

# Processability Analysis of the Acquisition of English L2 Syntax by Japanese and Chinese Speakers

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## Abstract

Processability Theory (PT; Pienemann, 1998) argues that there is a universal hierarchy in the acquisition of second language (L2) grammar. As for L2 syntax, PT proposes the Lexical Mapping Hypothesis (LMH; Pienemann, et al. 2005) in which learners are predicted to progress from ‘default mapping’, where the argument hierarchy maps onto the grammatical function hierarchy in a default way, to ‘non-default mapping’, where the strictly hierarchical mapping is disrupted under semantic and/or pragmatic pressure (Pienemann, et al., 2015). More recently, an additional intermediate stage between default and non-default mapping stages has been proposed by Bettoni and Di Biase (2015) accounting for locative, ditransitive, and other constructions containing ‘default mapping plus additional argument.’ Although this intermediate stage has been tested to some extent (e.g., Di Biase, et al., 2015; Kawaguchi, 2015; Liu, et al., 2023; Yamaguchi & Kawaguchi, 2022), more detailed analyses of how L2 learners proceed from the default mapping stage to the non-default mapping stage are needed. The participants in the present study are 139 English L2 learners, that is 88 learners of English as a foreign language (EFL) in Japan and 21 Japanese and 30 Chinese speakers in English as a second language (ESL) environments in Australia. Their speech production in English is examined based on the updated LMH (Bettoni & Di Biase, 2015). Results show

that, in terms of additional arguments in the intermediate stage, the oblique (OBL) construction emerges before the double object (OBJ) construction. This finding contributes to the further development of PT hypotheses for L2 syntactic development.

**Keywords:** EFL, ESL, Syntax, Processability Theory, Lexical Mapping Hypothesis

## 1. Introduction

This study examines English syntactic development in second language (L2) learners using the extended version of Processability Theory (PT; Pienemann, et al., 2005). Over the last two decades, the developmental stages of L2 syntax and morphology hypothesised in PT have been tested in various second language acquisition (SLA) studies (e.g., Pienemann, 1998, 2015; Lenzing, et al., 2019; Kawaguchi, et al., 2023). Concerning the acquisition of L2 syntax, PT has updated the hypotheses in two phases. Following the advancements of Lexical Functional Grammar (LFG; e.g., Bresnan, 2001), the Topic Hypothesis and the Lexical Mapping Hypothesis (LMH) were proposed in the first phase (Pienemann, et al., 2005). After that, Bettoni and Di Biase (2015) extended the Topic Hypothesis by including the Focus discourse function in the Prominence Hypothesis and modified the LMH with the additional intermediate stage. While some L2 studies (e.g., Bettoni & Di Biase, 2015; Kawaguchi, et al., 2023; Liu, et al., 2023; Yamaguchi & Kawaguchi, 2022) have shown support for these hypotheses in the extended PT, the intermediate stage in the revised LMH has not yet been investigated in detail. Therefore, the current study attempts to analyse L2 syntactic development focusing on the intermediate stage proposed in the latest LMH using larger learner data.

## 2. Processability Theory

Processability Theory (PT; Pienemann, 1998; Pienemann, 1998, 2005) is one of the major theories of second language acquisition (SLA) and assumes that there is a universal hierarchy of L2 development. Based on Levelt's (1989) Speech Model and Lexical Functional Grammar (LFG; e.g., Bresnan, 2001), PT hypothesises L2 learners' developmental stages of grammatical structures, including morphology and syntax. In 2005, PT proposed new hypotheses concerning the acquisition of syntactic structures (Pienemann, et al., 2015) in accordance with the advancement of LFG.

One of the hypotheses in the extended PT, namely the Lexical Mapping Hypothesis (LMH; Pienemann, et al., 2005) predicts that after the lemma stage (i.e., one word or formulaic expressions), L2 learners use default mapping at first, where the highest available role (i.e., most prominent role) in the thematic hierarchy, namely the Agent, is mapped onto the Subject (SUBJ) grammatical function, which is the highest in the ordering of argument functions. The sentence, *Sam chased the dog*, as in Figure 1, shows a typical default mapping with a transitive verb *chase* which requires two arguments. In this sentence, the most prominent role, the Agent *Sam* is mapped onto the SUBJ, and the less prominent role, the Theme *the dog* is mapped onto the Object (OBJ). Many scholars including Pinker (1984) and Slobin (1985) argue that beginning learners map the most prominent thematic role onto the SUBJ between the thematic role and the grammatical function, requiring the least processing cost because

this is the most accordant mapping to human mind.

Agent	Patient	- thematic role
SUBJ	OBJ	- grammatical function
<i>Sam</i>	<i>the dog</i>	- constituent structure

Figure 1. Default mapping of the sentence: *Sam chased the dog*

L2 learners are assumed to gradually learn how to direct the listener’s attention to a particular thematic role lower in the hierarchy by promoting it to the SUBJ and de-focus the highest role by mapping it onto a grammatical function other than the SUBJ or suppress it. A typical case of non-default mapping is the passive construction. In the sentence *the dog was chased by Sam*, as in Figure 2, the Patient *the dog* is mapped onto the most prominent grammatical function, SUBJ, while the highest thematic role, the Agent, is suppressed, and appears as Adjunct, *by Sam*.

Agent	Patient	- thematic role	
∅	SUBJ	Adjunct	- grammatical function
	<i>the dog</i>	<i>by Sam</i>	- constituent structure

Figure 2. Non-default mapping of the sentence: *The dog was chased by Sam*

More recently, Bettoni and Di Biase (2015) proposed the intermediate stage, ‘the default mapping plus additional argument’ stage, between the default and non-default mapping stages, where the Agent/Experiencer’ mapped on SUBJ, the Patient/Theme mapped on OBJ (if present), and other members of the argument-structure (a-structure) hierarchy, such as Goals and Locatives, mapped on Oblique (OBL)’. This suggests that L2 learners at this stage become able to differentiate between core arguments (i.e., SUBJ, OBJ) and noncore arguments (i.e., secondary OBJ, OBL). Thus, the updated LMH claims that L2 learners first use only default mapping and then start producing sentences with additional arguments while maintaining default mapping as in those involving ditransitive verbs. The developmental stages of English L2 predicted in the current LMH following Di Biase, et al. (2015) are summarised in Table 1 (the development follows from the bottom to the top).

Table 1. Developmental stages of English L2 syntax based on the LMH (After Di Biase, et al., 2015, p. 113)

Stage	Structural outcomes	Examples
Non-default mapping	unaccusatives, passives, causatives, exceptional verb constructions, etc.	<i>the vase broke</i> <i>Bob was beaten by Ted</i> <i>she made him cry</i> <i>we received a letter</i>
Default mapping + additional argument	agent/experiencer mapped on SUBJ, patient/theme mapped on OBJ, and other members of the a-structure hierarchy, such as goals and locatives, mapped on OBL.	<i>Mary put the butter in fridge</i> <i>she gave Tom a new bike</i> <i>Anne went to Rome by train</i>
Default mapping	agent/experiencer mapped on SUBJ patient/theme mapped on OBJ	<i>John sleeping</i> <i>John fry egg</i>
Lemma Access	single words formulas	<i>station, here</i> <i>my name is Pim</i>

The intermediate stage in the LMH was tested for the first time in Di Biase, et al. (2015) in an English L2 context utilising the database from Yamaguchi's (2010, 2013) longitudinal study of a Japanese primary school-aged child learning English as a second language in Australia. Later, PT research in more various L2 contexts has tested and shown support for the updated LMH which includes the default mapping plus additional argument stage (e.g., Di Biase & Bettoni, 2015 for Italian L2; Kawaguchi, 2015; 2016 for Japanese L2; Liu, et al., 2023 for Chinese L2, and Magnani, 2022 for Russian L2).

However, most of them were small-scale studies. For instance, Di Biase and Bettoni (2015), Di Biase et al. (2015), and Kawaguchi (2015) were case studies, and Liu, et al. (2023) examined a few informants. Although Yamaguchi and Kawaguchi (2022) provided supporting evidence for the intermediate stage using larger learner data, no studies have conducted detailed analyses of the development of the grammatical features belonging to the intermediate stage, namely the double OBJ construction and the OBL construction. Figure 3 shows the mapping of the sentence involving two OBJs (*Jim gave Mary flowers*), while Figure 4 indicates the mapping of the sentence containing an OBL (*Jim gave flowers to Mary*).

Agent	Theme	Goal	- thematic role
SUBJ	OBJ	OBJ	- grammatical function
<i>Jim</i>	<i>flowers</i>	<i>Mary</i>	- constituent structure

Figure 3. Default mapping and an additional argument of the sentence (double objects): *Jim gave Mary flowers*

Agent	Theme	Goal	- thematic role
SUBJ	OBJ	OBL	- grammatical function
<i>Jim</i>	<i>flowers</i>	<i>to Mary</i>	- constituent structure

Figure 4. Default mapping and an additional argument of the sentence (oblique dative): *Jim gave flowers to Mary*

### 3. Research Question and Hypothesis

The informants in this study were randomly selected from two different learner corpora, that is Japanese Learner Corpus of English Narratives (JaLCEN) constructed in Japan and WSU-Xi'an Jiaotong ESL Corpus constructed in Australia. As summarised in Table 2, the current study analyses the speech production by 88 Japanese L1 university students in English as a foreign language (EFL) environment in Japan (aged 18-30) from JaLCEN as well as 21 Japanese L1 (aged 20-56) and 30 Chinese L1 (aged 18-32) speakers in English as a second language (ESL) environments in Australia from WSU-Xi'an Jiaotong ESL Corpus.

In order to elicit English speech production from Japanese EFL learners, a picture book (*Frog, where are you?*, Mayer, 1969) containing 24 wordless pictures is used (see some example pictures in Appendix A). They are asked to perform spoken narratives about the pictures. In Australia, a computer-regulated picture description task was conducted to collect speech data from Japanese and Chinese ESL speakers. In this task, the informants were asked to create a sentence about each of the 30 pictures displayed on the computer screen (see some example pictures in Appendix B). All the speech data are audio-recorded and transcribed, and the sentences produced by the informants are analysed using the latest LMH focusing on the intermediate stage, namely the default mapping plus additional argument stage.

Table 2. Informants and tasks in JaLCEN and WSU-Xi'an Jiaotong ESL Corpus

Corpus	Informants	Task
JaLCEN (Japan)	Japanese L1 university students in English as a foreign language (EFL) environment, aged 18-30 ( $n = 88$ )	Spoken narratives using a wordless picture book ( <i>Frog, where are you?</i> , Mayer, 1969)
WSU-Xi'an Jiaotong ESL Corpus (Australia)	Japanese L1 speakers, aged 20-56 ( $n = 21$ ) Chinese L1 undergraduate and master university students, aged 18-32 ( $n = 30$ ) All in English as a second language (ESL) environment	Computer regulated picture description speaking task

#### 4. Results and Discussions

Tables 3 and 4 show PT stages found in the spoken narratives by 88 Japanese EFL learners in Japan and the computer-regulated picture description task by 51 ESL speakers, including 21 Japanese L1 and 30 Chinese L1 speakers, in Australia, respectively. In these tables, the leftmost columns list the structures of the PT stages in the LMH. The first row encodes the number of informants in each specific stage. The sign '+' indicates that the informants are considered to have acquired the structures hypothesised in the LMH. As for the intermediate stage, it is indicated in the brackets if the informants produced the OBL construction or/and the double OBJ construction.

As demonstrated in Yamaguchi and Kawaguchi (2022), Tables 3 and 4 indicate that the informants' acquisition of English L2 syntax followed the implicational sequence hypothesised in the LMH. In other words, there was no case where they reached the higher PT stage before the lower PT stage. It should be noted that four ESL speakers in Australia who have reached the non-default mapping stage, as shown in Table 4, did not use default mapping plus additional argument in the picture description task, but all of them were found to produce the OBL construction while performing the interview task, as in samples (1) and (2).

(1) JA 07: *we went around ah south America*

(2) CH 29: *I have worked in a hospital for one years*

Table 3. PT stages found in the spoken narratives by 88 Japanese EFL learners

Number of informants ( $n = 88$ )	5	40	43
Non-default mapping	/	/	+
Default mapping + additional argument	/	+	+
		(39 - only OBL, 1 - OBL & double OBJ)	(42 - only OBL, 1 - OBL & double OBJ)
Default mapping	+	+	+

Table 4. PT stages found in the computer-regulated picture description task by 51 Japanese/Chinese ESL speakers in Australia

Number of informants ( $n = 51$ )	2	6	4	39
Non-default mapping	/	/	+	+
Default mapping + additional argument	/	+	/	+
		(only OBL)		(38 only OBL, 1 OBL & double OBJ)
Default mapping	+	+	+	+

Regarding the intermediate stage, namely the default mapping plus additional argument stage, both Table 2 and 3 indicate that the OBL construction was used more frequently than the double OBJ construction by the informants in this study. According to Table 2, 39 out of 40 Japanese EFL learners at the default mapping plus additional argument stage only produced the OBL construction. That is, only one learner used the double OBJ construction as well as the OBL construction. As for the Japanese and Chinese ESL speakers in Australia, Table 3 shows that 6 ESL speakers in Australia at the default mapping plus additional argument stage produced only OBL construction. Only one person used the double OBJ construction in addition to the OBL dative construction.

These results show that the bulk of the EFL and ESL learners at the intermediate stage produced the OBL construction, while only three learners (one from WSU-XJ Corpus and two from JaLCEN) used the OBJ construction. This implies that the OBL construction



emerges earlier than the double OBJ construction at the intermediate stage in the LMH.

Moreover, the double OBJ construction rarely appears even in the speech production by L2 speakers at the higher PT stage. As shown in Table 3, 42 out of 43 Japanese EFL learners who have reached the highest PT stage, that is non-default mapping stage, only used the OBL construction. In other words, only one learner at the non-default mapping stage produced both OBL and double OBJ constructions, as in (3) and (4) respectively.

(3) EFL 35: *he could move away from bees* (OBL)

(4) EFL 35: *and the frog's family wants him to send them letters* (double OBJ)

Table 4 also shows that only one out of 39 ESL speakers in Australia, a Japanese L1 speaker, at the non-default mapping stage only used both OBL and double OBJ constructions, as in (5) and (6).

(5) JA03: *guy is giving the cake to child* (OBL)

(6) JA03: *a woman is giving him a cup of coffee* (double OBJ)

Based on these results, we can answer the research questions. As for the first research question, all speakers who were able to produce the double OBJ construction also used the OBL construction. This suggests that independently constructed English L2 corpora support the proposition that L2 learners go through the default mapping plus additional argument stage in the latest LMH in PT. Regarding the second research question, the findings support our hypothesis that the OBL construction is found to emerge before the double OBJ construction.

However, some issues still remain to be answered. For instance, it is not clear why the double OBJ construction rarely appears in L2 speech production. While the double OBJ construction is not allowed in Japanese grammar, it exists in Chinese grammar (e.g., Comrie, 2009; Malchukov, et al., 2010). Nevertheless, this study found that the Chinese L1 speakers never used the double OBJ construction in their speech performance. This finding suggests that the production of the double OBJ construction requires more processing cost and that the L2 learners may find it easier to produce the alternating structure, the OBL dative construction. Thus, the order of the appearance of these two constructions cannot be influenced by L1 backgrounds. Instead, it may be attributed to the processing constraints.

## 5. Conclusion

This study investigates the acquisition of English L2 syntax by Japanese L1 and Chinese L1 speakers within the framework of the updated LMH in PT. The analysis of the speech data of 88 Japanese EFL learners as well as 21 Japanese and 30 Chinese speakers in ESL environments using two different corpora (i.e., JaLCEN and WSU-Xi'an Jiaotong ESL Corpus) has demonstrated that all informants go through the stage of default-mapping plus additional argument as in Yamaguchi and Kawaguchi (2022) and, that the OBL construction is acquired before the double OBJ construction within this stage. Thus, it can be argued that this study made an important contribution to the LMH in PT through the detailed



investigation of the the intermediate stage, namely the default mapping plus additional argument stage. Also, the present study suggests that L1 backgrounds may not have an impact on the production of the double OBJ construction since Chinese speakers who use it in their L1 never produced the double OBJ construction in the data collection sessions.

Since it examined only Japanese L1 and Chinese L1 speakers in EFL and ESL environments, more studies are clearly needed to investigate the acquisition of the OBL construction and the double OBJ construction hypothesised in the intermediate stage in the LMH in order to establish a more precise Lexical Mapping Hypothesis in PT. Also, further research should explore what makes double OBJ more constrained.

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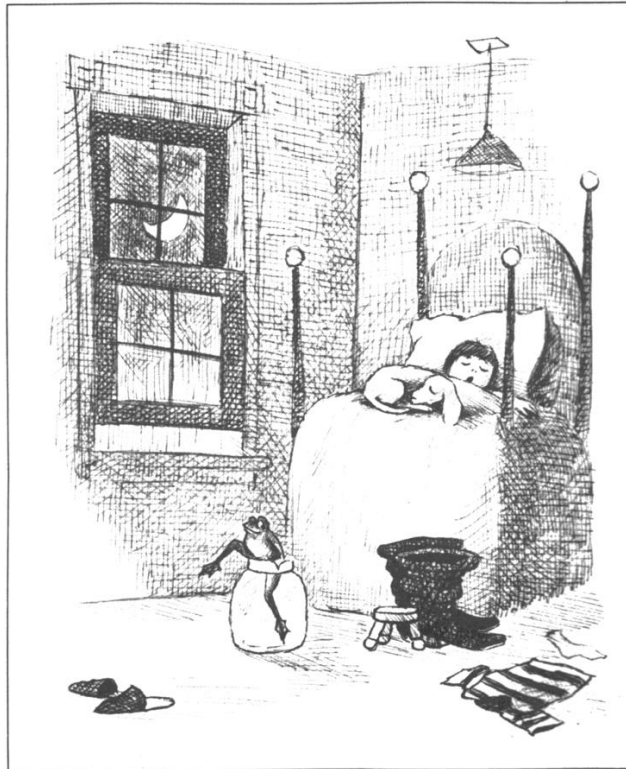
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Appendix A. Example Pictures for the Spoken Narrative (Adopted from Mayer, 1969)





### Appendix B. Example Pictures for the Computer-regulated Picture Description Task



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