

An Impact of L2 Exposures on Use of N-Grams in Academic Writing as Part of Phraseological Competent among College-Level Japanese EFL Learners

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Introduction

In recent years, the knowledge of formulaic sequences has gained much empirical attention, and its importance was acknowledged in the field of second language acquisition (SLA) (Wray, 2002). Despite its importance, however, many studies found it relatively challenging to learn and use it appropriately, especially among L2 learners (Liu, 2012). For achieving the full-fledged development of the formulaic sequences, some studies emphasized the importance of rich exposure to the target language (Boers & Lindstromberg, 2012; Ellis, 2008, 2012; Meunier, 2012). In a case of lexical bundles, the focus of the present study, some studies found that as L2 proficiency develops, L2 writers' use of lexical bundles, especially longer strings of words, are prone to fade out as the result of lexical development (Paquot & Granger, 2012). The present study attempted to shed light on to what extent the exposure of L2 would influence the development and usage of lexical bundles in an English as a foreign language (EFL) college level academic writing context according to levels of L2 proficiency.

Background

Formulaic sequences are prevalent in natural language use. According to studies (Erman & Warren, 2000; Foster, 2001), formulaic sequences form nearly half of written as well as spoken discourse. For this reason, knowledge of formulaic

sequences, or phraseological competence, is essential among L2 learners (Wray, 2002). Furthermore, development of phraseological competence correlates with general proficiency among L2 learners (Keshavarz & Salimi, 2007). That is, the more proficient learners become in L2, the more use of formulaic sequence such as collocations they tend to show (Hsu, 2007; Laufer & Waldman, 2011; Lewis, 2009). For this reason, it is a growing consensus that to be native-like in L2, the development of phraseological competence is indispensable in language use and learning (Biber & Conrad, 1999; Biber, Conrad, & Cortes, 2004; Meunier & Granger, 2008; Schmitt, 2004; Simpson-Vlach & Ellis, 2010; Sinclair, 1987; Wray, 2008).

“Formulaic sequence” is a broad term that includes multiword units (e.g., catch up), prefabricated expressions (e.g., what’s up?), collocations (e.g., spread news), lexical bundles and n-grams (e.g., in the meantime, I don’t know), idioms (e.g., it came straight from the horse’s mouth), irreversible binominals (e.g., bride and groom), proverbs (e.g., A rolling stone gathers no moss) (Siyanova-Chanturia & Van Lancker Sidtis, 2019), and more. What is important in L2 acquisition is understanding that academic texts are filled with those types of formulaic sequences (Biber, Conrad, & Cortes, 2004; Biber, Johnsson, Leech, Conrad, & Finegan, 1999; Hyland, 2008; Liu, 2012a; SimpsonVlach & Ellis, 2010). Regarding academic texts, use of formulaic sequences can qualitatively distinguish apprentice L2 writers from expert ones (Conrad, 2001; Cortes, 2004). Yet, achieving a sufficient level of phraseological competence, especially being successful in academic writing, seems to be challenging for L2 learners because of the enormous quantity of formulaic sequences exploited in academic texts that require the development of lexical knowledge (Laufer & Waldman, 2011; Liu, 2012)

A growing body of research has investigated various types of formulaic sequences due to the aforementioned reliance of recurring phrases in academic writing (Siyanova-Chanturia & Van Lancker Sidtis, 2019). Among them, L2 learners showed a particular tendency in their use of lexical bundles or n-grams compared to their use of other types of formulaic sequences such as collocation in relation to L2 proficiency development

(Granger, 2019). Generally speaking, a lexical bundle is defined as a word-string which consists of a statistically highly recurrent combination of a few words. More specifically, in Granger's (2019) definition, lexical bundles are "fully corpus-driven sequences of n continuous words such as *you know what I mean or as a result of* which recur frequently in speech or writing" (p.235). Following this definition, sizes of lexical bundles vary widely from bigrams (i.e., two words) (Crossley & Salsbury, 2011) to six words (De Cook, 2004).

From a development aspect, L2 learners showed differences of lexical bundles in use according to their level of proficiency. One of the distinctive aspects of lexical bundles in L2 studies was a quantitative change in its usage among L2 learners. Considering previous studies of collocations (e.g., Laufer & Waldman, 2011), it was naturally presupposed that lexical bundle usage would increase along with the development of L2 proficiency like collocations. However, the lexical bundle usage showed a somewhat different tendency. In a study of EFL learners of Chinese, for instance, Ping (2009) reported that Chinese EFL learners used four times as many 4-gram bundles as native speakers did. Similarly, Bo and Shutang (2005) found that Chinese EFL learners used more 3- to 6-gram bundles in their writing compared to native speakers of English. In short, EFL learners tended to use more longer word-combinations compared to the native speakers of English.

The quantitative change of lexical bundles in use among L2 learners seems to be developmental. Another study conducted by Wei and Lei (2011) examined L2 learners' use of lexical bundles in academic writing. The study compared the number of lexical bundles between advanced Chinese EFL learners and professional L2 writers. Here, the former group was considered less proficient than the latter group. The results showed that the less proficient learners exploited many more lexical bundles and more kinds of bundles in their academic writing compared to their counterpart. In the same vein, Staples, Egbert, Biber, and McClair (2013) examined both the quantity and quality of lexical bundles used in academic writing among L2 learners across different proficiency levels. The study found that less proficient L2 learners used more lexical

bundles in their writing. Moreover, it was also found that regardless of the proficiency levels, L2 learners frequently used more stance and discourse organizing bundles while they limitedly used referential bundles (Staples et al., 2013). All in all, L2 learners tend to use more longer strings of word-combinations than native speakers of English, and this tendency was more prominent among less proficient L2 learners.

Another indispensable variable requiring further consideration is the rich exposure to the target language, which might affect the development of lexical bundles usage. Many suggested that rich exposure to the target language facilitates the development of formulaic sequences among L2 learners (Boers & Lindstromberg, 2012; Ellis, 2008, 2012; Meunier, 2012). More specifically, ample exposure in a rich L2 environment would reinforce the chances of repetitive encounters with formulaic sequences that would maximize implicit learning. In terms of what L2 learners would learn in the L2 rich environment, Conklin and Carrol (2019) asserts, “Acquiring new forms in the L2 is an effortful process that requires high levels of exposure, not simply to instantiate new patterns, but in some cases to reconfigure the way the same ideas are expressed” (p. 65).

To scrutinize the impact of L2 exposure to the development of lexical bundles usage, Groom (2009) conducted a metanalysis by creating two corpora of L2 learners’ texts with different length of exposure in L2. The study found that the number of lexical bundles decreased among L2 learners as the time L2 learners spent in an English-speaking country increased. Likewise, but more specific, Goya (2021) examined the impact of L2 rich context on EFL learners’ use of lexical bundles in academic writing. Based on a comparison of the number of lexical bundles across n-gram sizes from bigrams to 5-grams, the study found that the use of bigrams increased as their learners continued learning in the L2 rich environment while that of 3-, 4-, and 5-gram bundles decreased.

Taken together, although a rich exposure to a L2 environment facilitated quantitative changes of collocations in academic writing in EFL contexts, lexical bundles usage had decreased among L2 learners (e.g., Groom, 2009). Furthermore, despite the decrease of lexical bundles in general as L2 proficiency developed (e.g., Staples

et al., 2013), their usage differed across the n-gram sizes as L2 learners continued learning in the L2 rich context (e.g., Goya, 2021). Based on meticulous observations of existing empirical evidence, there seems to be a link among some variables; that is, L2 proficiency, exposure to L2, and n-gram sizes, all of which interrelatedly impact the developmental sequence of lexical bundles among EFL learners. Specifically, the previous studies depicted to what extent increasing L2 exposures would impact the overall development of lexical bundles in general. However, how the effect of L2 exposure would differently influence n-grams by size as well as whether the effect would equally benefit to EFL learners with different L2 proficiency has not been sufficiently documented in the previous research, and it deserves more investigation to disentangle the variables. Thus, the present study addressed the following research questions to shed more light on the developmental aspects of lexical bundles among EFL learners.

Research questions

Research question (RQ) 1: What quantitative changes in use of lexical bundles are there among college-level Japanese EFL learners when exposure to L2 continues?

Research question (RQ) 2: What differences are there in the use of lexical bundles between proficient and less proficient EFL learners when exposure to L2 continues?

Method

The present study attempted to investigate the impact of L2 exposures according to L2 proficiency levels towards the development of formulaic sequences, especially lexical bundles, in a linguistically rich environment. The study employed a learner corpus based on writing tasks conducted twice at discrete points of time in a college level EFL writing course over a semester. As for a medium of language, all course-related events were instructed and conducted exclusively through English unless linguistic comparison between languages was needed.

Participants

Thirty-one participants partook in the study; however, five participants missed one of the writing tasks. Therefore, written texts collected from 26 participants were included for further analyses. Their majors were either English or English Education. They were all in the second year of the undergraduate program at the time of the study. Their mother tongue was all Japanese, and none of them claimed to be Japanese-English bilinguals. Their proficiency was quantified by self-reported TOEIC scores. The average of the scores was 635 ($SD=126.26$), and the highest score was 850 and the lowest was 400. Two groups were organized based on their scores to make the number of participants equal in the groups. Their average scores were 733.46 ($SD=92.14$) and 537.31 ($SD=62.30$) for the proficient group and the less proficient group, respectively. The independent t-test showed a statistically significant difference between the groups ($p<.01$, $d=2.49$) in terms of the scores. In short, they were different in terms of English proficiency as a group.

Learner corpus

Learner corpus was built based on participants' essays composed for the purpose of a class assignment. The writing topics were adopted from the writing section of the Test of English as a Foreign Language (TOEFL). Two prompts were provided at discrete points of time and were 1) Opinion towards children's household tasks, and 2) Comparison of transportation for travel. Each of the writings took 30 minutes at the beginning of the session on data-collection days (i.e., Week 3 and 15).

Subsequently, all texts were loaded to a free application, AntConc (Anthony, 2019) which can analyze compiled texts with tagged information. The compiled data according to the topic, or two sub-corpora, were labeled as Data 1 (i.e., a sub-corpus based on texts collected at Week 3) and Data 2 (i.e., a sub-corpus based on texts collected at Week 15), respectively. The size of each sub-corpus was 4289 words ($n=26$, $M=164.96$) and 5458 words ($n=26$, $M=187.44$) for Data 1 and Data 2, respectively. The size of each sub-corpus is presented in Table 1.

Table 1.

Description of Sub-Corpora (Data 1 & Data 2)

Corpus	Corpus size (Tokens)	Number of essays	Mean length of essay
Data 1	4,289	26	164.96
Data 2	5,454	26	209.77
Total	9,747	52	187.44

Analysis

All sub-corpora (i.e., Data 1 and Data 2) were analyzed with AntConc (Anthony, 2019) with the following settings: the n-gram size varies from two (i.e., bigrams) as the minimum length to five (i.e., 5-grams) as the maximum. The minimum frequency in an individual essay was set to three times and the minimum range was set to seven (e.g., across seven essays); setting a range was necessary since all essays were individually analyzed.

Furthermore, both corpora differed in size, which would make it difficult to compare raw frequencies descriptively. To avoid misinterpretation as a result of the different corpus size, the present study used segmented bar charts, which would adequately show a breakdown of n-gram distributions by size, instead of using simple bar charts which would show raw frequencies of n-grams by size. In addition, to draw a plausible conclusion, the study employed Chi-square tests for independence and multiple comparisons by Bonferroni tests to see if gained differences would be statistically significant instead of comparing raw frequencies descriptively. To run the chi-square tests, the study used a website called js-STAR XR (<http://www.kisnet.or.jp/nappa/software/star/index.htm>), accordingly.

Results

According to analyses done by AntConc (Anthony, 2019), the total n-gram tokens in Data 1 and Data 2 were 1764 and 883 respectively. Among them, Data 1's tokens by

n-gram size were 801 for bigram, 415 for 3-gram, 310 for 4-gram, and 238 for 5-gram. Data 2's tokens by n-gram size were 639 for bigram, 132 for 3-gram, 66 for 4-gram, and 46 for 5-gram. Figure 1 illustrates overall n-gram tokens by size in Data 1 and Data 2.

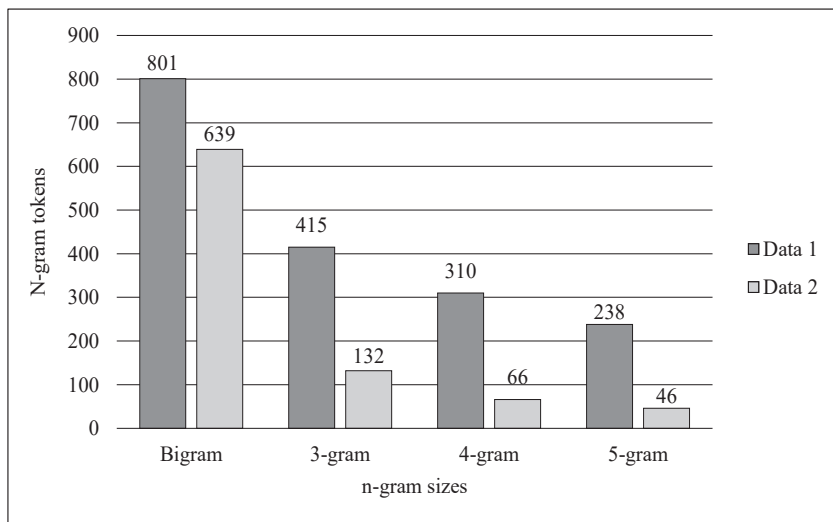


Figure 1. Overall n-gram tokens by size in Data 1 and Data 2.

To examine the distribution differences of the tokens by n-gram size between Data 1 and Data 2, a Chi-square test for independence was carried out. According to the result, the overall difference was significant, $\chi^2(3) = 179.44, p < .01, Cramer's V = .26$. The multiple comparisons done by Bonferroni's test showed significant differences for all n-gram tokens. According to the residual tests, a distribution of the bigram tokens in Data 2 was significantly more than that in Data 1 ($p < .01$). However, other n-gram tokens in Data 2 were significantly fewer than those in Data 1 ($p < .01$). In short, the EFL participants produced significantly more bigrams and fewer other n-grams in Data 2 than they did in Data 1. Figure 2 shows an overall distribution of n-gram tokens produced by the EFL participants in Data 1 and Data 2

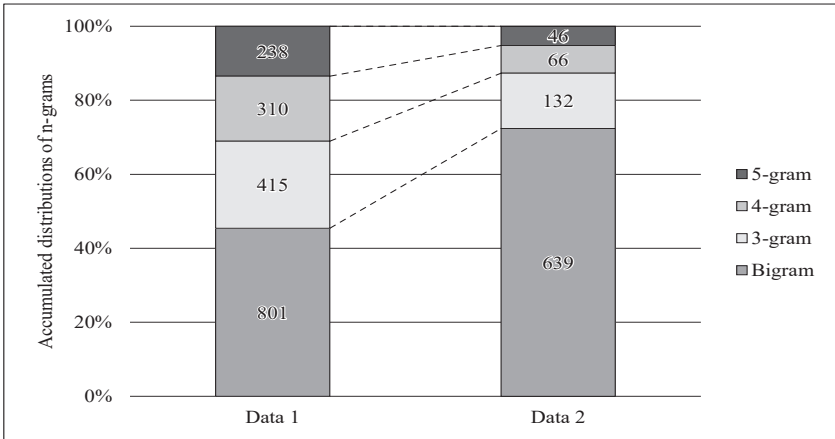


Figure 2. An overall distribution of n-gram tokens produced by the EFL participants in Data 1 and Data 2.

To scrutinize the impact of L2 exposure to the development of lexical bundles usage, each of the n-gram tokens from Data 1 and Data 2 were compared between the two participant groups (i.e., the proficient and less proficient groups in terms of TOEIC scores). As for the proficient group, they produced 355 bigrams, 193 3-grams, 150 4-grams, and 126 5-grams in Data 1. In contrast, the same participants produced 264 bigrams, 67 3-grams, 46 4-grams, and 38 5-grams in Data 2. As for the less proficient group, they produced 446 bigrams, 222 3-grams, 160 4-grams, and 112 5-grams in Data 1, and 375 bigrams, 65 3-grams, 20 4-grams, and eight 5-grams in Data 2.

To see if the distribution differences of the tokens between Data 1 and Data 2 within the groups would be statistically significant, two Chi-square tests for independence were employed separately. The results indicated that the differences of the n-gram tokens by size were significant in the both groups; $\chi^2 (3)=46.95, p<.01, Cramer's V=.20$ for the proficient group and $\chi^2 (3)=149.64, p<.01, Cramer's V=.33$ for the less proficient group. To locate the significant differences among the n-gram tokens in each group, Bonferroni's tests for the multiple comparisons were carried out. The results

showed that, within each group, significant differences between Data 1 and Data 2 for all n-gram tokens existed. That is, compared to Data 1, the EFL participants in both groups produced significantly more bigrams in Data 2 ($p<.01$); however, both produced significantly fewer 3-grams ($p<.01$), 4-grams ($p<.01$), and 5-grams ($p<.01$) in Data 2. Figure 3 illustrates distributions of n-gram tokens in Data 1 and Data 2 by the proficient and the less proficient group.

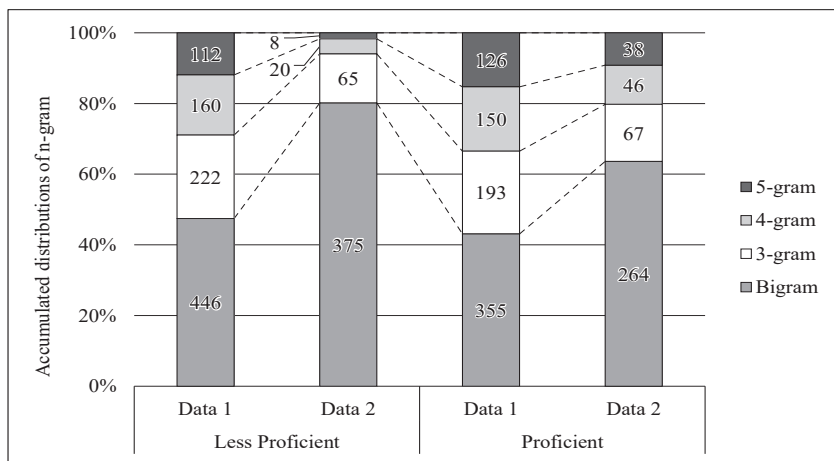


Figure 3. Distributions of n-gram tokens in Data 1 and Data 2 produced by the proficient group and the less proficient group.

In addition to the distribution differences of n-gram tokens between sub-corpora (i.e., Data 1 and Data 2) by proficiency level, the study also considered the distribution differences between the n-grams within each sub-corpus. Within Data1, the less proficient group produced 446 bigrams, 222 3-grams, 160 4-grams, and 112 5-grams while the proficient group produced 355 bigrams, 193 3-grams, 150 4-grams, and 126 5-grams. A chi-square test indicated that the distribution difference of the tokens by n-gram size between the groups in Data 1 was not significant, $X^2(3)=5.91$, Cramer's $V=.06$. In other words, the EFL learners, regardless of the proficiency, similarly

produced the n-gram tokens at the beginning of the course (i.e., Week 3).

In contrast, in Data 2, the less proficient group produced 375 bigrams, 65 3-grams, 20 4-grams, and eight 5-grams while the proficient group produced 264 bigrams, 67 3-grams, 46 4-grams, and 38 5-grams. A chi-square test for independence indicated that the distribution difference of n-grams between the groups within Data 2 was statistically significant, $\chi^2(3)=46.11$, $p<.01$, *Cramer's V*=.23. The Bonferroni's multiple comparisons showed that the distribution of bigrams produced by the less proficient group was significantly more than that by the proficient group ($p<.01$). However, that of 4-grams ($p<.01$) and 5-grams ($p<.01$) produced by the less proficient group were significantly fewer than those by the less proficient group. In short, at the time of data collection for Data 2 (i.e., Week 15), the less proficient group became to use more bigrams and fewer long word-combinations compared to the proficient group. Figure 4 illustrates the same n-gram distributions indicated in Figure 3, but arranged differently so that it became visually easy to compare the n-gram distributions of two groups within the same corpora.

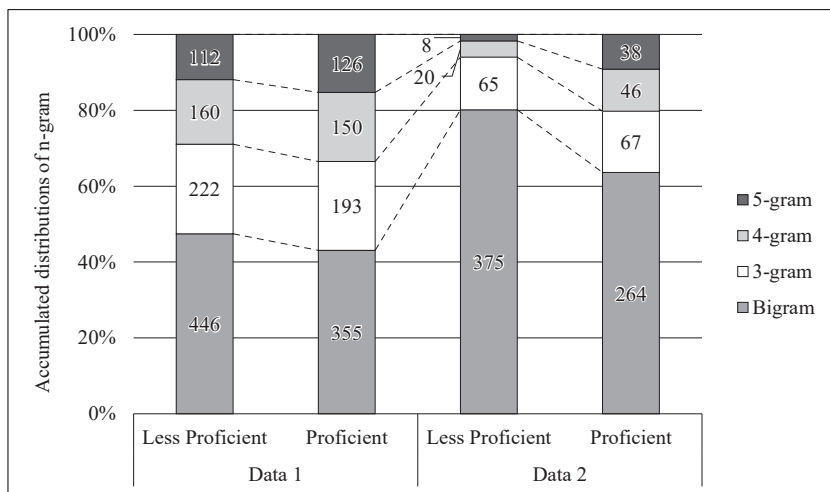


Figure 4. Distributions of n-gram tokens produced by the proficient group and the less

proficient group within each of the corpora.

To examine the impact of L2 exposure on the quantitative change of lexical bundles in use among EFL learners, the study also looked at variations of n-grams in the two groups. The proficient group produced 26 types of bigrams, 17 types of 3-grams, 15 types of 4-grams, and 14 types of 5-grams in Data 1, while in Data 2, the same participants produced 24 types of bigrams, eight types of 3-grams, six types of 4-grams, and five types of 5-grams. The less proficient group, on the other hand, produced 35 types of bigrams, 22 types of 3-grams, 16 types of 4-grams, and 12 types of 5-grams in Data 1, and 26 types of bigrams, six types of 3-grams, two types of 4-grams, and one type of 5-grams in Data 2.

To seek any significant difference between distributions of n-gram types between Data 1 and Data 2 for each group, two Chi-square tests for independence were employed to the groups separately. According to the result, the numbers of each n-gram type between Data 1 and Data 2 indicated a significant difference among the less proficient group, $\chi^2 (3)=11.90$, $p<.01$, *Cramer's V*=.32. To locate the significant difference among the n-gram sizes, Bonferroni's test for the multiple comparisons was carried out. The results showed a significant difference between Data 1 and Data 2 for bigrams ($p<.01$), but no significant differences for other n-grams. According to the residual analyses, the less proficient group began to use significantly more varieties of bigrams ($p<.01$) but their use of other n-grams stayed unchanged from Data 1 to Data 2. In contrast, there was no significant difference in the proficient group, $\chi^2 (3)=4.41$, *Cramer's V*=.20. Thus, the variation of n-grams stayed unchanged from Data 1 (i.e., Week 3) to Data 2 (i.e., Week 15) among the proficient group. Figure 5 illustrates distributions of n-gram types by size produced by the proficient and less proficient groups in Data 1 and Data 2.

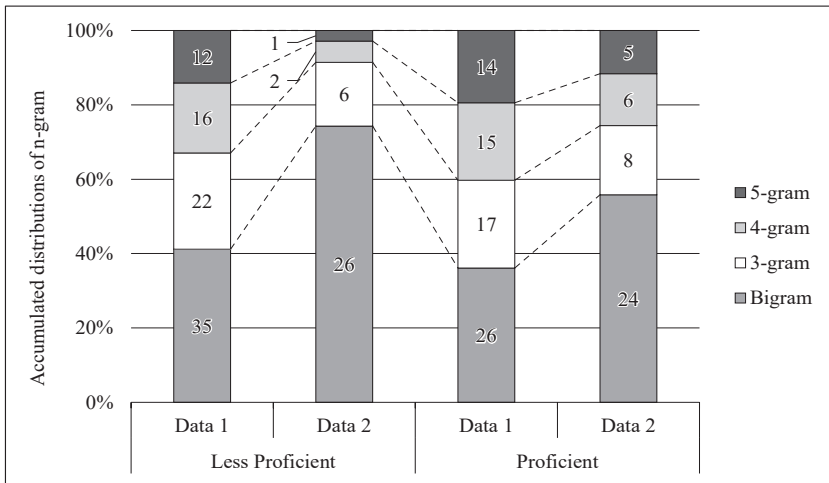


Figure 5. Distributions of n-gram types in Data 1 and Data 2 produced by the proficient and the less proficient group.

Discussion

The first research question asked whether the use of lexical bundles would become quantitatively different as exposure to L2 input increases. The present study found that, regardless of the L2 proficiency levels, L2 exposures may have similarly impacted the use of lexical bundles quantitatively among our EFL participants ($\chi^2(3)=46.95, p<.01$, *Cramer's V*=.20 for the proficient group and $\chi^2(3)=149.64, p<.01$, *Cramer's V*=.33 for the less proficient group). Frankly speaking, the EFL learners in the present study became able to use significantly more bigrams ($p<.01$) and fewer longer strings of words such as 3-grams ($p<.01$), 4-grams ($p<.01$), and 5-grams ($p<.01$) as their exposure to L2 accumulated. Thus, it seems safe to conclude that accumulative L2 exposures influenced EFL learners' use of lexical bundles.

The second research question attempted to examine the L2 exposure effect toward the development of lexical bundles, especially whether the effect might differ according

to the EFL learners' proficiency levels as an exposure to L2 input increases. The study found that, although L2 exposures similarly impacted our EFL learners in terms of lexical bundles in writing, the less proficient EFL learners were more influenced by the exposures than their counterparts. The present study found that, as seen in Figure 3, the proficient and less proficient groups produced significantly more bigrams ($p < .01$) and less 3-grams ($p < .01$), 4-grams ($p < .01$), 5-grams ($p < .01$) in Data 2 than they did in Data 1. Furthermore, despite the similarity in distributions of n-gram tokens between the two groups within Data 1, the less proficient group began to produce significantly more bigrams but less 4-grams ($p < .01$) and 5-grams ($p < .01$) than the proficient group did within Data 2 (cf. Figure 4). Taken together, it seems safe to conclude that, although L2 exposures may similarly influence EFL learners to some extent, it may have more impact on less proficient L2 learners.

The second research question also concerns a change of n-gram variations between the proficient and less proficient EFL learners. In particular, the study examined n-gram types by size according to the L2 proficiency levels between Data 1 and Data 2. It was found that the types of n-grams produced by the less proficient EFL learners was significantly more from Data 1 to Data 2 for bigrams ($p < .01$) while the proficient EFL learners stayed unchanged after being exposed to L2 (cf. Figure 5). In short, the less proficient EFL learners began to use a wider range of bigrams after being exposed to L2 while no significant change was confirmed among the proficient EFL learners.

The overall findings of the present study seem congruent to the previous studies; EFL learners tend to use more of the longer strings of word-combination (Ping, 2009), and this tendency was more prominent among less proficient L2 learners (Bo & Shutang, 2005). From a developmental perspective, the use of lexical bundles in writing decreased as the time L2 learners spent in an English-speaking country increased (Groom, 2009). Furthermore, use of bigrams increased as EFL learners continued learning in the L2 rich environment while that of 3-, 4-, and 5-gram bundles decreased (Goya, 2021), and EFL learners showed more reliance on bigrams and less reliance on fewer long word-combinations in their writing after being exposed to

L2 (Paquot & Granger, 2012; Wei & Lei, 2011). As has been claimed in the previous studies above, the present study also confirmed the facilitative effect of L2 exposures among EFL learners in terms of lexical bundles in writing. What is more, the less proficient learners would benefit from the effect relatively more than their counterpart.

Despite such congruency in the findings, what could be different in our findings to others is the fact that the EFL learners in the study, despite their statistically significant differences of L2 proficiency between the groups, showed analogous use of n-grams. More specifically, regardless of the proficiency levels, our participants commonly showed a decrease in use of longer word combinations and an increase in use of bigrams. This might contradict the previously acknowledged effect of L2 proficiency for the development of lexical bundles in L2; the more proficient, the less use of longer n-grams. In fact, the present study divided the Japanese college level EFL learners into two groups according to their self-reported TOEIC scores, but both groups showed comparable distributions of n-grams.

However, based on comparisons of n-gram distributions between the groups within Data 1 and Data 2 (cf. Figure 4) and the results of the chi-square test, it was confirmed that the difference among n-gram distributions between the proficient and the less proficient groups was statistically significant in Data 2, $\chi^2(3)=46.11$, $p<.01$, *Cramer's V*=.23. Considering no significance in Data 1, the less proficient group in the present study might have benefitted more than their counterpart in terms of n-gram tokens. As it is, the two distinctive groups showed a somewhat different developmental tendency in terms of n-gram usage as L2 exposure accumulated.

What might deserve further consideration in its development is the sequential achievement of native-like use of lexical bundles among EFL learners. The study found that the less proficient EFL learners were significantly more dependent on bigrams, and their variation in use was wider as they continued learning in the L2 rich context. Would it be a part of the developmental sequence of formulaic sequences, especially for lexical bundles in L2? If this is part of phraseological competence development, where would it be at in the sequential development stages? Given that L2 learners

tended to use more of longer strings of word-combination than native speakers of English (Bo & Shutang, 2005; Ping, 2009) and that this was significant among lower EFL learners than proficient L2 writers in tokens and types (Groom, 2009; Staple, et al., 2013; Wei & Lei, 2011), it would be possible to suppose that the reliance on bigrams and its wider variety in the present study could be prominent among lower proficient L2 learners. More specifically, by examining Figure 4, it could be assumed that the EFL learners might develop their use of lexical bundles on a continuum scale in which one end might fall into the novice stage as seen in the Data 1's less proficient group, and the other end might fall into the proficient stage as seen in the Data 2's proficient group. What is more problematic are the stages in between. To investigate a sequence of developmental stages, more careful and detailed design of the study, such as measuring proficiency levels in the time of data collection for Data 2, must be necessary so that the relationship between L2 proficiency and use of lexical bundles can be scrutinized more carefully and accurately.

The above point can be considered as a caveat. That is, without the appropriate operationalization of L2 proficiency, it seems inadequate to compare our findings to the previous ones and the statistical considerations between the studies. Simply put, the EFL participants in our proficient group might not have been advanced enough to reach such threshold levels to start using less n-grams like native speakers as found in the previous studies (e.g., Ping, 2009). Furthermore, as many have suggested (e.g., Boers & Lindstromberg, 2012), L2 exposures were gradually conducted to all EFL learners in the study. Yet, the amount and quality of L2 exposure was not quantified and controlled throughout the investigation. Instead, the study took it for granted that the EFL learners accumulatively received L2 input during the course and blindly believed the learners improve their proficiency and knowledge of formulaic sequences simply because the course was taught exclusively in English. If the proficient EFL learners were sufficiently advanced and the study had measured the quality and quantity of L2 exposures, the results could have been different.

Another more indispensable caveat is the need to consider more qualitative and

quantitative aspects of lexical bundles. That is, the present study mainly addressed a concern of quantity of lexical bundles and attempted to take a step further into understanding of their development. Yet, to construe actual use of n-grams as part of L2 development, it is essential to look at the qualities of its use such as functions of the bundles in written discourse, which has been found as peculiar among EFL learners according to proficiency levels of L2 (Staples et al., 2013). What is more, as more quantitative aspect of lexical bundles, measuring how strongly componential words of each n-gram token are associated would be informative to the construe. The strength of association within n-grams can be measured by statistical measures such as Log-likelihood or Mutual Information, and those should be examined individually among EFL participants rather than comparing distributions of tokens and types between the groups with different proficiency levels. With the above limitations in mind, an in-depth qualitative as well as quantitative investigation of n-grams in future would add more empirical evidence to what is claimed in the present study.

Pedagogical Implication

Nevertheless, based on the findings of the present and previous studies, the following pedagogical implication can be drawn. In recent years, there has been a consensus that, to maximize the development of L2 proficiency in a limited exposure to the target language, the courses are taught exclusively in the target language in an academic context at the university level. Although such teaching in English as the medium of instruction, or EMI, is a pervasive trend in the world (Dearden, 2014), to what extent such trend helps grow EFL learners' phraseological competence in the target language use is limitedly acknowledged (Goya, 2021). Given that formulaic sequences are prevalent in the natural language and construct nearly half of written as well as spoken discourse (Erman & Warren, 2000; Foster, 2001), EFL instructors must pay meticulous attention to in what way their learners exploit formulaic sequences under such L2 rich context. This, in turn, helps EFL learners become more competent in the use of formulaic sequences. As shown in the present study, it is now a growing consensus

that, as EFL learners continue learning and being exposed to L2, their use of lexical bundles changes according to their levels of L2 proficiency. In particular, they began to show fewer use of n-gram tokens, more use of bigrams with wider variation, and fewer use of longer n-grams. If we know such change is only a part of the sequential process in development, instructors can emphasize a balanced use of n-grams by presenting a variety of lexical bundles in sizes, especially longer word-strings along with their discourse functions in actual usages. In this way, use of n-grams among the EFL learners can be balanced as seen among native speakers investigated in the previous studies (e.g., Staple, et al., 2013).

Conclusion

The use of formulaic sequences in L2 can determine to what extent L2 learners are proficient. The present study attempted to illuminate the developmental aspect of the formulaic sequences, especially lexical bundles among EFL learners. In particular, the study looked at how differently an exposure to L2 would benefit EFL learners in terms of lexical bundles usage. The study found that EFL learners became more dependent on the use of bigrams; however, such tendency seems more prominent among the less proficient group than the proficient group. Although some caveats should be taken care of in the future study, the current finding would add to the studies of formulaic sequences, especially for achieving native-like phraseological competence in L2.

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目標言語による授業運営の影響について：英語アカデミックライティングにおける日本人英語学習者の単語連鎖表現の変化と英語習熟度の関連とは

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要旨

定型表現 (formulaic sequences) は自然なことばの使用の大部分を占めており (Foster, 2001), 第二言語学習者にとって第二言語の定型表現の習得は, 流暢性に関わる必要不可欠な知識である。特にいくつかの単語の組み合わせからなる表現, いわゆる単語連鎖 (lexical bundles もしくは n-grams) は, 学習者の習熟度によってその使用は異なり (Waldman & Laufer, 2013), 同じ定型表現であるコロケーションとも異なる発達の様相を示している (Paquot & Granger, 2012), その発達には目標言語へ十分に触れる必要があるとされる (e.g., Boers & Lindstromberg, 2012)。本研究では, 英語のみで運営される日本の大学におけるライティングコースで, 日本人英語学習者 ($n=26$) が産出した英文エッセイに見られる単語連鎖の総語数や種類の変化について調査した。調査方法は, 参加者が講義を受ける前と (第3週), 受けたあと (第15週) に産出したエッセイから構築された学習者コーパスを用いて, コーパス分析ツールの AntConc (Anthony, 2019) を使いサイズの異なる単語連鎖を抽出し, 高い習熟度のグループとそうでないグループの単語連鎖を受講前と受講後に分け, それぞれの値をいくつかのカイ二乗検定を用いて分析した。分析の結果, 両グループとも英語による講義を12週間受講したところ短い単語連鎖の使用の割合が増加し, 長い単語連鎖の使用の割合が減少した。加えて, 習熟度の低いグループでは2語からなる単語連鎖の種類が増加したが, これは習熟度の高いグループには見られなかった。このことから, 学習言語を教授言語とする EFL 環境では, 定型表現能力の発達は習熟度によってその影響は異なることが示唆された。