# Interlanguage Analysis Concerning Japanese EFL Learners' Syntactic Parsing of Garden-path Sentences

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This case study is regarded as a part of series of my experimental researches into Japanese EFL learners' syntactic parsing in the Eight Garden-path sentences.

## 1  Major aim of this study

The principal aim of this case study is an attempt to support descriptive and qualitative evidences for the empirical results of series of researches mainly on the basis of these data analysis into proficient Japanese EFL learners with over TOEFL® PBT score 550 and over.

## 2  Cognitive factors of the subjects participating in this case study

All of the subjects are the Japanese EFL Learners graduated from Japanese University, whose experiences of studying abroad are quite limited to less than two months. In addition, they mainly learn English as a foreign language mainly in the classroom contexts in Japan. Therefore, they can safely be defined as 'purified' Japanese learners of English who have not been influenced by total immersion in English speaking countries. The number of the subjects is 14 adult learners. Their Proficiency levels of English; all of the participants' English language abilities are more than TOEFL® PBT score 550 and over.

# 3　Research method and procedure

## 3.1　Data-collection task and procedure

For each of the eight garden path sentences (see; appendix A), the subjects were required to use markings to indicate syntactic analysis and then translate it into Japanese. The marking they were instructed to make were to use brackets [　] to indicate the beginning and end of a clause, or to indicate a phrase with parentheses (　), or use an arrow to show modifying relationship. After the marking and translation, they were required to reflect on the cognitive processes and procedures of their syntactic analyses and write down as concrete a description as possible in Japanese. At the next stage, the questionnaire about the processing strategies they had adopted during processing was offered to the subjects and they were requested to answer the following three questions:

(1) "How did you think about the possibility of syntactic analysis, and/or interpretation ?"
(2) "What did you do if you found your syntactic analysis, and/or interpretation ?"
(3) "Where did you start your reanalysis in the sentence?" (For the choices, see appendix B).

For the completion of the processing data-collection tasks, about 180 minutes were given to all the participants in accordance with their self-paced processing.

## 3.2　Data analysis

Translation into Japanese was judged correct or incorrect in a dichotomous scoring protocol, taking into consideration the markings made in the sentence and the Japanese translation as indicators of syntactic and semantic analysis.

The descriptions of how they processed each sentence were also analyzed

as significant data to explore what kind of information was principally used.

Each subject's degree of reliance on syntactic, semantic, other features in processing the sentences was evaluated by the two researchers. The descriptions difficult to judge were thoroughly discussed between them on a case by case basis.

## 4　Cognitive error analyses based on the transfer of interlanguage grammar on Japanese EFL Learners syntactic parsing strategies

4.1　Without her contributions failed to come in.

1) The number of the subjects who thought that the subject was omitted in this sentence is the three ones.

 i) Examples of the errors

(1)-Kanojo no kifu ga nakute shuunyuu ni shippai shita.

(Without her contribution, ??? failed to get income.)

(2)-Kanojo no kifu ga nakute shuunyuuga erarenakatta (nyuujo dekisokoneta).

(Without her contribution, income could not be obtained.)

(3)-Kanojo no kifu nashi dewa koko made yatte kurukoto wa dekinakatta.

(Without her contribution, we couldn't go this far.)

 ii) Reasons for the errors above

As the subjects judged that *Without her contributions* was an adverbial phrase, they tried to keep the consistency of its interpretation. Though the subjects understood that a prepositional phrase cannot function as a subject of a sentence, they tried to make up an interpretation in terms of their interlanguage grammar; transfer of the Japanese linguistic feature of 'null subject' that a subject can be omitted from a sentence.

2) The number of the subjects who thought that come in should be the subject of the target sentence is only one member.

i) Examples of the errors
  -Kanojo no kifu nashi dewa hairu koto ga dekinakatta.
  (Without her contribution, ??? could not enter.)

ii) Reasons for the errors above

　　Because of regarding *Without her contributions* as a prepositional phrase, the subject could not find the subject of the target sentence. To compensate for this misinterpretation, the subject judged that come in must be a noun and that the target sentence must be an inverted sentence.

4.2　While the boy scratched the big and hairy dog yawned loudly.

　　The number of the subjects who thought that the subject was the boy is the two ones

i) Examples of the errors
  -Shounen ga ookii ke no ooi inu wo kaiteita aida akubi wo shita.
  (Whle the boy scratched the big and hairy dog, ??? yawned.)
  -shounen wa ookiku te kemukujara no inu wo kaite yarinagara ookina akubi wo shita.
  (Whle the boy scratched the big and hairy dog, ??? yawned.)

ii) Reasons for the errors above

　　The subjects interpreted that the subsequent NP *the big and hairy dog* was the object of *scratched*, but could not find the subject of *yawned*. The subjects tried to avoid the lack of subject by interpreting that *the boy* was the subject of yawned.　However, it is not clear whether the subjects interpreted the subject of *yawned* was omitted or *the boy* next to *While* was the subject of both *scratched*

*and yawned.*

4.3 This was only the beginning of the bad-mouthing robots would receive for the next couple of decades.

1) The number of the subjects who thought that *This* was the formal subject and *only the beginning ... couple of decades* was the real subject is the two ones.

　i) Examples of the errors

　-robotto ga tsugi no suujuunen no aidani to iunowa waruguchi no honno haji-mari de shi ka nakatta.

　(The fact that robots were ???? for the next couple of decades was just the beginning of bad-mouthing.)

　-robotto ga korekara suu nijuu sanjuu nenkan wo ukeireru (mukae ireru) to iunowa waruguchi no hajimari ni suginakatta.

　(The fact that robots would receive, from then on, a couple of decades was just the beginning of bad-mouthing.)

　ii) Reasons for the errors above

　　The parsing principles that are thought to be used for the stimulus sentence were used properly, but the subjects regarded *This* was the formal subject and *robots would receive ... couple of decades* was the real subject. It may be said that the sentence structure *It is ~ that* …, in which formal/real subjects are used and which students in Japan learn at the beginning level at school, influences a lot on the interpretation of the stimulus sentence.

4.4 The criminal confessed his sins harmed too many people.

1) The number of the subjects who thought that *harmed too many people* modified his sins: 5

i) Examples of the error

-Sono hanzaisha wa ookuno hitobito wo kizutsuketa kare no tsumi wo kokuhaku shita.

-Sono hanzaisha wa amarinimo ooku no hitobito wo kizutsuketa kare no tsumi wo kokuhaku shita.

-Sono hanzaisha wa ookuno hitobito ni gai wo ataeta kare no tsumi wo kokuhaku shita.

-Sono hanzaisha wa amarinimo ookuno hito wo mushibanda tsumiwo kokuhaku shita.

-Hanzaisha wa hijou ni ooku no hitobito wo kizutsuketa tsumi wo kokuhaku shita.

(The criminal confessed his sins that harmed too many people.)

ii) Reasons for the errors above

Judging *his sins* was the object of *confessed*, the subjects regarded *harmed too many people* as an adjective phrase modifying *his sins*. And the subjects didn't make any judgment about the plausibility of *harmed* modifying *his sins*, they didn't realize the fallacy of this interpretation and completed the sentence processing.

2) The number of the subjects who thought *confessed his sins* modified *The criminal* are the five members.

i) Examples of the errors

-Jibun no tsumi wo kokuhaku shita hanzaisha wa amarinimo ookuno hito wo kizutsuketa.

-Kare no tsumi wo kokuhaku shita hanzaisha wa amarinimo ooku no hito wo kizutsuketa.

(The criminal who confessed his sins harmed too many peole.)

-Tsumi wo kokuhaku shita sono hanzaisha wa ookuno hitobito wo kizu

tsuketa.

(The criminal who confessed his sins harmed many people.)

-Hanzaisha ga jibun no tsumi wo kokuhaku shita koto ni yotte ooku no hito-bito wa kizutsuita.

(Because the criminal confessed his sins, many people were harmed.)

ii) Reasons for the errors above

As the subjects regarded *harmed* was the matrix verb, *they* interpreted *confessed his sins* modified *The criminal*. In this case again, the subjects couldn't realize the fallacy of *confessed his sins* modifying *The criminal*.

4.5　As the woman edited the magazine amused all the reporters.

1) The number of the subjects who thought *all the reporters* was the subject of *amused* are the only one.

i) Examples of the errors

-Sono josei ga sono zasshi wo henshuu shita node repootaa wa mina tanoshinda.

(As the woman edited the magazine, all the reporters were amused themselves.)

ii) Reasons for the errors above

The subject seems to have understood the clause that begins with *As* is the subordinate clause. However, the subject regarded *the magazine* was the object of *edited*, which resulted in the failure to discover the subject of *amused*. To compensate for this failure, the subject wrongly assumed that the matrix sentence was an inverted sentence, regarding *all the reporters* as the subject of *amused*.

2) The number of the students who thought *As the woman edited the magazine* was the subject of *amused* is the two ones.

i) Examples of the errors

　-Sono josei ga henshuu shiteiru zasshi wa ookuno dokusha wo tanoshimaseta.

　(The magazine which the woman edited amused many readers.)

　-Henshuu sareta sono josei ni tsuiteno zasshi wa subeteno houdoukishatachi wo tanoshimaseta.

　(The edited magazine about the woman amused all the journalists.)

ii) Reasons for the errors above

　　The subjects tried to regard *the magazine* as an object of *edited* by regarding an adverbial clause (*As the woman edited the magazine*) could be a subject of a sentence.

3) The number of the subjects who thought *she*, the subject of *amused*, was omitted is the only one.

i) Examples of the errors

　-Sono josei ga sono zasshi wo henshuu shitanode subete no repootaatachi wo tanoshimaseta.

　(As the woman edited the magazine, she amused all the reporters.)

ii) Reasons for the errors

　　The subject didn't clause the phrase when s/he encountered *edited*, and at the same time, it tried to justify its interpretation that *As the woman edited the magazine* was an adverbial clause.  In doing this, the subject seems to have misanalyzed, based on the interlanguage grammar, that the subject of the matrix sentence, *she*, was omitted.

4.6　I told the boy the dog bit Sue would help him.

1) The number of the students who thought *bit Sue* modified *the dog* is the eleven ones.

i) Examples of the errors

-Watashi wa suu ni kamitsuita sono inu wa kare wo tasuke uru to sono shounen ni tsutaeta.

(I told the boy that the dog that bit Sue could help him.)

-Watashi wa suu ni kamitsuita inu wa omae wo tasukeru darou to hanashita.

(I said that the dog which bit Sue would help you.)

-Watashi wa sono shounen ni suu ni kamitsuita sono inu wa osoraku kare wo tasuketa nodarou to itta.

(I told the boy that the dog which bit Sue probably helped him.)

-Watashi wa sono shounen ni suu ni kamitsuita inu ga kimi wo tasukete kure-rudarou to hanashita.

(I told the boy that the dog which bit Sue would help you.

-Watashi wa sono shounen ni suu wo kanda inu ga kare wo tasuketanoda to hanashita.

(I told the boy the dog which bit Sue helped him.)

-Watashi wa suu ni kamitsuita inu wa kitto tasuke ni narudarou to sono shounen ni hanashita.

(I told the boy that the dog which bit Sue would be helpful.)

-Watashi wa suu ni kamitsuku inu wa kare wo tasukerudarou to sono shounen ni itta.

(I told the boy that the dog which bit Sue would help him.)

-Watashi wa sono shounen ni suu ni kamitsuita sono inu wa sono shounen wo tasukeru to iu koto wo hanashita.

(I told the boy that the dog which bit Sue would help him.)

-Watashi wa sono shounen ni suu ni kamitsuita inu ga kimi no koto wo tasuketekurerudarou to hanashita.

(I told the boy that the dog which bit Sue would help him.)

-Watashi wa shounen ni inu ga suu ni kamitsukukoto wa kare wo tasukeru-darou to itta.(*)

(I told the boy that the dog's biting Sue would help him.)

-Watashi wa shounen ni sono inu ga suu ni kamitsuita koto ga kare wo tasuketa to hanashita.(*)

(I told the boy that the dog's biting Sue helped him.)

ii) Reasons for the errors above

The subjects failed to recognize that *the boy the dog bit* is an NP, and tried to understand the stimulus sentence by taking *the dog bit Sue* as an NP. In the first 9 examples, the subjects tried to grasp the meaning of the stimulus sentence by regarding *bit* as a past participle modifying *the dog*. In the last two examples (*), on the other hand, the subjects tried to see *the dog bit Sue* was an NP meaning "*the dog's biting Sue.*"

2) The number of the subjects who thought a relative pronoun was omitted is the only one.

i) Examples of the errors

-Watashi wa shounen ni kare wo tasuketa suu ga inu ni kamareta to iu koto wo hanashita.

(I told the boy that Sue, who helped him, was bitten by a dog.)

ii) Reasons for the errors

Based on the assumption that *the boy* was an NP, the subject tried to see *told* as an intransitive verb and saw that a relative pronoun *who* was omitted next to *Sue*.

4.7　The cotton clothing is made of grows in Mississippi.

1) The number of the subjects who regarded *grows* as a noun is the nine ones.

i) Examples of the errors

-Men no irui wa mishishippi de sodatta mono kara dekiteiru.

(Cotton clothing is made of the things which grows in Mississippi.)

-Mishishippi dewa men de dekita irui wa kusaki kara tsukurarete iru.

(In Mississippi, cotton clothing is made of plants.)

-Men no irui wa mishishippi shuu no sanbutsu kara tsukurarete iru.

(Cotton clothing is made of the products in Mississippi.)

-Sono men no irui wa mishishippi de dekita shokubutsu ni yotte tsukurarete imasu.

(The cotton clothing is made of plants in Mississippi.)

-Kono men no irui wa mishishippi ni haete iru shokubutsu kara natte iru.

(This cotton clothing is made of plants which grows in Mississippi.)

-Cotton sozai no irui wa mishishippi de seizou sareta mono kara dekiteiru.

(Cotton clothing is made of the things produced in Mississippi.)

-Sono men no fuku wa mishishippi de sodatta men kara dekite iru.

(The cotton clothing is made of the cotton which grows in Mississippi.)

-Sono men no irui wa mishishippi san de aru.

(The cotton clothing is made in Mississippi.)

-Sono men no fuku wa mishishippi no "grows" kara tsukurarete iru.

(The cotton clothing is made of "grows" in Mississippi.)


ii) Reasons for the errors above

As the subjects interpreted that *The cotton clothing* was the subject, and *is made of* was the verb, of the matrix sentence, they tried to keep grammatical plausibility of the stimulus sentence by regarding *grows* as a noun.


4.8  The pitcher tossed the ball tossed the ball.

1) The number of the subjects who thought the first *tossed the ball* modified *the pitcher* is the three ones.


i) Examples of the errors

-Booru wo nagesuteta picchaa ga booru wo ue ni nageta.

(The pitcher who threw the ball away threw the ball upward.)

-Booru wo nageta picchaa ga booru wo nageta.

(The pitcher who tossed the ball tossed the ball.)

-Sono booru wo nageta picchaa ga mata booru wo nageta.

(The pitcher who tossed the ball tossed the ball again.)

ⅱ) Reasons for the errors above

As the subjects judged that the second *tossed the ball* was the matrix verb of the stimulus sentence, they tried to keep the grammaticality of the stimulus sentence by interpreting that the first *tossed the ball* modified *The pitcher*. At this point, the subjects doesn't seem to have paid attention to the validity of *tossed the ball* modifying *The pitcher*.

2) The number of the subjects who thought the first tossed was a ditransitive verb is the only one.

ⅰ) Exmaples of the errors

-Picchaa wa sono booru wo hourareta booru ni nageta.

(The pitcher tossed the ball to the ball which was tossed.)

ⅱ) Reasons for the errors

It seems that as the subject thought that the first *tossed* was the verb, and that the first *the ball* was an object of the first *tossed*, s/he had to regard the second *tossed the ball* as an NP. As a result, the subject had to regard the first *tossed* as a ditransitive verb.

3) The number of the subjects who thought the second *tossed the ball* modified the first *the ball* is the only one.

i) Examples of the errors

  -Picchaa wa tosu sareta booru wo tosu shita.

  (The pitcher tossed the ball which had been tossed.)

ii) Reasons for the errors above

     Just as the errors in 2, as the subject regarded *The pitcher* as the subject, *tossed* as the verb, and *the ball* as the object, s/he tried to maintain the grammaticality of the stimulus sentence by thinking of the second *tossed the ball* as modifying the first *tossed the ball*.

4) The number of the subjects who thought the second tossed the ball modified *The pitcher tossed the ball* is the only one.

i) Examples of the errors

  -Sono picchaa wa sono booru wo nageraretanode sono booru wo nageta.

  (Because the pitcher was tossed the ball s/he tossed the ball.)

ii) Reasons for the errors above

     In order to see *The pitcher tossed the ball* as a complete sentence, the subject regarded the second *tossed the ball* as the adverbial phrase.

5) The number of the subjects who thought a relative pronoun was omitted before the second *tossed the ball* is the only one.

i) Examples of the errors

  -Picchaa ga booru wo nagetara sono booru ga betsu no booru wo haneta.

  (The pitcher tossed the ball which hit another ball.)

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## 5 Conclusion

On the basis of these data obtained from interlanguage grammar-based analysis, it can be safely concluded that there is a general tendency that the transfer of the subjects' First language, especially Japanese language-specific features has a crucial effect on Japanese EFL learners' syntactic parsing of the eight garden-path sentences. Typical examples of the major types of transfer are as follows: There are, specifically, the principles of 'null subject functioning as pro-drop parameter', the tug of war between the verb and the subject taking the noun as subject or object, and transitivity, or intransivity as the function of main verb.

Appendix 1: Data collection task

課題：
①まず、次の各英文を和訳してください。
②和訳の際には、どんな文法事項や文の構造の知識を手がかりにしたのか、どんな点で誤訳をしそうだったかなど、和訳のプロセスも書いてみてください。
③書き方は例題を参考にして、和訳のほかに、主語や動詞や修飾・被修飾の関係の把握、関係詞節と主節の区別など、和訳を行う時に必要な事柄を、実際に英文に書き込みながら考えてみてください。また、和訳の時には、辞書は使用してかまいません。
④各英文について、①〜③の作業が終わる毎に、（1）・（2）の質問に答えてください。

例題：（斜体字やカッコは書き込みの例）

　The horse <u>(raced past the barn)</u> fell.
　　　　　　　*S*　　　　　　　　　　　*V*

|和訳|　　全速力で納屋を通り過ぎた馬が倒れた。

|和訳の手がかり|　最初の方にracedという動詞があるので、The horseが主語でracedがその動詞と考えたが、文の最後にfellという動詞の過去形が来ているので、その前のThe horse raced past the barn全体が主部だと考え直した。その結果、最初のracedは、形容詞の働きをしている過去分詞で、raced past the barnが主語のThe horseを修飾していると捉え直した。

|質問|　英文の意味が分からなかった時、どのように対処しましたか。それぞれ当てはまると思う記号に○をつけてください。

1　解釈の可能性についてはどのように考えましたか。
　　ア．1つの解釈の可能性だけを考えて、その解釈がうまくいかなかった時に、改めて別の解釈の可能性を考えた。
　　イ．最初から2つの解釈の可能性を考えながら読み進めた。

2－1　解釈を間違えたと判断した際には、どのように対処しましたか。
　　ア．間違えたと判断した時点で、すぐに読み返した。
　　イ．読み返さずに最後まで読み、読み終わった段階で判断した。

2－2　また、その場合には、どのような方法で読み返しましたか。
　　ア．文頭まで戻って、もう一度読んだ。
　　イ．間違いの原因と思われる部分まで戻って、もう一度読んだ。
　　ウ．英文を、右から左へ逆戻りをしながら読み返した。

それでは、始めます。

1. Without her contributions failed to come in.

   *contributions「寄付」

和訳

和訳の手がかり

質問　英文の意味が分からなかった時、どのように対処しましたか。それぞれ当てはまると思う記号に〇をつけてください。

1　解釈の可能性についてはどのように考えましたか。
　ア．1つの解釈の可能性だけを考えて、その解釈がうまくいかなかった時に、改めて別の解釈の可能性を考えた。
　イ．最初から2つの解釈の可能性を考えながら読み進めた。

2－1　解釈を間違えたと判断した際には、どのように対処しましたか。
　ア．間違えたと判断した時点で、すぐに読み返した。
　イ．読み返さずに最後まで読み、読み終わった段階で判断した。

2－2　また、その場合には、どのような方法で読み返しましたか。
　ア．文頭まで戻って、もう一度読んだ。
　イ．間違いの原因と思われる部分まで戻って、もう一度読んだ。
　ウ．英文を、右から左へ逆戻りをしながら読み返した。

Appendix 2

Eight different types of garden-path sentences functioning as stimulus sentences used for the data-collection tasks of the present case study

- · 1. Without her contributions failed to come in. (Theta reanalysis constraint, Late Closure)
- · 2. While the boy scratched the big and hairy dog yawned loudly.　(Late Closure)
- · 3. This was only the beginning of the bad-mouthing robots would receive for the next couple of decades. (Late Closure, Theta reanalysis constraint)
- · 4. The criminal confessed his sins harmed too many people. (Late Closure)
- · 5. As the woman edited the magazine amused all the reporters. (Late Closure)
- · 6. I told the boy the dog bit Sue would help him. (Late Closure, Theta reanalysis constraint, Centrally-embedded sentences)
- · 7. The cotton clothing is made of grows in Mississippi. (Late Closure, Theta reanalysis constraint, Centrally-embedded sentences)
- · 8. The pitcher tossed the ball tossed the ball. (Early Closure)

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