The Acquisition of Complex Structures: The Case of Child ESL

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This study examines how complex linguistic structures are acquired in child English as a second language. The spontaneous speech producing by a Japanese primary school child, learning English in a naturalistic environment, was audio-recorded regularly over two years and the development of complex syntactic structures containing subordinate clauses was compared with the acquisition of other English morpho-syntactic structures as represented within Processability Theory (PT) (Pienemann, 1998; Pienemann, Di Biase, & Kawaguchi, 2005). Although PT predicts that subordination is acquired at the highest stage in processability hierarchy, the results in this longitudinal study show that some of the subordinate constructions emerge at earlier stages in child ESL acquisition.

Keywords: English as a Second Language; Complex Structures; Subordinate Clauses; Processability Theory; Primary School Child

Introduction

The development of subordinate clauses has been the focus of much language acquisition research in both first language (L1) (e.g., Diessel & Tomasello, 2005; Kidd & Bavin, 2002; Sheldon, 1974) and second language (L2) contexts (e.g., Doughty, 1991; Eckman, Bell, & Nelson, 1988; Gass, 1979; Izumi, 2003; Pavesi, 1986). However, most of the previous studies are experimental and few observational studies on this issue have been conducted. While the use of English subordinate clauses in children's spontaneous speech in L1 acquisition has been examined to some extent (e.g., Bowerman, 1979; Bloom, 1991; Diessel, 2004), longitudinal studies on the development of subordinate clauses by L2 learners (e.g., Mellow, 2006; Schumann, 1980) are rare. Also, a majority of previous studies analyzed the acquisition of relative clauses in terms of noun phrase accessibility hierarchy (Keenan & Comrie, 1977).

Subordinate Clauses in English

Basic types of English subordinate clauses include complement, relative, and adverbial clauses (e.g., Diessel, 2004; Kroeger, 2005). Complement clauses are commonly defined as subordinate clauses functioning as an argument of the matrix clause predicate. They may serve as the subject or object of the matrix clause. In child L1 studies (e.g., Diessel, 2004, Diessel & Tomasello, 2001), object complement clauses are found to be very common in early child speech. Also, it is found that sentential complements (S-complements) marked by "*that*" or zero (e.g., "*Ken know* (*that*) *Mary likes dogs*") are the earliest complement clauses and emerge a few months after the second birthday. *Wh*-complements (e.g., "*I wonder what John ate for lunch*") and *If*-complements marked by "*if*" or "*whether*" (e.g., "*Lisa asked me if I like pizza*") are found to appear several months after the first S-complements.

Relative clauses are subordinate clauses that modify a referential expression in the matrix clauses. The modified element is called the head (or filler), and the head can be the subject, the object, an oblique, a predicate nominal, and so on. Child L1 studies (e.g., Diessel, 2004; Diessel & Tomasello, 2000) found that the vast majority of the children's early relative constructions contain a single proposition. In particular, Diessel (2004) who observed five young children found that an average of 80% of the first ten relative clauses produced by each child is attached to the predicate nominal of a copular clause. Those constructions are called "presentational relatives" and the examples are shown as in 1) to 4). According to Diessel (2004), young children often produce infinitival and participial relative constructions containing a single proposition, as in 3) and 4) respectively.

1) *That's the dog that bit me.*
2) *There is the girl who Tim loves.*
3) *This is something to eat.*
4) *Here's a bird chasing a cat.*

This indicates that relative constructions expressing two propositions, as shown in 5) and 6), rarely appear at early stages in child L1 acquisition.

5) *The boy who called me lives in Japan.*
6) *I ate the cake which Mary baked.*

Regarding adverbial clauses, final adverbial clauses (e.g., "*When Mary came, I was eating lunch*") are found to emerge earlier than final adverbial clauses (e.g., "*I washed my hands after I cleaned my room*") in child L1 acquisition (e.g., Diessel, 2004).

Subordinate Clauses in Japanese

As the L1 of the participant in this study is Japanese, this sub-section provides a brief description of Japanese subordinate clauses.

Japanese has three basic types of subordinate clauses, which are similar to those in English, such as complement clauses, relative clauses, and adverbial clauses. According to Shibatani (1991), the verb is always in the final position of the sentence in Japanese. Complement clauses are placed before the verb, as in 7), while relative clauses precede the modified noun, as in 8) and 9). Adverbial clauses are usually placed before the main clause, as in 10).

7) *Ken wa* [*Mary ga sushi o tabeta koto*] *o shitteiru*
"Ken knows [that Mary ate sushi]."
8) *Ken wa* [*Mary ga dokode sushi o tabeta ka*] *kiita*
"Ken asked Mary [where she ate sushi]."
9) *Mary wa* [*Ken ga tukutta yuushoku*] *o tabeta*
"Mary ate dinner [that Ken cooked]."
10) [*Mary ga kita toki*] *Ken wa yuushoku o tukutta*
"[When Mary came], Ken cooked dinner."

Processability Theory (PT)

This study uses Processability Theory (PT) (Pienemann, 1998; Pienemann, et al., 2005) as a theoretical framework for analysing the learner's development of complex syntax. PT predicts a universal hierarchy of processing procedures, which are required for producing linguistic structures, based on Levelt's (1989) speech production model and Lexical Functional Grammar (e.g., Bresnan, 2001). According to PT, learners, at any stage of development, are able to produce only those linguistic structures which the current stage of their language processors can handle. The hypothetical hierarchy of processing procedures for morpho-syntactic development is summarized in Pienemann (1998, 2005), as shown in **Table 1**.

At the first stage, the learner has not developed any language-specific procedures yet. Thus, possible outcomes at this stage are single words of invariant form that do not require any processing procedure or information exchange.

The learner at the category procedure stage is assumed to become able to employ lexical form variation, such as the insertion of the affix *-ed* on the verb for indicating past tense and plural *-s* marking on nouns without agreement, as in *I read books*.

At the phrasal procedure stage, the agreement between the head noun and its modifier in the noun phrase, as in *two cats*, is predicted to emerge since the information exchange between two elements in the same phrase becomes possible. In the case of languages with verb phrases, such as English, the learner is assumed to become able to assign particular verb forms with auxiliaries (e.g., *is cooking* vs. *has cooked*) at this stage[1].

The learner at the S(entence)-procedure stage is assumed to become able to exchange information between different phrases. Thus, subject-verb agreement (i.e., third person singular *-s*, as in *Mary likes pizza*) is predicted to emerge at this stage.

Complex structures containing subordinate clauses are placed at the top of the processing hierarchy, namely at S'-procedure stage. At this stage, the learner is assumed to become able to exchange information about the values of relevant diacritic features between elements in different clauses, that is, the main and the subordinate clauses. According to PT, possible outcomes at the S'-procedure stage are indirect questions, as in 11), since the learner needs to distinguish between the main clause and the subordinate clause where the question word order (i.e., *where has Mary gone*?) is not applied.

11) *I wonder where Mary has gone*.

Previous PT studies for English (e.g., Dyson, 2010; Pienemann, 1998; Sakai, 2008) reported that indirect questions were acquired later than other morpho-syntactic structures listed in processability hierarchy. However, as the acquisition of other types of subordinate constructions, such as relative clauses, has not been examined in PT, it is not clear whether indirect questions and other subordinate constructions are acquired at the same stage in processability hierarchy. Therefore, more studies are needed to investigate the developmental stages of complex structures containing various subordinate clauses.

Research Questions

In order to address the issues which remain unclear in previous ESL and PT studies, the following research questions are formulated in this study.

Q1: Are indirect questions acquired at the highest stage in ESL acquisition by a Japanese child as predicted in PT?

Q2: Does the child learner acquire indirect questions and other subordinate constructions at the same time?

Table 1.
Hypothetical hierarchy of processing procedures (after Pienemann, 2005).

Procedure	t1	t2	t3	t4	t5
S-Bar Procedure	-	-	-	-	inter-clausal information exchange
Sentence-Procedure	-	-	-	inter-phrasal information exchange	inter-phrasal information exchange
Phrasal Procedure	-	-	phrasal information exchange	phrasal information exchange	phrasal information exchange
Category Procedure	-	lexical form variation	lexical form variation	lexical form variation	lexical form variation
Word/ Lemma	single words and formulas	single words and formulas	single words and formulas	single words and formulas	single words and formulas

[1]Although PT predicts that verb phrase agreement emerges after noun phrase agreement, the relative sequence is not clear yet (Bettoni & Di Biase, in preparation).

Research Design

In order to trace the way in which English subordinate clauses develop over time, a two-year longitudinal study was conducted on a Japanese primary school child learning English in Australia. Since longitudinal studies on L2 acquisition over a period of two years are rare, the current study provides a valuable resource for investigating ESL development from the beginning point of L2 learning to higher acquisitional stages.

Participant

The informant in this study is a Japanese female child, Kumika (code name). She was a Japanese monolingual until she was 5 years 7 months old. Although she participated in an English activity program instructed by a native speaker of English for 2 hours per week for 32 weeks from 4 years 10 months to 5 years 6 months old, she never received formal English instruction and had few opportunities to speak English in Japan. When she moved to Australia with her family and started attending local primary school at the age of 5 years and 7 months, her English was limited to basic words and formulaic expressions (e.g., *thank you*, *I don't know*).

Data Collection Procedure

Data collection started one month after Kumika started attending local primary school in Australia. The child's speech production in English was audio recorded regularly. **Table 2** shows the amount of her exposure to English in Australia in weeks before each session.

In order to elicit the child's speech production in English, several tasks, such as picture description tasks and communication games, were utilized in this study. Each session lasted 20 to 40 minutes according to the child's motivation. All the audio-recorded sessions were transcribed.

Data Analysis

The distributional analyses of speech data were conducted for English structures listed in PT stages and other subordinate constructions. In order to examine the development of indirect questions and other types of subordinate constructions in detail, subordinate clauses appeared in the child speech production were coded based on previous observational studies (e.g., Diessel, 2004) as follows:

Complement clauses: *S-*, *Wh-*, *If-*complements

Relative clauses: Relative constructions with two propositions or with a single proposition, Presentational (e.g., *there is ~*, *this is ~*), Infinitival, or Participial relatives

Adverbial clauses: Initial or Final adverbial clauses

Then, the development of each type of subordinate clauses is compared with the acquisition of other morpho-syntactic structures listed in PT stages.

Results

The results of the distributional analyses of various subordinate clauses are presented in **Table 3**. The first row shows the different points in time (t1, t2…) in the corpus. Note that *If-*complements are not included in this table as they never appeared in the child corpus. The occurrences of each structure were simply counted and the total number of the occurrences was entered for each structure at each point in time. The number in brackets shows the total number of the occurrences of non-target-like relative constructions. As for *Wh-*complements, the number after the slash "/" indicates the contexts of *Wh-*complements. For instance, "1/2" shows that the child was able to produce one target-like indirect question out of the two contexts.

As shown in **Table 3**, non-target-like relative constructions with a single proposition, as in 12), appeared at t2.

12) *Do you have a flower is pink?*

This structure is called "presentational amalgam construction" (Lambrecht, 1988) and is found to appear as a precursor to the presentational relative constructions at the early stage in child L1 acquisition (e.g., Diessel, 2004).

At t3, target-like relative constructions with a single proposition emerged in the form of infinitival relative clauses, as in 13). Then, participial relative clauses appeared at t4, as in 14).

Table 2.
Kumika's exposure to English in weeks before each session.

Time	t1	t2	t3	t4	t5	t6	t7	t8	t9	t10	t11	t12	t13	t14
Exposure to English (weeks)	4	6	8	10	12	20	28	36	44	52	64	76	88	100

Table 3.
Distribution of subordinate clauses.

Structure/time	t1	t2	t3	t4	t5	t6	t7	t8	t9	t10	t11	t12	t13	t14
*S-*comp	0	0	0	0	0	1	1	2	2	1	4	2	1	2
*Wh-*comp	0	0	0	0	0	0	1/1	3/3	1/1	1/1	1/2	1/1	0	0
Relatives-two propositions	0	0	0	0	0	0	0	0	1	2	0	2	1	0
Relatives-single proposition (with *Wh-*, *that*, or zero)	0	(8)	(1)	0	0	(1)	0	1(1)	4	2	4	5	2	2
(Infinitival relatives)	0	0	2	1	0	0	0	0	0	0	3	0	0	1
(Participial relatives)	0	0	0	2	0	4	5	0	4	0	0	0	8	2
Final ADV	0	0	0	0	0	1	3	0	2	5	3	1	1	7
Initial ADV	0	0	0	0	0	0	1	2	11	5	4	8	9	7

13) *We have a books <u>to read</u>*
14) *I have dog <u>eating the doughnut</u>*

At t6, *S*-complements and adverbial clauses in the final position emerged at the same time, as in 15) and 16) respectively.

15) *Boy think <u>that's a bad man</u>*
16) *Scooby Doo was really scary <u>because they are going fast</u>*

At t7, *Wh*-complements in the form of indirect questions emerged, as in 17).

17) *Do you know <u>what this is</u>?*

At the same time, adverbial clauses in the initial position also emerged, as in (18). Note that "xxx" in brackets indicates an unintelligible word with three syllables.

18) *<u>When boy sleep</u> (xxx) he start to go out from a bottle*

At t8, the child started using relative pronouns in the presentational relative constructions which express a single proposition, as in 19).

19) *One day there was a mother <u>**who** was not scared of anything</u>*

Then, at t9, she finally produced relative constructions containing two propositions for the first time, as in 20).

20) *They have something <u>looks like stick</u>*

Although she omitted a relative pronoun, namely "*that*" in 19), more target-like relative constructions with two propositions appeared at t10, as in 21) and 22).

21) *He got up and look at his frog <u>**that** he caught yesterday</u>*
22) *He saw big bunch of the bees <u>**who** was chasing the dog</u>*

Discussion

The results show the child in this study produced "presentational amalgam constructions" before any of the target-like relative constructions. This is consistent with the findings in child L1 acquisition studies (e.g., Diessel, 2004) and suggests that the amalgam construction can be a precursor to the presentational relative constructions in L2 acquisition as well.

Figure 1 shows PT stages for other morpho-syntactic structures compared with emergence points for subordinate construction examined in this study.

As shown in **Figure 1**, the child was at stage 3, namely phrasal procedure stage, when English subordination emerged. This suggests that the child started using subordinate clauses after she acquired phrasal morphology which requires phrasal procedure. At that time, the child was able to produce relative constructions containing only one proposition. The child was still at stage 3 when S-complements and adverbial clauses in the final position emerged at t6.

When the child reached stage 4, namely S-procedure stage, at t7, *Wh*-complements in the form of indirect questions and adverbial clauses in the initial position emerged. This indicates that indirect questions emerged at the same time when the child
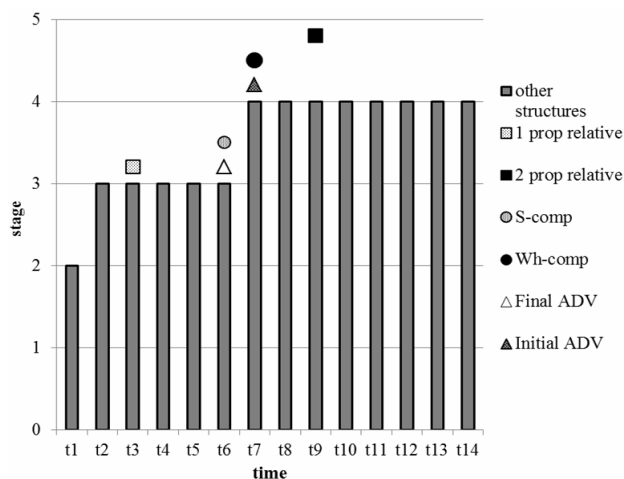

Figure 1.
Stages for other structures compared with emergence points for subordinates.

acquired inter-phrasal morphology. Thus, this finding is not compatible with the prediction in PT that the production of indirect questions requires the highest procedural skill, namely S'-procedure.

On the other hand, relative constructions containing two propositions emerged at t9 after she acquired other morphosyntactic structures listed in PT stages. This suggests that only relative constructions with two propositions can be considered to emerge at the highest stage in L2 acquisition.

These findings indicate that different types of subordinate constructions emerged at different stages in child ESL acquisition. In other words, indirect questions and other types of subordinate constructions, except initial adverbial clauses, are not found to be acquired at the same time. Since indirect questions were acquired when the child was at S-procedure stage, the finding in this study is not consistent with the prediction in PT that English subordination emerges at S'-procedure stage. This suggests that it may be necessary to reconsider possible outcomes at S'-procedure stage in processability hierarchy and to reformulate developmental stages by including other types of subordinate constructions.

However, it should be noted that the earlier occurrence of relative constructions with a single proposition is compatible with the findings in L1 acquisition studies. Also, final adverbial clauses are shown to develop before initial adverbial clauses as found in L1 acquisition studies. These findings suggest that English subordination develops in a similar manner in both L1 and L2 acquisition.

Conclusion

The results of this two-year longitudinal study of a Japanese child learner do not show support for the prediction in PT that indirect questions are acquired at the highest stage in ESL acquisition. This study also demonstrates that indirect questions and other types of subordinate constructions, except initial adverbial clauses, are not acquired at the same time. As only relative constructions expressing two propositions are found to emerge at the highest stage, it seems that the production of subordinate clauses does not always require the highest procedural skill. However, as this study examined only one Japanese pri-

mary school child, more research on the acquisition of complex structures including various subordinate clauses is needed in order to establish more precise developmental stages for English L2.

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