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First Language Acquisition of Elliptical Structures in Cantonese*

Lawrence Y.-L. Cheung
University of California, Los Angeles
yllc@ucla.edu

1. Introduction

Ellipsis is a very common phenomenon across languages. It has attracted much attention in the literature of syntax and semantics. However, research on the acquisition of ellipsis is relatively more limited. Some recent studies looked at the acquisition of various aspects of VP Ellipsis (VPE). Foley et al. (2003) examined the knowledge of sloppy vs strict readings. Rosalind and Wexler (1999) investigated the implication of VPE to Principle B of the binding theory. Matsuo and Duffield (2001) studied children's knowledge of VP ellipsis with regard to the structural parallelism constraint. They compared VPE and VP anaphora and found that English-speaking children are sensitive to the different parallelism requirements at the age of four, despite their superficial resemblance. The purpose of this study is to investigate the knowledge of VPE among Cantonese-speaking children aged between 3;11 to 6;9. This is done by exploring the subtle difference of adverbial recovery present in VPE and but absent in (superficially similar) Null Object Construction (NOC). NOC has been independently found in production data before two (Wang et al. 1992 for Mandarin Chinese and Lee 2000 for Cantonese). The goals of the project are two-fold:

(i) to investigate children's sensitivity to the differences between VPE and NOC in terms of adverbial recovery, and
(ii) to investigate the age effect on their sensitivity to the constructions.

The paper is organized as follows. Section 2 discusses the syntax of VPE and NOC. In particular, the contrast in the possibility of recovering adverbials will be highlighted. In Section 3, the methodology of the judgment task will be provided. In Section 4, the results of the experiment will be presented. Finally, a conclusion will be provided in Section 5.

2. VPE vs NOC in Chinese

2.1 Syntax of VPE and NOC

Huang (1991), Li (2002) and Xu (2003) distinguished between two elliptical constructions in Mandarin Chinese, namely, NOC and VPE. Both constructions are used in parallel or coordinate clauses. Cantonese essentially patterns with Mandarin. In Cantonese VPE, the site that corresponds to an elided VP is marked by the auxiliary verb *hai* 'be' or modal verbs like *wui* 'will', *hoji* 'can.' They function as a pro-VP, as in (1).

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(1) John piping-le tade laoshi, Mary ye shi [*e*][1]. [Mandarin; VPE] (Li 2002)
John criticize-PERF his teacher Mary also *be*
'John criticized John's teacher, and Mary *criticized John's teacher*, too.'
'John criticized John's teacher, and Mary *criticized Mary's teacher*, too.'

In NOC, however, the elided site is marked by repeating the verb in the antecedent clause. For example, *kanjian* 'see' is repeated in the second conjunct in (2).

(2) John kanjian-le tade mama, Bill ye kanjian-le [*e*]. [Mandarin; NOC]
John see-PERF his mother Bill also see-PERF
'John$_i$ saw his$_i$ mother and Bill$_j$ saw his mother$_{i/j}$ too.'

Based on the availability of strict/sloppy ambiguity and locality effects[2], NOC in Chinese has been analyzed as (lower) VP-ellipsis after the verb has raised to *v* or Infl (Huang 1991, Li 2002). VPE and NOC are the results of *v*P- vs. VP-ellipsis. However, Pan (2002) and Xu (2003) argued that the NOC allows a third reading which is not predicted on the *v*P/VP ellipsis account. They suggested NOC involves anaphor deletion instead of VP ellipsis.

In this study, we are interested in a difference between VPE and NOC, namely, the recovery of adverbial in the previous clause. If the subject is sensitive to the difference, it suggests that the constructions have been acquired. Adverbial recovery will be discussed in Section 3.2

3.2 Adverbial Recovery

Li (2002) and Xu (2003) found that if the first clause has an adverbial, be it preverbal or postverbal, the elided VP in the VPE must be interpreted as including the adverbial. Consider (3).

(3) John hui zixide shua ya, Peter ye hui. [Mandarin; Xu 2003]
John will carefully brush teeth Peter also will
'John will clean his teeth carefully; Peter will also clean his teeth carefully.'

Though there is no specification of the manner, the second clause has to mean 'Peter will clean his teeth carefully' but not 'Peter will clean his teeth.' It can be confirmed by the fact that Peter will clean his teeth carelessly. This can explained by the fact that adjuncts that are no higher than *v*P level in the antecedent are part of the elided *v*P. When *v*P is elided in VPE, the adverbial has to be interpreted as part of the elided *v*P.

Descriptively, NOC does not entail that the adverbial in the preceding clause should be recovered.

(4) John zixide shua-le ya, Peter ye shua-le. (Mandarin)
John carefully brush-PERF teeth Peter also brush-PERF
'John will clean his teeth carefully and Peter will clean his teeth too.'

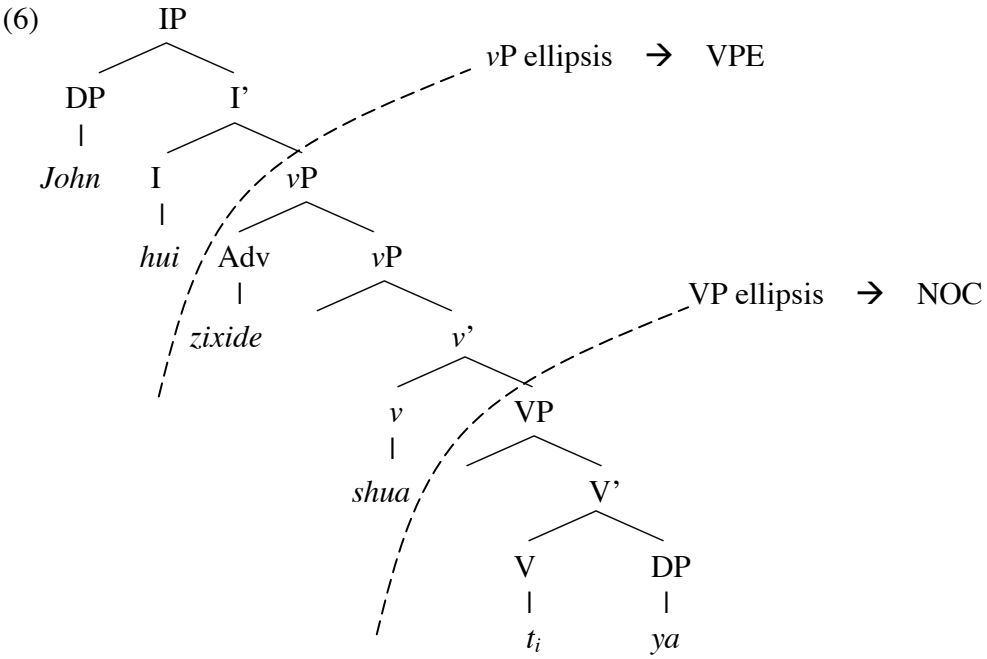
[1] [e] indicates the elided site.
[2] These are also properties of *v*P ellipsis in English.

As a result, the manner of brushing the teeth is not specified in (4). It is possible for Peter to clean his teeth carefully or carelessly. Consequently, only (4) but not (3) can be followed by (5).

(5) Keshi Peter meiyou zixide shua.
but Peter have-not carefully brush
'But Peter did not brush his teeth carefully.'

If one assumes that the lower VP is elided in NOC, one can explain the observation as follows. In NOC, the antecedent of the elided material is VP. The adverbial is adjoined to a position higher than the VP. This adjunction position is not part of the elided material. Consequently, the adverbial is not recovered in the interpretation of the gap. How the manner in the second clause in NOC is interpreted is subject to the speaker and context. (6) shows the level of verbal projection that gets elided in the two constructions.

(6)



The contrast of adverbial recovery between VPE and NOC can be summarized as follows:

	VPE	***NOC***
Recovery of elided materials	Yes	No
Results: 2nd clause has the same manner as 1st clause	Yes	Yes/No, underspecified

Table 1. Adverbial recovery in VPE and NOC

4. Methodology

4.1 Subjects

In this study, 24 Cantonese-speaking subjects aged between 3;11 and 6;9 were recruited in Hong Kong[3]. Seven native speakers of Cantonese were included as adult control subjects. Three are from Hong Kong and the other three from Los Angeles. The child subjects were divided into three groups (4-, 5-, 6-year-olds). It prevents characteristics pertaining to certain subgroup offset by other subgroups. Each group has 8 subjects. The table below summarizes the details of the subjects.

Group	***No. of Subjects***	***Age Range***	***Mean***
Children (4-year-olds)	8	3;11—4;11	4;5
Children (5-year-olds)	8	5;1—5;6	5;4
Children (6-year-olds)	8	5;11—6;9	6;3
Adult	7	20—36	--

Table 2. Subject groups

4.2 Procedure

To tap into the children's competence of the constructions, a truth-value grammaticality judgment experiment was conducted to find out children's sensitivity to the adverbial recovery property. The procedure was adapted from Hiramatsu and Lillo-Martin (1998) and Matsuo and Duffield (2001). The experiment was divided into two sessions, namely, training session and testing session. The entire experiment session will last for about 30—40 minutes.

Instead of asking for judgments directly, the grammaticality judgment task was framed as a role-play game. In the game, the child was asked to act as a teacher to teach a puppet, Lulu, to speak Cantonese. Lulu is a fictitious character that comes from the moon and is learning Cantonese. This setup offers a more natural environment to present ill-formed or infelicitous sentences because the subject knows that Lulu can make mistakes from time to time.

The puppets (Lulu, Winnie the Pooh, Eeyore and Snoopy) and some simple instructions were presented at the beginning of the training session. The investigator acted out a story. The subject watched it together with Lulu. At the end of each short story, Lulu produced some stimulus sentences that were supposed to describe the scenarios. To assign a grammaticality judgment to a sentence, the subject had to give Lulu some reward depending on whether the Lulu's sentence could describe the scenarios correctly. If the sentence is correct, the subject will reward Lulu with a little chocolate bar which is Lulu's favorite food. Otherwise, he should give Lulu a magic pill which can make Lulu smarter. After the child subject had made his/her judgment, the investigator would ask a follow-up question to make sure that the subject made the decision for the right reason.

Children's Experiment: Training and Testing Session

The purpose of the training session is two-fold. First, the investigator can familiarize the

[3] 30 children were recruited. However, six of them did not pass the screening test. Only 24 child subjects eventually participated in the experiment.

subject with the puppets and the truth-value judgment task. Second, the session also serves as a screening test to eliminate subjects that cannot perform the task reliably. Five stimulus sentences were presented. The stimuli were simple sentence. No VPE or NOC sentences were used in this session. The subject should accept 2 stimuli and reject 3 stimuli. The subject had to correctly answer at least 4 out of 5 questions to qualify for the testing session. A total of 6 subjects failed the test in the training session. The procedure is the more or less the same as that in the training session. However, the stimulus sentences contain VPE, NOC or control structures.

Control Experiment: Testing Session

To compare children's and adults' grammar on VPE and NOC, a simplified grammaticality judgment experiment was conducted for adults. It was a regular paper-based grammaticality judgment task. The same act-out stories and stimuli were presented to the adult subjects. They had to judge whether the stimuli matched the description in the story or not.

4.3 Stimuli

How do we test the subject's sensitivity to adverbial recovery? As mentioned earlier, the subject was asked to judge whether the stimulus sentence correctly described the act-out scenario. Two kinds of scenarios were presented. Parallel Scenarios involve two puppets acting in the same manner. For example, Winnie the Pooh and Eeyore both ate some fish *quickly*. In Non-parallel Scenarios, Winnie the Pooh ate some fish *quickly* and Eeyore *slowly*. A sample story is provided in Appendix I for reference. The following table illustrates various types of stimuli.

Scenarios	***VPE*** ***(Adv recovered)***	***NOC*** ***(Adv NOT recovered)***
Non-parallel 1: quickly 2: slowly	CASE A INCORRECT	CASE B INCORRECT or CORRECT
Parallel 1: quickly 2: quickly	CASE C CORRECT	CASE D CORRECT

Table 3. Stimuli and prediction of responses

Key: CORRECT = the sentence matches the scenario
INCORRECT = the sentence does not match the scenario

Here is an explanation of each case and the predicted result.

Case A: The puppets acted in different manners. Here are two possible responses:
(i) If the adverbial is recovered in the second clause (VPE), the VP in the second clause should be carried out in the same way as the VP in the first clause. As a result, the second clause should always be considered as ***not matching*** the scenario.
Predicted response: INCORRECT

(ii) If the adverbial is not recovered in the second clause (VPE), the VP in the second clause underspecifies the manner and should be compatible with the action carried out in whatever manner. As a result, the second clause should always be considered as ***matching*** the scenario.
Predicted response: CORRECT

Case B: The puppets acted in different manners. Here are two possible responses:
(i) If the adverbial is recovered in the second clause (NOC), the VP in the second clause should be carried out in the same way as the VP in the first clause. As a result, the second clause should always be considered as ***not matching*** the scenario.
Predicted response: INCORRECT
(ii) If the adverbial is not recovered in the second clause (NOC), the VP in the second clause underspecifies the manner and should be compatible with the action carried out in whatever manner. As a result, the second clause should always be considered as ***matching*** the scenario.
Predicted response: CORRECT

Case C: The puppets acted in the same manner. Here are two possible responses:
(i) If the adverbial is recovered in the second clause (VPE), the VP in the second clause should be carried out in the same way as the VP in the first clause. As a result, the second clause should always be considered as ***matching*** the scenario.
Predicted response: CORRECT
(ii) If the adverbial is not recovered in the second clause (VPE), the VP in the second clause underspecifies the manner and should be compatible with the action carried out in whatever manner. As a result, the second clause should always be considered as ***not matching*** the scenario.
Predicted response: INCORRECT

Case D: The puppets acted in the same manner. Here are two possible responses:
(ii) If the adverbial is recovered in the second clause (NOC), the VP in the second clause should be carried out in the same way as the VP in the first clause. As a result, the second clause should always be considered as ***matching*** the scenario.
Predicted response: CORRECT
(ii) If the adverbial is not recovered in the second clause (NOC), the VP in the second clause underspecifies the manner and should be compatible with the action carried out in whatever manner. As a result, the second clause should always be considered as ***not matching*** the scenario.
Predicted response: INCORRECT

In the experiment, each case was tested twice. As a result, there were 2 x 4 VPE/NOC stimuli for each subject. A filler sentence about the story was inserted after each stimulus. A total of 15 sentences were presented in the testing session. Here are some sample stimulus sentences.

(7) Winnie the Pooh hou daailik-gam jiu pinggwo-shu; Eeyore dou hai. (VPE)
Winnie the Pooh very big.force-ly shake apple-tree Eeyore also be
'Winnie the Pooh forcefully shook the apple tree; Eeyore did too.'

(8) Eeyore maanmaan-gam waak-zo jat fuk waa; Winnie the Pooh dou hai. (VPE)
Eeyore slow-ly draw-PERF one CL picture Winnie the Pooh also be
'Eeyore drew a picture slowly; Winnie the Pooh did too.'

(9) Winnie the Pooh hou junglik-gam ceoi-zo sei go bobo; Eeyore dou ceoi-zo. (NOC)
Winnie the Pooh very use.force-ly blow-PERF four CL balloon Eeyore also blow-PERF
'Winnie the Pooh forcefully blew four balloons; Eeyore also blew ~~(four balloons)~~.

(10) Winnie the Pooh hou faai-gam sik-zo ng tiu jyu; Eeyore dou sik-zo. (NOC)
Winnie the Pooh very quick-ly eat-PERF five CL fish Eeyore also eat-PERF
'Winnie the Pooh quickly ate five fish; Eeyore also ate ~~(five fish)~~.

4. Results

To verify the prediction of the grammaticality judgment, let us first examine the responses from the adults. The results appear to be more or less similar to the predicted pattern.

Scenarios	***VPE*** ***(Adverbial recovered)***	***NOC*** ***(Adverbial not recovered)***
Non-parallel 1: quickly 2: slowly	CASE A (INCORRECT : CORRECT) 14 : 0	CASE B (INCORRECT : CORRECT) 6 : 8
Parallel 1: quickly 2: quickly	CASE C (INCORRECT : CORRECT) 2 : 12	CASE D (INCORRECT : CORRECT) 4 : 10

Table 4. Results of adult control

From the results in Case A and C, the adult subjects rather consistently recover the adverbial in the VPE. Interestingly, the responses in Case B are split. This suggests that adult subjects had no strong preference for adverbial recovery in the NOC. Many of the responses in Case D are CORRECT. A minority (4 out of 14) think otherwise. No matter how, on the whole, it is clear that the patterns displayed in VPE and NOC are very different.

Next, the aggregate results of the child subjects are provided in the table below.

Scenarios	***VPE*** ***(Adv recovered)***	***NOC*** ***(Adv not recovered)***
Non-parallel 1: quickly 2: slowly	CASE A (INCORRECT : CORRECT) 45 : 3	CASE B (INCORRECT : CORRECT) 24 : 23*
Parallel 1: quickly 2: quickly	CASE C (INCORRECT : CORRECT) 3 : 45	CASE D (INCORRECT : CORRECT) 8 : 39*

Table 5. Aggregate results (4-, 5-, 6-year-olds)

* = 1 missing value in the category because of a child's failure to answer

The overall distribution of responses is rather similar to that of the adults. The strong preference for adverbial recovery in the VPE can be illustrated by Case A and C. In Case B, there is again an equal split between CORRECT and INCORRECT. In Case D, the majority of the responses are that the NOC sentence matched the scenario but some (8 out of 47) found it good. See Section 5.1 for discussion of a confounding factor in Case D.

When the sub-groups of the child subjects are examined, similar pattern largely recur across the three groups. Even four year olds seem to do pretty well on the task. The results of the three groups are given below.

Scenarios	***VPE*** ***(Adv recovered)***	***NOC*** ***(Adv not recovered)***
Non-parallel 1: quickly 2: slowly	CASE A (INCORRECT : CORRECT) 16 : 0	CASE B (INCORRECT : CORRECT) 7 : 8*
Parallel 1: quickly 2: quickly	CASE C (INCORRECT : CORRECT) 2 : 14	CASE D (INCORRECT : CORRECT) 3 : 12*

Table 6. Results of 4-year-olds
* = 1 missing value in the category because of the child's failure to answer

Scenarios	***VPE*** ***(Adv recovered)***	***NOC*** ***(Adv not recovered)***
Non-parallel 1: quickly 2: slowly	CASE A (INCORRECT : CORRECT) 15 : 1	CASE B (INCORRECT : CORRECT) 10 : 6
Parallel 1: quickly 2: quickly	CASE C (INCORRECT : CORRECT) 0 : 16	CASE D (INCORRECT : CORRECT) 4 : 12

Table 7. Results of 5-year-olds

Scenarios	***VPE*** ***(Adv recovered)***	***NOC*** ***(Adv not recovered)***
Non-parallel 1: quickly 2: slowly	CASE A (INCORRECT : CORRECT) 14 : 2	CASE B (INCORRECT : CORRECT) 7 : 9
Parallel 1: quickly 2: quickly	CASE C (INCORRECT : CORRECT) 1 : 15	CASE D (INCORRECT : CORRECT) 1 : 15

Table 8. Results of 6-year-olds
* = 1 missing value in the category because of the child's failure to answer

5. Discussion

5.1 Sensitivity to VPE and NOC

Child and adult subjects exhibit very similar response patterns. Despite the superficial similarity in form between VPE and NOC, the findings suggest that children are sensitive to the difference of the two constructions. This is revealed by the big differences in the VPE column as opposed to the NOC column. For example, in Case A, the subjects consistently chose INCORRECT, but in Case C, the responses were equally split between CORRECT and INCORRECT.

Comprehension of VPE

There is an overwhelming preference for INCORRECT in Case A and CORRECT in Case C. It shows that they understood that the recovery is obligatory and can use the construction appropriately in the correct context. They have consistent and strong judgment with VPE.

Comprehension of NOC

The equal split in Case B is a bit unexpected. It may suggest that the subjects recover the adverbial randomly. A follow-up interview was conducted with some adult subjects. They found that as the NOC underspecified the manner in the second clause, it sounded unclear semantically. They felt that the sentence could be ambiguous between recovered and non-recovered reading. As they were asked to choose either CORRECT or INCORRECT, some just had to pick one. So it seems that the subjects detected the recovery effect but were not completely sure how it should be translated into their choice of response. Pragmatic considerations or experimental artifact may interfere with some subjects' judgment. If the explanation is right, it is quite possible that the subjects did not recover the adverbial because otherwise the NOC patterns should be the same as the VPE patterns.

In Case D, if the non-recovery analysis for NOC is on the right track, it is a bit unexpected to see some adult and child subjects chose INCORRECT. This was quite possibly the result of a confounding factor in one test sentence for Case D. In the birthday party story, when Winnie the Pooh and Eeyore were drinking some juice, a balloon on the wall burst suddenly. Both were frightened. They dropped the glass of juice on the floor carelessly[4] and broke the glasses. Then the NOC sentence (Stimulus 21) was presented. The intended answer is CORRECT.

(11) Eeyore hou m-siusam gam daalaan-zo go bolei-bui; Winnie the Pooh dou daalaan-zo.
Eeyore very not-careful –ly break-PERF CL glass-cup Winnie the Pooh also break-PERF
'Eeyore carelessly broke the glass; Winnie the Pooh also broke ~~(the glass)~~.' (=Stimulus 21)

In the follow-up question, some child subjects that chose INCORRECT explained that (11) did not match the scenario because Winnie the Pooh and Eeyore were not really careless. They broke the glasses because of the sudden burst of the balloon rather than their carelessness. Such reasoning seems legitimate. It has nothing to do with the structure or adverbial recovery. Pragmatic considerations might have affected the results. This can be further confirmed by comparing the results of the two stimulus sentences for Case D.

[4] I explicitly said in the story that Winnie the Pooh and Eeyore dropped the glasses carelessly.

Case D Stimuli	*INCORRECT*	*CORRECT*
Stimulus 13	1	22
Stimulus 21	7	17

It seems that the responses in Stimulus 13 come out as predicted. Most of the unexpected responses (7 out of 8 INCORRECT's) are contributed by Stimulus 21.

5.2 Age Effect

There does not seem to be an age effect. The response patterns of the all the groups (including the control group) are rather similar. The findings suggest that children as young as 3;11 are sensitive to the difference of the two constructions. The results are a bit surprising. The property of adverbial recovery is rather subtle, and may not be easily detected in the input. Yet even four year olds display robust sensitivity to the property. These elliptical structures are likely to be acquired before four. The results echo Matsuo and Duffield's (2001) findings that children as young as 3;11 are sensitive to the structural constraints on VPE constructions in English.

5.3 Remaining Issues

Two issues require further investigation. First, it is interesting to look closer into how children and adults interpret NOC in Case B and why they do it the way they do. If the post-hoc feedbacks by the adults are correct, the adverbial recovery in NOC is possibly subject to pragmatic factors. A further complication about NOC is that in the syntax literature, there are debates about whether it involves VP ellipsis or deletion of the object, which could potentially be another source of difference between the two constructions. However, the current experimental setup has not been able to identify the factors.

Second, Matsuo and Duffield (2001) and this study seem to converge on the fact that VPE constructions are acquired by four. Santos (2005) reported that Portuguese-speaking children start producing VPE as early as 1;6. However, there is difficulty in conducting the experiment with children younger than four with the current experimental methodology. In fact, two three-year-olds were recruited in the pilot study. Unfortunately, they have more difficulty in performing the judgment task. The methodology may need to be modified in order to test younger children.

6. Conclusion

Cantonese-speaking children as young as four are sensitive to the difference in adverbial recovery between VPE and NOC. The results from VPE sentences show that Cantonese-speaking children consistently recover the adverbial in VPE sentences and can give very reliable and robust judgment. They do not recover the adverbial in NOC sentences as they do in VPE sentences. This may suggest that they do not recover the adverbial in NOC sentence. Further work needs to be

done to ascertain the factors that determine the split responses in Case B. (The observation is not peculiar to children. It is also found among adults.) The experiment shows no improvement over age because the judgment seems to be rather robust early on. Further work on younger children is needed to determine the age when these elliptical constructions are acquired. The findings are consistent with Matsuo and Duffield's (2001) findings that English-speaking children are sensitive to the structural constraint in VPE (as opposed to VP anaphora). This may suggest that cross-linguistically, (at least) some elliptical structures are consistently acquired early.

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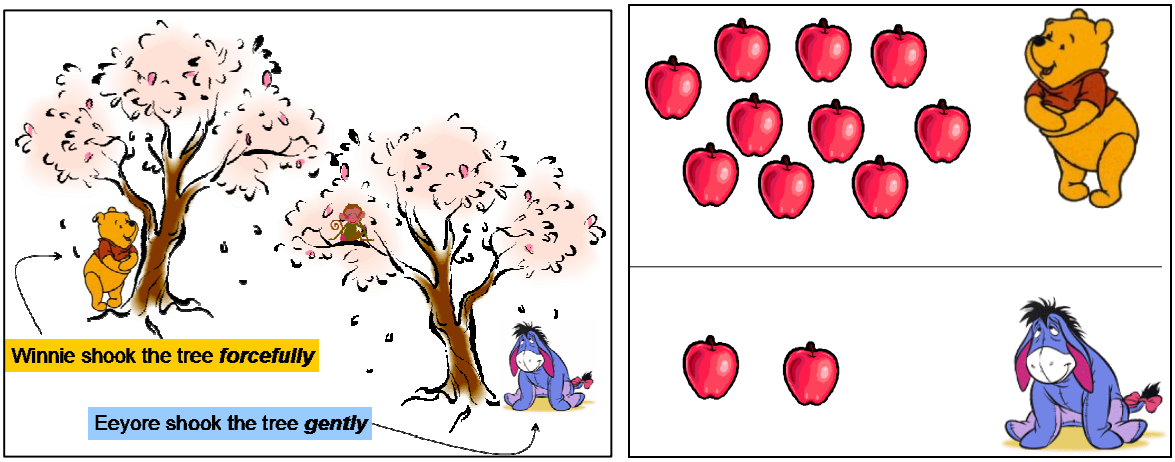
Appendix I

Competition story (English Translation)



Snoopy suggested, "What about having an apple picking competition? There are two apples there. Let's see who will pick more apples in five minutes."

Winnie and Eeyore ran to the apple trees. Both of them could not climb the trees. They rocked the apple trees. Winnie rocked the tree forcefully to make the apples fall off the tree. But Eeyore rocked the tree gently. This is because he saw a baby monkey up in the tree. He was afraid that heavy rocking would make it fall down.

In the end, Winnie got 10 apples. Eeyore got only 2.

* * * *

Investigator: Lulu, what did Eeyore see up in the tree?

Lulu: Eeyore saw a mouse. [Filler sentence]

Investigator: (Child's name), did Lulu say it correctly?

Child: _____ (response from the child)

* * * *

Investigator: Lulu, how did Winnie and Eeyore pick the apples?

Lulu: Winnie forcefully rocked the apple tree; Eeyore did too. [Stimulus sentence]
(Case A / VPE)

Investigator: (Child's name), did Lulu say it correctly?

Child: _____ (response from the child)