

Original Paper

An Analysis on Chinese EFL Learners' Understanding of “Direct Object/Subject” Garden Path Sentences

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Abstract

The current study probes into the comprehension of “DO/S” GP sentences by Chinese EFL learners with different language proficiencies. 70 questionnaires are obtained. The results show that 60% triggering condition is not reached in high language proficiency group and no GP ambiguity is found, whereas the GP ambiguity is found and eliminated by low-proficiency group. And the level of language proficiency influences the emergence of GD phenomenon ($x^2=12.570$, $p=.000<.05$). The Q&A test reveals the residual of the initial misunderstanding among learners. Although the 60% triggering condition is not reached, we find that the comprehension ability differs significantly between the two groups based on the scores of their answers ($p=.004<.05$). It can be safely concluded that the L2 proficiency will affect learners' comprehension of “DO/S” GP sentences. The higher L2 proficiency learners gain, the more likely they may eliminate the ambiguity of GP sentences and there will be less residual of misunderstanding.

Keywords

“Direct Object/Subject” Garden Path Sentences, Chinese EFL learners, L2 proficiency

1. Introduction

Due to the feature of temporary or local ambiguity, Garden Path (GP) sentences have always been a research focus in the field of linguistics and psycholinguistics (Gu & Cheng, 2010). And the processing process and results of GP are of great significance for studies on human brain, artificial intelligence, language acquisition and foreign language teaching practice. To further reveal the process of ongoing comprehension more directly, stupendous studies have probed into the way language learners process input in both native language context and second language (L2) context.

This special ambiguity phenomenon was first proposed and defined by psycholinguist Bever (1970). He claimed that a sentence is first comprehended in the conventional way until it is only later

discovered that the first understanding is incorrect. Then on the purpose of re-understanding, non-conventional means are used to reprocess the input language by going back to the bifurcation. The study of GP sentences is helpful to the discovery of human language understanding mechanism.

Despite reanalysis and disambiguation of syntactic structure of GP sentences, the residual of misunderstanding remains exist (Gu & Cheng, 2010).

Hence, the current study aims to explore the comprehension of GP sentences by Chinese learners who regard English as foreign language with different proficiencies so as to measure whether individual proficiency correlates with GP sentence comprehension. It is hoped that investigation into effects of individual difference language proficiency on GP sentence comprehension can shed light on practical teaching with different instructions for different learners.

2. Literature Review

2.1 GP Sentences

The term of GP sentence comes from the saying “to be led down the garden path”, which means “to be misled”. The name is self-descriptive as in understanding a sentence, we may be “led up the garden path” by the structure of the sentence and hence difficulty arises when the first syntactic parsing does not fit the rest of the sentence. Bever (1970) identified such a linguistic processing: when processing a sentence from left to right, we make guesses of structure on the basis of early syntactic cues, and may be led up the garden path (Gibson, 1991; Waters & Caplan, 1996).

A classic example of garden path sentence was given by Bever (1970):

E.g. *The horse raced past the barn fell.*

Before seeing the verb “fell”, most readers tend to understand “The horse raced past the fence” as a “NP+V+PP” sentence structure, which is an unconscious selection.

Only when they read the verb “fell” can they realize that their previous understanding is incorrect, and then turn back to reprocess the language input. This is like they first advance a wrong way in the garden, and then turn back to find the path anew. Generally speaking, this kind of ambiguity can cause more difficulties in language processing.

In English, GP sentences can be divided into the following three categories according to the syntactic features and the cause of local ambiguity (Table 1).

Table 1. Classification of GP Sentences (Pritchett, 1992)

Type	Abbreviation	Example
Main verb/reduced relative clause ambiguity	MV/RR	<i>The horse raced past the barn fell.</i>
Direct object/subject ambiguity	DO/S	<i>Before Mary ate the pizza arrived from the local restaurant</i>

Direct object/sentential complement ambiguity	DO/SC	<i>The athlete realized his goals would be difficult to achieve</i>
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The first one is main verb/reduced relative clause ambiguity (also MV/RR, some scholars also call it main verb/relative ambiguity), which is a relative clause that is not marked by an overt complementizer (such as “that”). It is caused by misinterpreting a regular passive participle as a main verb. *The horse raced past the barn fell*, is classified as a MV/RR GP sentence. Similarly, sentences like *Before Mary ate the pizza arrived from the local restaurant*, is a direct object /subject ambiguity GP sentence. The noun phrase *the pizza* is initially attached to the syntactic representation of the sentence as the object of the verb *ate*, when ultimately it must serve instead as the subject of the matrix clause verb *arrived* and the subordinate verb *ate* must in fact be intransitive. And in the sentence *The athlete realized his goals would be difficult to achieve*, *his goals* is not the direct object of the verb *realized*. In fact, it is the subject of the following object clause.

2.2 Second Language Proficiency and GP Sentences

Since 1970s, this particular and interesting language phenomenon was noticed by different schools of linguists. Psycholinguists tried to find out the independent syntactic strategies (Bever, 1970; Fraizer & Clifton, 1996) when the brain processes the garden path sentences, while others analyzed the garden path sentences according to grammatical rules (Pritchett, 1988).

L2 processing is likely to be modulated by the attainment of target language. Studies mainly investigated whether nonnative speakers and native speakers have the same processing mechanism regardless of their proficiency level (Yang, 1996). Hoshino (2005) investigated the role of working memory (WM) capacity and L2 proficiency in subject-verb agreement sentence comprehension. She found that “English monolinguals with higher reading span were sensitive to the conceptual number of the subject phrase during the process of subject-verb agreement, whereas those with lower span were not” (Hoshino, 2005). Less proficient bilinguals (Spanish-English and English-Spanish bilinguals) showed sensitivity to conceptual number only in their L1, whereas highly proficient bilinguals were sensitive to conceptual number in both languages (Hoshino, 2005). The results supported her hypothesis that WM constraints in LI processing and individual differences in L2 proficiency have similar cognitive constraints on the process of subject-verb agreement.

The degree of native-like processing has been found to be correlated with proficiency level in some studies. Juffs and Harrington (1996) found that advanced EFL speakers’ parsing behavior was nearly identical to native speakers, though they generally spent more time to read the sentences. Additionally, it was found that in some cases, Chinese EFL speakers were in fact better at recovering in GP sentence comprehension. Fernandez (1999) also proposed that the more fluent a learner was in English, the more native-like processing strategies he or she used. In comprehending relative clauses attachment ambiguity (like *Roxanne read the review of the play that was written by Diane's friend*), L2 proficiency in English was found significantly correlated with attachment preferences. The higher the proficiency

of an individual, the more likely this individual was to employ the same processing strategy as native English speakers.

Jackson (2008) examined how L2 German speakers at different proficiency levels processed case-marking information to resolve subject-object ambiguities in German. Results indicated that intermediate L2 speakers had difficulty processing case-marking information during online sentence comprehension while advanced L2 speakers can rapidly process case markings and use this information to aid ambiguity resolution.

At home, Chen (1998) proposes Proficiency Constrained Model to explain how L2 proficiency can affect syntactic ambiguity processing. The model is parallel to previous studies supporting the idea that language proficiency constrains and influences L2 comprehension. To be specific, it predicts a pattern of reading time and comprehension accuracy data as an indication of both the learners' language proficiency level and the nature of the resolution for an ambiguous sentence.

In general, all learners spend more time in processing a sentence with syntactic ambiguity than its unambiguous counterpart. For the ambiguous sentences resolved with a highly preferred interpretation both high and low level learners should comprehend well. The reading time needed will not differ significantly. When the ambiguous sentence is resolved with the un-preferred interpretation (i.e., GP sentences such as *The experienced soldiers warned about the dangers conducted the midnight raid*), only high-level learners can construct the right interpretation, therefore, they comprehend better than low-level learners.

Empirical studies so far indicate that proficiency differences can affect L2 sentence processing. As Hopp (2007) concluded after reviewing many event-related potential studies on L2 proficiency constraints, "these studies indicate that proficiency difference at higher levels incur substantive changes in processing, even though L2 grammatical acquisition of the phenomena at hand is not at stake. In this case, increased proficiency is likely to reflect more efficient deployment of cognitive resources in L2 processing". If this is true, we may accordingly infer that such an effect can also be found in the occurrence of underspecified interpretations which is partly caused by computational limitation.

3. Research Design

3.1 Research Questions

In light of the review of the existing studies, it is critical to explore the relationship between L2 proficiency and GP sentence comprehension. Thus, this study is designed to answer the following three research questions:

- (1) Will GP phenomenon appear when Chinese EFL learners comprehend GP sentences?
- (2) Is second language proficiency closely related to disambiguation of GP sentences?

3.2 Instruments

(1) Questionnaire

To answer the two research questions, a questionnaire was designed based on Christianson's (2001) and Hou's (2014) materials and methods. The Questionnaire consisted of three parts. The first part was "General information", which can obtain the L2 proficiency and their grades. Participants who have passed TEM4 or TEM8 were classified as high proficiency group and those who have not passed or taken TEM4 and TEM8 were classified as low proficiency group.

The second part was introspective multiple choice, which was composed of five questions aimed to examine whether the GP phenomenon will appear and whether the subjects can disambiguate the sentences after the GP phenomenon appears. For example:

When the police stopped the driver got nervous. 请您选择与您在理解该句过程中相符的表述

- A. 我第一次读到该句时就知道动词 *stopped* 后面没有宾语。
- B. 我第一次读到该句时认为 *the driver* 是动词 *stopped* 的宾语, 但当读到动词 *got* 时才发现理解有误, *the driver* 并不是动词 *stopped* 的宾语。
- C. 以上表述与我的理解方式均不符, 我对该句的理解为

The third part was composed of five questions, which had two sub-questions for each. The third part was aimed to check if there is residual of misunderstanding. Moreover, the questionnaire was designed in Chinese and English so that participants can better understand the questions and difficult vocabularies were replaced. For example:

As the artist painted the model went out for lunch. 请根据您的理解回答问题

Question A: Did the artist paint the model?

- A. *Yes.*
- B. *No.*

Question B: Did the model go out for lunch?

- A. *Yes.*
- B. *No.*

(2) SPSS

After the collection of the data, Chi-square and t test was conducted in SPSS. According to the results of the third part of the questionnaire, the score was calculated. Since there were totally ten questions, ten points will be obtained for each correct answer. In this way, we can inspect whether there is significant difference between language proficiency and GP sentence comprehension.

4. Results

Seventy questionnaires were received, among which 37 questionnaires were from low proficiency group and 33 from high proficiency group. As for the results of introspective multiple choices (Table 2), it shows that 45.4% (75/165), less than 60% (Vainikka & Young-Scholten, 1996), of the participants in high proficiency group choose B. Thus, it indicates that GP sentence phenomenon does not appear in

this group when learners comprehend these ambiguous sentences. By contrast, 64.3% (119/185), more than 60%, of learners in low proficiency group choose B, which demonstrates that when learners in this group come across GP sentences, GP phenomenon appears.

Table 2. Results of Emergence of GP Phenomenon

	Emergence of GP Phenomenon		Total number
	No	Yes	
High proficiency group	90	75	165
Low proficiency group	66	119	185
Total	156	194	350

It can be seen in Table 3 that there is a significant difference between the two language groups ($\chi^2=12.570$, $p=.000<.05$). Therefore, language proficiency does affect the emergence of GP phenomenon.

Table 3. Chi-Square Test

	Value	df	Significance
Pearson Chi-Square	12.570	1	.000**

** $p<0.01$

As for Q & A in the third part of the questionnaire, we can know whether learners can gain disambiguation and whether there is residual of misunderstanding. If learners can answer Question A correctly, it annotates that they can disambiguate GP sentences. If learners can answer Question B correctly, it means that there is no residual of misunderstanding. From Table 4, it can be noted that 165 valid answers for Question A and Question B are received in high proficiency group whereas 185 and 149 respectively for Question A and Question B in low proficiency group. In high proficiency group, 80% of the learners can answer Question A correctly, indicating disambiguation in this group. It is the same as that in low proficiency group, despite 71.3% of the participants. Regarding Question B, the error rate of answering Question B is 7.2% and 12.8% respectively in high proficiency group and low proficiency group.

Table 4. Results of Disambiguation of GP Sentences

	Question A			Question B		
	Correct	Incorrect	Total	Correct	Incorrect	Total
High proficiency group	132	33	165	153	12	165
Low proficiency group	132	53	185	130	19	149
Total	264	86	350	283	31	314

To further clarify the relationship between language proficiency and comprehension ability, independent samples test was conducted in SPSS. As is shown in Table 5, learners in high proficiency group have a significantly better ability to comprehend GP sentences than those in low proficiency group ($p=.004<.05$). Hence, it can be assumed that learners with high language proficiency can better disambiguate “DO/S” GP sentences and there will be less residual of misunderstanding.

Table 5. Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
Comprehension ability	Equal variances assumed	18.173	.000	2.922	68	.005
	Equal variances not assumed			2.922	62.343	.004**

** $p<0.01$

5. Discussion

The verbs in the test sentences in current study hold varying theta-roles, which can be used as either a one-place predicate or a two-place predicate, and the one-place predicate is the marked form of these verbs. The GP phenomenon occurs when the subject mistaken the theta-roles of these verbs, in other words, use one-place predicate as a two-place predicate. For subjects in high proficiency group, Table 2 indicates that they do not reach the trigger criteria for the GP phenomenon. Table 4 further shows that there is no residual misinterpretation, indicating that the subjects in this group has successfully acquired different theta-roles of these verbs, especially the marked one-place predicate structure, and own the ability to select the correct theta-role by analyzing syntax. Nonetheless, for the participants in low proficiency group, it can be seen in Table 2 that they met the trigger standard of GP phenomenon, and the garden path phenomenon appeared in the interpretation of garden path sentences. Table 4 further demonstrates that although they can eliminate the local ambiguity of the garden path sentence, the GP phenomenon still exerts an impact on it, resulting in the residual after the disambiguation for the wrong answer of question B in Q&A test. This result is basically consistent with the findings of Gu & Cheng (2010). This indicates that the subjects in this group have not yet successfully acquired different theta-roles of verbs, particularly marked one-place predicate structures. The reason for the GP phenomenon of the subjects in this study might attribute to abiding by the “minimum node attachment principle” (Frazier & Rayner, 1982) when dealing with sentence structure, i.e., when the newly entered linguistic component can be attached to two or more nodes, the identified node will be selected as the attachment object, maintaining a minimum number of nodes in the whole structure.

6. Conclusion

The current study probes into the comprehension of “DO/S” GP sentences by Chinese EFL learners with different language proficiencies. The results show that 60% triggering condition is not reached in high language proficiency group and no GP ambiguity is found, whereas the GP ambiguity is found and eliminated by low-proficiency group. And the level of language proficiency influences the emergence of GD phenomenon. The Q&A test revealed the residual of the initial misunderstanding among learners. Although the 60% triggering condition is not reached, we found that the comprehension ability differs significantly between the two groups based on the scores of their answers. It can be safely concluded that the L2 proficiency will affect learners’ comprehension of “DO/S” GP sentences. The higher L2 proficiency learners gain, the more likely they may eliminate the ambiguity of GP sentences and there will be less residual of misunderstanding. The results of this study can provide inspirations for English teaching, for example, it is essential for learners to improve their language skills and attach importance to syntax when comprehending sentences. However, there are some limitations in the current study. Only 70 samples were attained, which was a small sample size. Furthermore, when classifying the two groups, a proficiency test should be taken by the participants.

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Appendix

An Analysis on Chinese EFL Learners’ understanding of “Direct Object/Subject” Garden-Path Sentences

中国英语学习者“直接宾语/主语”类花园路径句的理解

1. 您的年级 [单选题] *

- 大一
- 大二
- 大三
- 大四
- 研一

2. 您的英语水平 [单选题] *

- 尚未参加/通过英语专业水平考试
- 通过专四
- 通过专八

3. When the police stopped the driver got nervous. 请您选择与您在理解该句过程中相符的表述:

[单选题] *

- A. 我第一次读到该句时就知道动词 stopped 后面没有宾语。
- B. 我第一次读到该句时认为 the driver 是动词 stopped 的宾语, 但当读到动词 got 时才发现理解有误, the driver 并不是动词 stopped 的宾语。
- C. 以上表述与我的理解方式均不符, 我对该句的理解为 _____

4. While the reporter photographed the rocket landed on Mars. 请您选择与您在理解该句过程中相符的表述: [单选题] *

- A. 我第一次读到该句时就知道动词 photographed 后面没有宾语。
- B. 我第一次读到该句时认为 the rocket 是动词 photographed 的宾语, 但当读到动词 landed 时才发现理解有误, the rocket 并不是动词 photographed 的宾语。
- C. 以上表述与我的理解方式均不符, 我对该句的理解为 _____

5. While Jack ordered the fish swam upstream. 请您选择与您在理解该句过程中相符的表述: [单选题] *

- A. 我第一次读到该句时就知道动词 ordered 后面没有宾语。
- B. 我第一次读到该句时认为 the fish 是动词 ordered 的宾语, 但当读到动词 swam 时才发现理解有误, the fish 并不是动词 ordered 的宾语。
- C. 以上表述与我的理解方式均不符, 我对该句的理解为 _____

6. While Susan wrote the letter fell off the table. 请您选择与您在理解该句过程中相符的表述: [单选题] *

- A. 我第一次读到该句时就知道动词 wrote 后面没有宾语。
- B. 我第一次读到该句时认为 the letter 是动词 wrote 的宾语, 但当读到动词 fell 时才发现理解有误, the letter 并不是动词 wrote 的宾语。
- C. 以上表述与我的理解方式均不符, 我对该句的理解为 _____

7. As Sam counted the children got on the bus. 请您选择与您在理解该句过程中相符的表述: [单选题] *

- A. 我第一次读到该句时就知道动词 counted 后面没有宾语。
- B. 我第一次读到该句时认为 the children 是动词 counted 的宾语, 但当读到动词 got 时才发现理解有误, the children 并不是动词 counted 的宾语。
- C. 以上表述与我的理解方式均不符, 我对该句的理解为 _____

8. As the artist painted the model went out for lunch. 请根据您对该句的理解回答问题 [矩阵单选题]

*

	Yes	No
Did the artist paint the model?	<input type="radio"/>	<input type="radio"/>
Did the model go out for lunch?	<input type="radio"/>	<input type="radio"/>

9. As Angela cleaned the dog ran down the street. 请根据您对该句的理解回答问题 [矩阵单选题] *

	Yes	No
Did Angela clean the dog?	<input type="radio"/>	<input type="radio"/>
Did the dog run down the street?	<input type="radio"/>	<input type="radio"/>

10. As the detective investigated the robbery occurred. 请根据您对该句的理解回答问题 [矩阵单选题] *

	Yes	No
Did the detective investigate the robbery?	<input type="radio"/>	<input type="radio"/>
Did the robbery occur?	<input type="radio"/>	<input type="radio"/>

11. While the chef stirred the soup boiled. 请根据您对该句的理解回答问题 [矩阵单选题] *

	Yes	No
Did the chef stir the soup?	<input type="radio"/>	<input type="radio"/>
Did the soup boil?	<input type="radio"/>	<input type="radio"/>

12. As Jerry played the violin gathered dust in the attic. 请根据您对该句的理解回答问题 [矩阵单选题] *

	Yes	No
Did Jerry play the violin?	<input type="radio"/>	<input type="radio"/>
Did the violin gather the dust the attic?	<input type="radio"/>	<input type="radio"/>