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兒童早期「比」字比較句之副詞使用

Children's Early Use of Degree Adverbs in Mandarin BI Comparative Structure

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本論文係 賴美璇 君(學號: R94142002）在國立臺灣大學 語言學研究所 完成之碩（博）士學位論文，於民國 97 年 7 月 2 日承下列考試委員審查通過及口試及格，特此證明

口試委員： 張顯達 （簽名）

（指導教授）

黃瓊之

陳淑惠

獻給我的父母
和一路支持的親朋好友
In appreciation of those whose unfailing support made this research possible

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Abstract

This study investigates whether children's early use of degree adverbs in Mandarin BI comparative structure is rule-based or analogy-based. On the one hand, as hypothesized by the rule-based account, the basic BI comparative structure and a broad-range rule that allows for degree adverbs in BI comparative structure are constructed first. Children will follow the rule and place adverbs in the BI structure "Y [bǐ X] +___+predicate". On the other hand, the analogy-based account hypothesizes that children rely on a formula "Y bǐ [X___]", in which they analogically fill in the blank with a simple sentence "X+ adverb +predicate" regardless the grammatical status of the predicate. Evidence was collected from three aspects, including naturalistic data analyses, experimental elicitation of BI utterances, and grammatical judgment task. Analyses of early spontaneous language samples revealed that the children before age 4 did not seem to have mastered the BI comparative structure due to few exemplars, let alone the use of adverb within the construction. Results of grammatical judgment task also showed that the children did not distinguish between correct and incorrect uses of degree adverbs in the tested BI sentences. The elicitation task elicited BI utterances from the children of age 3 and 5 that received different conditioned input. One group was exposed to the input of a predicate modified by an adverb that was not allowed in BI comparative structure. The other group was exposed to the input of nominalized predicate for contrast. The incorrect BI utterances elicited from the three-year-old children revealed that the young children made use of a formula for BI comparative structure, "Y bǐ [X___]", where they incorrectly slotted in the frame with a predicate modified by an adverb, or a nominalized predicate. Namely, they underwent the same process of analogy making.

Key words: Mandarin BI comparative structure, degree adverbs, rule-based, analogy-based, language acquisition

摘要

本研究探討兒童早期中文「比」字比較句的副詞使用策略，是否建立在規則的使用上，或只是單純的類比過程。規則理論假設兒童先建立基本的「比」字比較句結構，再將副詞放入該結構『Y［比 X］+___+述語』中；類比理論則假設兒童先建立「比」字比較句框架『Y 比［X___］』，再運用類比填入簡單句『X+副詞 +述語』，無論該簡單句是否合乎「比」字比較句的文法規則。本文從三方面收集證據：自然語料、實驗誘發、和文法判斷。自然語料的分析顯示，「比」字比較句的出現十分有限，兒童似乎尚未掌握「比」字比較句的結構，遑論副詞使用；文法判斷作業上，3 歲和 5 歲的兒童對於「比」字比較句是否使用合文法的副詞，並未做出正確判斷。實驗誘發的作業中，兩組兒童接受不同的語言刺激，其中一組兒童所處的語言環境提供由副詞修飾的述語，但該副詞不為「比」字比較句所接受；另一組兒童的語言環境則提供名詞化的述語。3 歲組兒童的文法錯誤顯示，兒童利用比較句框架 『Y 比[X____]』，放入副詞修飾的述語或名詞化的述語，造成不合文法的比較句。

關鍵詞：中文「比」字比較句、程度副詞、規則建立、類比過程、語言習得

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Chapter1
Introduction

1.1 Background

As children begin to produce utterances that signal their departure from the one-word stage, they could undergo a variety of phases before they finally acquire adult-like grammar. They could simply learn by rote; they could productively slot a word into a stable frame by analogy, or they could learn argument structures by generalizing rules. Various acquisition theories emphasize on different aspects of the process, and the stances they take depend on their belief of how the end-state of adult grammar is mentally represented.

Arguments toward the issue of how children acquire abstract syntactic structures generally diverge into two streams. Generativists view the process as rule formation in which children manipulate abstract symbols and productively apply formal rules. Pinker (1989) argued that anytime a child produced a structure that was grammatical, chances were she had acquired the form in principle, and would be able to apply it in new argument structures (Pinker, 1989). Experimental results have shown that 3 to 8 year-old children were able to passivize novel verbs that had been taught in active voice, proving they were productive users of rules (Pinker, Lebeaux, and Frost, 1987). Therefore, a sentence “I wanna go” produced by a child might imply her understanding of infinitival complement structures to some extent.

On the other side of the debate, children are assumed to be conservative language learners. They do not generalize on abstract forms until they have established enough item-based schemas and make analogies among them (Tomasello, 2003). Therefore, the sentence “I wanna go” in early uses of a child would be simply regarded as an utterance schema of “I wanna[ ]” that was formed by drawing analogies of other concrete phrases, such as “I wanna go”, “I wanna eat”, etc. Other similar schemas could have been stored independently as well, such as “I gotta[ ]”, “I hafta[ ]”. Children do

not consider those structures to be tokens of an infinitive complement structure, not until later phases of development in which they perform abstraction and distributional analyses.

Productivity is a central issue. Bowerman (1982) examined the syntactic development of causal events and found a period when the children frequently made such over-regularization error as" *are you washing me blind?", or "*I'm patting her wet". It posed an important issue of how children eventually constrained overgeneralization. Pinker (1989) regarded the errors as incomplete formulation of rules. The children overextended a broad-range rule that defined broad patterns of selectivity of verb alternations while a narrow-range rule that dealt with fine selectivity were still yet to be acquired. Tomasello (2006) argued that such incorrect analogical generalizations would be constrained through the processes of entrenchment and preemption of correct forms.

Hsieh (2004) studied the acquisition of Mandarin BI comparative structure and found the BI utterances produced by the children as young as 3 years old in her experiment. However, they seemed to take a long time before fully acquiring this structure. According to Hsieh's observation, even the children at age five produced errors caused by incorrect uses of degree adverbs in BI comparative structure. For example, she collected such incorrect sentence as "*wǒ de bǐ nǐ de hěn dà" '*mine is very bigger than yours'. Hsieh first adopted Pinker's Rule-based model (1989) as an attempt to account for such error. She proposed that the children could have overextended a broad-range rule, which allowed for use of degree adverbs in BI comparatives, but failed to construct a narrow-range rule, which restricted the types of degree adverbs being allowed. However, it seemed that the children's errors did not come from overgeneralizing the broad-range rule because no evidence of correct adverb uses, such as "wǒ de bǐ nǐ de gèng dà" 'mine is even bigger than yours' was found in the

children's correct BI utterances. On the other hand, Hsieh found a close correlation between prior degree modifiers used in non-BI-comparatives (e.g. "nǐ de hěn dà" 'yours is very big'), and subsequent degree adverbs incorrectly used in BI comparatives (e.g. "*wǒ de bǐ nǐ de hěn dà" 'mine is very bigger than yours'). The contingency of these two structures hinted that the children may make analogies between them.

The source of the error regarding the incorrect use of degree adverbs in BI comparative structure seems to be closely related with how children process the grammatical structure of Mandarin BI comparative construction. One key question is whether young children learn to use degree adverbs in Mandarin BI comparative structure by rule or by analogy. Before addressing this issue, the following discussion is devoted to exploring the linguistic structure of the BI comparative construction and examining in what way it is related with the problem.

Although the grammatical status of Mandarin BI comparative structure has yet been determined (Liu, 1996, Hong, 1991), it is generally agreed that in a basic BI comparative structure, the BI marker and the NP following it form a constituent, which is followed by a gradable predicate that specifies the dimension of comparison. In addition to the basic structure, a general rule (or broad-range rule in Pinker's term) allows degree adverbs to be placed before the adjective for intensifying the expression. Narrow-range rule defines the adverb types being allowed. Therefore, if a young child observes the rule as she learns to use degree adverbs in BI comparative structure, she would first master the basic structure "Y [bǐ X] +___+predicate", and then follow the general rule to insert degree adverbs between the standard NP and the gradable predicate. In the case of children's incorrect use of the degree adverb "hěn" 'very' in a BI sentence, the rule-based account assumes the following analysis (1) for the representation of the BI comparative structure:

(1) * Y [bǐ X] +hěn+ADJ

The bracketed string is acquired as a set, which is on a different layer from the degree adverb and predicate adjective. The child applies the broad-range rule of BI comparative structure since she is able to use degree adverbs in the structure. However, she has not yet acquired the narrow-range rule that selects adverb types. It is the rule that should eventually exclude the choice of adverb "hěn" from BI comparative structure. In other words, the error of incorrect adverb use comes from the child's overextending a broad-range adverbial rule.

On the other hand, as suggested by Hsieh (2004), if a child learns to use degree adverbs in BI comparative structure by analogy, she would create a formula for BI comparative structure, "Y bǐ [X___]", which is formed out of other concrete BI comparative utterances. She slotted in the frame with a simple sentence containing a degree adverb, "X +adverb +ADJ" that appeared to fit well by form. The incorrect use of degree adverb "hěn" comes from the child's slotting an unanalyzed simple sentence "X hěn ADJ" in the frame, resulting in such incorrect sentence as "*Y bǐ X hěn ADJ", mentally represented as the analysis (2):

(2) *Y bǐ [X hěn ADJ]"

In order to explain whether children's early use of degree adverbs in Mandarin BI comparative structure is rule-based or analogy-based, this thesis collects evidence from three directions: (1) spontaneous language examples, (2) experimental elicitation of BI utterances, and (3) grammatical judgment task.

As Hsieh (2004) attempted to interpret the children's incorrect use of degree adverbs in BI comparative structure as overgeneralization of a broad-range rule, she failed to find evidence of the rule being correctly applied in her experiment. Namely, she failed to find such correct adverb use as "wǒ de bǐ nǐ de gèng dà" 'mine is much

bigger than yours“. She did not explore spontaneous language samples that could have presented correct uses of degree adverb to support the rule account. Therefore, a portion of the thesis is devoted to the analyses of longitudinal language samples of children, as well as conversations between adults. This analysis provides some information on use of comparison children are exposed to in every day, as well as their early uses of BI comparative structure. It explores whether adverbs are constantly used in BI comparative structure in the natural contexts, whether children have broadly applied adverbial rules. The data also serves as background knowledge for the interpretation of children's use of BI utterances in experimental contexts.

In addition to language sample analysis, two experimental tasks were administered: (1) an elicitation task, and (2) a grammatical judgment task. The elicitation task elicits BI utterances from two groups of children that receive different conditioned input. One group is exposed to the input of a predicate with an adverb that can not be used in BI comparative structure. The other group is exposed to the input of a nominalized predicate for contrast. If children overgeneralize adverbial rules that allow them to use degree adverbs in BI comparative structure, frequent incorrect uses of the degree adverb in the BI comparative structure will be expected in the children exposed to the adverb. No such overgeneralization error would be found in the other group. On the other hand, if children use the strategy of analogy to complete the task, the group receiving adverb input would fill in the frame "Y bǐ [X___]" with a predicate that includes an incompatible adverb; the other group would fill in it with an incompatible nominalized predicate. The children both undergo the same process of analogy making.

The grammatical judgment task gathers data from a different perspective lest the production task should involve variables that can hardly be controlled in the experimental context. Children's metalinguistic knowledge of degree adverb is tested. They have to judge BI sentences with different degree adverbs as correct or incorrect.

1.2 Organization

This thesis aims to explore whether children's early use of degree adverbs in Mandarin BI comparative structure is based on rule or on analogy. Chapter2 first presents the Mandarin structures that are used for doing comparison, including BI comparative structure. In section 2.2, BI comparative structure is highlighted. It reviews literatures that discuss the internal syntactic structure from the perspective of generative grammar. These analyses provide the background of rule-based representation of the structure. Section 2.3 explores what types of degree adverbs are allowed in BI comparative structure. Section 2.4 examines the syntactic status of the construction "ADJ+de" as in the sentence "tā de dàdà de" 'his is a big one'. The sentence type is used in the experimental input for the children receiving nominalized predicate as input. In 2.5, two current acquisition theories, Rule-based model and Usage-based model, are reviewed. They provide theoretical backgrounds for the rule and analogy accounts of the early use of degree adverbs in BI comparative structure. Chapter 3 investigates naturalistic conversations by adults to examine what types of comparatives are favored, which reveals linguistic input children are generally exposed to. Longitudinal language samples are also investigated to explore the use of BI comparative structure and the adverb use before age 4. Chapter 4 provides experimental studies, including experimental elicitation of BI comparative structure and a grammatical judgment task. Chapter 5 discusses whether the results support rule account or analogy account of children's early use of degree adverbs in BI comparative structure.

Chapter2
Literature Review

2.1 Comparison in Mandarin

In Mandarin, there are two ways of doing comparison, by use of structure or inference. In terms of syntactic structure, there are two types of comparatives that are distinguished by the number of arguments referred to, two-argument or single-argument. Li & Thomson (1981) generalized a basic pattern for comparative structures of two arguments, as shown in Table 2.1.

Table 2.1 Basic Pattern of Mandarin Comparative Structures of Two Arguments

	Y	comparison word	X	(adverb)	dimension	(measurement)
superiority:	tā	bǐ	nǐ	(hái)	gāo	(sān cùn)
inferiority:	tā	bùrú/méiyǒu	nǐ	(nàme)	gāo	
equality:	tā	gēn/hàn	nǐ	yíyàng	gāo	

The parenthetic are optional.

According to their analyses, Y serves as a comparee, which is compared to a standard X along some dimension. The comparison word determines the result of a comparing event. There are three possible outcomes that could be applied to this pattern:

(a) Y being superior to X, marked by "bǐ", as shown in Example (3).

(3) wǒ bǐ nǐ gāo
I compare you tall

'I am taller than you.'

(b) Y being inferior to X, marked by "bùrú" or "méiyǒu", as shown in Example (4).

(4) wǒ méiyǒu nǐ gāo
I not you tall

'I am not as tall as you.'

(c) Y being equal to X, marked by “gēn” or “hàn”, as shown in Example (5)

(5) wǒ gēn nǐ yíyàng gāo
I and you same tall
‘I am as tall as you.’

In addition to the core elements, an optional adverb can be used in the structures that signify inequality to intensify the comparison. Namely, BI comparative structure does not necessarily need a degree adverb in terms of syntax. The measurement in the structure is also optional, which specifies to what extent Y is superior to X.

In addition to two-argument comparatives where two compared items are referred to, a single-argument comparative only specifies the compared item, Y, leaving the standard item(s) inferred from the context, as shown in Table 2.2.

Table 2.2 Basic Pattern of Mandarin Comparative Structures of One Argument

	Y	(degree adverb)	dimension
comparative:	tā	(gèng/ bǐjiào)	gāo
superlative:	tā	zuì	gāo

The degree adverbs determine whether the comparisons are between two items or more than two. The former is usually marked by the degree adverbs, gèng or bǐjiào (6), but does not necessarily require a degree adverb to specify it, as shown in Example (7).

(6) tā bǐjiào gāo
he relatively tall
‘He is elatively taller.’

(7) tā gāo
he tall
‘He is taller.’

The superlative degree is mostly marked by “zuì” when more than two items are under comparison, as in Example (8).

(8) quán bān tā zuì gāo
whole class he most tall
‘He is the tallest in his class.’

Disregarding structures, one may also express comparing intent by using words that are semantically comparative. For example, the verb “chāoguò” meaning “surpass” is often used (9),

(9) tā de shēngāo chāoguò qítārén
his height surpass others
‘His height surpasses other people.’

or phrases such as “xiāng bǐ zhī xià“ meaning “by comparison” as in Example (10).

(10) xiāng bǐ zhī xià, tā shì ge gāogèzi
by comparison he is a tall guy
‘He is tall by comparison.’

2.2 Syntactic Structures of Mandarin BI Comparative Structure

Researchers have argued about the formal syntactic structure of Mandarin BI comparative sentence. Attitudes toward the structural analysis could be divided into conjunction and adjunction analyses. Hong (1991) took "bǐ " as a conjunctor (see Figure 2.1), which coordinated two semantically and syntactically parallel items, in this case, a dog and a cat, both forming a NP constituent, and the VP constituent was raised under the operation of Right Node Raising (RNR) or Across The Board (ATB).

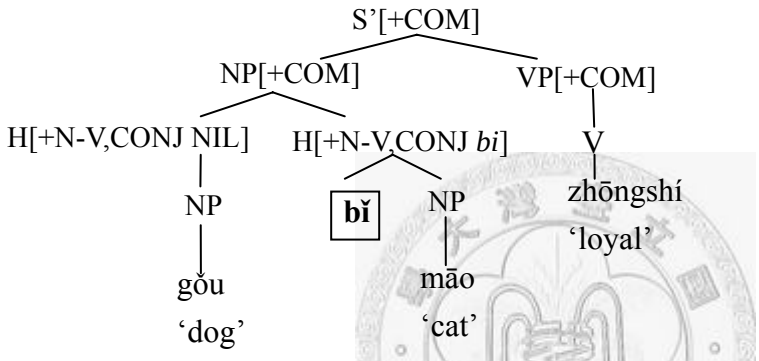


Figure 2.1 BI Marker Analyzed as a Conjunctor (Hong, 1991)

On the other hand, adjunction analysis places "bǐ " under the VP constituent. Liu (1996) regarded "bǐ" as a prepositional complementizer, introducing a prepositional phrase "cat" (Figure 2.2).

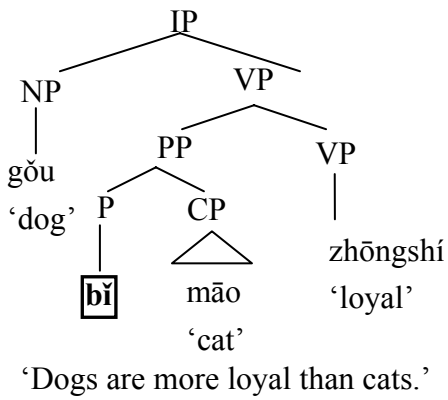
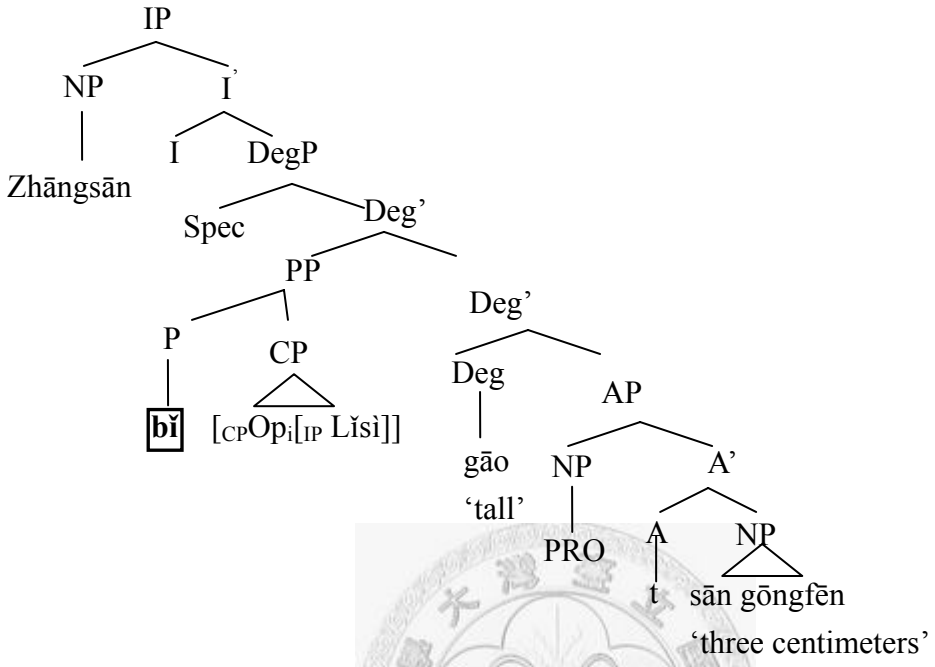


Figure 2.2 BI Marker Analyzed as a Preposition (Liu, 1996)

Similarly, Chao (2005) regarded “bǐ ” as a complementizer, which can be followed by a noun phrase, like “Lǐsì”. The two form a prepositional phrase (Figure 2.3).



‘Zhāngsān is taller than Lǐsì by three centimeters.’

Figure 2.3 BI Marker Analyzed as a Complementizer (Chao, 2005)

Adopting adjunction analysis, Chung (2006) took into account the role of degree adverbs, and positioned the degree adverb “gèng” or “hái” as the core element in a BI comparative structure, as well as BI marker.

The formal analyses all place “bǐ” marker and the standard NP under the same constituent. Therefore, in terms of rule account of children’s use of degree adverbs in BI comparative structure (11), children would store the BI constituent as a set, which is conjoined to the comparee, or adjuncted to the verb phrase.

(11) wǒ de [bǐ nǐ de] gèng dà
mine compare yours even big

‘Mine is even bigger than yours.’

The degree adverb use “gèng” ‘even’ is allowed by a broad-range rule but constrained by a narrow-range rule. The semantic restrictions on the types of degree adverbs being allowed are discussed in what follows.

2.3 BI Comparative Structure and Degree Adverb

When doing comparison, inflectional languages usually modify predicate adjectives through affixation. In English for example, the short Germanic adjectives, such as “tall”, take the suffix *–er* in the comparative form, and the*–est* in the superlative form. Mandarin as an isolating language, however, draws on degree adverbs to indicate different degrees of comparison (Table 2.3).

Table 2.3 Different Degrees of Comparison in English and Mandarin

	English	Mandarin
simple	tall	gāo
comparative	taller	gèng/ bǐjiào gāo
superlative	tallest	zuì gāo

For example, the degree adverb “gèng” ‘even’ preceding the predicate “gāo” ‘tall’ indicates a comparative relationship of two heights while “zuì” ‘most’ shows a superlative relationship among three or more items. Although many degree adverbs carry comparative meanings to some extent, only certain types of degree adverbs are allowed by BI comparative structure. For example, the degree adverb “gèng” ‘even’ (12) is allowed in BI comparative structure.

(12) wǒ bǐ nǐ gèng gāo
I compare you even tall

‘I am even taller than you.’

However, the degree adverbs “hěn” ‘very’ (13) and “zuì” ‘most’ (14) are not allowed.

(13) *wǒ bǐ nǐ hěn gāo
I compare you very tall

‘*I am very taller than you.’

(14) *wǒ bǐ nǐ zuì gāo
I compare you most tall

‘I am even taller than you.’

Only certain type of degree adverbs that meet semantic restrictions set by BI comparative structure can co-occur with it.

2.3.1 Types of Degree Adverbs

Wang (1987) first divided degree adverbs into the relative and the absolutive types depending on whether or not specific comparison was expressed. The relative degree adverbs usually appeared in comparative sentences where standard entities could be identified or inferred. Such degree adverbs included the ones that marked equality, such as “yíyàng” ‘same’ in (15),

(15) wǒ hàn tā yíyàng gāo
I and he same tall

‘I am as tall as he is.’

and the ones that marked the superlative degree, such as “zuì” ‘most’ in (16),

(16) quán bān tā zuì gāo
whole class he most tall

‘He is the tallest in his class.’

and the ones that marked comparative degree, such as “gèng” ‘even’ in (17).

(17) wǒ bǐ tā gèng gāo
I compare he more tall

‘I am taller than he is.’

The absolutive degree adverbs, however, were used to modify or intensify expressions without objective comparison, which, in other words, were expressions out of speakers' subjective evaluations. There were some that marked the highest degree, such as "jí" 'extremely', or "shífēn" 'completely' (18), ones that intensified expressions, such as "hěn" 'very' (19), ones that marked little amount, such as "yǒuxiē" 'a little' (20), and ones that marked excessiveness, such as "tài" 'too'(21).

(18) tā shífēn kāixīn
he completely happy
'He is completely happy.'

(19) tā hěn kāixīn
he very happy
'He is very happy.'

(20) tā yǒuxiē kāixīn
he a little happy
'He is a little bit happy.'

(21) tā tài kāixīn
he too happy
'He is too happy.'

Later studies follow Wang's dichotomy (Chang, 2000, Chang, 2003), some in different terms, such as comparative versus confirmative (Zhou, 1994), overt versus covert (Li, 1997).

Chang (1997) clearly distinguished between the relative and the absolutive by testing each degree adverb through the following five comparative constructions.

Table 2.4 Five Comparative Constructions for Testing Degree Adverbs

Comparative Construction	Example
Ⅰ. NP_1+ bǐ + NP_2 +___+ VP	“wǒ bǐ tā gèng gāo” ‘I am even taller than he.’
Ⅱ. NP_1+ bǐ yǐqián +___+ VP	“wǒ bǐ yǐqián gèng gāo” ‘I am taller than the past.’
Ⅲ. zài NP_1、NP_2 hàn NP_3 zhōng, NP_1 +___+ VP	“zài Wángwǔ、Zhāngsān hàn Lǐsì zhōng, Wángwǔ zuì gāo” ‘Among Wángwǔ, Zhāngsān, and Lǐsì, Wángwǔ is the tallest.’
Ⅳ. gēn píngcháng xiāng bǐ, NP_1+___+ VP	“gēn píngcháng xiāng bǐ, tā gèng kāixīn” ‘Compared with the usual, he is happier.’
Ⅴ. xiāng bǐ zhī xià, NP + ____ + VP + yì xiē	“xiāng bǐ zhī xià, tā gèng gāo yì xiē” ‘By comparison, he is a little bit taller.’

He suggested that the degree adverbs that failed to fill in all of the five blanks belonged to absolutive degree adverbs. Such degree adverbs included “fēicháng” ‘fairly’, ”hěn” ‘very’, “shífēn” ‘completely’, “tài” ‘too’, etc. The degree adverbs that fit at least one of the five constructions were classified as relative degree adverbs. Table 2.5 illustrates the adaptability of some degree adverbs.

Table 2.5 Adaptability of Some Degree Adverbs in the Five Proposed Constructions

	hěn	zuì	gèng	hái	bǐjiào	shāowéi
Ⅰ	－	－	＋	＋	－	－
Ⅱ	－	－	＋	＋	－	－
Ⅲ	－	＋	－	－	＋	－
Ⅳ	－	－	＋	－	－	－
Ⅴ	－	－	＋	－	＋	＋

It seems that “hěn” could not pass the five tests, so it should be classified as an absolutive degree adverb. “gèng” and “zuì ” are complementarily adaptable to the five comparative constructions. “zuì” ‘most’ is only used in multiple-NP (more than two NPs) comparison while “gèng” is used in all the types of comparisons, except the multiple-NP one.

Chang further divided the relative and the absolutive degree adverbs into subcategories in accordance with different degrees of comparison, shown in Table 2.6.

Table 2.6 Subcategorization of the Relative and the Absolutive Degree Adverbs

degree adverbs	the relative	superlatively	ex. zuì
		superiorly	ex. gèng, hái, géwài
		comparatively	ex. bǐjiào
		slightly	ex. shāowéi, luè
	the absolutive	excessively	ex. tài, guòyǘ, chāojí
		extremely	ex. jídù
		fairly	ex. fēicháng, hǎo, hěn, shífēn
		slightly	ex. yǒuxiē

“zuì” denotes highest degree among the relative adverbs, followed by “gèng”, “bǐjiào” and “shāowéi”. Of the absolutive adverbs, a higher degree than the utmost, i.e. excessively, is included, reflecting the subjective feature of this category. Subjective evaluation usually involves exaggerated expressions or descriptions.

The semantic features of degree adverbs decide whether they can occur with BI comparative structure. The following discussion highlights the degree adverbs that children mostly use or misuse in BI comparative structure.

2.3.2 Degree Adverbs in BI Comparatives

BI comparative structure presupposes two entities compared against each other. This presupposition excludes from the comparative structure the absolutive degree adverbs, which do not suggest overt comparison. Therefore, Example (22) that uses an absolutive degree adverb "hěn" is ungrammatical.

(22) *wǒ bǐ tā hěn gāo
I compare he very tall
'*I am very taller than he is.'

Example (23) sounds odd because the superlative adverb "zuì" 'most' is only used when more than two items are compared.

(23) * wǒ bǐ tā zuì gāo
I compare he most tall
'*I am tallest than he is.'

The relative degree adverbs "gèng" and "hái" that mark comparative degrees fit well into the BI comparative structure (24).

(24) wǒ bǐ tā gèng/hái gāo
I compare he even/more tall
'I am even/much taller than he is.'

As for the degree adverb "bǐjiào", it is a relative degree adverb, but not accepted by BI comparative structure, as shown in Example (25),

(25) * wǒ bǐ tā bǐjiào gāo
I compare he relatively tall
"I am relatively taller than he is".

Chang (1997) suggested that "bǐjiào" used in comparative sentences emphasized more on the fact that the compared item had achieved or exceeded some standard or average level, than on the fact that the compared NP was superior to a certain comparer. Therefore, "bǐjiào" was not compatible with a BI comparative that clearly identified the standard NP.

It is clear now that the problem of the sentence "*wǒ de bǐ tā de hěn dà" 'Mine is very bigger than his' comes from the absolutive degree adverb "hěn," which does not suggest two items explicitly compared against each other. Children that make such a mistake seem to be unable to grasp the subtle semantic property yet.

In contrast, the following section explores the syntactic status of the nominalized predicate "ADJ+de", such as "tā de dàdà de"'His is a big one'. The pattern is used in the experiment as the input for the group that receive no adverb stimuli, as opposed to the other group receiving adverb input, such as "tā de hěn dà " 'His is very big".

2.4 The Syntactic Status of ADJ+de

Chao (1968) studied the Mandarin construction "shì…de", and considered the construction in its equative use (counter to the cleft structure use) as a nominalizing specifier. He took the "shì" in Example (26) as a copula, preceding an adjective "dà" 'big' and "de". The adjective and "de" form a de-construction, which used to be followed by a noun that was omitted.

(26) zhè shì dà de (chē)
this is big (car)
'This is a big one (car).'

In other words, "shì" functions as a verb, denotes the equation between what precedes it and what follows it (Wang, 1995). In this case, "zhè" 'this' is equivalent to "dà de" 'big one'. Since "zhè" 'this' is a demonstrative pronoun, "dà de" (ADJ+de) is essentially a nominal. In Paris's (1979) study on Mandarin "de", she suggested that once a predicative element was followed by "de", that chunk usually possessed syntactic characteristics that were typical of nouns. She used several tests to support this claim. For example, using quantifiers as an index, she suggested that although only nouns could co-occur with quantifiers, predicative adjectives once followed by "de" could also

be modified by quantifiers (Table 2.7).

Table 2.7 Co-occurrences of Adjectives with Quantifiers

quantifier “yì duǒ”	
yì duǒ huā	‘a flower’
yì duǒ hóng de	‘a red one’
* yì duǒ hóng	‘a red’

In other words, Mandarin “de” serves as a nominalizer that nominalizes predicative adjectives. Therefore, “ADJ+de” is essentially a nominal constituent. As only gradable predicates are allowed in the final position of BI comparative structure, nominals are arbitrarily excluded (27).

(27) *gǒu bǐ mǎyǐ dà de
dog compare ant big one
‘*Dogs are big ones than ants.’

2.5. Child Grammar—Rule-based or Analogy-based?

Language acquisition theories have long disputed about how children eventually construct adult-like grammar, as well as how they unlearn overgeneralization errors along the process.

Arguments toward this issue generally diverge into two streams. On the one hand, it is argued that children acquire grammar by language-specific rules that are represented in forms of abstract syntactic units. On the other hand, some other researchers attempt to relate language learning to general cognitive principals rather than a language specific domain. They explore to what extent language processing can be attributed to our general cognitive processes shared by other areas of cognitive functioning. Only when the cognitive interpretation fails could we have a "solid reason to suspect that the skills involved are specific to language" (p250, MacWhinney, 1987). Under this assumption, children undergo a variety of general cognitive processes, which might include memory, connection, analogy, abstraction, etc.

2.5.1 Rule-based Model

The Rule-based model is built on the premise that children are productive users of rules (Pinker, 1989). Pinker proposed a set of children's learning mechanism to account for the process of rule formation. In the beginning, children are innately endowed with linking rules, which 'create the syntactic argument structure associated with a given thematic core'. In other words, thematic roles are linked to syntactic categories, which are the units that children learn phrase structure rules with.

Bowerman (1982) documented systematically errors resulted from overgeneralization by her two daughters, such as "*Are you washing me blind?", or "Don't giggle me". It posed a question as how children were eventually restrained from endless generalization. In the rule-based model, children generate broad-range rules, which define the necessary range of alternations that a given verb could possibly

operate. Under each broad-range rule, there are specific narrow-range rules that provide the sufficient conditions of a verb's alternation. Pinker discussed the relations of the rules by using the examples of English dative, as shown below.

(28) She drove the car to Chicago.
(29) *She drove Chicago the car.
(30) *She pulled John the suitcase.

Only Example (28) is a grammatical dative sentence. He explained that Example (29) violated the broad-range dative constraint because it lacked possession change, which was the necessary condition for dativization (Chicago could not possess the car). Example (30) conformed to the necessary condition (John's possession was feasible) but violated the sufficient condition of the narrow-range constraint, which required instantaneous, not continuous, imparting of force. Hence, the verb "pull" was not a dativizable verb. The verb was misused by the children that had not acquired the narrow-range restriction yet.

In the course of development, children first used argument structures with a relatively small set of verbs without productivity. Gropen et al. (1989) studied the development of double-object datives and propositional datives from naturalistic data and found that the first case of generalizing double-object form could occur at an age as late as four. After this period, rule formation was triggered by verbs in pairs of argument structures. Pinker demonstrated the existence of rules by presenting experiments, which, for example, taught 3 to 8 year-old children novel verbs in active voice. It was found that the children were able to use those verbs in passive structures when they were given chances to do so (Pinker, Lebeaux, and Frost, 1987). He also provided productive errors that were resulted from overgeneralizing broad-range rules before narrow-range restrictions were acquired.

According to the mechanism of the rule-based theory, the BI marker and the standard NP in a BI comparative structure form a constituent. A broad-range rule allows degree adverb use in front of the predicate while a narrow-range rule limits the types of the adverbs being allowed. As for such incorrect production as "*wǒ de bǐ nǐ de hěn dà" '*Mine is very bigger than yours', it is caused by overgeneralization of the broad-range rule when the narrow-range rule is not yet fully acquired.

2.5.2 Usage-based Model

Under the usage-based model of language (Croft, 2000), linguistic productions are anchored in the actual language usage events. The so-called linguistic competence result from one's accumulated linguistic experience, which undergoes the processes of entrenchment and abstraction. Entrenchment, which comes from repeated uses of particular expressions, i.e. high token frequency, automatizes the process of linguistic extraction, and enables users to fluently access the expression as a whole. Abstraction, on the other hand, enables the operation of abstract linguistic constructions, adding creativity to utterances, and this process is determined by type variations of a certain expression. From the perspective of grammatical acquisition, Tomasello (2006) proposed four sets of psycholinguistic processes that were based on the usage-based theory.

In the beginning, intention-reading and cultural learning motivate children to attend to linguistic symbols. Children read intentions of other people and imitatively learn the fixed expressions that successfully meet communication purposes. Those expressions become exemplars of utterances that are accessed and used as fundamental units. Children's early holophrases and fixed linguistic expressions, such as "How-ya-doing", "I dunno", "Where's Daddy", etc, are the results of imitative learning (Langacker, 1988).

Schematization and analogy enable children to construct abstract syntactic patterns out of individual concrete expressions. Schematization is an analogy making process during which children repeatedly hear certain utterances with systematic variations, usually with a single slot or constituent substituted, such as “Let’s go”, “Let’s sing”, “Let’s do it”, etc. Children draw analogies among those recurrent patterns and form the schema “Let’s___”, a schema with a concrete function of inviting others to do “something” that is relatively abstract in the slot.

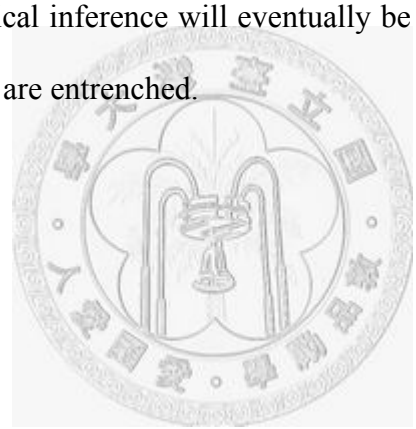
Entrenchment and preemption set constraints to schematization and analogy. The extent of abstraction is limited by conventional ways of using constructions. The more certain construction is said in certain way, the more the construction is entrenched, and children would tend to believe it is the only way it can be said (Dodson, 1999). The principle of Preemption states that when a communicative intention is expressed in Form X, rather than From Y, there must be a reason for that choice. And children are motivated to distinguish the appropriate contexts of the two forms.

Through the process of functionally-based distributional analysis, linguistic units that serve the same functions in communication are grouped into the same paradigmatic categories, such as noun, verb, etc. This process of distributional analysis is not limited to single words, but could also operate on long phrases. For example, a noun phrase may refer to a pronoun, a proper name, or to a common noun with a determiner preceding it and a relative clause following it. They are all treated as units of the same type in that they all serve the same function of identifying certain referents.

Through the four processes, children structure an inventory of linguistic constructions. Children’s linguistic production also undergoes general cognitive processes. When young children intend to say something, they first try to retrieve set expressions that are readily available out of their stored experiences. If the attempt fails, they turn to retrieve linguistic schemas and items that were previously mastered either

by their own production or by their comprehension of others' utterances, and then "cut and paste" them together in order to achieve communicative purposes. This creative act involves analogically filling in or adding on items to a schema foundation, or coordination of two utterance schemas.

From the cognitive point of view, children's early use of BI comparative structure is based on analogical inference. Namely, they first create an utterance schema [Y bǐ X___] out of other concrete BI comparative sentences. Then, they analogically filling in the blank with, a simple sentence for example, "tā de hěn dà" 'His is very big,' resulting in an ungrammatical sentence like "*wǒ de bǐ [tā de hěn dà]" '*Mine is very bigger than his'. Such incorrect analogical inference will eventually be constrained as conventional adverb uses in the structure are entrenched.



Chapter 3
Analyses of Spontaneous Language Samples

Results of corpus study are reported in this chapter. Section 3.1 investigates adult-to-adult uses of comparative structures that mark inequality in natural conversations. It shows what types are favored over others, presenting the general linguistic environment of comparison. Section 3.2 examines children's longitudinal language samples gathered in naturally occurring contexts. It attempts to explore the developmental preferences of comparative utterances and the early uses of BI comparative structure.

3.1 Adult to Adult Uses of Comparatives in Natural Conversations

The corpus used for the following analyses is based on natural discourse conversations, taken from NTU Corpus of Mandarin Chinese (Huang, 1995). Six hours of transcriptions are randomly selected from the database. The selected oral texts comprise 42 discrete text files, each with an independent topic with the length of recording ranging from 5 to 20 minutes. The conversation genres include friend chatting, broadcast interviews, radio phone call-ins, etc. The subject areas include sports, music, medicine, pets, etc.

The analyses focus on comparative structures used in the situation where BI comparative structure can also be used. Namely, it investigates frequency distribution of the sentence types that mark inequality between two entities. The exploration reveals whether BI comparative structure is a preferred type when doing comparison in natural conversations.

The comparative structures gathered from the corpus can be divided into two categories: single-argument and two-argument comparative types. The former only specifies the compared item, leaving the standard item inferred from the context. The later clearly states two compared items.

The single-argument comparative type is often used with different degree adverbs. Two-argument comparative type relies on BI comparative structure or inferior comparative structure to refer to the compared items. The former uses positive voice to states the compared item being superior to the standard comparer while the later uses negative voice to describe the compared item not the same as the standard item in terms of degree. The frequency distribution of single- and two- argument comparative structures is presented in Table 3.1. Examples are provided in Table 3.2.

Table 3.1 Frequency of Comparative Structures in Adult Corpus

		Degree adverb	Frequency	Sum
single-argument "X +(adverb)+ ADJ"		bare	11	173(85.2%)
		gèng	19	
		bǐjiào	143	
two-argument	BI	bare	11	30(14.8%)
		hái	7	
	inferior		12	
TOTAL				203

Table 3.2 Examples of Comparative Structures in Adult Corpus

single-argument comparative	bare	-政大是女生**多** "Zhèngdà shì nǚshēng duō" 'It is girls that are the majority in Zhèngzhì University.'
	With a degree adverb (bǐjiào/ gèng)	-那天看個**更**好笑 "nà tiān kàn ge **gèng** hǎoxiào" 'That day, (I) watched one that was even more funny.'
		-那時候**比較**有錢 "nà shíhòu **bǐjiào** yǒu qián" 'At that time, (we were) comparatively richer.'
two-argument comparative	BI	-他考得**比**我們好 "tā kǎo de **bǐ** wǒmen hǎo" 'He had a better grade than us'. -妳**比**教育部官員**還**知道路 "nǐ **bǐ** jiàoyùbù guānyuán **hái** zhīdào lù" 'You know roads better than the officials of Education Ministry.'
	inferior	-女同性戀好像**沒有**男同性戀**多** "nǚ tóngxìngliàn hǎoxiàng méiyǒu nán tóngxìngliàn duō" 'It seems that lesbians are not as many as gays.'

Chi-square analysis of single-argument and two-argument comparative structures showed that the former significantly outnumbers the later (X^2=100.73, df=1, p<.05). Namely, the adults favor the comparative structures that only specify the topic item, leaving the standard comparer inferred from the immediate surrounding contexts. Statistical analysis of the single-argument comparatives reveals that most of the utterances are produced with degree adverbs (X^2=131.8, df=1, p<.05), as shown in Table 3.3.

Table 3.3 Frequency of Degree Adverbs in Single-argument Comparative Structures in Adult Corpus

	Bare	Degree Adverb	
		gèng	bǐjiào
Frequency	11	19	143

As for two-argument comparative structures, there are two sentence types used in the corpus: BI comparative structure and inferior comparative structure. Table 3.4 shows the frequencies of the two types, which do not significantly differ in number (X^2=1.2, *df*=1, *p*>.05). Adults use BI comparative structure and inferior comparative structure alternately.

Table 3.4 Frequency of Two-argument Structure Types in Adult Corpus

	BI	Inferior
Frequency	18	12

Within the BI utterances produced by adults, only the degree adverb, hái, was found used (Table 3.5). The adults showed no preference for using degree adverbs in BI comparative structure (X^2=0.89, *df*=1, *p*>.05).

Table 3.5 Frequency of Degree Adverbs in BI Comparative Structures in Adult Corpus

	Bare	Adverb
		hái
Frequency	11	7

Out of 203 comparative utterances gathered in adult natural corpus, BI comparative structure only shares 9%, not to mention the BI sentences produced with degree adverbs (3.45%). In other words, the general language environment does not provide abundant examples of degree adverb use in BI comparative structure.

3.2 Child-Adult Uses of Comparative Utterances in Natural Contexts

The subsequent investigation relies on four longitudinal language samples of adult-child conversations, taken from the previous studies conducted in NTU (Cheung, 1995). Speaking language samples of each child are collected in natural settings for about one hour once 4-5 weeks. Table 3.6 summarizes the age period and the total recording hours of each child.

Table 3.6 Age Periods and Total Recording Hours of Child Samples

Child	Age Period	Total hours
PAN	1;7-3;9	11
JC LIN	2;2-3;4	8
CHOU	2;2-3;4	6
ZHENG	3;1-3;11	8

Take PAN for example. He was recorded from one year and seven months old to three years and nine months old. During the period, there were 11 visits to his home with about one hour of recording on each visit. All the children lived with native speakers of Mandarin Chinese with no history of major illness. At a rough estimation, 0.5% of what each child and his/her interlocutors said was recorded for examination.

The following analyses particularly focus on the utterances used for comparing two objects in child and child-directed speech. A close investigation suggests that there are three major utterance types used by adults and children in an event of comparison, shown in Table 3.7.

Table 3.7 Utterance Types used for Comparison in Child Language Samples

Type	Example
I. single-argument comparative "X +(adverb)+ ADJ"	-誰的頭大？ "shéi de tóu dà?" 'who's head is bigger?' -這裡比較重 zhè lǐ bǐjiào zhòng 'This side is heavier.'
II. conjoined comparative	-這個大，這個矮 "zhè ge dà, zhè ge ǎi" 'this one big, this one short' -這個可怕還是魔鬼可怕？ "zhè ge kěpà háishì móguǐ kěpà?" 'This one horrible, or devil horrible?' -你的比較大，我的比較小 "nǐ de bǐjiào dà, wǒ de bǐjiào xiǎo" 'Yours is bigger, mine is smaller.'
III. BI comparative	熊熊比咪咪還高 "Xóngxong bǐ Mīmi hái gāo" "Little Bear is taller than MiMi".

A single-argument comparative structure includes one item and one predicate. It relies on the context to provide additional information for identification of the comparer item. This structure usually goes with degree adverbs, including "bǐjiào" and "gèng". The use of degree adverbs clearly states the intent to compare. In Example (31), the child used the single-argument comparative type with the degree adverb "bǐjiào" to express the intention of comparison.

(31)
PAN (3;5)
(Pan is playing with a toy scale with two adults. He compared the two sides.)
EXP: 哇!
“wà”
‘Oops’
GRA: 倒 下去 了.
“dǎo xiàqù le”
‘It decsended.’
CHI: **這 裡 比較 重.**
“zhè lǐ bǐjiào zhòng”
‘This side is heavier.’
EXP: 對!
“duì”
‘yes.’
CHI: 這 個 比較 不 重.
“zhè ge bǐjiào bú zhòng”
‘This one is less heavier’

As for the second type, a conjoined comparative can be seen as conjunction of two single-argument comparatives. The two compared items are explicitly stated in two independent clauses, each containing an antonymous predicate[1]. In Example (32), the child compared two shapes using a conjoined comparative with two antonymous predicates, and the adult followed his statement with an interrogative conjoined comparative with two independent clauses using repeated predicates. The adult provided two choices, “the front one bigger” or “the back one bigger,” for the child to choose. Such conjoined comparative is more understandable than a complex BI comparative sentence.

(32)
PAN(3;9)
(Pan is comparing two things.)
EXP: 這 是 長方形.
“zhè shì chángfāngxíng”
‘This is a rectangle.’
CHI: 這 要 長長 這 又 不 長.
“zhè yào chángcháng zhè yòu bù cháng
‘This is long, this is not long’
CHI <XXXXX>.
EXP: 不 長 啊, 很 長 啊!
“bù cháng a hěn cháng a
‘Not long? It’s quite long!’
CHI: 怎麼 長.
“zěnme cháng”
‘How is it long?’
CHI: 自己 看.
“zìjǐ kàn”
‘I see it myself.’
EXP: 誰 大?
“shéi dà?”
‘Whose is bigger?’
CHI: **這 個 大 這 個 矮.**
“zhè ge dà zhè ge ǎi”
‘This one big, this one small.’
EXP: **哪 一 個, 前面 的 大, 還是 後面 的 大?**
“nǎ í ge qiánmiàn de dà háishì hòmiàn de dà”
‘Which one? The front one is bigger, or the back one is bigger?’
CHI <XXXXXX>.

The third sentence type is a complex structure in which the comparee, the comparer, and the gradable predicate are all packed into one single clause, known as BI comparative structure. The child in Example (33) compared his stuff with his father’s by using a BI comparative structure.

(33)
Zheng (3;11)
CHI: 爸爸 是 小 的 啦!
“bàba shì xiǎo de la”
‘Father’s is a small one.’
ADU: 那 這個 呢?
“nà zhè ge ne”
‘How about this one?’
CHI: 媽媽 啦!
“māma la”
‘It’s Mom!’
ADU: 這個 算 媽媽 啊?
“zhè ge suàn māma a”
‘Is this counted as Mom?’
ADU: 那 爸爸 變 那麼 小 啊?
“nà bàba biàn name xiǎo a”
‘Then, Father becomes so small?’
CHI: 嗯.
“m”
‘yeah’
CHI: **我 比 我 比 爸爸 大 咧!**
“wǒ bǐ wǒ bǐ bàba dà le”
‘I, I am bigger than Father.’

Table 3.8 illustrates the frequencies of the three types of comparative structures in the child and child-directed speech of each sample.

Table 3.8 Frequency of Comparative Structures in Child Language Samples

	CHILD			ADULT		
PAN	Single	Conjoined	BI	Single	Conjoined	BI
2;0				1		1
2;6				1	2	1
3;0	4			11	4	4
3;6		1		2	4	
SUM	4	1		15	10	6
JC LIN						
2;0				1	3	
2;6				1	2	
3;0		2			1	
SUM		2		2	6	
CHOU						
2;0	1	1		1	1	
2;6		2				1
3;0		1			1	
SUM	1	4		1	2	1
ZHENG						
3;0		3	1		5	1
3;6		1	1		5	
SUM		4	2		10	1

When two objects to be compared are referred to verbally, there is tendency that the conjoined comparative type is favored over BI comparatives in child and child-directed speech across the four samples. The children tend to conjoin two single-argument comparatives that separate compared items in two independent clauses rather than packing the arguments in one complex BI sentence. Such preference endures throughout the first three years of life, differing only by degree. From Pan's sample, it can be found that the adult use of BI comparatives increased with the child's age, although the conjoined comparative is still the dominant type.

As suggested by the analyses of children's naturalistic corpus data, BI comparatives are rarely found in adult input or children's production data, let alone the BI sentences with degree adverb use. The lack of exemplars suggests that children before age 4 might not have mastered adverb use in BI comparative structure yet.

3.3 Summary

Analyses of adult and child corpus data both suggest that BI comparative structure is not a frequent type in natural linguistic settings. In other words, the young children have not mastered the pattern of adverb use in BI comparative structure yet. The results lead to the question as to what strategies young children use as they learn to use degree adverbs in BI comparative structure.

Note

[1] Interrogative conjoined comparatives use repeated predicates in two clauses that are conjoined by the conjunction, háishì. For example, the interrogative sentence “zhè ge dà, háishì zhè ge dà?” ‘this one big, or that one big?’ uses repeated predicates, instead of an antonymous pair.

Chapter 4
Experimental Studies

Two experimental tasks were administered. The first task aimed to elicit the children's free responses of comparative structures, as well as BI comparative utterances under conditioned input, examining whether the use of adverbs in the comparative structure is governed by a grammatical rule or simply by analogy. In the second task, the children were asked to make grammatical judgment on BI comparatives with different degree adverbs. The task attempted to investigate how much the children understood the constraints on degree adverbs in BI comparative structure. It is generally assumed that a production task involves variables that can hardly be controlled in an experimental context. The grammatical judgment task is administered to gather data from a different perspective.

4.1 Task One: Elicitation

The children were randomly divided into two groups. One group was exposed to the linguistic context that used the degree adverb "hěn," (Input A) as in the sentence "tā de hěn dà" 'his is very big', while the other group was exposed to the input that used nominalized predicates (Input N), such as "tā de dàdà de" 'his is a big one' for contrast.

If the children relied on the adverbial rule as they learned to use degree adverbs in BI comparative structure, it would be likely to elicit such incorrect BI comparative sentence as "*wǒ de [bǐ tā de] hěn dà" 'Mine is very bigger than his' from the children that received degree adverb input (Table 4.1).

Table 4.1 Incorrect BI Utterances Possibly Elicited From the Children Receiving Different Input

Input	Rule: Y [bǐ X] +___+ADJ	Analogy: Y bǐ [X +___]
X+ hěn + ADJ	* Y [bǐ X] hěn dà	* Y bǐ[X hěn dà]
X+ ADJ + de		* Y bǐ [X dàdà de]

Such error would be regarded as overgeneralization of the broad-range adverbial rule, which allows for the use of degree adverbs in BI comparative structure before a narrow-range rule that selects adverb types is acquired. The error would not be found in the other group.

On the other hand, if the children relied on the strategy of analogy as they used degree adverbs in BI comparative structure, the results would be different. The children receiving the different input would produce ungrammatical BI sentences in the same manner. For the children who received adverb input, they would likely slot the input predicate "hěn+ADJ" in the frame "Y bǐ [X___]", resulting in such ungrammatical sentence as "*wǒ de bǐ [tā de hěn dà]" 'Mine is very bigger than his'. For the children who received the input of nominalized predicates, they would also slot the input predicate "ADJ +de" in the frame "Y bǐ [X___]", resulting in such ungrammatical sentence as "*wǒ de bǐ [tā de dada de]" 'Mine is a big one than his'. The results would support the analogy account for the children's early uses of degree adverbs in BI comparative structure.

4.1.1 Method

The children assigned to receiving adverb input constantly heard sentences with the degree modifier, "hěn", like "tā de hěn dà" 'his is very big' in the experimenter's instruction. The other group constantly heard sentences with nominalized predicates for contrast, such as "tā de dàdà de" 'His is a big one'. In addition to the size trial, there were three other dimension trials, including length, height, and weight, as illustrated in Table 4.2.

Table 4.2 Input of the Elicitation Task

Trial	Input A (Adverb)		Input N (Nominalization)	
size	NP+ **hěn**	+ **dà** 'big'	NP	+ **dàdà de**
length		+ **cháng**'long'		+ **chángcháng de**
height		+ **gāo** 'tall'		+ **gāogāo de**
weight		+ **pàng** 'fat'		+ **pàngpàng de**

4.1.2 Participants

Forty children aged 3;2 to 3;10 (mean age = 3;5) and forty children aged 5;2 to 5;10 (mean age =5;6), participated in this experiment. They were recruited from daycare centers and kindergartens located in Taipei city with informed consent from their teachers. Half of the participants of each age group (N=20) was randomly assigned to receiving adverb input, and the other half (N=20) randomly assigned to receiving the input of nominalized predicate. There were equal numbers of boys and girls in each age group. Test sessions were audio-recorded for transcription and further analyses.

4.1.3 Materials

Materials consisted of 4 stimulus sets, which individually comprised three similar objects that only differed in one dimension, such as size, length, height or weight. The four sets included toy rhinoceroses with different sizes (shown in Figure 4.1a), pencils with different lengths (Figure 4.1b), toy people with different heights (Figure 4.1c), and toy ducks with different body weights (Figure 4.1d). There were three identical boxes (Figure 4.1e), in which toys of the same set could be put separately. A puppet bear (Figure 4.1f) played as a third person that joined the experiment.

(a) Toy Rhinoceroses With Different Sizes

(b) Pencils With Different Lengths

(c) Toy People With Different Heights

(d) Toy Ducks With Different Body Weights

(e) Boxes

(f) Puppet Bear

Figure 4.1 Materials Used in the Elicitation Task

4.1.4 Procedures

Each child was individually invited to participate in a box picking game, and was asked to compare what she had got inside the box with the experimenter's choice. Using size trial as an example, the experimenter first introduced three toy rhinoceros to a child and put them into three boxes separately. After they had both picked one box[2], the experimenter asked the child to describe the results (34). Table 4.3 illustrates the introduction the children receiving different input would hear. One group would hear the experimenter's description with the degree adverb "hěn". The other group would hear the same introduction except for the lack of the degree adverb.

(34)
EXP:結果誰贏了？因爲你的怎麼樣呀？
"jiéguǒ shéi yíng le? yīnwèi nǐ de zěnmeyàng a?"
'The result shows who wins? Because yours is …?'

Table 4.3 Procedures Eliciting Free Responses of Comparatives

Input with adverb	Input without adverb
The experimenter introduced the three objects to be compared to a child	
*EXP:你看這裡有**很大的**犀牛，還有**很小的**犀牛。 "nǐ kàn zhè lǐ yǒu **hěn dà de** xī'nióu, háiyǒu **hěn xiǎo de** xī'nióu" 'Look, here is a **very big** rhinoceros, and a **very small** rhinoceros.'	*EXP:你看這裡有**大大的**犀牛，還有**小小的**犀牛。 "nǐ kàn zhè lǐ yǒu **dàdà de** xī'nióu, háiyǒu **xiǎoxiǎo de** xī'nióu" 'Look, here is a **big** rhinoceros, and a **small** rhinoceros'
The experimenter put the three objects into three empty boxes, and they both picked one. *EXP:結果誰贏了？因爲你的怎麼樣呀？ "jiéguǒ shéi yíng le? yīnwèi nǐ de zěnmeyàng a?" 'The result shows who wins? Because yours is …?'	

The experimenter then invited a puppet bear to play the game with them. She first compared her choice with the puppet's[3] by using a simple sentence with the degree adverb "hěn**",** or a nominalized predicate (Table 4.4). In the size trial for example, one group heard the sentence "tā de hěn dà**"** 'His is very big' while the other group heard "tā de dàdà de**"** 'his is a big one' for contrast. The experimenter asked the child to compare what s/he had got with the puppet's by the question prompted with the BI comparative frame (35).

(35)

EXP:你的比他的怎麼樣？

"nǐ de bǐ tā de zěnmeyàng?"

"Yours compared to his how?"

EXP:那你再完整講一遍給我聽。

"nà nǐ zài wánzhěng jiǎng yí biàn gěi wǒ tīng"

'Then, say again the whole sentence for me'.

Table 4.4 Procedures Eliciting BI Comparative Structure in two Input Conditions

Input A	Input N
The experimenter introduced to the child a puppet bear, who also wanted to join the game. She first compared hers with the puppet's, and then asked the child to compare his/hers with the puppets by using BI comparatives.	
*EXP: 先來看我跟他的，你看他的**很大**耶，那你的呢？ "xiān lái kàn wǒ gēn tā de, nǐ kàn tā de **hěn dà** yie, nà nǐ de ne?" 'Let's look at his and mine. Look! His is **very big**. How about yours?'	*EXP: 先來看我跟他的，你看他的**大大的**耶，那你的呢？ "xiān lái kàn wǒ gēn tā de, nǐ kàn tā de **dàdà de** yie, nà nǐ de ne?" 'Let's look at his and mine. Look! His is **big**. How about yours?'
*EXP: 你的比他的怎麼樣？ "nǐ de bǐ tā de zěnmeyàng?" "Yours compared to his how?" *EXP: 那你再完整講一遍給我聽。 "nà nǐ zài wánzhěng jiǎng yí biàn gěi wǒ tīng" 'Then, say again the whole sentence for me'.	

There were two questions to be answered in each trial. The first question aimed to elicit the children's free responses of comparative structures. The experimenter provided no clue as to what types of comparatives should be used. The second question aimed to elicit BI comparative sentences, focusing on how the children would deal with the predicate of a BI structure.

4.1.5 Coding

In each trial, two questions were asked. The immediate response after each question was coded for subsequent analyses. As there were two questions in each trial, eight responses were produced by each participant. However, a few children did not answer some of the trials, so the number of responses was fewer than eight. For the unanswered questions, the present study simply ignored the silence, not counting it as correct or incorrect.

The comparative utterances out of free responses were classified into two types, single-argument and two-argument comparative types, distinguished by the number of arguments referred to. A single argument comparative only specifies the compared item, leaving the standard item inferred from the context. There are two sentence patterns in this type, as shown in Table 4.5.

Table 4.5 Single-argument Comparative Types of Free Responses

Pattern		Example
I. X + (adverb)+ ADJ	bare	我的大 “wǒ de dà” ‘Mine is bigger’.
	bǐjiào	我的比較大 “wǒ de bǐjiào dà” ‘Mine is relatively bigger’.
	hěn	我的很大 “wǒ de hěn dà” ‘Mine is very big’.
II. X+ ADJ + de		我的大的 “wǒ de dà de” ‘Mine is a big one’

The first pattern “X + (adverb)+ ADJ “ refers to a sentence that includes an argument, an optional adverb, and an adjective predicate. For example, it includes utterances that do not use any adverb, like “wǒ de dà” ‘Mine is bigger’, as well as ones that use degree adverbs like “bǐjiào” as in “wǒ de bǐjiào dà” ‘mine is relatively bigger’. There are other degree adverbs produced as well, including “hěn” ‘very’, “zhème” ‘so’, “hǎo” ‘so’, “zuì” ‘most’, “tài” ‘too’. The second pattern “X+ ADJ + de “ refers to the sentences including nominalized predicates, such as “wǒ de dà de” ‘mine is a big one’. Although such sentence pattern is not syntactically comparative, it is used in the event of comparison, therefore taken into analysis.

Two-argument comparative structures include both of the items that are said to be compared, and it can be either in conjoined comparative structure or BI comparative structure, as shown in Table 4.6.

Table 4.6 Two-argument Comparative Types of Free Responses

Pattern	Example
I. Conjoined comparative structure: X +(adverb)+ ADJ, Y +(adverb)+ ADJ	我的比較大，你的比較小 "wǒ de bǐjiào dà, nǐ de bǐjiào xiǎo" 'Mine is relatively bigger, yours is relatively small'.
II. BI comparative structure: X + bǐ + Y +(adverb)+ADJ	我的比你的大 "wǒ de bǐ nǐ de dà" 'Mine is bigger than yours'

A conjoined comparative structure is composed of two single-argument comparative sentences. For example, in the sentence "wǒ de bǐjiào dà, nǐ de bǐjiào xiǎo" 'Mine is relatively bigger, yours is relatively small', the arguments are separated in two independent clauses, each with an antonymous predicate. A BI comparative structure packs two arguments in one complex structure, as the example "wǒ de bǐ nǐ de dà" 'Mine is bigger than yours' shows.

4.1.6 Results of Comparative Structures out of Free Responses

The first question in the elicitation task attempted to investigate the preferred constructions when the children were asked to compare two objects. The experimenter provided no clue as to what types of comparatives children had to use in the first round of box picking game. Table 4.7 shows the frequency distribution of the comparative structures produced by the children receiving different input.

Table 4.7 Frequency of Comparative Structures out of Free Responses

			Age3				Age5			
			Input A		Input N		Input A		Input N	
Single-argument	X+(adverb)+ADJ	bare	5	(4%)	8	(11%)	3	(4%)	2	(3%)
		hěn	10	(14%)	5	(7%)	6	(8%)	2	(3%)
		bǐjiào	20	(28%)	7	(9%)	32	(41%)	31	(39%)
		zhème	4	(6%)						
		hǎo			5	(7%)	1	(1%)		
		zuì	1	(1%)			4	(5%)	2	(3%)
		tài					1	(1%)	2	(3%)
	X+ADJ + de		25	(35%)	46	(61%)	2	(3%)	22	(28%)
Two-argument	Conjoined		1	(1%)			13	(16%)	5	(6%)
	BI-		5	(7%)	5	(7%)	17	(22%)	14	(18%)
Total			71		76		79		80	

The three-year-children receiving nominalized predicate as input seemed to be influenced by the input, frequently using the sentence pattern "X+ADJ+de" (61%) in free responses. However, the three-year-old children exposed to the adverb "hěn" stimuli were not influenced by the input as much; only 14% of their responses used the pattern "X+ hěn +ADJ". Without nominalized input, there were still 35% of the responses that used the pattern "X+ADJ+de ".

The five-year-old children frequently used the adverb "bǐjiào" in the pattern "X+(adverb)+ADJ" (41% and 39%). There were 28% of the responses produced by the five-year-olds receiving nominalized input that used the pattern "X+ADJ + de", possibly influenced by the input. It seemed that the children of two ages were susceptible to nominalized predicates.

Chi-square analyses of single-argument and two-argument comparatives (Table 4.8) revealed that the former was preferred over the later by the three-year-old children that received adverb input (X^2=49.03, df=1, p<.05) and nominalized input (X^2=57.32, df=1, p<.05). Similar results were also found in the five-year-old children that received

nominalized predicates as input (X^2=22.05, df=1, p<.05) and adverb input (X^2=4.56, df=1, p<.05).

Table 4.8 Frequency of Single-argument and Two-argument Comparatives of Free Responses

	Age3		Age5	
	Input A	Input N	Input A	Input N
Single-argument	65	71	49	61
Two-argument	6	5	30	19

Chi-square analyses of the two-argument type (Table 4.9) revealed that BI comparative structures (X^2=10.76, df=1, p<.05) and conjoined comparative structures (X^2=15.21, df=1, p<.05) produced by the five-year-old children significantly outnumbered those produced by the three-year-old children. The numbers of conjoined comparative and BI comparative structures produced by the five-year-old children were not varied significantly (X^2=3.45, df=1, p>.05). Namely, the five-year-old children seemed to use conjoined comparative structure and BI comparative structure alternately when they compared two items.

Table 4.9 Frequency of Sentence Patterns in Two-argument Comparative Structure

	Age3		Age5	
	Input A	Input N	Input A	Input N
Conjoined comparative	1	0	13	5
BI comparative	5	5	17	14

4.1.7 Results of BI Utterance Elicitation

With the instruction prompted with BI comparative frame "Y bǐ X___", most of the children were able to produce BI utterances in at least one trial. The numbers of correct BI utterances and correct rate in the four trials are listed in Table 4.10 As each child contributed one BI utterance in each trial, 20 responses would be collected in a trial if there were no silence cases.

Table 4.10 Frequency and Rate of Correct BI Utterances in Each Age Group in the Four Trials

		dà	cháng	gāo	pàng	
Age3	Input A	13 (76.47%)	14 (82.35%)	9 (60%)	9 (56.25%)	45 (69.23%)
	Input N	10 (62.5%)	9 (52.94%)	9 (52.94%)	7 (36.84%)	35 (50.72%)
Age5	Input A	19 (95%)	20 (100%)	20 (100%)	20 (100%)	79 (98.75%)
	Input N	19 (95%)	19 (95%)	19 (95%)	19 (95%)	76 (95%)

Of all the BI utterances the three-year-old children produced, 51 % were correct by those exposed to nominalized predicate input, 69% by the other group. Nearly all the utterances produced by the five-year-old children were correct. Two-way ANOVA analysis of the correct BI utterances produced by the two groups of children receiving different input was administered. The correct utterances produced by the children receiving adverb input or nominalized predicate input were not significantly different between three- or five-year-old children [$F(1,1)=3.45$, $p>.05$]. The 5-year-old children near-significantly produced more correct BI utterances than the three-year-old children [$F(1,1)=114.8$, $p>.05$]. In other words, the children under different conditioned input produced incorrect BI utterances at a similar rate. Nearly all the five-year-old children were able to produce BI utterances correctly.

The numbers of correct BI utterances produced in the four dimension trials were not significantly different by the three-year-old children receiving Input A (X^2=1.84, df=3, p>.05) or Input N (X^2=.54, df=3, p>.05), or by the five-year-old children.

The degree adverbs used in correct BI utterances included "hái", as in "wǒ de bǐ tā hái gāo" 'Mine is even taller than his', "gèng", as in "wǒ de bǐ tā gèng gāo" 'Mine is even taller than his', etc. There were also correct BI comparatives that did not use any adverb, such as "wǒ de bǐ tā gāo" 'Mine is taller than his' (Table 4.11).

Table 4.11 Frequency of Degree Adverb Use in Correct BI Utterances

		bare	degree adverb			
			hái	gèng	other	Sum
Age3	Input A	27 (60%)	18 (40%)			45
	Input N	27 (77%)	8 (22.86%)			35
Age5	Input A	39(49.37%)	29(36.71%)	10(12.66%)	1 (1.27%)	79
	Input N	53(69.74%)	23(30.26%)			76

Other: wǒ de bǐ tā de háiyào gèng cháng 'Mine is even much longer than his.'

The adverb "hái" was the only adverb used in the BI comparative structure by all the three-year-old children, as well as by the five-year-old children receiving nominalized predicate as input. The five-year-old children exposed to adverb input also used "gèng" in BI utterances.

Different conditioned input significantly influenced adverb use in BI comparative structure of the three-year-olds and the five-year-olds, as shown in Table 4.12.

Table 4.12 Frequency of Degree Adverb Use in Correct BI Utterances

		bare	degree adverb	
Age3	Input A	27	18	45
	Input N	27	8	35
Age5	Input A	39	40	79
	Input N	53	23	76

The three-year-old children exposed to the adverb input significantly used adverbs in BI comparative structure more frequently than the other group (X^2=3.85, df=1, p<.05). Similar results were found in the five-year-old children (X^2=4.59, df=1, p<.05).

The error types of BI utterances were listed in Table 4.13. The incorrect BI utterances were classified according to how the predicate was incorrectly structured, i.e. the construction after the frame "Y bǐ X___". The error type "ADJ +de" referred to such nominalization error as "*wǒ de bǐ tā de dàdà de" '*Mine is a big one than his'; the "hěn + ADJ" type referred to the errors involving the degree adverb "hěn", such as "*wǒ de bǐ tā de hěn dà" '*Mine is very bigger than his'; there were also other incorrect adverb usages like "*wǒ de bǐ tā de bǐjiào dà" 'Mine is relatively bigger than his' or "*wǒ de bǐ tā de hǎo da" '*Mine is so bigger than his'. The errors classified into Construction Problems were those that were not directly related to the predicative structure of a BI sentence, like such utterance as "* wǒ bǐ gēn tā gāo" 'He and I compare tall'.

Table 4.13 Frequency of The Error Types of BI Utterances Produced by the Children

		ADJ+de	hěn+ADJ	Other adverbs	Construction	
Age3	Input A	2 (10%)	5 (25%)	10 (50%)	3 (15%)	20
	Input N	20 (58.82%)	0	10 (29.41%)	4 (11.76%)	34
Age5	Input A	0		1		1
	Input N	1		3		4

There were 25% of the incorrect utterances that belonged to the error type "hěn+ADJ" produced by the three-year-olds receiving adverb input. The incorrect use of the adverb "hěn" was not found in the other group exposed to nominalized predicate as input. The "ADJ+de" type of error was made by the children receiving the Input of nominalized predicates (59 %) and adverbs (10%).

The number of "ADJ+de" type of error produced by the children receiving Input N was significantly greater (X^2=14.73, df=1, p<.05) than the type produced by the children receiving Input A (Table 4.14).

Table 4.14 The Error Types of BI Comparatives Produced by the Three-year-old Children

	ADJ+de	hěn+ADJ
Input A	2 (10%)	5 (25%)
Input N	20 (58.82%)	0

Namely, the children exposed to nominalized predicates were influenced by the input, therefore incorrectly slotting the nominalized chunk in the BI comparative structure frame "Y bǐ X___." On the other hand, only a small number of the incorrect utterances produced by the children receiving adverb input belonged to the "hěn+ADJ" type of error. Namely, the children did not seem to be influenced by the adverb input as much.

Although the incorrect BI utterances produced by the two groups of three-year-old children were not equally influenced by the conditioned input, it seems that the rule account of children's early use of degree adverbs in Mandarin BI comparative structure was not supported. The evidence of using a nominalized predicate in the frame "Y bǐ X___" suggested that the early use of BI comparative structure was analogy-based. The similar process should also account for the incorrect use of degree adverbs in BI comparative structure by the three-year-old children receiving adverb input, though there were not many.

The frequency of the participants in each correct rate range was presented in Table 4.15. Take the five-year-old children receiving adverb input for example, there were 19 children that did not make any mistake when they produced BI comparatives.

Table 4.15 Frequency of the Participants in Different Correct Rate Range

Correctness(%)		100	79-60	59-40	39-20	0	silence	TOTAL
Age3	Input A	7	3	4	1	2	3	20
	Input N	5	5	1	2	7		20
Age5	Input A	19	1					20
	Input N	18	1		1			20

It seems that most of the 3-year-old children produced one or more incorrect BI utterances. And nearly all the 5-year-old participants were 100% correct when they used BI comparatives in the experiment[4].

4.1.8 Summary of Task One

In the free responses of comparative structures, the three- and five-year-old children tended to use structures that only referred to one compared item, leaving the other item inferred from the context. The five-year-old children exposed to adverbs or nominalized predicates as input both used the sentence type "X+(adverb)+ADJ" that relied on adverbs to express comparing intent. The three-year-old children used different types of single-argument comparatives that were under the influence of different input. The children receiving the input of nominalized predicates significantly used more nominalization pattern "X+ADJ+de" as the other group showed preference for the sentence type "X+(adverb)+ADJ".

The correct rates were not significantly different in the BI utterances produced by the three-year-old children receiving different input. The adverb use in the correct BI utterances seemed to be influenced by the input. There were more correct BI utterances produced with degree adverbs by the children receiving adverb input.

The nominalization error "Y bǐ X ADJ+de" was frequently produced by the three-year-old children exposed nominalized predicates as input, which supported the analogy account of children's early use of degree adverbs in BI comparative structure. However, there were not as many incorrect use of the degree adverb "hěn" in BI utterances produced by the three-year-olds receiving the adverb input.

4.2 Task Two: Grammatical Judgment Test

The grammatical judgment test was conducted after the first task. Each child made grammatical judgment on BI comparatives with different degree adverbs. It was attempted to investigate children's awareness of the constraints on degree adverbs in BI comparative structure. The children were tested after trained to pay attention to the form of a syntactic structure.

4.2.1 Participants

The participants were the same as those in Task One.

4.2.2 Materials

Materials included a koala puppet (previously mentioned), a toy cartoon figure, a pencil (Figure 4.2a Hamukoro), and five vehicles of different sizes (Figure 4.2b).

(4.2a) toy figure "Hamukoro" and a pencil

(4.2b) five vehicles of different sizes

Figure 4.2 Materials Use in the Grammatical Judgment Task

4.2.3 Training

The children were asked to help a puppet by finding his speech errors and teaching him how to rephrase his words. There were five sentences including three grammatical errors given by the puppet, illustrated in (36).

(36)

你好啊，我是無尾熊先生，我今天見到你，我*高興真。
"nǐ hǎo a, wǒ shì wúwěixóng xiānxēng, wǒ jīntiān jiàn dào nǐ, wǒ *gāoxìng zhēn"
'Hello, I am Mr. Koala. I am happy really to see you today.'

今天是我的生日，我收到好多的生日禮物喔，我拿出來給你看。
"jīntiān shì wǒ de xēngrì, wǒ shōu dào hǎo duō de xēngrì lǐwù, wǒ ná chūlái gěi nǐ kàn"
'Today is my birthday. I got so many presents. Let me show them to you.'

你看，這是大狗送我的哈姆太郎。(taking out hamukoro)
"nǐ kàn, zhè shì Dàgǒu sòng wǒ de Hāmǔtàiláng"
'Look, This is Hamukoro that Big Dog gave me.'

這*片鉛筆是大貓送的。(taking out a pencil)
"zhè *piàn qiānbǐ shì Dàmāo sòng de"
'This slide of pencil is given by Big Cat.'

而且啊，媽媽還會買生日蛋糕，因爲她知道我最喜歡*喝蛋糕了。
"réqiě a, Māma hái huì mǎi xēngrì dàngāo, yīnwèi tā zhīdào wǒ zuì xǐhuān *hē dàngāo le"
'And Mom will buy a birthday cake, because she knows I like to *drink cakes.'

If a child failed to identify any of the mistakes, the experimenter would explain to him/her why the sentences sounded strange and provided the common ways of saying them.

4.2.4 Testing

There were five sentences to be judged with presentation of five pairs of cars in different sizes (Figure 4.3).

a. 這台車比這台車**大**。
"zhè tái chē bǐ zhè tái chē **dà**"
'This car is bigger than this car.'

b. 這台車比這台車**還大**。
"zhè tái chē bǐ zhè tái chē **hái dà**"
'This car is even bigger than this car.'

c. *這台車比這台車**很大**。
"*zhè tái chē bǐ zhè tái chē **hěn dà**"
'*This car is very bigger than this car.'

d. 這台車比這台車**更大**。
"zhè tái chē bǐ zhè tái chē **gèng dà**"
'This car is even bigger than this car.'

e. *這台車比這台車**最大**。
"*zhè tái chē bǐ zhè tái chē **zuì dà**"
'*This car is most bigger than this car.'

Figure 4.3 Testing Procedure of Grammatical Judgment Test

4.2.5 Results

There were only two possible responses to each sentence: accept it or reject it. The numbers of responses that accepted the tested BI sentences were listed in Table 4.16. The first three predicates, "dà" 'big', "hái dà" 'even bigger', and "gèng da" 'even bigger', were compatible with a BI structure and should be accepted; "hěn dà" 'very bigger' and "zuì dà" 'most bigger' should be rejected.

Table 4.16 Frequency of Responses Judging the Tested BI Sentences as Grammatical

	Grammatical Sentence			Ungrammatical Sentence	
	dà	hái dà	gèng dà	*hěn dà	*zuì dà
Age3	23	25	27	24	28
	23/40 (57.5%)	25/40 (62.5%)	27/40 (67.5%)	24/40 (60%)	28/40 (70%)
Age5	15	20	23	16	18
	15/40 (37.5%)	20/40 (50%)	23/40 (57.5%)	16/40 (40%)	18/40 (45%)

Two-way ANOVA analysis did not reveal a significant difference among the numbers of responses that judged the five sentences as grammatical [$F(4,4)=3.87$, $p>.05$]. In other words, the grammatical and ungrammatical sentences were not significantly distinguished by the two age groups. Even the BI comparative structure that did not use any degree adverb was rejected by half of the three-year-olds and over half of the 5-year-old children. The results of the five-year-old children in the grammatical judgment test were fairly inconsistent with their performances in BI comparative elicitation. Examination of the reasons for rejecting the grammatical sentences suggested that most of the 5-year-olds replaced the grammatical ones with conjoined comparatives. For example, a child rejected the tested sentence "zhè tái chē bǐ zhè tái chē dà" 'This car is bigger than this car' by replacing it with a conjoined comparative "zhè tái chē dà**,** zhè tái chē xiǎo" 'this car big, this car small'. In other words, the rejection of the correct tested sentences by the five-year-old children was based more on their preferences for the conjoined structure than on the syntactic judgment on BI comparative structure. The grammatical judgment task seemed to be difficult for the three-year-old children because the reasons they provided for rejecting the tested sentences were not directly related to syntactic problems of BI comparative structure.

The numbers of responses that accepted grammatical or ungrammatical sentences with adverbs (Table 4.17) were not significantly different given by the three-year-old children (X^2=0, df=1, p>.05) and the five-year-old children (X^2=1.05, df=1, p>.05). Namely, the children did not distinguish between grammatical and ungrammatical adverb uses. They either accepted any BI comparative sentence with a degree adverb, or rejected all of them.

Table 4.17 Frequency of Responses Judging the Tested BI Sentences with Degree Adverbs as Grammatical

	Grammatical sentences with adverbs	Ungrammatical sentences with adverbs
Age3	52	52
Age5	43	34

Cross tabulation analyses of Task one and Task two were also conducted. Table 4.18 only shows the results of the children that produced BI utterances with over 75% above correct rate in the elicitation task. It seems that even if the children were able to produce BI sentences correctly, they did not distinguish between correct and incorrect adverb uses in the grammatical judgment test [F(4,4)=1.39, p>.05].

Table 4.18 Frequency of Responses Judging the Tested BI Sentences as grammatical by the Children Producing BI Utterances with over 75% or above Correct Rate

	Grammatical Sentence			Ungrammatical Sentence	
	dà	hái dà	gèng dà	*hěn dà	*zuì dà
Age3	16	17	17	17	17
	16/18 (88.89%)	17/18 (94.44%)	17/18 (94.44%)	17/18 (94.44%)	17/18 (94.44%)
Age5	14	19	22	15	17
	14/38 (36.84%)	19/38 (50%)	22/38 (57.89%)	15/38 (39.47%)	17/38 (44.74%)

Possible carry over effect from task one is selectively examined in subsequent analysis. Table 4.19 reports the numbers of responses that accepted the BI sentences with degree adverbs, given by the children receiving different input in task one.

Table 4.19 Frequency of Responses Judging the Tested BI Utterances with Degree Adverbs as Grammatical

		Children receiving Input A	Children receiving Input N
Age 3	hái dà	16	9
	gèng dà	15	12
	*hěn dà	14	10
	*zuì dà	14	14
Age 5	hái dà	13	7
	gèng dà	13	10
	*hěn dà	10	6
	*zuì dà	11	7

Analysis by Mann-Whitney *U* test revealed that the children receiving adverb input in the elicitation task tended to judge the tested sentences with degree adverbs as grammatical *(U*=8, $p<.05$). Namely, the adverb input seemed to increase the responses that accepted both grammatical and ungrammatical uses of degree adverbs in BI comparative structure.

4.2.6 Summary of Grammatical Judgment Task

The grammatical judgment task examined if children could correctly judge BI comparatives with different degree adverbs. The results showed that the children of both age groups failed to judge the grammatical and ungrammatical BI comparative sentences. The children who received adverb input in the elicitation task, in comparison with those exposed to nominalized predicates as input, tended to judge the BI sentences with degree adverbs as grammatical.

As grammatical judgment task is a meta-linguistic task, it may involve some extra-linguistic factors. For example, some of the five-year-old children rejected the tested BI sentences out of their preferences for conjoined comparative structures. Some three-year-old children made judgment on language-unrelated materials.

4.3 Summary

In the elicitation task, the children answered two questions. The first question elicited comparative structures out of free responses. It was found that the children preferred using structures that only specified one compared item, leaving the other inferred.

The second question prompted with BI comparative frame "Y bǐ [X___]" elicited BI utterances from the children. The correct rates were not significantly different in the BI utterances produced by the three-year-old children receiving different input. The children receiving adverb input tended to use adverbs in their correct BI utterances. The incorrect BI utterances resulted from nominalization error and incorrect adverb uses were both collected.

The results of grammatical judgment task showed that the grammatical and ungrammatical BI sentences with degree adverbs were not correctly judged even by the children that produced correct BI utterances in the elicitation task. The children exposed to adverb input in the elicitation task, compared with those receiving nominalized predicates as input, tended to judge the BI sentences with degree adverbs as grammatical. Many of the 5-year-olds rejected tested BI sentences out of their preferences for conjoined comparative structure type; the task itself seemed to be difficult for the 3-year-olds.

Notes

[2]The boxes had been marked in advance, so that the experimenter could predict the contents after the boxes were switched places. The procedure made sure all the children would take bigger ones so that their output could be controlled to the same adjective predicate (in this case, "dà" 'big').

[3]The experimenter made sure the child got the biggest, the puppet second biggest, and herself smallest.

[4] Three children from the age three group did not produce any BI utterance in any of the four trials. Such silence was not taken into calculation. Since the unanswered trials were not considered, the children that were classified into 100% correct rate were not necessarily correct across the four trials. Some of them could just answer two of the trials and had both of them correct.

Chapter 5
Discussion and Conclusion

This study investigates whether children's early use of degree adverbs in Mandarin BI comparative structure is rule-based or analogy-based. According to the rule-based account, the basic BI comparative structure and a broad-range rule that allows for degree adverbs in BI comparative structure are constructed first. Children will follow the rule and place adverbs in the BI structure "Y [bǐ X] +___+ADJ". The incorrect use of degree adverbs in BI comparative structure is interpreted as a result of incomplete formulation of a narrow-range rule that restricts the use of adverb types. On the other hand, the analogy-based account hypothesizes that children rely on a formula "Y bǐ [X___]", in which they analogically fill in the blank with a simple sentence "X+ adverb+ predicate" regardless of the grammatical status of the predicate. The incorrect use of degree adverbs is resulted from slotting an unanalyzed chunk in the frame.

To investigate the strategies young children use as they learn to use adverbs in BI comparative structure, evidence was collected from three sources, including natural adult corpus data and child language samples, elicitation of BI comparative structure by the children exposed to different conditioned input, and a grammatical judgment test on degree adverb use in BI comparative structure.

5.1 Rule-based Account Examined

Hsieh (2004) failed to seek evidence for the rule-based account of children's incorrect use of degree adverbs in BI comparative structure. The present study found few examples of correct adverb use in BI comparative structure, such as "wǒ de bǐ nǐ de gèng dà" 'Mine is much bigger than yours' from the three-year-old child language samples. In other words, the young children did not seem to have mastered the broad-range adverbial rule to use degree adverbs in the BI structure "Y [bǐ X] +___+ADJ". Therefore, the incorrect use of degree adverbs did not seem to come from

overgeneralization of a broad-range rule since the rule is not found productively applied.

Although results of the elicitation task showed that the five-year-old children correctly used degree adverbs, including “gèng” and “hái” in BI utterances, in the grammatical judgment test, nearly half of the five-year-old children rejected both of the grammatical and ungrammatical BI comparative structures that contained degree adverbs. In other words, even if the children used degree adverbs in BI comparative structure correctly, they did not necessarily lead to an adverbial rule that can facilitate the metalinguistic task.

The incorrect BI utterances resulted from nominalization error, such as “wǒ de bǐ tā de dàdà de” ‘Mine is a big one than his’ produced by the three-year-old did not support the rule-based account. Since BI comparative structure only allows for gradable predicates in the frame, a nominalized predicate is excluded. It seemed that the three-year-old children that produced such incorrect utterances were not sensitive to the difference between these grammatical categories. If they had not mastered the basic grammatical structure of BI comparative construction, the adverbial rule is unreachable. An alternative account of the children’s using a nominalized predicate in BI comparative structure states that the children did not treat “ADJ+de” as a nominal. They regarded the chunk as a gradable predicate that was compatible with BI comparative structure.

5.2 Analogy-based Account Examined

The incorrect BI utterances produced by the three-year-old children in the experiment revealed that these young children used the strategy of analogy as they used degree adverbs in BI comparative structure.

Table 5.1 Frequency of the Error Types of BI Comparatives Elicited in the Experiment

		ADJ+de	Hěn+ADJ	Other adverbs	Construction	
Age3	Input A	2 (10%)	5 (25%)	10 (50%)	3 (15%)	20
	Input N	20 (58.82%)	0	10 (29.41%)	4 (11.76%)	34
Age5	Input A	0		1		1
	Input N	1		3		4

There were 59 % of the incorrect BI utterances in the three-year-olds resulted from slotting a nominalized predicate in the frame of BI comparative structure when they were exposed to the input of nominalized predicates. On the other hand, there were 25 % of the errors resulted from incorrect degree adverb use by the three-year-old children receiving adverb input. In other words, the incorrect utterances (37) were produced through the same process of analogy making by the two groups of children.

(37) Children receiving adverb input: *wǒ de bǐ [tā de **hěn** dà]
Children receiving nominalized predicate input: *wǒ de bǐ [tā de dàdà de]

In the experiment, the children receiving adverb input were influenced by the experimenter's instruction " X +hěn +ADJ" as the other group by "X+ADJ+de". The three-year-olds drew analogies between the input and the formula of BI comparative structure (shown in Figure 5.1, 5.2), producing incorrect BI utterances.

		X	hěn dà
Y	bǐ	[	]
*Y	bǐ	X	hěn dà

Figure 5.1 Analogy Making Between Adverb Input and BI Comparative Structure

		X	dàdà de
Y	bǐ	[	]
*Y	bǐ	X	dàdà de

Figure 5.2 Analogy Making Between Nominalized Predicate and BI Comparative Structure

Namely, the children under the influence of the input patterns "X+adverb+ADJ" or "X+ ADJ+de" completed the formula "Y +bǐ + [X +___] " by analogically slotting the predicate modified by an incompatible adverb, or an incompatible nominalized predicate in the blank.

It seems that the evidence collected for now support the analogy view of children's use of degree adverbs in BI comparative structure. However, the analogical account leaves one question as to why the errors made by the children receiving nominalized predicates as input like "*wǒ de bǐ tā de dàdà de," 'Mine is a big one than his' were 4 times as many as those like "*wǒ de bǐ tā de hěn de" 'Mine is very bigger than his' by the children receiving adverb input if the children used the same strategy to construct a BI comparative. It seemed that the children did not simply rely on analogy making as they used adverbs in BI comparative structure. The familiarity with the input structures to be analogized across should be considered as well.

According to the usage-based theory, children rely on previously mastered utterance schemas to produce novel utterances. On examination of the three-year-old children's free responses of comparatives in the experiment, the group exposed to the input of nominalized predicates frequently used sentences of nominalization, such as

“wǒ de dà de” ‘Mine is a big one’ to compare items (61%). The other group receiving the adverb input “hěn” did not use the “X+hěn +ADJ” type of sentence (14%), like “wǒ de hěn dà” ‘Mine is very big’ as frequently as “X+ADJ +de” (35%). In other words, the children seemed to be more familiar with the sentence type “X+ADJ+de” than with “X+hěn +ADJ “ in spite of different conditioned input. As they were asked to complete the formula “Y bǐ [X___]”, the “ADJ+de” sentence type seemed to be more readily available to be analogized with the frame than “hěn +ADJ” type. The different degrees of familiarity could result in the unequal distribution of error types of BI comparative structure.

Longitudinal observation also reveals that “ADJ+de” tends to be favored over “hěn+ADJ” in the early child and child-directed speech. Table 5.2 shows the occurrence frequencies of the two types, “ADJ+de” and “hěn +ADJ”, from Pan’s sample.

Table 5.2 Frequency of the Types “ADJ+de” and “hěn +ADJ” in Child Language Sample

Pan		1;6	2;0	2;6
adult	ADJ+de	18	12	8
	hěn +ADJ	2	7	28
child	ADJ + de		1	13
	hěn +ADJ			4

There are frequent occurrences of the utterance type “ADJ+de” in the adult input before age 2, after which the child begins to frequently use this type throughout his second year of life. The “hěn +ADJ“ type is hardly found in Pan’s utterances before the third birthday. The direct and indirect evidence both supports the view that “ADJ+de” is mastered prior to the other type. The unequal mastery might account for the high frequency of “ADJ+de” type of error, but low of “hěn +ADJ” type in the experiment. In other words, familiarity with the phrases to be analogized across is another factor that should be considered in addition to analogy.

5.3 General Discussion

Analyses of longitudinal language samples suggested that BI comparative structure was not frequently used for comparing two objects by the children before age 4, not to mention adverb use in the structure. The lack of exemplars echoed high error rate in the BI utterances produced by the 3-year-old children in the elicitation task. It was also reflected in the results of grammatical judgment task where nearly half of the children did not distinguish between correct and incorrect uses of degree adverb in BI comparative structure.

Young children did not construct the broad-range rule but make use of a more general cognitive skill, analogy, in using degree adverbs in BI comparative structure, which is evident in the incorrect BI utterances collected in the experimental elicitation. The incorrect use of nominalized predicates and degree adverbs in the BI comparative frame "Y bǐ [X___]" suggested that the errors were made under the same analogy making process. However, it seemed that analogy was not the only strategy that the children adopted as they pieced up a new structure. The familiarity with the structures to be analogized across also played a role in the process.

The five-year-old children seemed to have been refrained from such incorrect analogical generalization since few incorrect BI utterances were elicited. The entrenchment and preemption of correct adverb uses from linguistic experiences might constrain the endless overgeneralization. However, the general linguistic environment did not seem to provide enough exemplars of correct adverb uses for the five-year-old children to fully master the structure, as suggested by analyses of the naturalistic adult conversations. They did not make correct grammatical judgment on the tested BI sentences.

Conjoined comparative structure type was found more frequently used in early child and child-directed speech than BI comparative structure. Such preference was also

found in the grammatical judgment test. Many of the 5-year-olds rejected both the grammatical and ungrammatical BI comparatives and replaced which with conjoined comparatives. In terms of syntactic complexity, BI comparative is more complicated and less understandable for children than conjoined comparative since the former packs two arguments in one single clause as the later uses two independent clauses that separate two arguments. Previous research also suggests that coordination precedes subordination when children first combine clauses. Bloom et al. (1980) found the first conjunction to appear in children's production is the coordinate "and"(by age 2;2). It links clauses for a variety of functions, depending on contexts to provide pragmatic inferences (Clark, 2003). Ardery (1980) found the most frequently produced and best understood coordinate type is a conjunction of two transitive-verb clauses. From the usage-based point of view, children seem to be more confident in using the already mastered pattern to compare items, i.e. "X+(adverb)+predicate" or single-argument comparative. Such preference is also consistent with the results in children's free choices of comparative types in the experiment. The 3- and 5-year-olds all chose single argument types in spontaneous production of comparative structures.

5.4 Concluding Remark

Analyses of early spontaneous language samples revealed that BI comparative structure was not a frequently used sentence type in conversations. Young children did not seem to have generalized from the pattern of adverb use in BI comparative structure. Before they master the structure, the three-year-old children relied on the strategy of analogy. They created a formula for BI comparative structure, "Y bǐ [X___]", where they slotted in the frame with the structures they are familiar with, "X+adverb+ADJ" or "X+ADJ+de", patterns frequently used in the natural language environment. The incorrect uses of degree adverbs or nominalized predicates in BI comparative structures were resulted from the same analogy making process.

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Appendix

Table 1.1 Preferred Outputs for Grammatical Sentences

Conjoint Problem (C), Adverb Problem (A), and Other (O).

	dà			hái dà			gèng dà			SUM		
	C	A	O	C	A	O	C	A	O	C	A	O
Age3	1		16	1		14	1	1	11	3	1	**41**
Age5	14	9	2	12	8		11	6		**37**	23	2

Table 1.2 Preferred Outputs for Ungrammatical Sentences

Conjoint Problem (C), Adverb Problem (A), and Other (O).

	* hěn dà			* zuì dà			SUM		
	C	A	O	C	A	O	C	A	O
Age3	2	1	13	1	1	10	3	2	23
Age5	12	12		10	12		**22**	**24**	