

**A Preliminary Study on Why Second Language
Learners Accept Ungrammatical Sentences:
Its Theoretical Implications**

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Abstract

Why do second language learners sometimes accept ungrammatical sentences in the target language? In the present study, we focus on Japanese-speaking learners of English as a Foreign Language (EFL) and investigate whether such “grammatical illusion” effect would be observed in them and whether the effect could be dependent on their proficiency. The results of one acceptability judgment questionnaire experiment and of one preliminary self-paced reading experiment are reported. The results of the questionnaire experiment showed that the lower-proficiency Japanese EFL learners were more likely to accept ungrammatical sentences in English compared to the higher-proficiency learners. The results of the self-paced reading experiment indicated that the reading time difference between ungrammatical sentences and their grammatical counterparts was significant for one native English speaker but not for two Japanese EFL learners. It is suggested that the “grammatical illusion” effect (i.e., erroneous acceptance of ungrammatical sentences) in second language learners is more likely to be observed when their proficiency is lower, and possibly that second language learners can accept ungrammatical sentences during their real-time processing. We discuss a new approach to second language acquisition from the perspective of the grammatical illusion phenomenon.

Key Words: ungrammatical sentences, grammatical illusion, Japanese-speaking learners of English as a foreign language, proficiency, acceptability judgment, self-paced reading

アブストラクト

第二言語学習者はなぜ学習対象言語において非文法的である文を容認してしまうのか？本研究では、日本人英語学習者に焦点を当て、非文を容認してしまうという「文法性の錯覚」の効果が彼らに観察されるか、そしてその効果は彼らの習熟度に依存するのかを検証する。容認可能性判断の質問紙実験と予備的な自己ペース読文実験の結果を報告する。質問紙実験の結果は、習熟度の低い日本人英語学習者の方が、習熟度が高い学習者よりも、英語の非文を容認しやすいことを示した。自己ペース読文実験の結果は、英語の非文とそれに対応する正文（文法的な文）の間における読み時間の差が、一人の英語母語話者では有意であったが、二人の日本人英語学習者では有意ではなかったことを示した。第二言語学習者の「文法性の錯覚」効果（非文を誤って容認してしまうこと）は学習者の習熟度が低いほど観察されやすいこと、第二言語学習者はリア

ルタイムの文理解において非文を容認してしまう可能性があることが示唆された。文法性の錯覚という現象の観点から第二言語習得に対する新たなアプローチを議論する。

キーワード：非文法的な文、文法性の錯覚、日本人英語学習者、習熟度、容認可能性判断、自己ペース読文

1. Introduction¹

A variety of input-output discrepancy is observed in a natural phenomenon of human language. In child or native language acquisition, there is a problem called “Plato’s problem”: “explaining how we can know so much given that we have such limited evidence” (Chomsky, 1986: xxv; see also Russell, 1948). Children come to be able to produce and comprehend the virtually infinite number of sentences despite their impoverished input for native language acquisition. Adults, on the other hand, are very poor at knowing a second language, resulting in being less able to produce and comprehend sentences, in spite of the fact that they can have richer (or longer) linguistic experience. Hence, in adult or second language acquisition this problem is similar to what is called “Orwell’s problem”: “explaining how we can know so little, given that we have so much evidence” (Chomsky, 1986: xxv). Errors in both native and second language acquisition are another case of input-output discrepancy. Even though ungrammatical sentences are rarely included in their input, child and adult language learners often make grammatical errors in the sentences that they generate. Since these input-output discrepancy phenomena are naturally observed, we can obtain insights into what human language is like through investigating them.

In the present paper, we focus on a question of why second language learners produce ungrammatical sentences as in (1) that rarely occur in the input (an asterisk* means that a given string of words is ungrammatical or judged as unacceptable by native speakers of a particular language in question).

(1) *John like dogs.

In (1), the subject *John* is third-person and singular, and thus the verb *like* has to be inflected as *likes* for subject-verb agreement if the verb is in the present tense. This kind of grammatical error is commonly observed in Japanese-speaking learners of English as a Foreign Language (henceforth EFL). What is interesting is that Japanese EFL learners never receive such ungrammatical input as in (1) during English classes (in fact, virtually no ungrammatical sentence appears in textbooks). Nonetheless, they frequently produce ungrammatical sentences like (1).

What is more interesting is that Japanese EFL learners sometimes accept ungrammatical sentences in English. This is part of the so-called “grammatical illusion” phenomenon, which is defined as follows: people erroneously accept ungrammatical sentences (Phillips, Wagers, & Lau, 2011). This phenomenon was originally discussed for native speakers’ production and comprehension experimental data such as (2) (Bock & Miller, 1991).

(2) *The key to the cabinets are broken.

The sentence in (2) is ungrammatical because the subject *the key to the cabinets* is singular while the verb *are* is plural, resulting in a violation of subject-verb agreement. Even native speakers, however, erroneously produce and comprehend (i.e., accept) ungrammatical sentences like (2) (e.g., Bock & Miller, 1991; Wagers, Lau, & Phillips, 2009). The phenomenon of grammatical illusions has less frequently discussed for second language learners so far (cf. Schlueter, Momma, & Lau, 2017).

In the present preliminary study of grammatical illusions in second language learners, we investigate a possibility that depending on a second language learner's proficiency, his/her erroneous acceptance of ungrammatical sentences could vary. Based on this possibility, we will propose a new approach to second language acquisition from the perspective of the grammatical illusion phenomenon.

What follows are reports of a questionnaire experiment (Section 2) and a self-paced reading experiment (Section 3) to observe how Japanese EFL learners respond to ungrammatical sentences in English, and discussion of the results for further studies (Section 4).

2. Questionnaire Experiment

The purpose of this questionnaire experiment was to examine whether Japanese EFL learners wrongly accept ungrammatical sentences in English and further whether their acceptance of ungrammatical sentences could vary depending on their proficiency.

2.1. Method

Participants

Sixty undergraduate students at Gunma University participated in the experiment as the experimental group of Japanese EFL learners, and one native English speaker did as the control group. Sixty Japanese EFL learners were divided into two groups: the higher-proficiency group of 32 participants (their mean TOEIC score: 650) and the lower-proficiency group of 28 participants (their mean TOEIC score: 450). These two groups are abbreviated as Higher and Lower Groups below.

Materials

Forty-two ungrammatical sentences in English were used with their corresponding grammatical ones (see Appendix below).² The ungrammatical sentences in (3) are examples of them.

- (3) a. *It's a my strength.
(cf. It's my strength.)
- b. *I belonged the wind-orchestra club when I was a junior high school student.
(cf. I belonged to the wind-orchestra club when I was a junior high school student.)
- c. *There are many good winter song.
(cf. There are many good winter songs.)
- d. *And I takes photos very well.
(cf. And I take photos very well.)
- e. *When I was a child, a deer suddenly approach me.

(cf. When I was a child, a deer suddenly approached me.)

As seen in (3a-e), the ungrammatical sentences used in the experiment were of five types of grammatical error: determiner in (3a), preposition in (3b), number agreement within a noun phrase in (3c) (NP number agreement hereafter), subject-verb agreement in (3d), and tense/aspect in (3e) (the sentences in parentheses were the corresponding grammatical materials). In the experiment, 10 pairs of ungrammatical and grammatical sentences were used for determiner error and eight pairs were used for each of the other four types of error.

Procedure

An acceptability judgment task was carried out. The participants were asked to judge the acceptability of each sentence on a five-point scale: 1 for *totally unacceptable*, 2 for *somewhat unacceptable*, 3 for *I don't know*, 4 for *somewhat acceptable*, and 5 for *totally acceptable*. Note that no filler sentence was included in the questionnaire used for this task, and also that the participants experienced all the sentences (i.e., both grammatical and ungrammatical sentences for each item).

Data treatment

The data were analyzed by ordinal logistic regression (Baayen, 2008) to examine whether the results from the two groups of Japanese EFL learners were statistically different, in particular whether the lower-proficiency group could be more likely to accept ungrammatical sentences compared to the higher-proficiency group. First, the overall data were analyzed with a factor of grammaticality (grammatical or ungrammatical) for all the three groups. Second, the data of Higher and Lower Groups were analyzed with two factors of grammaticality and of proficiency (higher or lower).

2.2. Results and Discussion

The results of the acceptability judgment questionnaire experiment are summarized in Table 1 below. For the overall results, the mean scores of ungrammatical and grammatical sentences were as follows: 3.1 (SD = 1.6) and 4.3 (SD = 1.0) for Lower Group ($\beta = -1.49$, $SE = 0.08$, $z = -18.31$, $p < .0001$), 2.5 (SD = 1.6) and 4.6 (SD = 0.9) for Higher Group ($\beta = -2.77$, $SE = 0.09$, $z = -30.63$, $p < .0001$), and 2.9 (SD = 1.3) and 4.9 (SD = 1.3) for Control Group ($\beta = -5.98$, $SE = 1.14$, $z = -5.24$, $p < .0001$). The mean scores of ungrammatical sentences were significantly lower than those of grammatical ones for all the three groups. This suggests that all the three groups were less likely to accept ungrammatical sentences compared to grammatical sentences.

As for the comparison between Higher and Lower Groups, the overall results showed a significant interaction between the two factors ($\beta = 1.49$, $SE = 0.11$, $z = 12.98$, $p < .0001$) with their main effects ($ps < .0001$). The simple effect of proficiency was significant both in grammatical sentences and in ungrammatical ones ($ps < .0001$), indicating that the mean scores of grammatical sentences were higher in Higher Group (4.6 (SD = 0.9)) than in Lower Group (4.3 (SD = 1.0)) and that those of ungrammatical sentences were lower in Higher Group (2.5 (SD = 1.6)) than in Lower Group (3.1 (SD = 1.6)). The same pattern of interaction was found for determiner, preposition, NP number agreement, and subject-verb agreement (all $ps < .05$). For

Table 1 The mean acceptability scores (and SDs)

	Lower	Higher	Control
Determiner:			
ungrammatical	3.8 (1.3)	3.2 (0.9)	3.8 (1.0)
grammatical	4.3 (1.6)	4.6 (0.8)	5.0 (0)
Preposition:			
ungrammatical	3.4 (1.5)	2.7 (1.6)	2.6 (0.9)
grammatical	4.4 (0.9)	4.8 (0.7)	4.8 (0.7)
NP number agreement:			
ungrammatical	2.8 (1.7)	2.1 (1.5)	3.1 (1.2)
grammatical	4.2 (0.9)	4.5 (1.0)	5.0 (0)
Subject-verb agreement ³ :			
ungrammatical	3.0 (1.7)	2.3 (1.6)	2.1 (1.3)
grammatical	4.4 (1.0)	4.8 (0.7)	5.0 (0)
Tense/Aspect:			
ungrammatical	2.1 (1.5)	2.0 (1.5)	2.4 (1.4)
grammatical	4.1 (1.2)	4.4 (1.1)	5.0 (0)
Total:			
ungrammatical	3.1 (1.6)	2.5 (1.6)	2.9 (1.3)
grammatical	4.3 (1.0)	4.6 (0.9)	4.9 (1.3)

(Lower: Lower Group of 28 lower-proficiency learners; Higher: Higher Group of 32 higher-proficiency learners; Control: Control Group of one native English speaker.)

tense/aspect, the interaction of the two factors was significant ($\beta = 0.93$, $SE = 0.26$, $z = 3.58$, $p = .0003$), and the simple effect of proficiency was significant in grammatical sentences ($p = .0001$) but not in ungrammatical ones ($p = .20$). These results show that except for tense/aspect, Higher Group was more likely to accept grammatical sentences and less likely to accept ungrammatical sentences compared to Lower Group. This suggests that the Japanese EFL learners' acceptability of grammatical and ungrammatical sentences in English is dependent on their proficiency.

Focusing on the results of ungrammatical sentences, it was implied that Lower Group were more likely to accept ungrammatical sentences compared to Higher Group. This leaves a possibility that such grammatical illusion is more likely to be observed when second language learners' proficiency is lower.

3. Self-paced Reading Experiment (Preliminary)

The purpose of this self-paced reading experiment was to investigate whether Japanese EFL learners respond differently to grammatical and ungrammatical sentences in English during their real-time processing, in particular whether the grammatical illusion effect could be observed in second language learners' on-line parsing as well. What follows is the report of a preliminary study with only three participants.

3.1. Method

Participants

Two Japanese EFL learners and one native English speaker took part in this experiment.

Materials

The same materials (42 ungrammatical sentences and their grammatical counterparts) were used as in the questionnaire experiment above.

Procedure

A word-by-word, non-cumulative, moving-window self-paced reading task (Just, Carpenter, & Wolley, 1982; Just & Carpenter, 1992) was conducted on a PC controlled by Linger.⁴ For example, if the reading sentence is *John like dogs*, three hyphens appear on the PC screen. The participant's first pushing the space key replaces the first hyphen with *John*, his/her second push replaces *John* with the hyphen back and the second hyphen with *like*, and his/her third push replaces *like* with the hyphen and the third hyphen with *dogs*. The participant's reading time in each region was measured in millisecond. The ungrammatical sentences were never presented consecutively. Comprehension check questions followed fourteen grammatical sentences to make the participants concentrate on the task. As in the questionnaire experiment, there was no filler sentence, and the participants experienced all the sentences in Appendix below.

Data treatment

The reading time in the critical region was analyzed. The critical region was the region in which the sentence in question turns out to be ungrammatical as seen in the underlined words in (4a-e) (for almost all the grammatical counterparts, the critical region was the corresponding word in the ungrammatical sentences (see Appendix below)).

- (4) a. *It's a my strength.
(cf. It's my strength.)
- b. *I belonged the wind-orchestra club when I was a junior high school student.
(cf. I belonged to the wind-orchestra club when I was a junior high school student.)
- c. *There are many good winter song.
(cf. There are many good winter songs.)
- d. *And I takes photos very well.
(cf. And I take photos very well.)
- e. *When I was a child, a deer suddenly approach me.
(cf. When I was a child, a deer suddenly approached me.)

Due to this way of deciding the critical region, its position in a sentence can be different between ungrammatical and grammatical sentences as in (4a-b). Since the length of words in the critical region can be different between ungrammatical and grammatical sentences as shown in (4c-e), the residual reading times were analyzed. First, a pair of grammatical and ungrammatical sentences were excluded from further analyses when the participants' answer to the comprehension check question accompanying the grammatical sentence was wrong (one pair were eliminated for the native speaker and four pairs were for each of the two Japanese EFL learners). The residual reading times below -500 milliseconds and above 2000 milliseconds were eliminated as outliers (0.9% of data were excluded). In addition, the reading times beyond 2.5 SDs

above or below each participant's mean were replaced with the boundary values (3.3% of the data were affected). The remaining data of residual reading times were analyzed by Linear Mixed-Effects (LME) models (Baayen, Davidson, & Bates, 2008). For LME modeling, grammaticality (grammatical or ungrammatical) was entered as one fixed effect, which was centered (i.e., effect coding), and participants and items as two random effects.⁵ The best-fit model was chosen by a backward selection from the maximal structure consisting of a random intercept and slope of the fixed effect for both participants and items.

3.2. Results and Discussion

Table 2 shows the results of the self-paced reading experiment.

Table 2 The mean residual reading times in the critical region

	Learners	Native Speaker
Determiner:		
ungrammatical	-70.78	58.84
grammatical	-151.46 [0.8]	55.64 [0.7]
Preposition:		
ungrammatical	48.61	140.03
grammatical	-100.54 [1.8]	5.15 [2.3]
NP number agreement:		
ungrammatical	-87.51	33.07
grammatical	-100.54 [1.8]	105.71 [-0.5]
Subject-verb agreement:		
ungrammatical	-4.16	-20.07
grammatical	55.57 [-0.6]	-96.38 [1.6]
Tense/Aspect		
ungrammatical	-32.48	2.56
grammatical	-45.03 [0.1]	-123.17 [3.0]
Total:		
ungrammatical	-32.04	44.20
grammatical	-77.57 [1.0]	-9.19 [2.0]

(Learners: two Japanese EFL learners; Native Speaker: one English native speaker. The numbers in brackets stand for the t values of the best-fit models, and the difference in residual reading times between ungrammatical and grammatical sentences for each type of error is significant if the absolute t value is 2.0 or above.)

Because the number of participants is very low, let us focus on the overall results. For the native English speaker, the difference in residual reading times between ungrammatical and grammatical sentences (44.20 vs. -9.19 milliseconds) was significant ($\beta = 66.44$, $SE = 34.02$, $t = 2.0$). For the two Japanese EFL learners, the difference was not significant ($\beta = 45.46$, $SE = 44.38$, $t = 1.0$) (-32.04 milliseconds for ungrammatical sentences and -77.57 milliseconds for grammatical ones). The results indicate that for the native English speaker, the mean residual reading time in the critical region was significantly longer for ungrammatical sentences compared to their grammatical counterparts, whereas for the two Japanese EFL learners, the same tendency was found numerically but not statistically.

These results leave a possibility that the Japanese EFL learners did not perceive ungrammatical sentences as ungrammatical but rather processed those as grammatical sentences and thus the difference in

reading times between ungrammatical and grammatical sentences was not significant. If this is the case, the self-paced reading results from the Japanese EFL learners could reflect the grammatical illusion effect in on-line parsing.

4. General Discussion and Concluding Remarks

The results of the acceptability judgment questionnaire experiment suggested that depending on proficiency, the Japanese EFL learners differently responded to grammatical and ungrammatical sentences in English. It was shown that the lower-proficiency learners were more likely to accept ungrammatical sentences compared to the higher-proficiency learners. This implies that the “grammatical illusion” phenomenon is related to second language learners’ proficiency, and specifically that the grammatical illusion effect is more likely to be observed when the learners’ proficiency is lower.

The results of the preliminary self-paced reading experiment showed no significant difference in reading times between grammatical and ungrammatical sentences for the two Japanese EFL learners. This left a possibility for the grammatical illusion effect during on-line processing in that the participants processed ungrammatical sentences as grammatical ones and thus no difference was found between “ungrammatical” sentences and their grammatical counterparts. Since the difference in reading times between grammatical and ungrammatical sentences was significant for the one native speaker of English, it may be the case that it is more difficult for second language learners, compared to native speakers, to perceive ungrammatical sentences as ungrammatical during on-line processing.

As concluding remarks, we can approach second language acquisition from the perspective of grammatical illusions if it is the case that the grammatical illusion effect in second language learners depends on their proficiency. The present study suggested that the grammatical illusion effect is found not only in the whole-sentence comprehension as in the acceptability judgement questionnaire but also possibly in the word-by-word comprehension as in the self-paced reading. The observation of the grammatical illusion effect in the real-time processing contributes to explicating the mechanism of second language processing (Schlueter, Momma, & Lau, 2017) and further to deeper understanding of second language acquisition. If proficiency is related to the grammatical illusion effect as suggested in the present questionnaire experiment, it could make a difference in the real-time processing of ungrammatical sentences as well. Examination of this possibility is a future issue.

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Notes

1. This paper is an extended version of the manuscript (Yamada, 2017) presented at MAPLL-TCP (Mental Architecture for Processing and Learning of Language and Tokyo Conference on Psycholinguistics) 2017 at the National Institute for Japanese Language and Linguistics (NINJAL) on July 23rd, 2017. I would like to thank the audience for their insightful comments on the earlier drafts.

2. The 42 ungrammatical sentences were produced by other Japanese EFL learners (see Yamada, 2016).
3. One ungrammatical sentence of subject-verb agreement error (and its grammatical counterpart) was excluded from further analyses because the sentence could be judged as unacceptable for reasons other than subject-verb agreement.
4. For Linger, see the website: <http://tedlab.mit.edu/~dr/Linger/>.
5. If participants' scores on a proficiency test are included in the LME models as a covariate, the data analysis will be more informative (of course, we need the sufficient number of participants of Higher and Lower Groups). I am grateful to Doctor Edson T. Miyamoto for this insightful comment at MAPLL-TCP 2017.

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Appendix

The following sentences are the stimuli used in the questionnaire and self-paced reading experiments. Sentences in (a) are ungrammatical, and those in (b) are their grammatical counterparts. In both experiments, all the participants experienced every sentence here. The underlined word was the critical region for the self-paced reading experiment.

Determiner

- 1 a. Watching movie is very fun and useful for studying.
- b. Watching a movie is very fun and useful for studying.

- 2 a. I met him when I entered junior high school.
 b. I met him when I entered the junior high school.
- 3 a. She is good at playing piano.
 b. She is good at playing the piano.
- 4 a. When I was a junior high school student, I joined tennis club.
 b. When I was a junior high school student, I joined the tennis club.
- 5 a. So, we absolutely need bed.
 b. So, we absolutely need a bed.
- 6 a. I liked Japanese teacher.
 b. I liked a Japanese teacher.
- 7 a. So I get a my family picture with me.
 b. So I get a family picture with me.
- 8 a. I'm a member of handball team.
 b. I'm a member of the handball team.
- 9 a. I go to the library on weekend.
 b. I go to the library on the weekend.
- 10 a. It's a my strength.
 b. It's my strength.

Preposition

- 11 a. I belonged the wind-orchestra club when I was a junior high school student.
 b. I belonged to the wind-orchestra club when I was a junior high school student.
- 12 a. In my university life, I'd like to go many countries.
 b. In my university life, I'd like to go to many countries.
- 13 a. I spend most time to my club activities.
 b. I spend most time on my club activities.
- 14 a. We can study and get credits if we watch some programs and lessons in TV.
 b. We can study and get credits if we watch some programs and lessons on TV.
- 15 a. I want to talk people in English.
 b. I want to talk with people in English.
- 16 a. My hobby is listening music.
 b. My hobby is listening to music.
- 17 a. I use an iPad when I go to somewhere.
 b. I use an iPad when I go somewhere.
- 18 a. I talked to her a lot of things.
 b. I talked to her about a lot of things.

NP number agreement

- 19 a. Since I was a junior high school students, I have been dreaming to become a teacher.
 b. Since I was a junior high school student, I have been dreaming to become a teacher.
- 20 a. I'm really happy to have such a wonderful friends.
 b. I'm really happy to have such a wonderful friend.
- 21 a. He is also one of my oldest friend.
 b. He is also one of my oldest friends.

- 22 a. I didn't think we became a good friends at first.
 b. I didn't think we became good friends at first.
- 23 a. Everyone except me was girls.
 b. Everyone except me was girl.
- 24 a. I couldn't communicate with an exchange students who stayed at my home at all.
 b. I couldn't communicate with an exchange student who stayed at my home at all.
- 25 a. I liked many novel.
 b. I liked many novels.
- 26 a. When I was junior high school students, I liked English.
 b. When I was a junior high school student, I liked English.

Subject-verb agreement

(Items (29a-b) were excluded from further analyses (see note 3).)

- 27 a. Third, our teachers was bad.
 b. Third, our teachers were bad.
- 28 a. I prefer a music player to a simple alarm that just make noisy sounds.
 b. I prefer a music player to a simple alarm that just makes noisy sounds.
- 29 a. It smells so bad and taste strangely.
 b. It smells so bad and tastes strangely.
- 30 a. Some people says they prefer Soba to Udon.
 b. Some people say they prefer Soba to Udon.
- 31 a. A cook slice a tuna and put it on the rice.
 b. A cook sliced a tuna and put it on the rice.
- 32 a. Teachers is very friendly.
 b. Teachers are very friendly.
- 33 a. There are nothing around me.
 b. There is nothing around me.
- 34 a. My favorite sports is baseball.
 b. My favorite sports are baseball.

Tense/Aspect

- 35 a. When I was a child, a deer suddenly approach me.
 b. When I was a child, a deer suddenly approached me.
- 36 a. However, they were seemed to dislike this idea.
 b. However, they seemed to dislike this idea.
- 37 a. So I wanted be a social teacher though I am majoring in English.
 b. So I wanted to be a social teacher though I am majoring in English.
- 38 a. When we are in bed, we can feel relax.
 b. When we are in bed, we can feel relaxed.
- 39 a. I like to solves many types of questions.
 b. I like to solve many types of questions.
- 40 a. I like make anything and watch it.
 b. I like to make anything and watch it.
- 41 a. I'm play table tennis.
 b. I'm playing table tennis.

- 42 a. It's difficult to speaking English.
b. It's difficult to speak English.