

The Influence of Chunking on Reading Comprehension: Investigating the Acquisition of Chunking Skill

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Chunking has been demonstrated to improve reading comprehension. In order to understand the function of using chunks to aid reading, learners require knowledge of syntactic structures and the ability to use them in practice. In this study, participants received instructions relating to syntactic structure and were asked to practice reading using chunks. This study aimed to quantitatively assess whether the ability to practice chunking accurately could improve reading comprehension skills. Thereafter, records of learning achievement (i.e., chunking tests and English-to-Japanese translation practice conducted during classes) were qualitatively analyzed, and attempts were made to clarify the process by which participants acquired chunking and improved their reading comprehension skills. Additionally, factors contributing to the improvement of reading comprehension skills were explored. The findings showed that chunking errors decreased when participants received continued instructions on chunking methods and syntactic structures. However, a decrease in chunking errors was not always associated with improved reading comprehension skills. Reading comprehension was most affected by differences in the acquisition and implementation of knowledge of syntactic structure.

Keywords: chunking, reading comprehension, instruction on syntactic structures, triangulated study

INTRODUCTION

The standards of English reading comprehension for Japanese university students are steadily declining. While there are various reasons for this trend, a limited vocabulary and lack of grammatical knowledge have been outlined as major factors (Suzuki, 2005). Students sometimes lack clarity in understanding a text or require a substantial amount of time to comprehend it because of a lack of exposure to English language texts. The teaching of the English language should focus on low-level processing, including vocabulary, phrase/syntactic structures, and filling knowledge gaps. This study thus focuses on phrase and sentence processing.

Reading comprehension is carried out based on 'chunks'. A chunk is a semantically and structurally distinct unit constructed by the writer. Linking one chunk to another in a sequence is known as chunking (Tanaka, 2006). There are a number of processes that take place during the reading of a text. First, there is vocabulary processing, then understanding phrase units based on chunks, followed by sentence processing/comprehension, which occurs in relation to syntactic structure. The use of chunking helps readers understand the provisional structure of a text and then aids the reader in restructuring and organizing the content of each sentence. Reading comprehension does not only require the ability to chunk, but also the ability to understand the syntactic structure and how each chunk functions in relation to the sentence. Therefore, the teaching of chunking in reading must also include explanations about the relationship between different chunks and the structure of the sentence (Hijikata, 2010). Grabe (2002) defines reading comprehension as a set of necessary processes, including efficient, interactive, strategic, linguistic and evaluating processes. Reading comprehension does not occur by one process alone and all of the processes combined are thought to be important for fluency in reading English.

Many learners with poor reading comprehension are unable to process phrases because they lack a sufficient knowledge of phrase structure. Without knowing how to divide certain words, the learner is unable to understand where one semantic unit begins and another ends (Tenma, 2002). Even if the learner performs phrase processing, when adding information from newly read chunks to the previously

read English text, they fails to understand the relationship between the new and old chunks without knowledge of the syntactic structure, which commonly leads to the misinterpretation of text. In order to facilitate reading comprehension, chunk reading is useful as it helps the learner understand how meaning in English is formed (Tanaka, 2006). In addition, the teaching of phrases and syntactic structures also helps to compensate for insufficient grammatical knowledge.

LITERATURE REVIEW

Chunking as part of English language teaching is receiving increasing interest and attention. The practice and research of reading using chunks is now very common. This may be partly because chunking is one of the components involved in reading fluency, proposed by Kuhn and Stahl (2004). The benefits of chunking in reading comprehension are; increased processing speed (Ellis, 2003; Kameyama, 1993; Komaba, 1992; Newell, 1990; Nishida, 2009; Ohtagaki & Ohmori, 1991; Tan & Nicholson, 1997; Yubune, 2012); improved reading comprehension (Ellis, 1996, 2001; Tuchiya, 2002; Ushiro, 2002); and the promotion of direct reading with direct understanding (Shiokawa, 2008; Terashima, 2002). However, the relationship between comprehension and the ability to chunk is tenuous. A positive effect on reading comprehension was observed in the studies of Ohtagaki and Ohmori (1991), Tan and Nicholson (1997), and Komaba (1992), in which advanced learners were taught chunking. However, there was no effect of chunking on reading comprehension in the study of Komaba (1992) in which beginners and intermediate learners were taught chunking. The level of reading proficiency required for the maximum impact of chunking is widely debated. Nishida (2009), Rasinski (1990), Yubune (2012), and Yubune, Kanda, & Tabuchi (2009) reported an effect among beginners, but in Oikawa (1996), the effect of chunking was exhibited only by intermediate learners. However, it is difficult to compare both reading proficiency of the participants and the level of text difficulty used in these studies. Further study is needed in order to identify whether chunks are effective and whether reading proficiency impacts the ability to chunk.

Rasinski (1989) emphasized that measuring learners' chunking ability is essential for providing effective teaching of chunking. Chunking is usually measured by chunking accuracy and the size of chunks. Accuracy is measured by the number of correct chunk divisions within a sentence (Rasinski, 1989). Rasinski reports that a more common error for learners to make is to miss where a phrase starts and ends. Rasinski also reports that chunking errors arise more often in beginners and when learners are trying to comprehend difficult texts (Rasinski, 1989). Reports show that when Japanese learners read English texts, they identify chunks that are longer than phrases (Kadota, 1982; Kadota & Tada, 1992; Kadota, Yoshida, & Yoshida, 1999). This is problematic because chunks cannot be categorized as specific linguistic units such as phrases. Learners may do this because of a range of factors (Henry, 1996), including the learner's reading comprehension ability, the level of text difficulty, the learner's reading speed, and whether the learner has background or contextual knowledge (Kadota, 2001, 2002). The nature of chunking is open to interpretation, and it is generally accepted that learners should be allowed to make chunk units in a way that comes naturally to them, provided that there are no clear linguistic errors.

Much remains unknown about how learners successfully improve their reading comprehension using chunking as well as the processes that underpin successful chunking. By understanding how learners acquire and develop the skill to chunk information, we can create better approaches to teaching and learning chunking skills. Until now, no study has addressed the process by which learners acquire chunking skills. Thus, we aimed to investigate the process by which learners learn chunking in order to improve teaching and learning for English-language reading.

We report two studies in this paper. One (study 1) quantitatively examined whether chunking text and knowledge of phrase and syntactic structures enable learners to master accurate chunking and improve reading comprehension. Then, we conducted a second study (study 2), in which we qualitatively analyzed pre- and post-test data on chunking skill with select participants who showed a significant improvement in chunking and reading comprehension across the training period in study 1. We also integrated data from study records on relevant class work. In the chunking test, the participants attempted to chunk sentences by inserting slashes

into an English text. We verified whether divisions had been placed in the correct positions and analyzed the errors. There is no single method for determining where one chunk begins and ends. However, we followed the principles provided by Shiokawa (2008) as an assessment standard. He points out that divisions should be placed according to syntactic information, after an adverb introducing the sentence, before a complement boundary, and before a syntactic boundary in the passage (preposition, conjunction, relative, infinitive, and participle). We investigated errors that hampered reading and how they improved as participants advanced in the study. By performing this experiment, we aimed to investigate how participants successfully apply chunking to understand English language texts.

STUDY 1

The research questions of Study 1, which focused on quantitative examination of chunking skill, were as follows:

- (1) Does chunking text have an impact on reading comprehension and the development of chunking skills?
- (2) Does knowledge of phrase and syntactic structures have an impact on reading comprehension and the development of chunking skills?

METHODS

Participants

The study included 122 Japanese university students who studied English, but were not majoring in the language. Participants were divided into two experimental groups and one control group. Experimental group 1 (37 participants) was taught how to effectively use chunk reading and knowledge of phrase/syntactic structure, while experimental group 2 (41 participants) was taught chunk reading alone. The control group (44 participants) was given no instruction on either subject. A

one-way analysis of variance (ANOVA) confirmed that there were no significant differences between the three groups in the pre-reading test results ($F(2, 119)=1.882$, $p=.777$).

Procedure

Tests

The teaching period lasted for 14 weeks. The pre-tests were administered at the beginning of the semester and the post-tests at the end. There were two types of test. The first was a chunking test, which consisted of a 352-word English passage where participants were required to divide the text into chunks. The second test was a reading test. Both the pre- and post-reading tests included three reading passages. The participants read all three passages (which ranged from 310 to 367 words) and then answered four multiple-choice questions, which assessed their level of understanding. Two passages were taken from the Eiken Pre-Second Grade test (Test in Practical English Proficiency) designed for second-year high school students and another from a Second Grade test for high school graduates. There were 15 questions in total (resulting in a maximum score of 15). The time limit for the test was 20 minutes.

Material

The English passages in the experimental classes ranged between 256 and 647 words, with Flesch Reading Ease levels between 67.0 and 59.5 and Flesch-Kincaid Grade Levels between 6.2 and 8.2. The level of difficulty of the texts was then gradually increased, while care was taken not to set it too high for the participants.

Instruction

The instructions for experimental group 1 were as follows.

(1) Printouts of English passages were distributed at the end of each class. On the printouts, slashes were inserted into the text to identify each chunk unit. As class

prep work, the participants would write the Japanese translation under each respective chunk in order to demonstrate their understanding of the content.

(2) During the class, participants were taught the correct meaning of the English text. While doing this, a teacher carefully explained, as appropriate, how the different phrases were connected together. During this process, the English text was comprehended not by reading and translating, but by reading each chunk from left to right without converting it to Japanese. In addition, instructions on the phrase and syntactic structure were given.

(3) The participants practiced by inserting slashes into different English text (about 100 words) to mark the chunks off themselves, after which they then submitted their work.

For experimental group 2, instructions referring to phrase and syntactic structure were not administered and activity (3) was not conducted. The control group did not receive any instructions. They were given the English passage to read and were required to summarize each paragraph and then answer questions to assess their level of understanding.

RESULTS

In order to examine any differences in the mean scores between the pre- and post-tests on the reading comprehension as well as between groups, a two-way repeated measures ANOVA was conducted along with multiple comparison tests.

Table 1 shows the mean scores, standard deviations, and number of participants for each group in the pre- and post-tests on reading comprehension. The mean scores for the pre- and post-tests in experimental group 1 ($F(1, 36)=48.115, p<.01$) and 2 ($F(1, 40)=32.172, p<.01$) showed a significant improvement compared with the control group. The results of multiple comparisons using Bonferroni's method were as follows: experimental group 1 > experimental group 2 ($p<.05$), and experimental group 1 > control group ($p<.01$). The improvement was significant in experimental group 1 compared not only with the control group, but also with

experimental group 2. These results indicate that the teaching/learning of chunking is effective in improving learners' reading comprehension, but it is more useful when taught along with phrase/syntactic structures.

TABLE 1
Comparison of Pre- and Post-Test Scores in Reading Comprehension in the Three Groups

Test & Variables	N	M	SD
Pre-test			
Experimental group 1	37	7.95	2.44
Experimental group 2	41	7.00	2.74
Control group	44	7.95	2.58
Post-test			
Experimental group 1	37	11.92	2.98
Experimental group 2	41	9.85	2.69
Control group	44	8.41	2.21

TABLE 2
Comparison of the Pre- and Post-Test Results on Chunking for the Three Groups

Test & Group	N	M
Pre-test		
Experimental group 1	27	9.22
Experimental group 2	31	9.81
Control group	36	8.03
Post-test		
Experimental group 1	27	2.56
Experimental group 2	31	3.52
Control group	36	7.11

In addition to the reading comprehension tests, participants completed a chunking test. The way in which the participants grasped the chunks differed according to their proficiency level. Therefore, the following were judged as errors: (1) slashes put in parts of the text that could not be chunks; and (2) failure to place

slashes in parts of the text where they should have been placed in order to facilitate English text comprehension. The number of such errors were then counted and converted into test scores. Thus, lower scores corresponded to better chunking skill. Table 2 shows the results.

The number of errors in the pre- and post-tests on chunking decreased considerably in experimental groups 1 and 2, by 6.66 and 6.29, respectively. In contrast, the changes in the control group were minimal, with a decrease of only 0.92. These results suggest that chunk reading facilitated a better understanding of sentences, which in turn enabled a more refined and faster phrase processing of English language texts.

STUDY 2

The results of Study 1 indicate the need for further consideration of how chunking and learning phrase/syntactic structure might improve reading comprehension. Understanding these processes would provide a greater understanding of what promotes reading comprehension, which in turn would lead to the development of clearer, more effective guidelines for teaching chunking. The research questions of this qualitative study were as follows:

- (1) How do learners understand/learn about chunks?
- (2) How do learners understand/learn about the process of chunking?
- (3) What factors lead to the improvement of reading comprehension in individual learning?

METHODS

Participants

Five participants from experimental group 1 who showed considerable improvement in the reading test (i.e., improvement by more than three points from

pre-test to post-test) and who showed a decrease of at least 10 errors between pre- and post-test for the chunking test were selected for inclusion in the study.

Data Sources

Data were taken from three sources, as follows.

1. Pre- and post- chunking test
2. Study records in which the participants inserted slashes into an English text to mark the chunks
3. Study records in which the participants wrote Japanese translations for each chunk of an English text that had slashes already inserted.

With regards to the use of data, the content of the research was explained to participants and their informed consent was obtained.

RESULTS

Analysis of Errors in the Chunking Exercises

In order to elucidate research question (1) (i.e., How do learners understand/learn about chunks?), we examined the task in which participants placed slashes in an English text (data source 2). We attempted to identify the types of errors that were made. We also sought to identify from which point in time the errors began to decrease and how they decreased. However, no conspicuous characteristics were observed during participants' mastery of chunks. This perhaps related to the fact that a different English text was read each time. As the level of text difficulty also differed, feedback given to participants about their errors could not ensure that the same mistakes would not recur in subsequent exercises. For instance, when participants failed to place a slash before a relative pronoun, they were given an explanation informing them about this error, but in other English texts, the slash would variously be absent or present. As the difficulty of the English texts gradually increased, even if participants understood relative pronouns while working on

easier English texts, there was a possibility that they would fail to identify relative pronouns in more complicated texts.

Although no conspicuous characteristics were observed in participants' learning of chunks, we did note three common chunking errors. Table 3 shows examples of each chunking error.

TABLE 3
Three Types of Errors Performed in Chunking

1. Slash placed where the text cannot be divided	
1-1. the first / world championship (Unit 1)	<i>K</i>
1-2. while / one woman waits for a clone (Unit 3)	<i>K</i>
1-3. who are on the receiving end of the anger usually / do not remember (Unit 5)	<i>Y</i>
2. Slash inappropriately placed but does not hamper reading	
2-1. The goal of extreme ironists is / to have their sports included (Unit 1)	All learners
2-2. they can start using / their real names (Unit 1)	<i>K</i>
2-3. decided to / spend \$50 (Unit 3)	<i>K</i>
3. Failure to notice the phrase boundary	
3-1. the inventor _ of extreme ironing (“_” represents where a slash should reasonably be placed) (Unit 1)	Four learners
3-2. we move or travel _ to a new place (Unit 2)	Three learners
3-3. more intelligent than most of the people _ I know (Unit 3)	<i>M</i> and <i>T</i>

The first type of error involves placing a slash where the text cannot be divided. In 1-1, *K* placed a slash after an adjective modifying a noun, thus demonstrating a lack of understanding about the structure of modification.

The second error related to when a chunk was incorrectly identified, although reading comprehension was not affected. In example 2-1, all five participants made the same mistake by placing a slash after the verb in a subject–verb–complement sentence form. This was considered an error following the before an infinitive principle in the standards for dividing phrases.

The third error involves the failure to notice phrase boundaries. In example 3-3,

the relative pronoun before “I know” was omitted. Therefore, although a slash was required in this place, M and T did not correctly identify this need. The examples of the third type of error listed in Table 3 resulted from the participant failing to grasp the chunks correctly, but there is also a high possibility that the processing of chunks with a modifying function, such as prepositional phrases or relative pronoun clauses, might have been carried out on the basis of large semantic units along with the preceding chunks.

Analysis of Errors in the Chunking Tests

TABLE 4
Change over Time in Chunking Test Errors

	Pre-Test	Post-Test
<i>Y</i>	Y-1. as proof of who / they are Y-2. detecting faked / signatures Y-3. how much pressure was / put on the paper Y-4. Thanks to / this 3D technique	No errors
<i>T</i>	T-1. Whether people are / buying something T-2. be able / to tell the difference T-3. in exactly / the same way	No errors
<i>S</i>	S-1. Whether people are / buying something S-2. their signatures are / used S-3. be able / to tell the difference S-4. as proof of who / they are	No errors
<i>K</i>	K-1. Whether people are / buying something K-2. their signatures are / used K-3. in exactly / the same way	No errors
<i>M</i>	M-1. a 3D image of a person's signature is / created M-2. their signatures are / used M-3. how much pressure was / put on the paper M-4. Whether people are / buying something M-5. even when / written by the same person M-6. This makes it / essential to be able to tell the difference	M-1. a 3D image of a person's signature is / created M-5. even when / written by the same person M-7. has / developed M-8. different / kinds of documents

The first type of error—placing slashes in areas that cannot be linguistically divided—is often the result of the participant not understanding appropriate word modification rules or phrase/syntactic structure. The participant’s reading comprehension cannot improve unless this error can be overcome by learning the correct use of chunking. To further examine this error, we examined changes in chunking errors between pre- and post-test chunking tests using the same passage (data source 1). Table 4 shows the change in errors involving incorrect placement of slashes.

In the pre-chunking test, Y placed slashes after an interrogative (Y-1), after an adjective modifying a noun (Y-2), after the “to be” verb in the passive “to be + past participle” construction (Y-3), and after a preposition in a prepositional phrase (Y-4). Y’s placement of slashes may be considered to hamper his understanding of the content, although these errors were not repeated in the post-test.

Analysis of Errors in the Providing a Japanese Translation for Each Chunk Unit

It is possible to identify how participants grasp chunks by examining the chunks inserted into an English text. However, this does not reveal whether the participant understands how chunks link together in a correct structural and semantic manner. We clarified this by examining the learners’ Japanese translations, which indicate their level of understanding of English and how they express that understanding, and as stated by Ushiro (2009), reflect a lower level of comprehension. In order to examine research question (2), (i.e., How do learners understand/learn the process of chunking?), it is necessary to closely examine the task in which participants carried out a Japanese translation for each chunk (data source 3). Among the five participants investigated here, two were selected for further detailed examination. The first of these two participants, T, showed remarkable progress between the two reading tests, increasing his score by six points (pre-test=9, post-test=15). The second participant, Y, who increased his score by three points (pre-test=8, post-test=11), recorded the lowest level of improvement among the five participants. The data from these two participants were investigated further to understand what

aspect they failed to grasp in the phrase/syntactic structures, and thus, how they misinterpreted the meaning.

TABLE 5
Errors Resulting from Poor Understanding of Sentence Structure

	English Text	Japanese Translation
<i>Y</i>	(1) but global warming may yet kill off the coelacanth	しかし、全体が暖かくなっていても、まだシーラカンスは絶滅しないかもしれない “but even if the temperatures rise on the whole, the coelacanth may not be killed off”
	(2) “Rising sea temperatures associated with global warming”—which scientists have linked to the use of carbon-based fossil fuels —have been cited as one of the leading causes	「海水温が上がるのが、地球温暖化に関係がある」 “The rise in sea temperatures is related to global warming”
	(3) the coelacanth may be one of many species to pay the price	シーラカンスは代償を払うため、多く種の一つなるかもしれない “to pay the price, the coelacanth may become one of many species”
	(4) Most of the food that does come into the coelacanth’s environment	多くの食べ物がシーラカンスの環境の中にあるのは “Most of the food being in the coelacanth’s environment”
<i>T</i>	(1) have been cited as one of the leading causes behind the destruction of about a quarter of the world’s coral reefs	世界のサンゴ礁のおよそ4分の1の破壊の陰に、原因を導いた1つとして引き合いに出されている “have been cited as one that has led the causes behind the destruction of about a quarter of the world’s coral reefs”

TABLE 6
Errors Resulting from Misunderstanding Correlation

	English Text	Japanese Translation
<i>Y</i>	(1) have been cited as one of the leading causes behind the destruction of about a quarter of the world's coral reefs	導く、1つの原因として世界のサンゴ礁の4分の1くらいが、死んでしまっていることを引き合いに出した “leading, (the fact that) about a quarter of the world's coral reefs have died has been cited as one of the causes”
	(2) the stunning coral systems off Sodwana Bay on South Africa's Indian Ocean coast	南アフリカのインド洋沿岸のソドワナベイのサンゴ礁から離れた所にある “in a place far away from the coral of Sodwana Bay on South Africa's Indian Ocean coast”
	(3) until one was caught by a trawler off South Africa in 1938 and identified by a museum curator	ついにそれが1938年南アフリカのトロール漁師によってとらえられ、博物館の学芸員によって鑑定された “it was finally caught by a South African trawler in 1938 and identified by a museum curator”
	(4) recently saw the future of global warming and rising sea levels	最近、将来の地球温暖化と海面の上昇が見えた “recently saw future global warming and rising sea levels”
<i>T</i>	(1) which could swamp low-lying nations such as Tuvalu and the Maldives in the Indian Ocean	地球温暖化は、インド洋にあるツバルやモルジブのような低地にある国を水浸しにする “global warming will swamp low-lying nations such as the Maldives and Tuvalu in the Indian Ocean”

We examined the participants' Japanese translations. However, as with the chunk analysis, no clear characteristics were identified in the chunking understanding/

learning process. This is again likely due to the fact that participants translated English texts with varying levels of difficulty that were different each time. However, if the same English text were read and the participant with an improved reading comprehension was closely compared with the other participant whose reading comprehension did not much developed, it would be possible to grasp what they did and did not understand. In other words, it would be possible to identify the aspects that participants need to understand in order to improve their skills. We were able to divide the cases pertaining to a lack of syntactic knowledge leading to mistranslations into two categories; the first category involved a lack of understanding about sentence structure, and the second category referred to a lack of understanding of correlation. A lack of vocabulary was not taken into account in this analysis. Tables 5 and 6 illustrate some typical examples of the two types of errors made by Y and T.

In Example (1) of Table 5, Y must translate a subject–verb–object sentence form. Y’s translation implies that he did not understand the correct structure of the sentence. As he did not understand the meaning of the subject global warming, we might infer that he was unable to apply the meaning to the rest of the sentence, which resulted in the translation “even if the temperature rises on the whole.”

In example (1) of Table 6, Y failed to understand how *as* in *as one of the leading causes* and *behind* in *behind the destruction* are structurally and semantically linked with the preceding phrases. As a result, he misunderstood the meaning of the sentence.

DISCUSSION

In this study, we aimed to investigate how participants understand/learn about chunks (research question 1) and how they understand/learn the actual skill of chunking (research question 2). However, we did not demonstrate any clear processes whereby participants understood and learnt chunks and chunking. Unfortunately, a simple comparison was not possible because participants read a different English text each time, which resulted in their making different types of

chunking errors.

Participants did, however, show a deeper understanding of chunks and chunking after they were corrected and given feedback about syntactic structure. Nevertheless, despite receiving these explanations and demonstrating adequate understanding of chunking, participants often repeated the same error in another text. Consistent practice of chunking successfully decreased the number of chunking errors, which is because repetition of the chunking process increased participants' knowledge of chunks and chunking, resulting in a shift from use of declarative to procedural memory. We conclude that participants were able to improve their understanding of chunks and chunking through repetitive English reading exercises.

GENERAL DISCUSSION

In order to address research question (3) (i.e., What factors lead to the improvement of reading comprehension in individual learning?), we analyzed the relationship between reading test and chunking test scores. We found that when reading test scores increased, there was a corresponding decrease in the number of chunking errors. However, participants whose scores between the pre- and post-reading tests decreased also made fewer chunking errors. Therefore, we cannot conclude that a reduction in chunking errors is directly linked to the improvement of reading comprehension. It is assumed that accurate chunking does have an influence on the development of reading comprehension, but here we demonstrate that the relationship is complex and may depend on other factors. Our study reveals a number of findings that deepen our understanding of how reading comprehension develops. For example, Y showed little improvement in the reading tests, but did not make any errors in the translations of easier English texts. When the difficulty of the text increased, he showed a poor grasp of syntactic structure and connection between phrases, which therefore diminished his overall level of understanding. In many instances, Y focused on the internal processing of individual chunks and did not try to make structural/semantic connections between the chunks. T, who increased his reading test scores considerably, committed similar errors. However,

the number of errors was extremely low compared with participant Y, therefore, they had a limited deleterious effect on his interpretation of texts.

Chunks are not units with a complete, self-contained meaning. In reading comprehension, chunks form logical strings of meaning, which help learners grasp the meaning of the sentence as a whole. During the process of chunking, the meaning remains unclear until the learner reorganizes the sentence by processing one chunk, then adding the meaning of the following chunk, and repeating this process (Tanaka, 2006). The case of T shows that accurately performing the process of connecting chunks using a correct syntactic structure is essential for successful reading comprehension. Indeed, to improve reading comprehension, it is essential to provide instructions on how chunks relate to other chunks in a sentence. We suggest that teachers need to facilitate learners' understanding of the function and syntactic structure of chunks within sentences to help them read more accurately.

CONCLUSION

Our results demonstrated that chunks, chunking, and in particular, the ability to link chunks while reading were essential elements for effective reading comprehension. Learners do not explicitly study syntactic structure during reading comprehension. Instead, each time a learner encounters a sentence that they fail to understand, they work towards understanding components of the sentence and then advance their reading after integrating what they have understood. There are cases in which learners gain an understanding about certain sentence structures, but then fail to apply this knowledge when the same example appears in a different text. It is important for learners to apply what they have learnt through repeated practice of comprehending English language texts. In order to improve the level of reading comprehension, learners need to receive feedback about syntactic structures and guidance on chunking.

The small number of participants in this study makes it difficult to generalize the findings. Nevertheless, the study can offer some suggestions for helping non-native speakers comprehend English texts. Notably, quality of individual reading

comprehension was not observed in test scores, but in the study records, (i.e., the Japanese translations). Therefore, using study records in order to understand the quality of a learners' reading comprehension may help teachers identify issues faced by English language learners. Further studies are required to investigate how teaching chunks and chunking in reading classes influences individual learning styles. To maximize the benefits that learners might receive from English language teaching, further quantitative and qualitative studies should be conducted.

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