# Null Object Construction vs. VP Ellips is Construction: An Experimental Study

Ruya LI    Jianhua HU

## 1. Introduction

This paper investigates Mandarin-speaking children's sensitivity to the strict/sloppy reading ambiguity, locality effect on the sloppy reading and observation of the parallelism principle in their interpretation of the following elliptical constructions.

(1)   John kanjian-le ta-de mama, Mary ye shi.
      John    saw        his mother Mary also be
      'John saw his mother; Mary did too.'
(2)   John kanjian-le ta-de mama, Mary ye kanjian-le.
      John    saw        his mother Mary also saw
      'John saw his mother; Mary also saw.'

There are two analyses of the two constructions. Huang (1988, 1991) argues that both constructions are VP ellipsis as they exhibit the two properties characteristic of VP-ellipsis: the strict/sloppy reading ambiguity and the locality effect on the sloppy reading. Xu (2003) argues that structures like (1) are VP ellipsis constructions (VPEC) and structures like (2) are null object constructions (NOC). On the one hand, the null object constructions can have a third reading except for the strict/sloppy reading whereas the VP ellipsis constructions cannot. On the other hand, the VP ellipsis constructions are subject to parallelism in terms of their interpretation whereas the null object constructions are not. Cross-linguistically, it has been found that children are sensitive to the strict/sloppy reading ambiguity and the parallelism principle in their interpretation of the elliptical structures (Guo et al. 1996; Matsuo & Duffield 2001; Foley et al. 2003; Matsuo 2007; Cheung 2008). Also, it has been found that children are sensitive to the locality condition in their anaphora resolution (Chien & Wexler 1990; Li 2010). Given the above findings, we are in a position to examine Mandarin-speaking children's comprehension of the structures like (1) and (2) with respect to their sensitivity to the strict/sloppy reading ambiguity, the locality effect on the sloppy reading and the parallelism principle involved in the interpretation of these structures. The findings of our study show that neither of the accounts mentioned above tells the whole story.

## 2. Theoretical background

Huang (1988, 1991) argue that structures like (1) and (2) are VP ellipsis structure. The pro-form *shi* 'be' in (1) serves as *do*-support in English. The second clause of (2) involves a V-to-INFL raising, thus leaving a null VP as shown in (3).

(3)   Mary ye [$_{INFL}$ [$_V$ kanjian-le] [$_{VP}$ t$_V$ [$_{NP}$ e]]]

Huang's argument was based on two observations: (a) both constructions exhibit the strict/sloppy reading ambiguity and (b) the sloppy reading is subject to the locality effect in both structures.

(4)   John kanjian-le tade mama, Mary zhidao Bill ye shi/kanjian-le.
      John    saw        his mother   Mary knew Bill also be/saw
      'John saw his mother; Mary knew Bill did too.'
      a. Mary knew Bill saw John's mother.    (strict reading)
      b. Mary knew Bill saw Bill's mother.    (sloppy reading)
      c. *Mary knew Bill saw Mary's mother.    (locality effect)

Xu (2003) argues that structures like (1) are VP ellipsis constructions whereas structures like (2) are null object constructions. On the one hand, the NOCs like (2) can have a third reading in addition to the strict/sloppy reading while the VPECs like (1) cannot. For example, in a context where people know that Mike hit his son first and then Jeanne hit Mike, one can say (5), but not (6).

(5)   Mike xian da-le tade erzi, Jeanne cai   da    de.
      Mike first   hit   his   son Jeanne then hit PARTICLE
      'Mike hit his son first; then Jeanne hit (somebody).'
(6)   Mike da-le tade erzi, Jeanne ye shi.
      Mike   hit   his son Jeanne also be
      'Mike hit his son; then Jeanne did as well.'

On the other hand, the VPEC is subject to the parallelism principle in its recoverability of the elided elements whereas the NOC may not. For example, the adverbials of the antecedent and elided clauses must be identical in (7), but may not be so in (8).

(7)   John mei-tian   shua   san-bian   ya,   Peter ye shi.
      John every-day brush three-times teeth Peter also be
      'John brushed teeth three times a day; Peter did too.'
      (Peter must brush teeth three times a day.)
(8)   John mei-tian shua san-bian ya, Peter ye shua.
                                            also brush
      'John brushed teeth three times a day; Peter also brushed.'
      (Peter may not brush teeth three times a day.)

## 3. Previous studies in child language acquisition

   Guo et al. (1996) investigated Chinese-speaking children's comprehension of the following structures:

(9)   DD yao-yi-xia ta-de shuili, SN ye shi.
      DD bite-one-time his pear SN also be
      'DD bites his pear; SN does too.'
(10)   DD peng-yi-xia ta-de qianbi, SN ye peng-yi-xia.
      DD hit-one-time his   pencil SN also hit-one-time
      'DD hit his pencil; SN does too.'

They found that both strict and sloppy readings of these structures were available for children though the sloppy reading was preferred. Based on the findings, Guo et al. (1996) argue that the structures like (9) and (10) are VP ellipsis structure, thus in accordance with Huang (1988, 1991). According to their analysis, both strict and sloppy readings are bound-variable readings (Foley et al. 2003). The two types of readings differ in the type of A-bar binding they involve. The sloppy reading involves local quantifier raising (QR) and the strict reading involves across-the-board quantifier raising with scope over the two conjoined clauses. Both strict and sloppy readings are available for children, given that the variable binding is innate. Since the local binding is always available in UG and the long-distance binding is pragmatically motivated, the sloppy reading is the default or unmarked interpretation.
   Matsuo (2007) made a comparative study of Japanese-speaking children's interpretation of the null object constructions like (11) and English-speaking children's interpretation of the VP ellipsis structures like (12).

(11)   Kukkii-monstaa-ga       zibun-no   kukkii-o   tabemasita.
      Cookie Monster-NOM self-GEN cookie-ACC eat-PAST
      Sosite, Maiku-san-mo tabemasita.
      and    Mike-Mr.-ALSO eat-PAST
      'Cookie Monster ate his cookie; Mike ate, also.'
(12)   Cookie monster ate his cookie; Mike did, too.

The truth value judgment task was used (Crain & Thornton 1998). In the task, the test sentences were presented in the context corresponding to a particular reading. Four conditions were designed: the sloppy reading condition, the strict reading condition, the color mismatch condition and the object mismatch condition. In the sloppy reading condition, the sloppy reading of the structures was true in the context. In the strict reading condition, the strict reading of the structures was true in the context. In the color mismatch condition, the objects of the antecedent and elided clauses were of different color. In the object mismatch condition, the objects of the antecedent and elided clauses were different. In the strict and sloppy reading conditions, English-speaking children as well as adults predominantly accepted the VP ellipsis structures, and Japanese-speaking children as well as adults predominantly accepted the null object constructions. In this case, the null object constructions in Japanese exhibit the same strict/sloppy reading ambiguity as the VP ellipsis constructions in English. However, in the color and object mismatch conditions, English-peaking children behaved differently from Japanese-speaking children. While Japanese-speaking children still accepted the null object constructions, English-speaking children rarely accepted the VP ellipsis constructions. English adults also behaved differently from Japanese adults. English adults did not accept the VP ellipsis structures at all under the two mismatch conditions. Japanese adults accepted the null object constructions to certain extent. This indicates that English VP ellipsis constructions are subject to the parallelism principle whereas Japanese null object constructions may not. In that case, Japanese null object constructions should not be treated on a par with English VP ellipsis (Hoji 1998).

Cheung (2008) found that Cantonese-speaking children (3;11-6;9) interpreted the VP ellipsis constructions like (13) and the null object constructions like (14) differently.[1] In the scenario for (13), Winnie the Pooh forcefully shook the apple tree and Eeyore gently shook the apple tree. In such scenarios, children rarely accepted the VP ellipsis constructions. In the scenario for (14), Winnie the Pooh quickly ate five fish and Eeyore slowly ate five fish. In such scenarios, children accepted the null object constructions around the chance level. The results indicate that the VP ellipsis constructions require the recovery of the adverbials of the predicates whereas the null object constructions may not, thus in accordance with Xu (2003). Note that the adverbials of the predicates in structures like (13) and (14) are outside the object NP. They are irrelevant to the recovery of the empty objects. The difference between the two structures only suggests that the pro-form *shi* recovers more information than the VP of the antecedent clause. More precisely, it recovers all elements except for the subject of the antecedent clause.

(13)   Winnie the Pooh hou daailik-gam jiu pinggwo-shu, Eeyore dou hai.
        Winnie the Pooh very big.force-ly shake apple-tree Eeyore also be
        'Winnie the Pooh forcefully shook the apple tree; Eeyore did too.'
(14)   Winnie the Pooh hou faai-gam sik-zo ng-tiu jyu, Eeyore dou sik-zo.
        Winnie the Pooh very quick-ly   are five-CL fish Eeyore also ate
        'Winnie the Pooh quickly ate five fish; Eeyore also ate.'

## 4. Experiment

The experiment was designed to investigate children's interpretation of the null object constructions and VP ellipsis constructions with different object forms. The experiment consisted of three studies. Study 1 examined children's sensitivity to strict/sloppy reading ambiguity exhibited in these constructions. Study 2 observed children's sensitivity to the locality effect exhibited in the sloppy reading of these constructions. Study 3 explored children's obedience of the parallelism principle in their interpretation of these constructions.

### 4.1. Study 1

This study aims to investigate children's interpretation of the VPECs and the NOCs in the contexts favoring either the strict or the sloppy readings.

*4.1.1. Participants*. Twenty 4-year-old Mandarin-speaking children were tested in the experiment. Their

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[1] Cantonese is one of Chinese dialects, which shares the same properties of the elliptical constructions in Chinese.

ages ranged from 4;0 to 4;9, with a mean age of 4;5. They were from a kindergarten in Beijing. Adult controls were 40 students from a university in Beijing.

*4.1.2. Method.* The truth value judgment task was used. The stories were acted out to each child using toys and props. A puppet watched the stories with the child. At the end of the story, the puppet would describe the story using a statement, i.e. the test sentence. The child's task was to judge whether the puppet's statement true or false according to his or her understanding of the story.

*4.1.3. Stimuli.* Two types of sentences were tested. One was the null object constructions like (15) and the other was the VP ellipsis constructions like (16), i.e. the *ye shi* structure. Each type was given three trials.

(15)   Pang-gongren tiao-guo-le ta-de ma, Shou-gongren ye shi.
          fat-worker    jumped-over his horse thin-worker also be
          'The fat worker jumped over his horse; the thin worker did too.'
(16)   Nanhai xiu-hao-le ta-de che, nühai ye xiu-hao-le.
          boy    fixed-well   his car   girl also fixed-well
          'The boy fixed his car; the girl also fixed.'

The test structures were used in two contexts: one in which the strict reading was true and one in which the sloppy reading was true. Totally, each child was tested on 12 sentences with corresponding stories (2 constructions x 2 contexts x 3 trials).

*4.1.4. Procedure.* Children were tested individually in a quiet room near their classroom. One experimenter presented the stories by manipulating the toy characters and the props. Another experimenter played the role of a puppet, *say* a Duck, who watched the stories with the child. At the end of each story, the child would judge whether the puppet's description of the story was true or false. If the child considered the puppet's statement wrong, he or she was asked to justify his or her judgment. The toys and props used for each story were put in transparent plastic bags. Children were allowed to pick up one that they were interested in. Thus, the story trials were randomized in a convenient way. The adults watched the video-taped clips of the stories as presented to children in a group.

*4.1.5. Results.* Figure 1 illustrates the mean percentages of adults' acceptance of the VPECs/NOCs in the contexts favoring the strict/sloppy readings. When the strict reading was true in the context, adults accepted more NOCs than the VPECs (45% vs. 15% of the time). The difference was significant ($F(1,78)=9.360$, $p<.01$). When the sloppy reading was true in the context, adults accepted both constructions at the same level (62.5% of the time). For both constructions, adults accepted more sloppy reading than the strict one. The difference was significant for the VPECs ($F(1,78)=24.178$, $p<.001$), but not for the NOCs ($F(1,78)=2.479$, $p>.05$). It is argued that the strict reading of the elliptical construction is referentially D(iscourse)-linked. This indicates that the interpretation of the NOCs is more likely to be related to the discourse in referentiality.
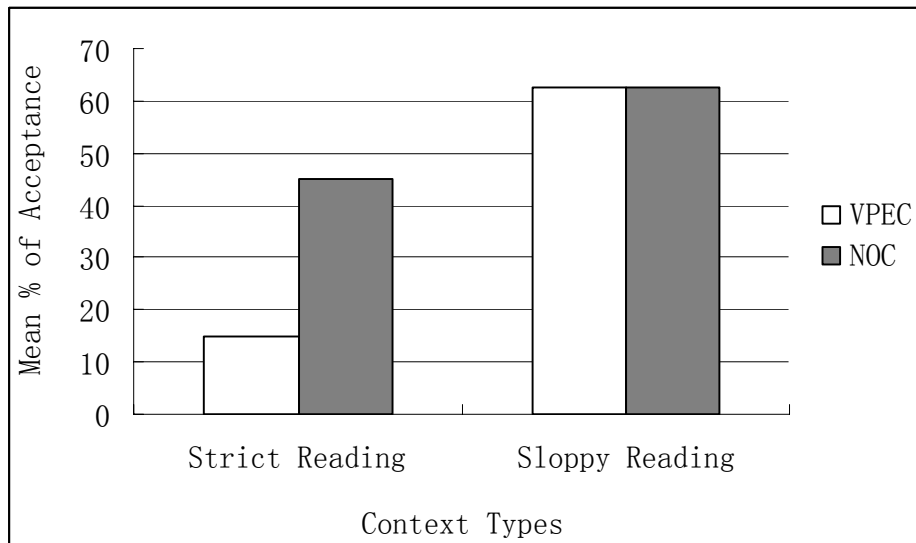
Figure 1. Mean percentages of adults' acceptance of VPECs/NOCs
in strict/sloppy reading contexts

Figure 2 illustrates the mean percentages of children's acceptance of VPECs/NOCs in the contexts favoring the strict/sloppy readings. In the strict reading context, children accepted slightly more NOCs than the VPECs (65% vs. 60% of the time). In the sloppy reading context, children also accepted slightly more NOCs than the VPECs (52% vs. 48% of the time). Overall, children accepted more strict reading than the sloppy reading (Matsuo 2007). The results showed that children did not make a distinction between the two constructions with respect to their strict/sloppy readings.
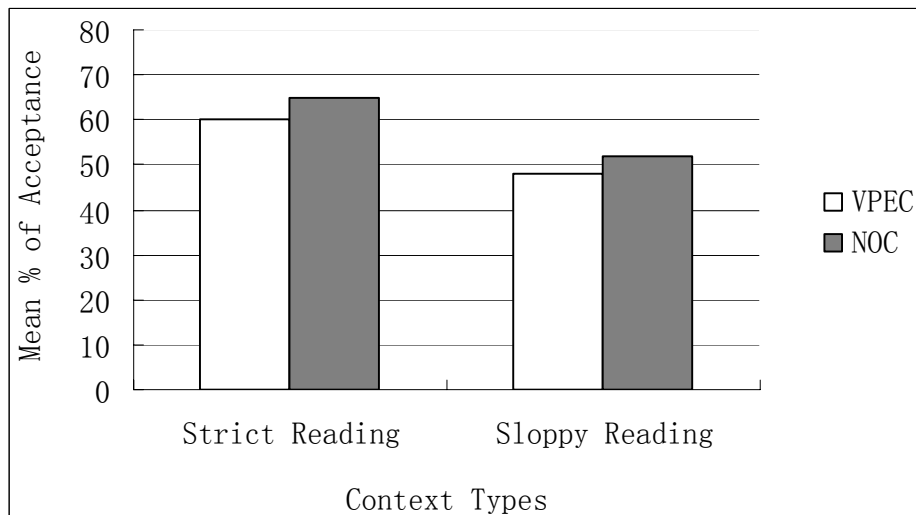


Figure 2. Mean percentages of children's acceptance of VPECs/NOCs
in strict/sloppy reading contexts

### 4.2. Study 2

This study aims to examine children's sensitivity to the locality effect on the sloppy reading of the NOCs and the VPECs.

*4.2.1. Participants*. All children and adults who participated in Study 1 participated in this study.

*4.2.2. Method and procedure.* The truth value judgment task was used as described in Study 1. The procedure of the study was the same as in Study 1.

*4.1.3. Stimuli.* The sentence types used in the study were the VPECs and the NOCs as illustrated in (17). Each type was given three trials.

(17)  Xiao-xiong xiu-hao-le ta-de che,
    little-bear fixed-well   his   car
   Xiaomao zhidao Xiao-xiang   ye    shi/ye xiu-hao-le.
    panda   know little-elephant also be/also fixed-well
   'The little bear fixed his car; the panda knew that the little elephant did too/also
    fixed.'

The local sloppy reading was false in the context. For example, in the story for (17), the bear, the panda and the elephant were repairing their own cars. The bear was repairing his car. The panda couldn't repair his car. He asked the bear for a help. The bear said that he would help him after he got his own car repaired. Then the panda turned to ask the elephant for a help. The elephant repaired the panda's car. However, the elephant failed to repair his own car. The bear and the panda could not repair the elephant's car either. As the elephant, i.e. the local subject of the elided clause, failed to fix his own car, the local sloppy reading was false. As the elephant fixed the car of the panda, i.e. the non-local subject, the non-local sloppy reading was true.

   The test structures were used in two contexts: one in which the test sentences were true and one in which the test sentences were false. Totally, each child was tested on 12 sentences with corresponding stories (2 constructions x 2 contexts x 3 trials).

*4.2.4. Results.* Figure 3 illustrates adults' responses to the VPECs/NOCs when the local sloppy reading was true or false in the contexts. When the local sloppy reading of VPECs/NOCs was true in the contexts, adults accepted both constructions 100% of the time. When the local sloppy reading of VPECs/NOCs was false in the contexts, adults rarely accepted the two constructions. This indicates that they predominantly rejected the constructions though the non-local sloppy reading was true. Thus, the locality effect on the sloppy reading was observed from adults' responses.
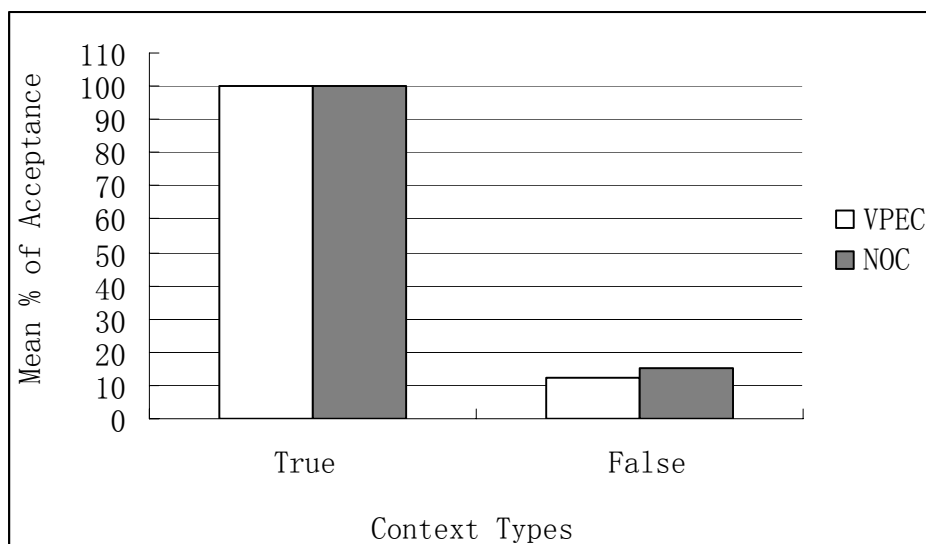


Figure 3. Mean percentages of adults' acceptance of the local sloppy reading
        of VPECs/NOCs in True/False contexts

Figure 4 illustrates children's responses to the VPECs/NOCs when the local sloppy reading of the

constructions was true or false in the contexts. When the local sloppy reading of the two constructions was true in the context, children accepted the VPECs 95% of the time and they accepted the NOCs 90% of the time. When the local sloppy reading of the two constructions was false in the context, children accepted the VPECs 27% of the time and they accepted the NOCs 29% of the time. Their rejections of the two constructions were adult-like. For example, to justify their rejections of the structures like (17), they would say that the elephant did not fix his own car. However, they accepted more non-local sloppy reading of the two constructions than adults.
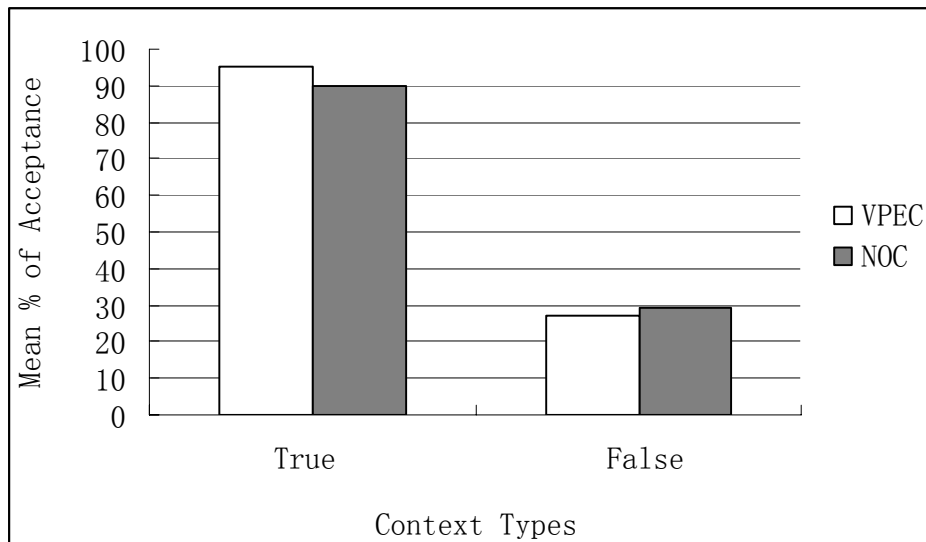


Figure 4. Mean percentages of children's acceptance of the local sloppy reading of VPECs/NOCs in True/False contexts

### 4.3. Study 3

This study aims to investigate children's observation of the parallelism principle in their interpretation of the VPECs/ NOCs.

*4.3.1. Participants.* As adult-like distinction between the NOCs and the VPECs has been found among the 4- to 5-year-old children (Matsuo 2007; Cheung 2008), we included the 3-year-old children in addition to the 4-year-olds to examine the age effect. The participants were sixteen 3-year-olds (3;5-3;9, M=3;7) and sixteen 4-year-olds (4;0-4;6, M=4;2). They were from the same kindergarten as mentioned in Study 1. The adult controls were 33 students from a university in Beijing.

*4.3.2. Method and procedure.* The truth value judgment task was used. The procedure was described as in Study 1.

*4.3.3. Stimuli.* Test sentences were the VPECs and the NOCs without the pronouns as shown in (18). Each type was given three trials.

(18)    Baba xiu-le diannao,
         father fixed computer
         Yeye      ye shi/ye xiu-le.
         grandpa also be/also fixed
         'Father fixed the computer; grandpa did too/also fixed.'

Four types of conditions were designed: (a) the object match condition in which the objects of the antecedent and the elided clauses were identical; (b) the object mismatch condition in which the objects of the antecedent and elided clauses were different; (c) the object number mismatch condition in which the

number of the objects of the antecedent and elided clauses were non-identical; and (d) the object partial mismatch condition in which the objects of the antecedent and elided clauses were partially different. Totally, each child was tested on 24 sentences with corresponding stories (2 constructions x 4 conditions x 3 trials).

A sample story for the VPEC/NOC in (18) with the object mismatch condition was described below.

Father and Grandpa were going to repair the car and the computer of their family. First, they fixed the car together. Then, they were going to fix their computer. But Grandpa said that he didn't understand the computer. Therefore he was unable to repair it. Father knew a lot about the computer. So he got it repaired.

*4.3.4. Results.* Figure 5 illustrates children's and adults' responses to the NOCs/VPECs in the Object Match Condition. The results show that children as well as adults predominantly accepted both constructions when the objects of the two clauses were identical. No age effect was observed.
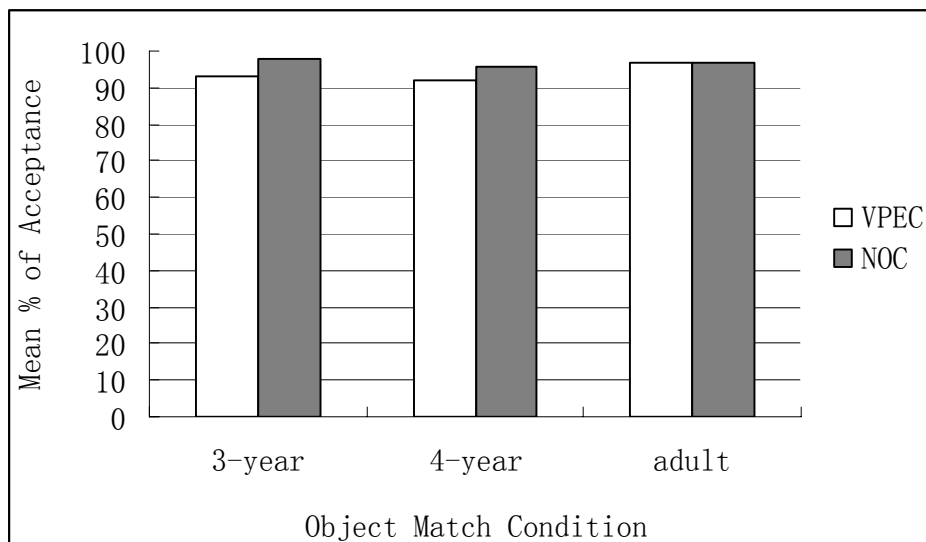


Figure 5. Mean percentages of acceptance of NOCs/VPECs in Object Match Condition

Figure 6 illustrates children's and adults' responses to the NOCs/VPECs in the Object Mismatch Condition. The results show that children's responses were non-adult-like. Adults accepted more NOCs than VPECs. The difference was significant. The 4-year-old children treated both constructions alike. The 3-year-old children accepted more VPECs than NOCs, though the difference was not significant. The difference between the 3-year-old children's responses to the VPECs/NOCs and those of the adults was significant.
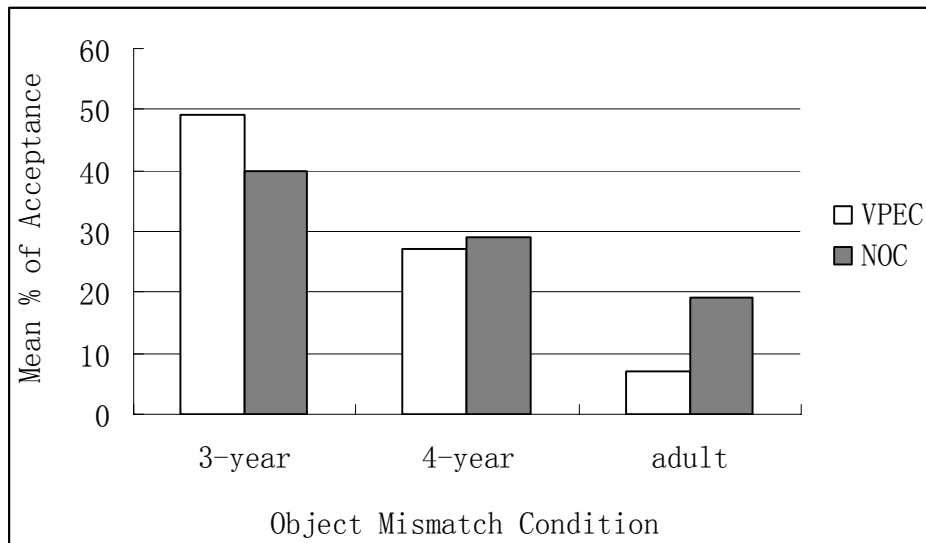
Figure 6. Mean percentages of acceptance of NOCs/VPECs in Object
Mismatch Condition

Figure 7 illustrates children's and adults' responses to the NOCs/VPECs in the Object Number Mismatch Condition. The results show that adults accepted the NOCs, but rarely accepted the VPECs under this condition. The 4-year-old children demonstrated adult-like responses. They made a significant difference between the two structures. The 3-year-old children accepted both constructions in the same way. They did not distinguish the two structures when the number of the objects in the antecedent and elided clauses was not identical.
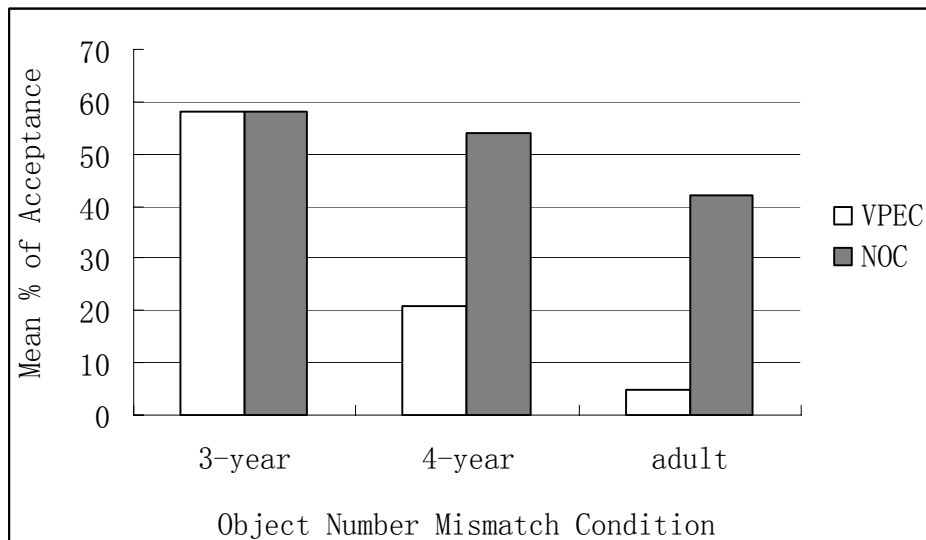


Figure 7. Mean percentages of acceptance of NOCs/VPECs in Object
Number Mismatch Condition

Figure 8 illustrates children's and adults' responses to the NOCs/VPECs in the Object Partial Mismatch Condition. The results show that adults accepted the NOCs, but rarely accepted the VPECs under this condition. The 4-year-old children demonstrated adult-like distinction between the two structures. The 3-year-old children responded to the two structures in a similar way. They did not distinguish the two structures when the objects of the two clauses of the elliptical constructions were partially different.
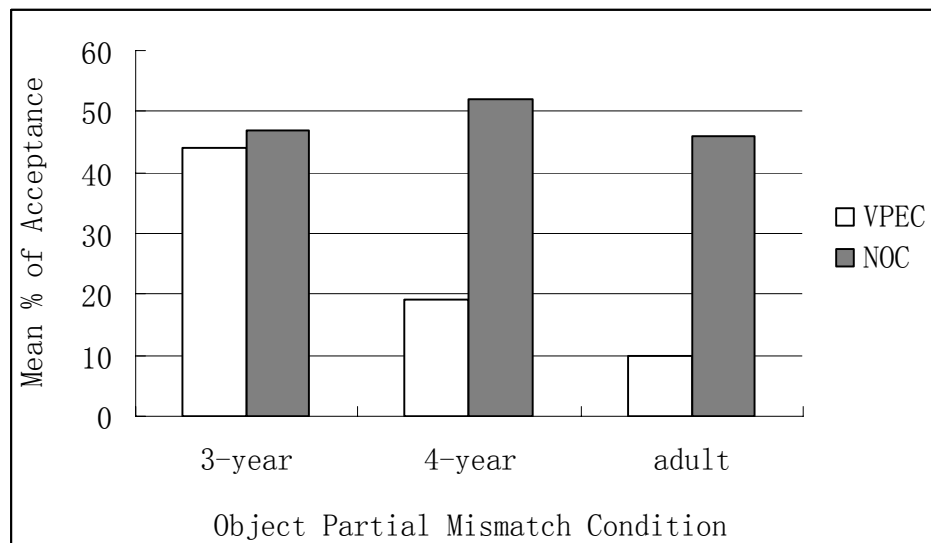
Figure 8. Mean percentages of acceptance of NOCs/VPECs in Object Partial
　　　　　 Mismatch Condition

## 5. Main findings and discussion

The main findings of the three studies are as follows. First, children were sensitive to the strict/sloppy reading ambiguity exhibited in the null object constructions and the VP ellipsis constructions. The preference for the sloppy reading of both constructions was observed from adults' responses, but not from children's responses. Adults accepted more strict reading of the NOCs than that of the VPECs. It is argued that the strict reading is pragmatically motivated (Guo et al. 1996; Forley et al. 2003) and the interpretation of the NOCs is subject to discourse or pragmatic factors (Xu 2003). Therefore, the responses of the adults suggest that the NOCs are more likely to have the strict reading than the VPECs. Children accepted the strict reading of the two constructions in a similar way. Their responses may suggest that they are less sensitive to the distinction between the NOCs and the VPECs in terms of the strict reading. Second, children, like adults, were sensitive to the locality effect exhibited in the sloppy reading of both NOCs and VPECs. According to Guo et al. (1996) and Forley et al. (2003), the sloppy reading is derived by the local variable binding, which is the default or unmarked interpretation that children might acquire earlier. Thirds, adults observed the parallelism principle in their interpretation of the VPECs, but not the NOCs. The 4-year-old children demonstrated adult-like responses. Their interpretation of the VPECs was constrained by the parallelism principle whereas their interpretation of the NOCs was not subject to the principle. The 3-year-old children did not observe the parallelism principle in their interpretation of the VPECs. They treated the NOCs and the VPECs alike.

The findings provide implications to the theoretical analyses of the NOCs. On the one hand, the NOCs and the VPECs were similar in exhibiting the strict/sloppy reading ambiguity and the locality effect on the sloppy reading, confirming Huang (1988, 1991). On the other hand, they differed in observing the parallelism principle. The NOCs can have a wider range of semantic interpretations, thus confirming Xu (2003). The findings suggest that the NOCs may not be grouped with the VPECs.

The present study also shows that children demonstrate earlier sensitivity to the strict/sloppy reading ambiguity and the locality effect on the sloppy reading of the NOCs/VPECs. Their distinction between the two constructions in terms of the semantic parallelism develops later.

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