Original Paper

A Processability Approach to the Development of English Syntax in L2 Speaking and Writing

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Abstract

This paper aims to investigate the development of English syntax based on Pienemann's (1998) Processability Theory (PT). While PT has been tested in various second language (L2) contexts, most previous PT studies have been done with L2 spoken data. The present study examines the English sentence formation in the spoken and written tasks performed by 80 Japanese native speakers using the Lexical Mapping Hypothesis in PT. The results of the analyses indicated similar developmental patterns in the learners' spoken and written performances in terms of English syntax demonstrating support for PT. This study also showed that there was a statistically significant correlation between L2 speaking and L2 writing.

Keywords

English, syntax, speaking, writing, L2, Processability Theory

1. Introduction

The existence of developmental sequences in acquiring second language (L2) grammar has been reported in various empirical studies in the field of second language acquisition (SLA) since the 1970s (e.g., Bailey, Madden, & Krashen, 1974; Cazden, Cancino, Rosansky, & Schumann, 1975; Dulay & Burt, 1973, 1974). It has been argued that understanding the natural developmental process of L2 grammar should have important implications in language education since formal instruction of linguistic features matching the learner's current developmental stage is more efficient than that of more advanced features (e.g., Pienemann, 1984). However, the use of L2 grammatical structures in both speaking and writing has not been extensively examined based on SLA theories while L2 learners have been argued to reach a higher level of grammatical accuracy in written tasks which allow learners to spend more time planning and searching among their linguistic resources than do spoken tasks (e.g., Foster & Skehan, 1996; Krashen, 1981, 1985; Yuan & Ellis, 2003).

The current study attempts to investigate empirically the development of L2 syntax with both spoken and written data based on Processability Theory (PT; Pienemann, 1998; Pienemann, Di Biase, & Kawaguchi, 2005). PT is one of the major theories of SLA, which claims that there is a universal hierarchy of L2 grammatical development. Based on Levelt's (1989) Speech Model and Lexical Functional Grammar (LFG; e.g., Bresnan, 2001), PT hypothesizes the developmental sequences for L2 linguistic features, including morphology and syntax. In 2005, PT proposed the new hypotheses concerning the acquisition of syntactic structures (Pienemann, Di Biase, & Kawaguchi, 2015) following the advancement of LFG.

The Lexical Mapping Hypothesis (The LMH; Pienemann, Di Biase, & Kawaguchi, 2015), which is one of the hypotheses proposed in 2005, predicts how argument mapping between thematic roles and grammatical functions in sentence construction develops in L2 acquisition. Table 1 presents the developmental stages of English syntactic structures hypothesized in the LMH.

Table 1. Developmental Stages for English Syntax Based on the Lexical Mapping Hypothesis (after Pienemann, Di Biase, & Kawaguchi, 2005)

STAGE	STRUCTURE	EXAMPLE
4. NON-DEFAULT MAPPING	passive	*The desk was cleaned by John*
	causative	*Mary made Bob drive the car*
3. DEFAULT MAPPING	Ditransitive	*Janet gave Ben a present*
+ADDITIONAL ARGUMENT	Canonical sentence + Oblique argument	*Tim put the book into the bag*
2. DEFAULT MAPPING	Canonical word order	*John cleaned the desk*
	e.g., agent-event-patient	
1. LEMMA ACCESS	single words	*Look*
	formulas	*Thank you*

In the LMH, sentences with "default mapping" can be produced when L2 learners become able to form utterances of more than one word. In "default mapping," the highest available role in the thematic hierarchy, the Agent, is mapped onto the Subject (SUBJ) grammatical function. The sample sentence (1) shows typical "default mapping" with a transitive verb "*clean*," which requires two arguments. In sentence (1), the most prominent role, the Agent, "*John,*" is mapped onto the SUBJ, and the less prominent role, the Patient, "*the desk,*" is mapped onto the Object (OBJ), as represented in Figure 1.

(1) *John cleaned a desk*

Agent   Patient   - thematic role

| |

SUBJ   OBJ   - grammatical function

| |

John   the desk - constituent structure

Figure 1. Default Mapping: *John cleaned the desk*

The LMH claims that a much higher processing cost is required for producing sentences with "non-default mapping." It is assumed that L2 learners gradually start directing the listener's attention to a certain thematic role lower in the hierarchy after they have acquired "default-mapping." The sentence construction with "non-default mapping" can be achieved by promoting it to the SUBJ and mapping it onto a grammatical function other than the SUBJ to de-focus the highest role, or by suppressing it. A typical case of "non-default mapping" is the passive construction, as in the sample sentence (2). As shown in Figure 2, the Patient "*the desk*" is mapped onto the most prominent grammatical function, SUBJ, while the highest thematic role, the Agent, is suppressed and appears as Adjunct, "*by John.*"

(2) *The desk was cleaned by John*

Agent   Patient   - thematic role

| |

ø   SUBJ   Adjunct   - grammatical function

| |

the desk   by John   - constituent structure

Figure 2. Non-default Mapping: *The desk was cleaned by John*

2. Previous Studies

The developmental stages of grammatical structures predicted in PT have been investigated in various SLA studies (e.g., Bettoni & Di Biase, 2015, Keßler, Lenzing, & Liebner, 2016; Lenzing, Nicholas, & Roos, 2019; Pienemann, 1998, 2005). However, since PT originally aimed to examine L2 spoken languages, the validity of PT in L2 writing has not been extensively tested yet.

Håkansson and Norrby (2007) was the first study that tested PT developmental stages using Swedish L2 spoken and written data and claimed that the development of L2 grammar in speaking and writing was equally constrained by processability. On the other hand, mixed findings have been reported regarding PT stages in speaking and writing by L2 learners of English (e.g., Tang & Zhang, 2015; Yamaguchi, 2019; Yamaguchi & Usami, 2017a, b).

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While Chinese learners of English were found to be at higher PT stages in their written performances than in their spoken performances (Tang & Zhang, 2015), it was shown that Japanese learners of English tended to be at the same PT stages in speaking and writing (Yamaguchi & Usami, 2017a, b; Yamaguchi, 2019). Since most of these previous studies focused on the development of L2 morphology, more various learner data need to be examined to explore the relationship between the PT stages in writing and that in speaking.

Concerning the LMH in PT, Japanese L2 data have mainly been analyzed in previous studies (Kawaguchi, 2005, 2007, 2008, 2009a, 2009b, 2016). While the LMH has been used in some English L2 contexts (e.g., Di Biase, Kawaguchi, & Yamaguchi, 2015; Keatinge & Keßler, 2009; Wang, 2009), research on the LMH with both spoken and written data is rare (Yamaguchi, 2019).

3. Research Question

The current study addresses the following research questions.

  - Is the development of English syntax consistent with the sequence as predicted in PT in both spoken and written performances by Japanese native speakers?

- Is there a relationship between the development of English syntax in the learners' speaking and that in their writing?

4. Methodology

The participants in the present study were 80 Japanese native speakers, aged 18-30, and each of them was asked to perform two tasks, that is, spoken and written narratives. For data elicitation, a picture book containing 24 wordless pictures, "*Frog, where are you?*" (Mayer, 1969), was utilized. This picture book was chosen since various linguistic features were observed in a number of previous language acquisition studies (e.g., Berman & Slobin, 1994). In order to minimize the ordering effects, half of the participants (i.e., 40 learners) were instructed to start with spoken tasks and the other half to start with written tasks. The participants wrote their narratives with pen and paper, while their spoken narratives were audio-recorded and transcribed.

The acquisition of English syntax by the Japanese learners was analyzed based on the LMH in PT. Pienemann (1998) claims that "emergence can be understood as the point in time at which certain skills have, in principle, been attained or at which certain operation can, in principle, be carried out" (p. 138). Although the development of grammatical structures has been examined based on accuracy in most previous language acquisition studies, PT argues that using a grammatical structure at a high level of accuracy, even 80% to 90%, does not guarantee that the learner will be able to continue producing that structure at the same or higher level of accuracy in the future. Thus, the present study applied the emergence criterion in PT to determine if each participant has acquired a target syntactic structure.

In the analysis of the acquisition of English syntax, the sentence structures used by the participants were coded using the LMT in PT. First, sentences with "default mapping," as in (3) and (4), were coded as PT

stage 2 structures.

> (3) *a lot of bees followed the dog*
>
> (4) *the boy found two frogs*

Then, when additional arguments were used after the sentences with "non-default mapping", as in (5) and (6), the participants were regarded to have reached PT stage 3.

> (5) *the boy named the frog Tommy*
>
> (6) *the frog gave a baby to the boy*

The sentence constructions with "non-default mapping," as in (7) and (8), were coded as PT stage 4 structures, that is, the highest structures for English syntax in the LMH.

> (7) *the boy was chased by a bird*
>
> (8) *the bees made the dog run*

5. Results and Discussion

Table 2 presents the results of the analysis of the use of English syntax in the spoken and written performances by 80 Japanese learners. As shown in the table, no PT stage 1 learners were identified since all the participants produced various sentences with "default mapping" in both tasks. This suggests that "default mapping" was in place in the English sentence formation by the Japanese learners.

Table 2. PT Stages Found in English Spoken and Written Performances by 80 Japanese Learners

PT stage	1	2	3	4
Spoken (n = 80)	0	3	34	43
Written (n = 80)	0	2	28	50

Figure 3 summarizes the comparison of PT stages (i.e., PT stages 2 to 4) found in English spoken and written performances by 80 Japanese learners. As presented in the table, three participants in speaking and two in writing used only "default mapping" in their sentence construction. Hence, they can be at PT stage 2 for English syntax. On the other hand, 34 learners in speaking and 28 in writing were regarded to be at PT stage 3 since they produced sentences with "default mapping" with additional arguments. Moreover, 43 learners in speaking and 50 in writing, who constructed sentences with "non-default mapping," were considered to have reached PT stage 4. In other words, 53.8% of the participants in speaking and 62.5% in writing were able to produce the most advanced syntactic structures in the processability hierarchy as proposed in the LMH. Moreover, PT stage 3 structures appeared in both tasks by all the PT stage 4 learners. This suggests that there were implicational patterns in the development of English syntax in the learners' speaking and writing. Therefore, it can be argued that the syntactic development found in the Japanese learners of English shows support for the

prediction in the LMH in PT with both L2 spoke and written data. Since the findings in this study are compatible with the results in previous PT research by H åkansson and Norrby (2007) and can be additional evidence that processability equally constrains the grammatical development in L2 speaking and L2 writing.
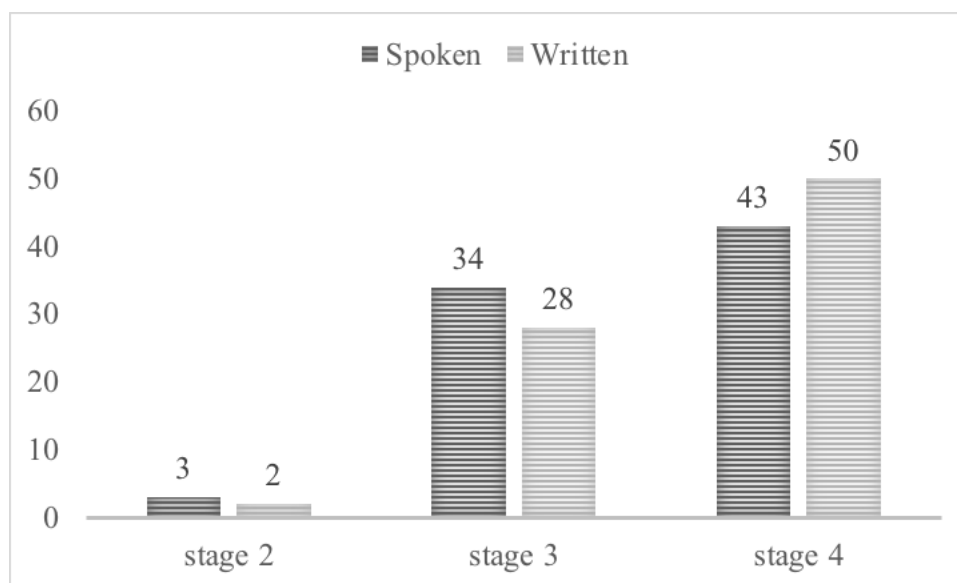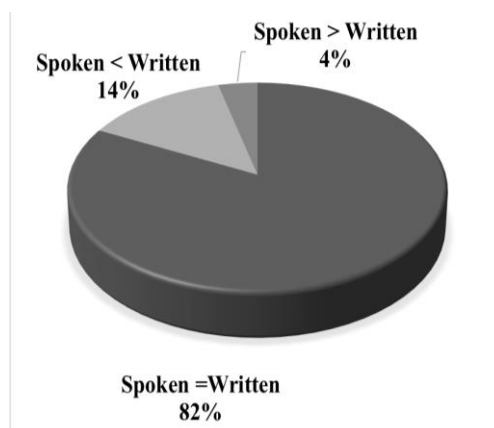

Figure 3. Comparison of PT Stages Found in English Spoken and Written Performances by 80 Japanese Learners

Table 3 presents the results of the comparison of the Japanese learners' PT stages between English spoken and written performances. According to the table, 66 participants were found to be at the same stages in both tasks. To be more specific, 40 of them were at PT stage 4, 24 at PT stage 3, and two at PT stage 2. This suggests that 82% of the Japanese learners of English in this study were at the same PT stages for English syntax in speaking and writing, as represented in Figure 4. Moreover, the results of a statical analysis (i.e., Pearson correlation analysis) demonstrated a strong correlation between the learners' PT stages in speaking and those in writing (0.733, $\rho < 0.01$).

Table 3. Comparison of the PT Stages between English Spoken and Written Performances by 80 Japanese Learners

	Spoken = Written (n = 66)			Spoken < Written (n = 11)		Spoken > Written (n = 3)
PT stage (Spoken)	4	3	2	3	2	4
PT stage (Written)	4	3	2	4	3	3
n = 80	40	24	2	10	1	3

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Figure 4. Percentage Comparison of the PT Stages between English Spoken and Written Performances by 80 Japanese Learners

On the other hand, the present study showed that 14 participants were at different PT stages in two different tasks. As shown in Table 3, 11 participants were at higher PT stages in writing than in speaking, while three of them were at higher PT stages in speaking than in writing. While all the Chinese learners of English in Tang and Zhang (2015) performed better in writing than in speaking, only 14% of the participants in this study were at higher PT stages in writing than in speaking, as indicated in Figure 4. The discrepancy between these findings may have been caused by methodological differences. For instance, Tang and Zhang (2015) analyzed the acquisition of English morphology while the present study focused on the development of English syntax in Japanese learners of English. Also, the participants' first languages, that is, Chinese in Tang and Zhang (2015) and Japanese in this study, may have influenced the learners' English production.

It should also be noted that the results in this study do not show support for the claim that L2 learners are able to spend more time planning and searching among their linguistic resources in written tasks than in spoken tasks (e.g., Foster & Skehan, 1996; Krashen, 1981, 1985; Yuan & Ellis, 2003). Since most participants were found to be at the same PT stages for English syntax, the processability of L2 grammar may not be greatly affected by planning and searching time which can be available in written tasks. While this study applied the emergence criterion in PT to determine the learners' current developmental stages, accuracy-based measures have been commonly used in most SLA research. Thus, it can be argued that planning and searching time would have an impact on grammatical accuracy rather than on processability.

6. Conclusion

In the present study, the development of L2 syntax was examined using both spoken and written data within the framework of the LMH in PT. The results of the analyses of 80 Japanese learners of English showed similar implicational patterns in the development of English syntactic structures in both spoken and written tasks. Hence, it can be argued that the development of English syntax is consistent with the

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sequence as predicted in PT in both spoken and written performances by Japanese native speakers. Moreover, this study revealed that there was a statistically significant correlation between the learners' PT stages for English syntax in the spoken production and those in the written production. Thus, it can be claimed that there is a strong relationship between the development of English syntax in the learners' speaking and that in their writing.

These findings have theoretical and pedagogical implications for SLA research and English language teaching. In particular, the present study contributes to the theoretical advancement of PT by providing additional evidence that PT, which was originally proposed to analyze L2 speaking, can be applicable to the investigation of L2 writing. In addition, this study has confirmed that it is crucial for language teachers to understand the natural developmental process of grammatical structures since the development of English syntax was demonstrated to be constrained by processability in both L2 speaking and writing.

However, further research is clearly needed since this study has several limitations. Since the participants were 80 Japanese learners of English, more various data from learners from different first language backgrounds in different L2 contexts should be examined to generalize the results. Also, the current study only examined the syntactic structures hypothesized in the LMH. Future studies should analyze a wider range of grammatical structures to test the validity of PT in speaking and writing.

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