Language Comprehension; LP: Language Production; LD: Language Development.

Another 12 kids constituted the TDY group (Month Age: Mean=44.08, SD=6.71). These children matched SLI children in MLU (Mean=4.27, SD=1.04), but were younger than SLI kids. TDY children also participated in the language tests, and their scores fell into the range of typically developing children (see Table 3).

Table 3. Basic Information of the 12 TDY Children.

Group	Age		PPVT		LC		LP		LD	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
SLI	59.75	8.69	28.75	13.20	16.17	6.77	20.08	10.16	36.25	15.85
TDY	44.08	6.71	33.92	11.26	21.58	7.06	30.25	5.46	51.83	11.89

Notes: PPVT: Peabody Picture Vocabulary Test; LC: Language Comprehension; LP: Language Production; LD: Language Development.

3.3. Data Collection and Procedures

Controlled Experiments Controlled experiments were designed to investigate subjects' comprehension and production of Chinese passives. It included two tasks: Picture-elicited Production and Picture Identification.

The passive structure NP_1+*BEI*+NP_2+*V*+*Complement* was chosen as the main sentence structures for investigation, based on the following considerations: 1) Compared with passives without agents, the meanings of sentences with agents are clearer. Mandarin-speaking children are able to use passive structures around the age of two, whereas the passives without agents do not appear until above three years old, but the frequency is rather low (Li, 1995; Yang, 2009; Zhou, 1997). 2) For four- to five-year-old children, their comprehension of sentences with psychological verbs is much weaker than those with actional verbs (Maratsos et al., 1985). Gorden and Chafetz (1990) claim that in Chinese, psychological verbs are used infrequently when adults speak to their pre-school children. Thus only the relatively simple actional verbs like *push*, *hit*, *break*, and *put* were selected in this study. Totally, three test structures with different complements were included in the controlled experiments.

(5) NP_1+*BEI*+NP_2+*V*+*Resultative Complement* (Passive Sentence)

Jimu *BEI* Xiaoming tui dao le.

Building blocks *BEI* Xiaoming push down ASP

'The building blocks were pushed down by Xiaoming.'

(6) *NP_1+BEI+NP_2+V+Direction Complement* (Passive Sentence)

Tiehua *BEI* baobao zhai xialai.

Decal *BEI* baby pick off

'The decal was picked off by the baby.'

(7) *NP_1+BEI+NP_2+V+Location Complement* (Passive Sentence)

Pingguo *BEI* baba fang zai zhuozi shang

Apple *BEI* Dad put table on

'The apple was put on the table by Dad.'

In language production, each group had twelve subjects and each subject had nine test items, so the total number of test items for passives in language production was 108 respectively. Likewise, the number of test sentences in language comprehension was 108. Language production was conducted first, followed by language comprehension. Experiment 1 was for language production, in which the picture-elicited method was adopted to study children's production of long passives. The experimenter provided subjects with some pictures, and then asked questions about what had happened to the patients in agent-prominent contexts. Passive structures were expected from subjects, and then subjects' responses were recorded. For example, (8) is a target sentence:

(8) Lanqiu *BEI* xiao xiang ju qilai le.

Basketball *BEI* little elephant hold up ASP

'The basketball was held up by the little elephant.'

The directions for the above target sentence were: "In the first picture, there is a basketball and an elephant is standing there. Now look at the second picture, you see what has happened to the basketball?"

Experiment 2 was for language comprehension. Sentence-picture matching method was adopted to investigate children's comprehension of long passives with different complement structures. Each test sentence was presented with two pictures for children to choose, but only one was correct. Children needed to choose the corresponding picture according to the sentence they heard. In addition, to minimize the pragmatic bias, the external argument and internal argument involved in questions were symmetric and reversible. For example, (9) was a target sentence:

(9) Xiao gege de yanjing *BEI* xiaojiejie meng shang le.

Little kid DE eyes *BEI* little sister blindfold up ASP

'The kid's eyes were blindfolded by the girl.'

The directions for the above target sentence were: "Look at the two pictures, a boy and a girl are playing hide-and-seek game, you see which picture shows that the boy's eyes are blindfolded by the girl?"

During the whole process, there were two experimenters: one was the chief experimenter, and the other was the reporter. The former was in charge of illustrating instructions, communicating with children and noting down children's output related to test items; the latter recorded children's reaction to testing items and all their language output. For the convenience of checking these data, the whole process was both audio- and video-recorded. After the testing, both the experimenter and the reporter checked the notes. If there was any inconsistency in the records, they needed to check again based on video recordings. The scores covered production and comprehension. In the production part, answers with passive markers, agents, patients and verb complements could get 1 point; answers with patients and verb complements could get 0.5 point; answers involving no passive markers or verbs got 0 point. In the comprehension part, if the subjects chose the right picture, they got 1 point; otherwise, they got 0 point. SPSS (13.0) was adopted to describe and analyze experimental data.

Naturalistic Recordings Natural language can reflect children's real language ability, so naturalistic data were also collected to investigate subjects' production of passives. Both audio and video equipments were used to collect the natural language of three groups of children. The whole collection took five one-hour sessions. In view of the rapid change of children's language, all the naturalistic data were collected within ten days. Researchers interacted with children for about ten minutes before the data collection. Both life narratives and picture talks were used to elicit children's spontaneous speech. All life narratives centered on the daily topics that they were familiar with, like life in kindergarten. When they had difficulties in keeping narrating a given topic, appropriate questions were added to encourage them to continue the narration. The following is an example to elicit children's production in the naturalistic data collection.

(10) Guide Words:

GEI ayi jiangjiang youeryuan youqude shi xing ma?

Give aunt tell kindergarten interesting thing MA (particle)

'Could you tell me about some interesting things in kindergarten?'

Induced questions:

a) Youeryuan DE xiaopengyou duo ma?

Kindergarten DE little kid many MA (particle)

'Are there many kids in kindergarten?'

b) Zai youeryuan dou gan shenme ne?

in kindergarten often do what NE (particle)

'What do you usually do in kindergarten?'

In terms of picture talks, experimenters first used guide words to give a brief introduction when presenting pictures to children. Then, they were required to describe what the pictures had shown in detail. When children could not continue their detailed descriptions, they were encouraged to provide some major information. In the process of picture talks, experimenters gave little interruption except some words like *ranhou* 'and then' or *jiexialai* 'next'. Each time, a different topic and a different set of pictures were selected for each subject. Both daily topics and pictures were the same for all three groups of subjects.

Recordings were transcribed and coded in CLAN (Child Language Analysis) software according to the criteria of CHILDES (Child Language Data Exchange System) (Mac Whinney, 2000). Transcription was mainly based on the audio recordings, and video recordings were taken as a supplementary material of the scene description. In order to guarantee the quality of transcribed files, another one or two researchers rechecked and proofread the transcribed files.

4. Results

4.1. Results from Controlled Experiments

The data included results from three groups of children, namely, the SLI group, the TDA group, and the TDY group. Since one SLI child did not cooperate with researchers during the experiment, he dropped out of the research halfway, thus totally 35 children completed the test. In the language production task, the number of responses for children with SLI, TDA children and TDY children was 104, 108, and 108 respectively. The number of language comprehension items was the same as that of language production items.

Experiment 1: production results Statistical software SPSS13.0 was used to compare and analyze the data. The data were firstly analyzed by comparing means, and then One-way ANOVA was carried out to analyze the data between groups and within groups. Also, paired sample *t*-Test was adopted to analyze *t* value and significant effect between SLI and typically developing children.

Table 4. Production of Passives (One-way ANOVA Test).

	Passives		
	SLI	**TDA**	**TDY**
st Items	104	108	108
Mean	.50	.88	.57
SD	.37	.24	.35
	$F(2, 317)=35.13$, $p=.00$		

TDA children produced both passive structures most, and their mean values were the highest among three groups. One-way ANOVA test showed that there were significant differences between three groups in language production of passives (F (2, 317) =35.13, p=.00<.05).

Table 5. Production of Passives (Paired-*t* Test).

Paired Groups	Passives		
	t	**df**	**sig. (two-tailed)**
SLI-TDA	-8.23	103	.00
SLI-TDY	-1.73	103	.09

Paired sample *t*-test of language production in Table 5 further showed that there was a significant difference between SLI and TDA children in the production of passives (t=-8.23, p=.00<.05), but there was no significant difference between SLI and TDY groups.

Experiment 2: comprehension results In the comprehension of passives with three types of complements, TDA children scored higher than SLI children and TDY children. One-way ANOVA test showed that there were significant differences between three groups in language comprehension of passives ($F(2, 317)=9.67$, p=.00<.05).

Table 6. Comprehension of Passives (One-way ANOVA Test).

	Passives		
Subjects	**SLI**	**TDA**	**TDY**
Test Items	104	108	108
Mean	.58	.84	.67
SD	.50	.37	.47
	$F(2, 317)=9.67$, p=.000		

Paired sample *t*-test of language production in Table 7 further showed that there was a significant difference between SLI and TDA children in the production of passives (t=-4.36, p=.00<.05).

Table 7. Comprehension of Passives (Paired-*t* Test).

Paired Groups	Passives		
	t	**df**	**sig. (two-tailed)**
SLI-TDA	-4.36	103	.000
SLI-TDY	-1.27	103	.207

In conclusion, there was a significant difference between the SLI group and the TDA group in the production and comprehension of passive sentences with different complements, namely, the performance of children with SLI was not as good as that of TDA children. However, the SLI group did not perform worse than the TDY group in these tasks.

4.2. Results from Naturalistic Data

Naturalistic data were transcribed, and the command of KWAL in CLAN was used to search for passive sentences children with SLI and typically developing children produced. In this way, the exact numbers of long passives, short passives,

patient subject sentences that three groups of children produced are compared, as shown in Table 8.

Table 8. Production of Passives in Naturalistic Data.

	Sentence Structures	SLI	TDA	TDY
Passives	NP_1+*BEI*+NP_2+*Verb*+*Complemennt* (Long Passives)	14	21	10
	NP_1+*BEI*+*Verb*+*Complemennt* (Short Passives)	31	27	5
	NP_1+*Verb*+*Complemennt* (Unaccusatives)	32	76	67

Table 8 showed the production number of passives in naturalistic data. It was obvious that long passive sentences SLI group produced were similar to patient subject sentences in number while short passive sentences were much less than them. For TDA children, the most frequently produced passives were patient subject sentences, followed by short passives and long passives. The order of three types of passives TDY group produced was patient subject sentences, long passives and then short passives. In brief, the most frequently produced passive structures by both TDA and TDY children were patient subject sentences in their natural language.

5. Discussion

The present study found that long passives and short passives appeared around four years old in typically developing Mandarin-speaking children, but the number was very small. TDA children performed best in the mastery of agents and patients of passives, followed by TDY and SLI children. There was a significant difference between SLI and TDA children in the production and comprehension of passives. This result was consistent with the previous findings on English-speaking children with SLI (Marshall, Marinis & van der Lely, 2007; van der Lely, 1996). However, the difference between SLI and TDY children was not significant, which did not completely match the findings of previous studies (van der Lely, 1996; Wexler, 2011). This may be due to the fact that only passives with actional verbs were studied, and passives with psychological verbs were not tested in the present controlled experiments. Research from Wexler (2011) reported that in the comprehension of passives by SLI and typically developing children, the difference between them was mainly reflected in passives with psychological verbs rather than passives with actional verbs. We hope that Mandarin-speaking children's comprehension of passives with psychological verbs can be investigated in the future, to further confirm their research results.

The present study has clearly proved that Mandarin-speaking children with SLI have some difficulties in acquiring passive sentences. As we mentioned in the INTRODUCTION part, three major accounts may be reasonable to explain the delay of complex sentences by SLI children. In the following session, we try to interpret the present results based on these three accounts.

The first account is Surface Hypothesis (Leonard, Eyer, Bedore & Grela, 1997), which assumes that language processing is very limited for SLI children. And only with more input of grammatical morphemes can SLI children fully understand complex sentences. Based on the results in the present experiments of the passive types produced by children with SLI from naturalistic data, the number of patient subject sentences was almost equal to that of the short passives, separately 32 and 31, which indicated that Chinese SLI children did not lag far behind the normal ones. However, results from the controlled experiments showed that there was a significant difference between SLI and TDA children in the production (t=-8.23, p=.00<.05) and comprehension (t=-4.36, p=.00<.05) of passives. This evidence indicated that SLI children may perceive some inflectional morphemes in passive structures, but they could not process these morphemes completely. As to the patient subject sentences produced by SLI children, the production number was almost equal to that of the short passives. Moreover, SLI children produced even more short passives than TDA children. So this account may not be strong enough to explain the results of present study.

The second account is Morphology Deficit Hypothesis (Leonard, 1998) and it holds that children with SLI are more likely to rely on the canonical word order, and thus ignoring grammatical morphological markers. In Mandarin Chinese, short and long passives are also non-canonical structures in Mandarin Chinese and both have the passive marker *BEI*. However, SLI subjects almost produced the similar amount of these two structures as TDA kids did. Therefore, there might be no direct relation between non-canonical word order and the omission of morphological markers and the difficulties Mandarin children with SLI had with passives could not be simply ascribed to the deficits of morphology.

The third one is Representational Deficit for Structure-Dependent Relations (van der Lely, 1996, 1998) and it claims that SLI children have difficulties with structure-dependent representations, thus preventing them from moving verbs in a hierarchical representation. Since SLI children have difficulties with syntax operation, their syntactic movement is usually optional rather than obligatory. According to the types of passives produced by these three groups in this study, the number of the patient subject sentences without passive markers was the largest, especially for TDA children. One of the examples produced by subjects

was *Dahuilang zhua zhu le* 'The wolf got caught'. By saying that children expressed the meaning *Dahuilang BEI lieren zhua zhu le* 'The wolf was caught by the hunter' or *Lieren zhua zhu le dahuilang* 'The hunter caught the wolf', they never denoted the meaning *Dahuilang zhua zhu le lierne* 'The wolf caught the hunter'. Meanwhile, although Mandarin-speaking children tended to omit agents and passive markers when producing passives, they never uttered *Lieren zhua zhu le* 'The hunter got caught' when they wanted to express the meaning *Lieren BEI zhua zhu le* 'The hunter was caught'. Obviously, when producing such a patient subject sentence as that, Mandarin-speaking children with SLI may resort to syntactic movement. From another aspect, some patient subject sentences in Mandarin Chinese contain internal arguments and verb-complements, which are similar to the construction *become/ get+complement*. For instance, in the sentence *Jiqigou zhuang huai le* 'Robert dog was hit and broken', *zhuang huai* 'hit and broken' means *yinwei zhuang le suoyi bian huai le* 'It became broken because it was hit', expressing a certain state or result. To a certain extent, this sentence can be regarded as a structure without any movement. In this way, movements can be either present or absent in the production of patient subject sentences by Mandarin-speaking children with SLI. In brief, this hypothesis well matches the experimental results, showing that Mandarin SLI children may possess some knowledge about movements. However, with limited syntactic processing ability, syntactic movements in their acquisition of passives become optional rather than obligatory.

Though the account of Representational Deficit for Structure-Dependent Relations has provided a reasonable explanation for the present results, it seems irrational to just define SLI children's limited syntactic processing ability as an innate deficit solely. Different from those UG-based accounts, the present study attributes this limitation to their slower pace of language development and their greater vulnerability to the more challenging details of the languages they are learning (Leonard, 2014). Though there are significant differences in the acquisition of passives by Mandarin-speaking SLI children and typically developing children, the weakness of SLI children may reveal that their paces of passive acquisition were little slower than that of the normal children. Namely, the lines of demarcation between SLI children and their typical peers are not greatly distinct (Leonard, 2014). So it is highly possible to improve SLI children's acquisition ability by altering the learning principles and the cognitive mechanisms that underlie SLI (Owen, Hall & Curran, 2014). Take the acquisition of *BEI* constructions as an example, with the more sufficient language input and the growth of processing ability, SLI children will have better performances on the production and comprehension of complex structures.

6. Conclusion

By comparing the production and comprehension of passives of three groups of children by both controlled experiments and naturalistic recordings, this study shows that 1) Mandarin-speaking children with SLI lagged behind TDA children in both production and comprehension of passives, but little difference existed between SLI children and TDY children. 2) Passives with resultative complements were comprehended and produced most by SLI, TDA and TDY children. 3) Representational Deficit for Dependent Relations can best account for passive acquisition by Mandarin SLI children. One of the important linguistic features Mandarin SLI children hold is that syntactic movement in complex sentences is optional, not obligatory. This research enriches the SLI studies on Chinese languages, and may make some contributions to the cross-language studies on SLI.

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Appendix: Experiment Materials

Production of passives in Experiment 1 (elicited production):

(1) Direction：(Look at Figure 1. There is a heap of building blocks and a boy standing there in the first picture, now look at the second picture.)

Ni kan, jimu zenme le?

You see building blocks how ASP

'You see what's happened to the building blocks?'

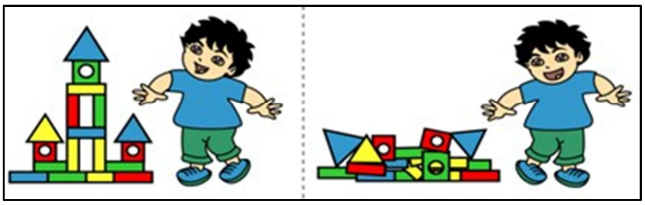

Figure 1. Sample One: Production of Passives.

(2) Direction：(Look at Figure 2, this is a basketball, and this is an elephant.)

Ni kan, lanqiu zenmeyang le?

You see basketball how ASP

'You see what's happened to the basketball?'

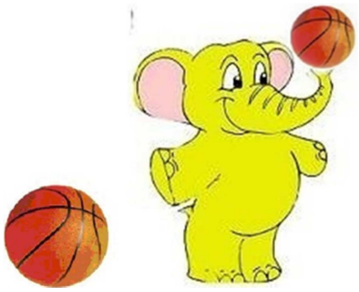

Figure 2. Sample Two: Production of Passives.

Comprehension of passives in Experiment 2 (sentence - picture matching):

(1) Direction：(Look at Figure 3, a boy and a girl are playing hide and seek game.)

Na zhang tu shi xiao gege DE yanjing *BEI* xiao jiejie mengshang le?

which picture is boy DE eyes *BEI* girl blindfold ASP

'Which one is about the boy's eyes are blindfolded by the girl?'

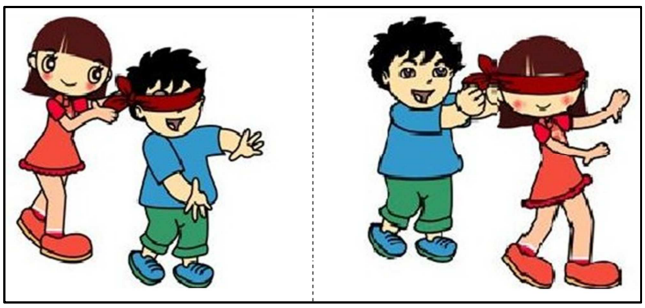

Figure 3. Sample One: Comprehension of Passives.

(2) Direction：(Look at Figure 4, a boy and a girl are competing who is stronger by picking the other up.)

Na zhang tupian shi xiao jiejie *BEI* xiao gege bao qilai le?

Which picture is girl *BEI* boy pick up ASP

'Which picture is about the girl is picked up by the boy?'

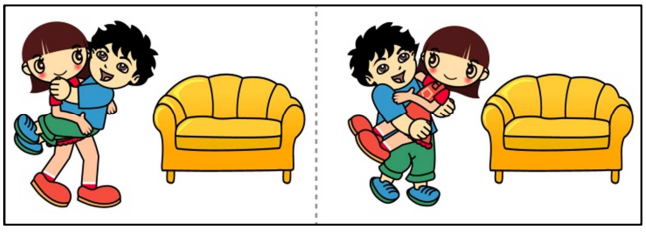

Figure 4. Sample Two: Comprehension of Passives.

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