A Study on the Learning of Before and After
by Japanese Learners of English
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Abstract

This thesis focuses on the misplacement of temporal subordinators before / after by Japanese learners of English as a second language (L2). Some L2 learners misplace the subordinators when expressing two events in English using subordinate constructions. For instance, we find such mistaken constructions as “Event 2 before Event 1” or “Event 1 after Event 2,” when in fact Event 1 (E1) occurred first followed by Event 2 (E2). Why do learners make such errors? Why do they misplace the temporal subordinators?

In order to answer these questions, we discuss the structural differences of temporal subordinate clauses in English and Japanese. Through our discussion two major characteristics are identified. One characteristic is that, in English, there are four options for expressing two events using temporal subordinators before / after (i.e., E1 before E2; E2 after E1; Before E2, E1; After E1, E2). In Japanese, on the other hand, there are only two options. In both, the subordinate clause comes prior to the main clause (i.e., E2 maeni (=before) E1; E1 atode (=after) E2). Another difference is that while English subordinators can be viewed as 'prepositional,' their Japanese equivalents are 'postpositional.'

We begin by examining first language (L1) acquisition research on English temporal subordinators before / after. In
this research we often come across the 'order-of-mention' strategy: "for interpreting sentences in which the listener assumes that the event mentioned first happened first" (Hoff-Ginsberg 1997). L1 acquisition researchers believe this is a strategy used by children. We thought that some Japanese learners of L2 English might also use this strategy. We found this was not the case.

We propose, therefore, that Japanese learners of English use two other strategies, the 'subordinate-clause-first' strategy and the 'head-last parameter' strategy. Both reflect influence of the learners' native language. We look at these strategies and their relation to structural differences in English and Japanese. The former strategy might be stated as "When you construct a sentence containing a subordinate clause, place the subordinate clause in the initial position of the sentence." The latter strategy is used "when interpreting or constructing sentences in which the learner assumes that the head-last characteristic of his or her own native language still applies to subordinators in the target language." We assume that learners use these two strategies and thereby misplace the location of temporal subordinators before / after.

Thus, we formulate two hypotheses. First, some Japanese learners of L2 English use the 'head-last parameter' strategy in addition to the 'subordinate-clause-first' strategy when they interpret or express sentences containing temporal
subordinators *before / after*. Secondly, if learners use the 'head-last parameter' strategy, it is possible to reset the L1 value of the parameter to the L2 value.

In order to confirm these two hypotheses, an experimental study on the effectiveness of teaching post-posed temporal subordinate clauses was conducted with Japanese high school students learning English as a foreign language. An experimental group received instruction on post-posed temporal subordinate clauses. A control group was instructed on the indirect question form. Both groups were encouraged to raise their consciousness to the target structures while receiving instruction. Subjects were tested prior to instruction, immediately after instruction, and again after 5 weeks following instruction.

As expected, the results show that the group instructed on temporal subordinators *before / after* performed significantly better than the group instructed on the indirect question. The results also show that the group which received instruction on *before / after* retained proficiency of post-posed temporal subordinate clauses 5 weeks after instruction. Judging from the evidence, it seems that formal instruction is effective, especially when it includes consciousness-raising on the form of the target language. This experiment provides evidence that formal instruction can bring about durable, effective learning.

We find that the experimental evidence supports both of our
hypotheses. That is, some Japanese learners of L2 English use the 'subordinate-clause-first' strategy and the 'head-last parameter' strategy when they interpret or express sentences containing temporal subordinate clauses. Furthermore, it is possible to reset the L1 value of the head-parameter to the L2 if appropriate treatment is provided.

Unexpectedly, the results of the experiment indicate that the performance of the group instructed on the indirect question form was significantly better in the post-test 2 than in the pre-test and than in the post-test 1. There are two possible explanations for the results: (1) practice effect and (2) the effect of a word test given before post-test 2.

We find three limitations to our experiment. First, it does not measure oral ability of the subjects. Secondly, it does not test 'pre-posed' temporal subordinate clauses. Finally, it does not measure the knowledge of before / after as 'prepositions,' which are used in 'before NP' or 'after NP.' Additional research will be needed to sort out these limitations.

Given the results of our study, further research into learner strategies with other subordinators may prove interesting. These other subordinators include temporal subordinators (e.g., as, when, while, etc.), causal subordinators (e.g., because, since, etc.) and concessive subordinators (e.g., although, though, etc.).
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Chapter 1

Introduction

1.1 Focus of inquiry

Second language (L2) acquisition research has gained much from first language (L1) acquisition research. This can be observed in various fields of L2 acquisition research. Morpheme order studies in L1 research greatly influenced L2 research, especially in the 1970s. Issues concerning abstract principles and parameters in the framework of Universal Grammar (UG) theory have explored the deeper-level mechanisms of both L1 and L2 acquisition. The functionalist analysis of L1 acquisition research has widened the view of L2 acquisition research.

In spite of the many findings, there still remain unsolved issues in both L1 and L2 research. One such issue is how language learners conceptualize temporal relationships.

Many L1 acquisition researchers have focused on how young children acquire the concept of temporal relationships (Amidon and Carey 1972; Atkinson 1982; Clark 1971, 1973a, 1973b, 1993; Clark and Clark 1977; Goodluck 1991; Hatch 1971; Johnson 1975; Silva 1991; Stevenson and Pollitt 1987, among others). No doubt, Clark's (1971) study on the acquisition of before and after inspired L1 researchers to investigate how children grasp the notion of temporal relations.

L2 researchers, on the other hand, have shown less interest
in this issue. As far as temporal subordinators are concerned, only a few studies have tackled the issue. Let us take a brief look at two examples here.

In his longitudinal study of 3 Japanese-speaking learners of English, Koike (1983) reports that his subjects showed a common feature in using temporal subordinators. They tended to pre-pose the subordinate clause and post-pose the main clause. In other words, they constructed sentences by putting the subordinate clause first, followed by the main clause. He notes that such sentence construction might correspond to the structure of Japanese sentences containing clauses which refer to consecutive events.

Flynn (1987) examined the acquisition of English sentences containing the subordinator when by Spanish and Japanese learners of L2 English. She hypothesized that while Spanish learners would prefer post-posed subordinate clauses to those pre-posed, Japanese learners would prefer pre-posed subordinate clauses to those post-posed. She assumed that the head-parameter value explained the difference between the two groups. She claimed that her experiment results confirmed her assumption. However, it should be noted that her conclusion drew severe criticism.

In the present thesis we intend to shed light on one aspect of the issue of temporal notion; the learning of temporal subordinators before and after by Japanese learners of English
as L2. In particular, we examine why some Japanese learners of English tend to misplace the subordinators when they express two events in subordinate constructions. The following is a typical error:

\[
\text{Watashi wa hon wo yomu maen, tegami wo kita. (Japanese)}
\]

"I book read before letter wrote"

* "I read a book before I wrote a letter." (Wrong interpretation)

The sentence in Japanese above can be expressed in English as "I wrote a letter before I read a book" or "Before I read a book, I wrote a letter."

It seems that Japanese learners of English are influenced by their mother tongue. We propose that they employ two strategies in comprehending English structures containing subordinators; the 'subordinate-clause-first' strategy and the 'head-last parameter' strategy. It is likely that the former strategy is used as it is characteristic of Japanese language use. The latter is a term from UG theory and concerns the head direction within phrases. We examine how and to what extent these strategies relate to the errors peculiar to Japanese learners of English. As the issue is inevitably related to the topic of parameter-setting in L2 research, we discuss whether a parameter-resetting takes place or not.

One important concern of L2 research is whether formal
instruction is effective or not. In order to deal with this issue, our experimental procedure in this present study involves formal instruction of temporal subordinators conducted at a Japanese senior high school where English is taught as a foreign language.

1.2 Overview of thesis

In Chapter 1, we provide a general introduction. Chapter 2 raises the question of why some Japanese learners of English as L2 misplace the location of the temporal subordinators. We examine the characteristics of Japanese and English subordinate clauses in order to answer this question.

In Chapter 3, we review research on temporal subordinators and consider the influence of learners' native language on L2 acquisition. We look at three strategies used by Japanese learners of English; the 'order-of-mention' strategy, the 'subordinate-clause-first' strategy, and the 'head-last parameter' strategy.

Chapter 4 describes the experimental research conducted at a senior high school in Japan. We present the methodological design, including a pre-test, instructional treatments, two post-tests and results.

In Chapter 5, we discuss the results of the experiment and the implications for pedagogy.
Chapter 2
An Examination into Subordinators

2.1 Introduction
Some Japanese learners of English as L2 tend to misplace the location of temporal subordinators. Differences in the characteristics of Japanese and English subordinate clauses may explain this tendency to error. We look at the phenomenon in this chapter.

2.2 A tendency to error
Suppose you wish to communicate a sequence of two events. What would you say?

Event 1: I wrote a letter.
Event 2: I read a book.
(Event 1 happened first, followed by Event 2.)

Some would express these two events by using two simple sentences such as “I wrote a letter. Then, I read a book.” Some might express the events in a single sentence with the first event coming first (i.e., “I wrote a letter and I read a book”; “After I wrote a letter, I read a book”; “I wrote a letter before I read a book”). Still others might begin their explanation with the second event (i.e., “Before I read a book, I wrote a letter”; “I read
a book after I wrote a letter").

In short, when we try to express a sequence of two events using temporal subordinators (before / after) in English, we have four options.

1. Event 1 before Event 2 (E1 before E2)
   “I wrote a letter before I read a book.”

2. Event 2 after Event 1 (E2 after E1)
   “I read a book after I wrote a letter.”

3. Before Event 2, Event 1 (Before E2, E1)
   “Before I read a book, I wrote a letter.”

4. After Event 1, Event 2 (After E1, E2)
   “After I wrote a letter, I read a book.”

Note that (1) and (2) have post-posed subordinate clauses. Some Japanese learners of English have difficulty with this structure.

The following mistakes are likely to occur:

5. “Event 1 before Event 2” is constructed as
   “Event 2 before Event 1.”

6. “Event 2 after Event 1” is constructed as
   “Event 1 after Event 2.”

(In both cases, Event 1 took place first and followed by Event 2).
Such errors are not made with sentences containing pre-posed subordinate clause as in options (3) and (4). Why do some Japanese learners mistake the order of events in sentences with sentence-medial subordinators (E1 before E2 / E2 after E1)? Why aren’t the same mistakes made with sentences containing sentence-initial subordinators (Before E2, E1 / After E1, E2)?

2.3 Subordinate clauses—Japanese vs. English
Let us now turn to the characteristics of Japanese subordinate clauses. This might shed light on why some Japanese learners of English misplace temporal subordinators.

Here, again, let us look at the examples mentioned in the previous section.

Event 1: I wrote a letter.
Event 2: I read a book.
(Event 1 happened first, followed by Event 2)

As we pointed out, if we express the two events using the temporal subordinators before / after in English, there are four options (i.e., E1 before E2; E2 after E1; Before E2, E1; After E1, E2).

In Japanese, there are only two options.
(7) Before Event 2, Event 1 (Before E2, E1)

"Before I read a book, I wrote a letter."

(8) After Event 1, Event 2 (After E1, E2)

"After I wrote a letter, I read a book."

They would be expressed in Japanese as follows:

(9) Event 2 maeni (=before) Event 1 (E2 maeni E1)

(10) Event 1 atode (=after) Event 2 (E1 atode E2)

The subordinators fall in the medial position of the sentences, a problematic structure for some Japanese learners of English as described in the previous section.

In summation, English allows four options for expressing two sequential events using the temporal subordinators before / after. In Japanese, there are only two options using the word equivalents maeni (=before) / atode (=after). Subordinate clauses cannot be post-posed in Japanese.

Koike (1983) has found that this Japanese character influences the production of English subordinators by Japanese learners of L2 English. In his longitudinal study of 3 Japanese-speaking learners of English, Koike reports that his subjects showed a common feature in using temporal subordinators. He claims that they tended to pre-pose the subordinate clause and post-pose the main clause:
Conditional adverbial clauses were seen in the children's utterances equally on the frequency level. Adverbial clauses of time were introduced by the conjunction when in most cases, and occasionally by the conjunctions while, before, and after. They usually modified the main clause in the preceding position at the head of the sentence. It appears only once in the postposition of the main clause. This is the same with the conditional conjunction if and the conditional clause. It seems that the adverbial subordinate clause is at the head of the main clause in the children's conversation utterances. Since the same type of clause in Japanese is also at the head of the sentence, the children probably did not have trouble in determining the order of the subordinate and main clauses in English. There is no concessive adverbial clause nor any other adverbial clauses except the above.

(Koike 1983: 319)

His study shows that the subjects applied the rule of their mother tongue to that of the target language when they constructed sentences containing subordinate clauses, although they did not fail to locate subordinators correctly.

Kuno provides us with a different angle on Japanese subordinate clauses:

Japanese lacks prepositions. All case relations and other functional relations that would be represented in English by prepositions, subordinating conjunctions, and coordinating conjunctions are expressed in Japanese by "particles" that are postpositional.

(Kuno 1983: 4-5)

In particular, the 'postpositional' characteristic of Japanese should not be overlooked, as it is highly relevant to the
characteristics of English that we are going to discuss.

According to Quirk et al. (1985: 998):

SUBORDINATORS (or more fully SUBORDINATING CONJUNCTIONS) are the most important formal device of subordination, particularly for finite clauses. Like prepositions, which they resemble in having a relating function, subordinators forming the core of the class consist of a single word, but there is a larger range of complex subordinators which function, to varying degrees, like a single conjunction.

It is worth noting that, in English, subordinators can be viewed as 'prepositions.'

In his compiled dictionary, Crystal (1997: 370) comments on subordinators as 'prepositions,' saying that "some grammarians analyse certain subordinators (e.g. before, since, until) as PREPOSITIONS with sentential COMPLEMENTS." We can find some scholars with this position. For instance, Baker (1995: 369) considers subordinators as 'clause-taking preposition.' McCawley (1998: 195) refers to them as 'prepositions with sentential objects.' Furthermore, Crain and Lillo-Martin (1999: 148) and Goodluck (1991: 85) include subordinate clauses as prepositional phrases (PP) in tree diagrams.

Therefore, it might be safe to say that some subordinators in English can be considered 'prepositions.' This characteristic contrasts clearly with that of Japanese subordinators which, as
Kuno (1983: 5) suggests, are "expressed in Japanese by 'particles' that are postpositional."

So far, we have examined the characteristics of Japanese and English sentences containing subordinators. One characteristic is that while in English there are four options to express two events by using temporal subordinators before / after, in Japanese there are only two options; sentences with pre-posed subordinate clauses. Another characteristic is that although English subordinators can be viewed as 'prepositions,' the Japanese equivalents are 'postpositional.' In the next chapter, we will examine them in more detail.
Chapter 3

Three Strategies in Using English Temporal Subordinators

3.1 Introduction

In the preceding chapter, we pointed out that there are crucial differences between the characteristics of Japanese and English subordinate clauses. In this chapter, we consider why some Japanese learners of L2 English mistake the location of the temporal subordinators before / after. To settle the issue we will look first at L1 research of English temporal subordinators. Then, we will examine three strategies in terms of L2 learning: the 'order-of-mention' strategy, the 'subordinate-clause-first' strategy, and the 'head-last parameter' strategy. In particular, the latter two strategies appear to be influenced by the learners' native language in L2 English learning. We will discuss the influence in this chapter.

3.2 Temporal subordinators before / after in L1 research

Let us first look at the L1 research dealing with temporal subordinators. This will provide useful hints as to why some Japanese learners of L2 English mistake the location of temporal subordinators before / after.

On the acquisition of temporal subordinators before / after by native speakers of English, Clark (1971) finds that young children use an 'order-of-mention' strategy. They perform
better with sentences in which the order of mention in the sentence corresponds to the order of events (i.e., E1 before E2; After E1, E2), than with sentences in which the order of mention does not match the order of events (i.e., E2 after E1; Before E2, E1). Furthermore, Clark finds that children's performance is better in sentences containing before than in sentences containing after. She explains this phenomenon in terms of semantic features. According to her, the meaning of each word can be represented as a set of features arranged hierarchically (Clark 1971: 273). The features of before are [+Time], [−Simultaneous] and [+Prior], while those of after are [+Time], [−Simultaneous] and [−Prior]. The priority of the positive value of the third feature [+Prior] distinguishes before from after in the children's performance.

These two observations by Clark have been examined by a number of scholars. In contradiction to the first observation, that children use the 'order-of-mention' strategy, Amidon and Carey (1972) find evidence that children attend more to the main clause than to the subordinate clause. On the contrary, Johnson (1975: 99) argues that "order of mention emerged as more important than coordinate-subordinate relations in describing children's strategy for processing temporal order information." Interestingly, Stevenson and Pollitt, denying both claims by Clark and by Amidon and Carey, point out that the sentences in these previous studies "did not give a pure measure
of children's understanding of temporal terms" (1987: 541). Gorrell, Crain and Fodor (1989) also show that children do not use the 'order-of-mention' strategy because the sentences they used in their study are 'lighter' than those employed in Clark's experiment, although they admit that their study is not designed to address the issue of the strategy.

Indeed, L1 research opinions diverge on the 'order-of-mention' strategy. Nevertheless, the strategy might help explain why some Japanese learners of L2 English mistake the location of temporal subordinators. We will examine this strategy as it relates to L2 learning in section 3.3.

Clark's second observation that semantic features facilitate the acquisition of temporal subordinators has been criticized on many grounds (Amidon and Carey 1972; Atkinson 1982; Goodluck 1991; Stevenson and Pollitt 1987). "The evidence in favor of the priority of superordinate features has been mixed and is open to alternative explanation. Also, the pervasiveness of overgeneralization of word meanings has been challenged" (Goodluck 1991: 133). Recently, Clark herself has abandoned the idea of semantic features (cited in Barrett 1995: 377). Thus, it will be wise not to follow this matter since we have not examined whether or not the difference between before and after affects language learner's performance. To argue this point would carry us too far away from the aim of this paper. Let us return to the main subject in the next section.
3.3 The ‘order-of-mention’ strategy

In the previous section, we reviewed L1 research on the English temporal subordinators before / after. While the issue is controversial, the ‘order-of-mention’ strategy seems critical to the problem of why some Japanese learners of L2 English mistake the location of temporal subordinators. In this section, we will consider this strategy in detail.

According to Hoff-Ginsberg (1997: 439), the ‘order-of-mention’ strategy is defined as “a strategy for interpreting sentences in which the listener assumes that the event mentioned first happened first.” That is to say, in comprehension, a language learner assumes that Event 2 happened first in sentences such as “Before E2, E1” or “E2 after E1” although, in fact, Event 1 happened first.

This strategy might be used by some Japanese learners of L2 English. When comprehending sentences such as “Before E2, E1” or “E2 after E1,” they incorporate the ‘order-of-mention’ strategy and suppose that Event 2 occurred first. In this case, we may state that the language learners are primitive, since it seems that they do not know the meaning of the temporal subordinators before / after. In truth, in English L1, younger children are said to depend on the ‘order-of-mention’ strategy since they cannot distinguish before from after (Clark 1971). In L2 research, Cook (1977) reported that L2 adult beginners in English found it more difficult to understand “E2 after E1” than
"After E1, E2," "Before E2, E1" or "E1 before E2," suggesting they might use the 'order-of-mention' strategy on the sentence type "E2 after E1."

How about sentences where the sequence of events is mistaken? Typical errors made by some Japanese learners of L2 English include "E1 after E2" or "E2 before E1." Some Japanese learners of English may use the 'order-of-mention' strategy as children do and conclude that what was mentioned first happened first, disregarding the meaning of before / after. These L2 learners might be considered primitive.

It may be said that, in comprehension, some Japanese learners of English use the 'order-of-mention' strategy with any sentences containing temporal subordinate clauses. If so, the learners might not even know the true meaning of before / after. How about in production?

The 'order-of-mention' strategy is believed to be used "for interpreting sentences in which the listener assumes that the event mentioned first happened first" (Hoff-Ginsberg 1997: 439). That is, the strategy is used in comprehension, not in production. It is difficult to explain by reason of this strategy alone why some Japanese learners construct sentences such as "E1 after E2" or "E2 before E1." What we need is a convincing explanation of this phenomenon that covers both comprehension and production. We have to abandon the 'order-of-mention' strategy here. We will propose and examine an alternative
strategy in the next section.

3.4 The 'subordinate-clause-first' strategy

Let us now take a look at the difference between English and Japanese temporal subordinate clauses containing before / after. As pointed out in Chapter 2, in English, there are four ways to express a sequence of two events using temporal subordinators before / after (i.e., E1 before E2; E2 after E1; Before E2, E1; After E1, E2). On the other hand, in Japanese, there are only two ways, using the equivalents maeni (=before) / atode (=after) (i.e., E2 maeni E1; E1 atode E2). Both sentences contain proposed subordinate clauses. It appears that the position of the subordinate clause has some bearing on our inquiry. We will examine the issue further in the following section.

Regarding the position of subordinate clauses, a recent study by Biber et al. (1999), based on analysis of a 40-million-word corpus of texts (e.g., conversation and newspaper language), shows that, in English, post-posed subordinate clauses are preferred. According to the study, sentences with final-position subordinate clauses accounted for 60% of the total, compared to 40% of sentences with initial-position subordinate clauses. This preference is observed across all registers. For example, temporal subordinate clauses "in all registers have a preference for final position, but the preference is stronger in the written registers" (Biber et al. 1999: 833). In the conversation
registers, 40% of these clauses are in the initial position, whereas 60% are final-position clauses. Similarly, in written registers, while the initial-position preference accounts for 25% of all the temporal clauses, the final-position preference accounts for 75% of all the clauses. It is duly noted that, for temporal subordinate clauses in English, the final position is preferred.

On the contrary, as mentioned above, temporal subordinate clauses in Japanese are always in the initial position. Intuitively, native speakers of Japanese may assume that:

When you construct a sentence containing a subordinate clause, place the subordinate clause in the initial position of the sentence.

We call this a 'subordinate-clause-first' strategy. The following are typical Japanese temporal subordinate clauses. Needless to say, the subordinate clauses are pre-posed.

(11) E₂ maeni E₁ (=[[ E₂ maeni ] [ E₁ ]])

Watashi wa hon wo yomu maeni, tegami wo kaita.
I book read before letter wrote

"Before I read a book, I wrote a letter."

(12) E₁ atode E₂ (=[[ E₁ atode ] [ E₂ ]])

Watashi wa tegami wo kaita atode, hon wo yonda.
I wrote a letter after I read a book.

"After I wrote a letter, I read a book."

Consequently, when Japanese learners of English construct sentences containing pre-posed subordinate clauses to express two events in English, they are using the 'subordinate-clause-first' strategy. There is empirical evidence to support the prediction. As pointed out earlier, Koike (1983) finds that his subjects tended to use pre-posed subordinate clauses. He explains that "since the same type of clause in Japanese is also at the head of the sentence, the children probably did not have trouble in determining the order of the subordinate and main clauses in English. There is no concessive adverbial clause nor any other adverbial clauses except the above" (1983: 319). In other words, his subjects constructed such sentences as "Before E2, E1" or "After E1, E2."

As just mentioned, there is a possibility that some Japanese learners of English pre-pose temporal subordinate clauses. If so, the strategy may explain the chief concern of this paper. Look at (13) and (14), which are errors made by some Japanese learners of L2 English. Note that, in truth, E1 happened before E2 happened.

(13) E2 before E1

"I read a book before I wrote a letter."
(14) E1 after E2

"I wrote a letter after I read a book."

The subordinate clause seems to follow the main clause. However, if learners assume that the subordinate clause ends with the temporal subordinator as illustrated in (15) and (16), errors such as (13) and (14) will likely occur.

(15) [[ E2 before ] [ E1 ]]

"[[ I read a book before ] [ I wrote a letter ]]."

(16) [[ E1 after ] [ E2 ]]

"[[ I wrote a letter after ] [ I read a book ]]."

Learners may assume that since Japanese subordinate clauses are always in the initial position, English temporal subordinators should be contained in the first clause of the sentence. We refer to this as the 'subordinate-clause-first' strategy.

However, there still remains a problem. Some learners correctly place temporal subordinators in the initial position of pre-posed subordinate clauses. Others place them in the final position of the subordinate clauses, as in (15) and (16), so that we get errors such as (13) and (14). Use of the 'subordinate-clause-first' strategy cannot satisfactorily account for this discrepancy in behavior. Other strategies may operate. We
will propose one in the next section.

3.5 The 'head-last parameter' strategy
We have found that the 'subordinate-clause-first' strategy cannot fully account for learners' misplacement of temporal subordinators before / after. Before proposing an alternative strategy, let us consider the head-direction of both Japanese and English.

"One way in which languages differ is the order of the head of a construction and its complements or modifiers" (Bley-Vroman and Chaudron 1988: 69). Japanese is said to be a head-last language as the head verb follows verbal complements. On the other hand, English is claimed to be head-first as the head verb precedes verbal complements. This difference is explained by the head-parameter; "the variation in order of elements between languages amounts to a single choice between head-first or head-last" (Cook and Newson 1996: 15). This difference may account for the difficulty facing some Japanese learners of English.

Let us draw tree diagrams here to show the difference of head-direction in Japanese and English subordinate constructions. Take the following two sentences: "Watashi wa hon wo yomu maeni, tegami wo kaita" and "Before I read a book, I wrote a letter." The structure of each sentence is illustrated in (17) and (18) respectively.
As illustrated above, the temporal subordinate clause precedes the main clause in each construction. Note the position of the head in each PP. In (17), the head is in the last position of P'.

(17)

\[
\begin{array}{c}
\text{IP} \\
\text{PP} \\
\text{P'} \quad \text{Postposition} \\
\quad \text{watashi wa hon wo yomu} \quad \text{maeni (= before)} \\
\end{array}
\]

\[
\begin{array}{c}
\text{IP} \\
\text{PP} \\
\text{P'} \quad \text{I wrote a letter} \\
\quad \text{Preposition} \quad \text{IP} \\
\quad \text{Before} \quad \text{I read a book} \\
\end{array}
\]
That is to say, the structure is 'head-last.' On the other hand, in (18), the head is in the first position of P'. That is, the structure is 'head-first.' This is also the case with the temporal subordinate clauses with 'atode' and 'after.'

Sentence construction errors such as "E2 before E1" or "E1 after E2" will occur if Japanese learners apply their own 'head-last' nature to English temporal subordinators. We call this application the 'head-last parameter' strategy. Learners construct English sentences in accordance with the head-last characteristics of their native Japanese. Some Japanese learners of English may be using the 'head-last parameter' strategy in their placement of subordinators, placing the English subordinate in the position it would take in Japanese.

This evaluation would seem to make sense. The 'subordinate-clause-first' strategy may account for the tendency of Japanese learners of L2 English to pre-pose English subordinate clauses, but fails to explain why they place temporal subordinators in the final position of pre-posed English subordinate clauses. The 'head-last parameter' strategy explains this phenomenon. If learners place temporal subordinators at the initial position of subordinate clauses, it may be assumed that they know the function of English temporal subordinators. If they place the subordinators at the final position within pre-posed subordinate clauses, we may say that they have not succeeded in resetting the value of the 'head-
direction' parameter.

It is important to note here that the 'head-last parameter' strategy works only if the 'subordinate-clause-first' strategy works. In other words, some learners may use the 'subordinate-clause-first' strategy and then use the 'head-last parameter' strategy.

In summary, we have proposed the 'head-last parameter' strategy in addition to the 'subordinate-clause-first' strategy, to understand why Japanese learners of English as L2 misplace the location of temporal subordinators. The point is that the learners may use the 'subordinate-clause-first' strategy first and then use the 'head-last parameter' strategy when misplacing temporal subordinators in the final position of pre-posed subordinate clauses. In particular, the 'head-last parameter' strategy seems more likely to result in error. If the learners could reset the value of the head-direction parameter, they would not make such errors.

Japanese learners of English need to reset the head-direction at the node of PP (Postpositional Phrase). It is important for teachers to get learners to focus attention on resetting the head-parameter to L2 value at temporal subordinators.

Before going on, let us look more closely into one more issue related to the 'head-direction parameter.' Flynn (1987) experimentally examined the acquisition of English sentences
containing the subordinator *when* by Spanish and Japanese learners of L2 English. One of her hypotheses is that while Spanish learners would prefer post-posed subordinate clauses to those pre-posed, Japanese learners would prefer pre-posed subordinate clauses to those post-posed. She assumes that the key difference between the groups was due to the value of head-parameter. Based on the result of her experiment, she claims that the assumption was confirmed.

However, many scholars have criticized her conclusions. For instance, Yamaoka (1988, 1997) doubts her ways of hypothesis formation and her interpretation of the result of the experiment. Bley-Vroman and Chaudron (1988: 71) point out that “we know of no version of current linguistic theory from which such a connection between head-complement direction and adverbial clause placement could be derived.”

Although much remains dubious in Flynn’s experiment, we should admit that she was the first in L2 acquisition research to attempt to investigate whether parameter-resetting takes place or not (Yamaoka 1997).

It must be noted that the big difference between Flynn’s interpretation and ours is the viewpoint on the head-direction parameter. She supposes that while a main clause is the head of a sentence, a subordinate clause is its complement. In other words, she assumes that a clause itself can be treated as the head of the construction. As Bley-Vroman and Chaudron
(1988) point out, this interpretation is beyond linguistic theory. Our interpretation is that the temporal subordinate clause is a prepositional phrase (PP) and that the preposition is the head of the PP. Namely, we discuss it within the framework of linguistic theory. It seems that our research is at least heading in the right direction.

To summarize, it seems that some Japanese learners of L2 English use not only the 'subordinate-clause-first' strategy, but also the 'head-last parameter' strategy when they express two events using temporal subordinators before / after. The latter strategy is more apt to cause such error types as "E2 before E1" or "E1 after E2." To avoid such errors, L2 teachers should encourage their learners to pay more attention to the head-direction of temporal subordinators and to reset the L1 value of the head-direction parameter to the L2 value.

3.6 The influence of the native language

In the preceding two sections, we have proposed the two strategies, the 'subordinate-clause-first' strategy and the 'head-last parameter' strategy, to understand why some Japanese learners of L2 English misplace the location of temporal subordinators before / after. Both strategies result from the influence of the mother tongue of the language learners.

To round off this chapter, we would like to take a brief look at the influence of the native language.
We choose to say 'the influence of the native language' rather than 'transfer' or 'interference' in so much as "the danger of using such technical terms closely associated with particular theories is that they may perhaps quite unconsciously constrain one's freedom of thinking about the particular topic" (Corder 1983: 86). However, many scholars continue to use technical terms.

We have to consider whether errors are due to the influence of the native language itself or are developmental problems in the language acquisition process. Regarding temporal subordinators, the influence of the native language would seem to be the culprit, but this remains unclear.

In order to determine the influence of the native language, all we have to do is to see whether some Japanese learners of L2 English use the two strategies we have proposed. We will examine this question in the next chapter.
Chapter 4
Present Study

4.1 Introduction

In the previous chapters, we examined why some Japanese learners of English as L2 misplace the temporal subordinators before / after. It may be that these L2 learners use the 'subordinate-clause-first' strategy and the 'head-last parameter' strategy, both of which indicate some influence of the native language, not only in interpretation, but also in production of sentences containing those subordinators. Particularly, the 'head-last parameter' strategy seems more problematic in determining placement of temporal subordinators.

Thus, the following hypotheses are formulated and they will be verified in the present study:

1) Some Japanese learners of L2 English use the 'head-last parameter' strategy in addition to the 'subordinate-clause-first' strategy when they interpret or express sentences containing temporal subordinators before / after.

2) If they use the 'head-last parameter' strategy, it is possible to reset the L1 value of the parameter to the L2 value.

4.2 Subjects

Subjects were 80 first-year students of a public senior high
school in Japan. They are native speakers of Japanese and learn English as a foreign language. They have little contact with English outside the classroom. Two classes of 40 students each participated in this study. One class was an experimental group and the other a control group. The present study includes a pre-test, instruction, and two post-tests. Only students who participated in the entire procedure were chosen as subjects. The final number of subjects came to 61, 29 in the experimental group and 32 in the control group.

The experimental group, or *before / after* group, was explicitly taught English post-posed subordinate clauses containing the temporal conjunctions *before / after*. The control group, or *wh*-question group, was not taught English post-posed subordinate clauses, but was instructed on English indirect questions with *wh*-questions.

A pre-test consisted of 5 tasks, as is explained in section 4.5, was given before the experimental instruction in order to check whether the groups were of the same quality in terms of English proficiency. One-way analysis of variance (ANOVA) was run on the pre-test scores, indicating no significant difference between the groups. Thus, both groups were considered to be equivalent in their proficiency in English (see Appendix 1).
4.3 Timetable and research design

Both groups were pre-tested on English temporal subordinators *before / after*, and indirect questions with / without *wh*-questions in the first class. In the next class, the experimental *before / after* group received form-focused instruction on post-posed subordinate clauses containing temporal conjunctions *before / after*. The control *wh*-question group received instruction on the formation of indirect questions with *wh*-questions in their second class. In the third class, after reviewing what they had been taught for a few minutes, both classes were post-tested on English temporal subordinators *before / after*, indirect questions with / without *wh*-questions (first post-test). A second post-test was fixed 5 weeks after the first post-test.

4.4 Instructional treatments

Two special instructional treatments were prepared for this study, one for the experimental *before / after* group and the other for the control *wh*-question group.

A teacher instructed the experimental group on post-posed temporal subordinate clauses. Errors concerning with temporal subordination made by Japanese learners of English include the misplacement of temporal subordinators. We have hypothesized that these errors result from the fact that the learners use both the 'subordinate-clause-first' strategy and the 'head-last
parameter' strategy. We have also hypothesized that if this is the case, it is possible for the learners to reset the value of the parameter with instructional help. The meaning of the temporal subordinators before / after and their placement was emphasized. The subjects were encouraged to pay close attention to the position of the subordinators in the post-posed subordinate clauses and to their grammatical functions as head of the clause. The teacher underlined temporal subordinators on the blackboard and explained that they were contained in the post-posed clauses, indicating the subordinators' function as head of the clause. There was no mention made that temporal subordinate clauses can be pre-posed in English (see Appendix 2).

The control group received instruction on indirect questions containing wh-questions from the same teacher. The teacher emphasized the form of the target structures and the necessity to cancel the inversion of word order in the structures (see Appendix 3).

In both groups, instruction and exercises were form-focused, in that the teacher pointed out errors and corrected them. As for the exercises, subjects in each group were given task sheets on each target structure and required to complete the tasks (see Appendices 4 and 5).

The teacher was a native speaker of Japanese.
4.5 Tests

Three different tests (a pre-test and two post-tests) were used to assess the effect of instruction. All tests consisted of five written tasks (see Appendices 6, 7, 8):

(1) Sentence-picture matching task. The aim of this task was to assess subjects' understanding of temporal subordinators *before / after*. The task contained four items. Each item consisted of two pictures and three sentences. Subjects had to choose the sentence best depicting the relationship of the two pictures.

(2) Grammaticality judgement task. The aim of this task was to assess subjects' comprehension of indirect questions. The task contained four items. Each item consisted of three sentences. Subjects had to choose the grammatically correct sentence.

(3) Re-arrangement task. This task consisted of 8 items. Four items were for measuring subjects' knowledge of temporal subordinators *before / after*, two were to measure knowledge of indirect questions with *wh*-questions and the remaining two were to measure knowledge of indirect questions without *wh*-questions. Each item consisted of a sentence in English with the words scrambled and a Japanese translation. Subjects had to indicate the proper word order of the English sentence using the Japanese translation.
(4) Translation task. Subjects had to translate into Japanese two English sentences containing temporal subordinators before / after.

(5) Sentence completion task. The aim of this task was to measure subjects' knowledge of indirect questions. This task contained 3 items. Each item contained an illustration with a speech bubble and the beginning of an indirect question. Subjects had to complete the question according to the illustration and speech bubble.

Among the five tasks, (1), (3) and (4) were related to the present study.

Subjects were given 30 minutes for each test.

4.6 Scoring procedures

Raw scores for each subject were calculated for the three tasks measuring knowledge of temporal subordinators before / after (i.e., the sentence-picture matching task, the re-arrangement task and the translation task). Each correct response to the task 10 items was given a score of 1 for a possible total score of 10 (Although the re-arrangement task consisted of 8 items, the items which measured the knowledge of indirect questions were excluded from the analysis).

At the same time, we carefully examined the errors. Among the errors, we identified the following as caused by the
'subordinate-clause-first' strategy and the 'head-last parameter' strategy:

(1) In the sentence-picture matching and re-arrangement tasks, errors which were expressed by misplacement of postposed subordinate clauses and of temporal subordinators in pre-posed subordinate clauses.

(2) In the translation task, errors in which events were reversed in the Japanese translation.

Thus, each subject was also assigned a score of errors attributed to the 'subordinate-clause-first' strategy and the 'head-last parameter' strategy. The error scores varied considerably between individuals, from 0 to 10.

4.7 Results

4.7.1 Combined three tasks

Table 1 displays the means and standard deviations of each group's scores on the combined three tasks for three tests. Figure 1 shows the scores.

A $2 \times 3$ mixed ANOVA (two groups $\times$ three tests) was performed on the scores of combined three tasks (i.e., a sentence-picture matching task, a re-arrangement task and a translation task). The ANOVA shows significant main effects on the factor of group ($F(1, 59) = 19.566, p < .001$) and on the
Table 1: Mean scores and standard deviations on combined three tasks for three tests

<table>
<thead>
<tr>
<th></th>
<th>B/A group (N = 29)</th>
<th>Wh-Q group (N = 32)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Pre-test</td>
<td>4.10</td>
<td>2.52</td>
</tr>
<tr>
<td>Post-test 1</td>
<td>8.14</td>
<td>2.15</td>
</tr>
<tr>
<td>Post-test 2</td>
<td>8.31</td>
<td>2.20</td>
</tr>
</tbody>
</table>

Figure 1. Combined three tasks: scores

factor of test \((F(2, 118) = 27.123, p < .001)\). The interaction between the two factors is also significant \((F(2, 118) = 17.775, p < .001)\) (see Appendix 9). A Ryan procedure applied \((p < .05)\) shows that there is no significant difference between the before / after group and wh-question group before instruction and a significant difference after instruction. The before / after group's pre-test performance significantly differs from its performance in both post-tests. The two post-test scores do not differ significantly from each other. This means that the before / after group improved significantly after instruction and
maintained proficiency of the target structures for five weeks. The scores of post-test 2 of wh-question group are significantly higher than those of pre-test and post-test 1 (see Appendix 10). This may have been due to practice effect. We will talk about this phenomenon in the next chapter.

Table 2 shows the percentages of errors of each task on each test attributed to both the 'subordinate-clause-first' strategy and the 'head-last parameter' strategy. The percentages account for a ratio of these kinds of errors in all the responses including correct response or other errors.

Table 2: Errors attributed to the 'subordinate-clause-first' and the 'head-last parameter' strategies, in all responses, in percentages

<table>
<thead>
<tr>
<th>Task</th>
<th>Pre-test</th>
<th>Post-test 1</th>
<th>Post-test 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B/A  Wh-Q</td>
<td>B/A  Wh-Q</td>
<td>B/A  Wh-Q</td>
</tr>
<tr>
<td>S-P task</td>
<td>74.14 78.13</td>
<td>17.24 64.03</td>
<td>10.34 47.66</td>
</tr>
<tr>
<td>Re-A task</td>
<td>42.24 45.31</td>
<td>18.10 53.13</td>
<td>13.79 41.41</td>
</tr>
<tr>
<td>Trans task</td>
<td>24.14 37.50</td>
<td>1.72 43.75</td>
<td>3.45 17.19</td>
</tr>
</tbody>
</table>

S-P task = Sentence-picture matching task  
Re-A task = Re-arrangement  
Trans task = Translation

The results show that, at the pre-test, both groups had a very strong preference for pre-posed subordinate clauses containing subordinators in the final position of the clause on the sentence-picture matching task, a slightly strong preference on the re-arrangement task, a weak preference on the translation task. It is clear that, after instruction, the before / after
group's mean error percentages decreased. In contrast, the percentages of these kinds of errors by wh-question group were almost the same for pre-test and post-test 1, although the group showed improvement at post-test 2.

At this point, let us look in more detail at the analysis of errors attributed to the 'subordinate-clause-first' strategy and the 'head-last parameter' strategy. Table 3 indicates the means and standard deviations of each group's error scores. Figure 2 provides a graphic representation of error scores for the combined three tasks.

A 2×3 mixed ANOVA was carried out on the error scores for combined three tasks in Table 3. The ANOVA reveals significant effects for group (F(1, 59) = 22.035, p < .001) and for test (F(2, 118) = 28.563, p < .001). The interaction between group and test is also significant (F(2, 118) = 10.494, p < .001) (see Appendix 11). A Ryan procedure applied (p < .05)

<table>
<thead>
<tr>
<th></th>
<th>B/A group (N = 29)</th>
<th></th>
<th>Wh-Q group (N = 32)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Pre-test</td>
<td>5.14</td>
<td>2.25</td>
<td>5.69</td>
<td>2.72</td>
</tr>
<tr>
<td>Post-test1</td>
<td>1.45</td>
<td>1.94</td>
<td>5.56</td>
<td>3.52</td>
</tr>
<tr>
<td>Post-test2</td>
<td>1.03</td>
<td>1.83</td>
<td>3.91</td>
<td>3.28</td>
</tr>
</tbody>
</table>
Figure 2. Combined three tasks: error scores attributed to the 'subordinate-clause-first' and the 'head-last parameter' strategies

shows no significant difference between before / after group and wh-question group prior to instruction and a significant difference after instruction. Significant differences exist between pre-test and post-test 1 and between pre-test and post-test 2 among the group instructed on before / after and no significant difference between the two post-tests among the group. This suggests that there is decrease in mean error scores after the instructional treatment for before / after group and maintenance of the knowledge of the target structures 5 weeks after instruction. However, the differences between the wh-question group's mean error scores on pre-test and post-test 2, and on post-test 1 and post-test 2, are significant (see Appendix 12). We will discuss this phenomenon in the next chapter.

In the following sections, we will examine the results of each task in more detail.
4.7.2 Sentence-picture matching task

The means and standard deviations of each group's scores on the sentence-picture matching task appear in Table 4 and the results of the scores are displayed in Figure 3.

<table>
<thead>
<tr>
<th></th>
<th>B/A group (N = 29)</th>
<th>Wh-Q group (N = 32)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Pre-test</td>
<td>1.03</td>
<td>1.50</td>
</tr>
<tr>
<td>Post-test 1</td>
<td>3.31</td>
<td>1.12</td>
</tr>
<tr>
<td>Post-test 2</td>
<td>3.59</td>
<td>1.03</td>
</tr>
</tbody>
</table>

Figure 3. Sentence-picture matching task: scores

A 2 × 3 mixed factorial design was employed on the results of the task. It yields significant main effects for group (F(1, 59)= 15.760, p < .001) and for test (F(2, 118)= 45.420, p < .001). The interaction between group and test is also significant (F(2, 118)= 9.533, p < .001)(see Appendix 13). A Ryan procedure
applied ($p < .05$) reveals no significant difference between the before / after group and wh-question group for pre-test. On the two post-tests, mean scores of the group instructed on before / after rise sharply, while the scores of the group instructed on wh-question increases gradually. No significant difference is found between the two post-tests among the before / after group, suggesting that the group retained the knowledge of the target structures for 5 weeks (see Appendix 14).

Table 5 presents the means and standard deviations of each group's error scores attributed to the 'subordinate-clause-first' strategy and the 'head-last parameter' strategy. Figure 4 illustrates the scores.

A $2 \times 3$ mixed factorial design was also used on the error scores of the sentence-picture matching task. There are significant main effects for group ($F(1, 59) = 15.760, p < .001$), for test ($F(2, 118) = 45.420, p < .001$), as well as a significant interaction between group and test ($F(2, 118) = 9.533, p < .001$)(see Appendix 15). A Ryan procedure applied ($p < .05$)

<table>
<thead>
<tr>
<th></th>
<th>B/A group ($N = 29$)</th>
<th>Wh-Q group ($N = 32$)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
</tr>
<tr>
<td>Pre-test</td>
<td>2.97</td>
<td>1.50</td>
</tr>
<tr>
<td>Post-test1</td>
<td>0.69</td>
<td>1.12</td>
</tr>
<tr>
<td>Post-test2</td>
<td>0.41</td>
<td>1.03</td>
</tr>
</tbody>
</table>

Table 5: Mean error scores and standard deviations for the sentence-picture matching task, attributed to the 'subordinate-clause-first' and the 'head-last parameter' strategies.
Figure 4. Sentence-picture matching task: error scores attributed to the 'subordinate-clause-first' and the 'head-last parameter' strategies shows that the before / after group's use of the 'subordinate-clause-first' and the 'head-last parameter' strategies is significantly different from that of the wh-question group both at the first post-testing and the second. In the before / after group, the mean error scores are significantly improved after instruction and no significant difference exists between post-test 1 and post-test 2, showing maintenance of improvement 5 weeks after instructional treatment. However, the differences between the wh-question group's mean error scores at pre-test and post-test 2, and at post-test 1 and post-test 2, are significant (see Appendix 16). This may have been due to practice effect. We will mention it in the next chapter.

4.7.3 Re-arrangement task

Table 6 indicates the means and standard deviations for the re-
arrangement task. Figure 5 presents the mean scores of this task.

Table 6: Mean scores and standard deviations for the re-arrangement task

<table>
<thead>
<tr>
<th></th>
<th>B/A group (N = 29)</th>
<th>Wh-Q group (N = 32)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Pre-test</td>
<td>2.03</td>
<td>0.85</td>
</tr>
<tr>
<td>Post-test1</td>
<td>3.03</td>
<td>1.38</td>
</tr>
<tr>
<td>Post-test2</td>
<td>3.03</td>
<td>1.10</td>
</tr>
</tbody>
</table>

Figure 5. Re-arrangement task: scores

A 2 × 3 mixed analysis of variance was employed on the re-arrangement task scores. The ANOVA shows significant differences on factor of group (F(1, 59) = 11.120, p < .005) and on factor of test (F(2, 118) = 3.283, p < .05). There is also a significant interaction between the two factors (F(2, 118) = 9.521, p < .001) (see Appendix 17). A Ryan procedure applied (p < .05) shows that the before/after group and wh-question group means
are not significantly different for pre-test and that they differ significantly for both post-tests. Scores on the two post-tests for the before / after group are significantly higher than the pre-test score and there is no significant difference in the two post-tests, suggesting that proficiency is maintained 5 weeks after the group received instruction. The post-test 2 score for the wh-question group differs significantly from pre-test and post-test 1 scores (see Appendix 18). As mentioned above, this may have been due to practice effect. We will mention it in the following chapter.

Table 7 indicates the means and standard deviations of each group's error scores attributed to the 'subordinate-clause-first' strategy and the 'head-last parameter' strategy. Figure 6 provides a graphic representation of the error scores.

Similarly, a 2×3 mixed ANOVA was run on the error scores of the re-arrangement task. According to the ANOVA, there are significant main effects on the factor of group \( F(1, 59) = 12.739, \)

<table>
<thead>
<tr>
<th></th>
<th>B/A group ((N = 29))</th>
<th>Wh-Q group ((N = 32))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(M)</td>
<td>(SD)</td>
</tr>
<tr>
<td>Pre-test</td>
<td>1.69</td>
<td>0.91</td>
</tr>
<tr>
<td>Post-test 1</td>
<td>0.72</td>
<td>1.26</td>
</tr>
<tr>
<td>Post-test 2</td>
<td>0.55</td>
<td>0.85</td>
</tr>
</tbody>
</table>
Figure 6. Re-arrangement task: error scores attributed to the 'subordinate-clause-first' and the 'head-last parameter' strategies

$p < .001$) and on the factor of test ($F(2, 118) = 5.758, p < .005$). There is also an interaction between the two factors ($F(2, 118) = 6.154, p < .005$) (see Appendix 19). A Ryan procedure applied ($p < .05$) confirms that there is no significant difference between the pre-test scores for the two groups and a significant difference after instructional treatment. No significant difference exists between the two post-test scores for the before/after group, indicating maintenance of their proficiency 5 weeks after instructional treatment. There is no significant difference among the three tests for the wh-question group (see Appendix 20).

4.7.4 Translation task

The results of this task are presented in Table 8 and in Figure 7.

A $2 \times 3$ mixed ANOVA was conducted on the data yields
Table 8: Mean scores and standard deviations for the translation task

<table>
<thead>
<tr>
<th></th>
<th>B/A group</th>
<th></th>
<th>Wh-Q group</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(N = 29)</td>
<td></td>
<td>(N = 32)</td>
<td></td>
</tr>
<tr>
<td>Pre-test</td>
<td>1.03</td>
<td>0.93</td>
<td>1.09</td>
<td>0.84</td>
</tr>
<tr>
<td>Post-test 1</td>
<td>1.79</td>
<td>0.48</td>
<td>0.75</td>
<td>0.79</td>
</tr>
<tr>
<td>Post-test 2</td>
<td>1.69</td>
<td>0.65</td>
<td>1.22</td>
<td>0.89</td>
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</tbody>
</table>

![Bar chart showing mean scores for B/A and Wh-Q groups](image)

Figure 7. Translation task: scores

significant main effects for group \((F(1, 59) = 10.847, p < .005)\) and for test \((F(2, 118) = 5.089, p < .01)\). There is a significant interaction between group and test \((F(2, 118) = 10.152, p < .001)\) (see Appendix 21). A Ryan procedure applied \((p < .05)\) shows no significant difference between groups for pre-test, but significant differences after instruction. For the two post-tests, mean scores of the before / after group rise sharply. The scores of post-test 1 for the before / after group are not significantly different from those of post-test 2. This means that the group's proficiency was maintained for 5 weeks. In the wh-question
group, significant difference exists between the two post-tests (see Appendix 22). This may have been due to practice effect. We will discuss this phenomenon in the next chapter.

The results of error scores attributed to the 'subordinate-clause-first' strategy and the 'head-last parameter' strategy are illustrated in Table 9 and Figure 8.

<table>
<thead>
<tr>
<th></th>
<th>B/A group (N = 29)</th>
<th>Wh-Q group (N = 32)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Pre-test</td>
<td>0.48</td>
<td>0.77</td>
</tr>
<tr>
<td>Post-test1</td>
<td>0.03</td>
<td>0.18</td>
</tr>
<tr>
<td>Post-test2</td>
<td>0.07</td>
<td>0.25</td>
</tr>
</tbody>
</table>

Figure 8. Translation task: error scores attributed to the 'subordinate-clause-first' and the 'head-last parameter' strategies

A 2 × 3 mixed ANOVA was also used on the raw error scores, attributed to the 'subordinate-clause-first' and the 'head-last
parameter' strategies. There are significant main effects for group \( F(1, 59) = 19.949, p < .001 \) and for test \( F(2, 118) = 6.365, p < .005 \). There is a significant interaction between group and test \( F(2, 118) = 4.034, p < .05 \) (see Appendix 23). A Ryan procedure applied \( p < .05 \) shows no significant difference between the groups before instruction and a significant difference after instruction. There is no significant difference between the two post-tests for the group instructed on before / after, showing maintenance of proficiency 5 weeks after instruction. Significant differences can be seen between the wh-question group's mean error scores on pre-test and post-test 2, and on post-test 1 and post-test 2 (see Appendix 24). We will discuss this in the next chapter.

To summarize, the experimental group, before / after group, outperformed the control group, wh-question group, on the two post-tests after the instructional treatment of the target structures and, more importantly, they retained knowledge of the structures five weeks after instruction. The errors attributed to the 'subordinate-clause-first' and 'head-last' strategies significantly decreased in the experimental group, before / after group, following instruction.
Chapter 5

Conclusion and Discussion

Thus far, we have addressed the issue of why some Japanese learners of L2 English misplace the location of temporal subordinators before / after. We began by examining both English and Japanese structures containing these subordinators. Two major characteristics were found. First, in English, there are four options for expressing two events using subordinators (i.e., E1 before E2; E2 after E1; Before E2, E1; After E1, E2). By contrast, in Japanese, there are only two options: sentences containing pre-posed subordinate clauses (i.e., E2 maeni (=before) E1; E1 atode (=after) E2). Another characteristic is that although English subordinators can be viewed as 'prepositions,' their Japanese equivalents are 'postpositional.'

These two characteristics allow us to propose two strategies, i.e., the 'subordinate-clause-first' strategy and the 'head-last parameter' strategy. We maintain that, in using these strategies, Japanese learners of L2 English misplace the location of temporal subordinators before / after. The 'subordinate-clause-first' strategy stipulates that "When you construct a sentence containing a subordinate clause, place the subordinate clause in the initial position of the sentence." The 'head-last parameter' strategy is "a strategy for interpreting or constructing sentences in which the learner assumes that the
head-last characteristic of the learner's own native language still works for subordinators in the target language." We have postulated that since L2 learners might first use the 'subordinate-clause-first' strategy and then follow up with the 'head-last parameter' strategy, they are likely to misplace the location of temporal subordinators before / after. Learners in the experimental group of our study were given instruction aimed at raising their consciousness regarding the position of post-posed temporal subordinators, so that they would stop using these strategies.

We set out to prove two hypotheses. First, we predicted that some Japanese learners of L2 English use the 'head-last parameter' strategy in addition to the 'subordinate-clause-first' strategy when they interpret or express sentences containing temporal subordinators before / after. As predicted, the results of our study show that subjects made more errors attributed to both strategies in a pre-test. The results also show that this tendency was still seen among the subjects instructed on wh-question in two post-tests, although the subjects instructed on before / after improved greatly after instruction. Therefore, the first hypothesis has been supported. Further, since our hypotheses assume that the strategies are engaged as influence of the native language, it seems reasonable to suppose that our results confirm that the native language influences L2 learning.

The second hypothesis predicts that it is possible to reset
the L1 value of the parameter to the L2 value for learners who use the 'head-last parameter' strategy. This hypothesis is also supported in that subjects receiving instruction on before / after improved more significantly in their use of post-posed temporal subordinate clauses than subjects who had received instruction on wh-question structures. Additionally, it is proved by the fact that errors attributed to the two strategies by subjects instructed on before / after decreased greatly after instructional treatment. As White (1987: 107) puts it: “Correction might provide a short cut, a different kind of trigger.”

Unexpectedly, results show significant differences between pre-test and post-test 2 and between post-test 1 and post-test 2 for the control wh-question group on some tasks. There are two possible explanations for this: (1) practice effect and (2) the effect of the word test given to subjects before post-test 2. The word test was given after post-test 1 and prior to post-test 2. It included both subordinators before / after. This may have influenced the results of the second post-test.

Results of our study suggest that it is possible to reset the direction of the head-parameter concerned with temporal subordinators. This assumption, however, needs to be approached with great caution. As far as parameter resetting is concerned, there is contradicting evidence in the UG literature (Braidi 1999; White 1996, 2000). Further research is needed on parameter-resetting, especially on the resetting of the head-
parameter.

A number of studies suggest that input control measures, including input enhancement, input processing, consciousness-raising, focus on form, etc., are valuable since they facilitate learner understanding and boost or support the natural acquisition process (Doughty 1991; Ellis 1994, 1997; Fotos 1993; Fotos and Ellis 1991; Larsen-Freeman and Long 1991; Lighbown and Spada 1999; Long 1991; Rutherford 1987; Schmidt 1990, 1995; Sharwood Smith 1993; VanPatten and Cadierno 1993a, 1993b; White et al 1991). This study has presented evidence regarding the effectiveness of formal instruction, especially, consciousness-raising on the form of the target language. Subjects who received instruction on post-posed temporal subordinate clauses containing before / after performed significantly better than subjects who received instruction on wh-question. It is also apparent that formal instruction helped learners reset the value of the head-parameter.

Our study results also indicate that subjects instructed on before / after retained proficiency of the target structures five weeks after instruction. This was also the case with White’s (1990/1991, 1991) studies in which subjects maintained proficiency of the targeted forms five weeks after instructional treatment, although her studies examined different parameters. To date, few definite conclusions on the durability of the effectiveness of formal instruction are available, but there is
sufficient evidence to show that learners retain at least some of the grammatical structures they have been taught (Ellis 1994). We believe our study shows that formal instruction provides durable effect.

Our study has its limitations. One is that learners’ oral ability was not measured due to the large class size and insufficient time for practice and evaluation. In this regard, it is worthwhile to refer to Ellis’s (1994: 643) comment: “in consciousness-raising activities the learners are not expected to produce the target structure, only to understand it by formulating some kind of cognitive representation of how it works.” One instructional objective of our study was to raise learners’ consciousness to the target structure. The paper-and-pencil test results showed that this objective was obtained. However, additional research is needed to confirm instructional effectiveness on oral production.

Our study is also limited in that it did not test for ‘preposed’ temporal subordinate clauses. We chose to exclude such testing for two reasons. One reason is that results of pilot tests conducted prior to the study using sentence-picture matching tasks and testing for both pre-posed and post-posed temporal subordinate clauses were unfavorable. The combination of subordinate clause types confused the examinees. Another reason is that we imposed a 30-minute time limit for completing the five tasks. We assumed it would be difficult for the subjects
to endure longer. Thus we abandoned testing for pre-posed
temporal subordinate clauses.

A third limitation is about the definition of parts of speech.
We regarded the temporal subordinators before / after as
'prepositions' to formulate our hypotheses. If we view them as
'prepositions,' we need to examine the role of the knowledge of
before / after used before NPs like 'before NP' or 'after NP.'
However, we did not measure the knowledge. We offer two
reasons for this neglect. One is that the pilot test results
indicated that many examinees understood the usage and
meaning of before / after as 'prepositions.' The other reason is
that we did not want to impose more tasks on the subjects, given
the 30-minute time limit. Additional research is needed to sort
out these limitations.

Our study deals solely with the misplacement of temporal
subordinators before / after by Japanese learners of L2 English.
Throughout the discussion, we argue that these learners may use
the 'subordinate-clause-first' strategy and the 'head-last
parameter' strategy. If our argument is valid, research is
needed to examine learner strategies for other temporal
subordinators (e.g., as, when, while, etc.). Given the results of
our study, research into learner strategies with other
subordinators such as causal (e.g., because, since, etc.) and
concessive (e.g., although, though, etc.), may prove interesting.

In conclusion, it is necessary to measure the oral ability of
L2 learners. It is also necessary to investigate the role of the knowledge of pre-posed subordinate clauses, the English 'prepositions' before / after and other types of subordinators.

Finally, as Larsen-Freeman and Long (1991: 304) put it, "while the desert may provide the minimum conditions for a plant to grow, watering it may help it grow faster, bigger and stronger, that is, to realize its full potential. So with language learning." This thesis supports what Larsen-Freeman and Long say. We should not forget the potentiality for a language learner to grow faster, bigger and stronger. With proper care, instruction facilitates learning. Raising learner's consciousness to the form of the target language seems to be the key to success in learning. Additional research into consciousness-raising is necessary.
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---. 1973a. How Children Describe Time and Order. In Ferguson,


Koike, I. 1983. Acquisition of Grammatical Structures and


Center, University of Hawai‘i.


Appendix 1

Table of Mean Scores and Standard Deviations on Pre-test

<table>
<thead>
<tr>
<th></th>
<th>B/A group (N = 29)</th>
<th>Wh-Q group (N = 32)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Pre-test</td>
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<td>3.10</td>
</tr>
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</table>

Table of Analysis of Variance on Means of Pre-test

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<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>A:Group error[WC]</td>
<td>0.1246467</td>
<td>1</td>
<td>0.1246467</td>
<td>0.013</td>
<td>0.9095</td>
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<tr>
<td>Total</td>
<td>564.4655172</td>
<td>59</td>
<td>9.5672122</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

+ p<.10, * p<.05, ** p<.01, *** p<.005, **** p<.001
Appendix 2

Transcription of Instruction on Post-posed Temporal
Subordinate Clauses Containing Before / After

＜指導手順＞
4枚の絵を横一列に並べる。（左から早い順）
Teacher: （絵を示して）Now, look at the pictures. He is Tom.
These pictures are his daily schedule. Now, look at the picture 1. What is Tom doing? Mr. M?
S1: え、what is?
T: Look at the picture 1. What is Tom doing?
S1: えーっと、勉強....
T: In English, please.
S1: Study.
T: He is....
S1: あ、He is studying.
T: Yes. He is studying. He studies from 5:00 to 6:30.
Ss: そんなに一.
T: Yes, he studies very hard everyday. Now, look at the picture 2. What are they doing? ... Ms.O?
S2: They are...eating.
T: Yes. They are having dinner. They have dinner at 7:00. Now, look at the picture 3. What is Tom doing? ...Mr. T?
S3: Watching TV.
T: He is....
S3: He is watching TV.
T: Good. He is watching TV. He watches TV from 8:30 to 9:00. Now, look at the picture 4. What time does he go to bed? Ms. H?
S4: 10:00.
T: He goes to bed at....
S4: He goes to bed at 10:00.
T: Good. Yes. He goes to bed at 10:00. Now, look at the pictures 1 and 2. Tom studies from 5:00 to 6:30. Then, he and his family have dinner at 7:00. So, Tom studies before he has dinner.
（1と2の絵の上に“Tom studies before he has dinner.”と板書。）
T: Now look at the pictures 3 and 4. What does Tom do before he goes to bed? ... Ms. A?
S5: Watch TV... He watches TV.
T: Very good. Yes, he watches TV before he goes to bed.
（3と4の絵の上に“Tom watches TV before he goes to bed.”と板書。）
T: Now, look at the pictures 1 and 2 again. Tom studies from
5:00 to 6:30 and he has dinner at 7:00. So, Tom has dinner after he studies. OK? Tom has dinner after he studies.

(1と2の絵の下に“Tom has dinner after he studies.”と板書。)

T: Now, look at the pictures 3 and 4. What does Tom do after he watches TV? Mr. Y?

S6: He goes to bed.

T: That’s right. He goes to bed after he watches TV.

(3と4の絵の下に“Tom goes to bed after he watches TV.”と板書。)

T: Now, look at the two sentences. (絵の上の2文を指して) Tom studies before he has dinner. (beforeの下にアンダーラインを引き、→で後ろ[he has dinner]にかかっていることを示す。)

Tom watches TV before he goes to bed. (beforeの下にアンダーラインを引き、→で後ろ[he goes to bed]にかかっていることを示す。)

T: Look at the other two sentences. (絵の下の2文を指して) Tom has dinner after he studies. (afterの下にアンダーラインを引き、→で後にかかっていることを示す。)

Tom goes to bed after he watches TV. (afterの下にアンダーラインを引き、→で後ろにかかっていることを示す。)

T: Now, let’s make sure in Japanese. “before”の日本語での意味って何？...Mr. K?

S5: before...「前」？

T: そうね。でも、「前」ではなくて、「〜の前に」で覚えましょう。

(板書 “A before B = 「B の前に A」”) 英語では before の後にある動作の方が、先に起こります。before は後ろにかかるのね。日本語との違いに注意しましょう。じゃあ、“after”は？

“after”の日本語での意味は？...Ms. S?

S7: 「後」...「〜の後」

T: そう、その通り。「〜の後に」で覚えましょう。

(板書 “B after A = 「A の後に B」”)

“after”も後ろにかかると覚えておきましょう。

<Practice>

T: じゃあ、次に穴埋め問題を出しますから、皆さん before と after のどちらかに入るか、考えてみて下さい。

(板書 1. Tom has dinner ( ) he goes to bed. 2. Tom watches TV ( ) he studies.)

(少し時間をおいてから)

T: 1番の答えは？Mr. W?

S8: “before.”

T: OK! じゃ、2番は？Ms.M?

S9: “after.”

T: Good! 違いがわかったかな？それでは、練習問題をやってみましょう。
Appendix 3

Transcription of Instruction on Indirect Question with
Wh-questions

<指導手順>
T: When is Children’s Day, Mr. N?
S1: え、子供の日ですか？えっと…5月5日…。
T: Please answer in English.
S1: It’s… May 5th.
T: Yes, it’s May 5th. He knows when Children’s Day is.
(1) When is Children’s Day? と板書。次に (2) He knows when
Children’s Day is. と板書。
T: (勉強している絵を見せる) Now, look at this picture. What
is he doing? Ms. K?
S2: Study… Studyng.
T: He…
S2: He is studying.
T: Yes, he is studying. She knows what he is doing.
(3) What is he doing? と板書。
(4) She knows what he is doing. と板書。
T: Now, look at the black board. What is the difference between
(1) and (2)? Anybody? Answer in Japanese.
S3: 前に “He knows” がついてるのと、“Children’s Day is” が反
対になるね。
T: That’s right. Good answer, S3! Now, look at the (3) and (4).
What is the difference between (3) and (4)?
S4: 前に She knows がついてるとこと、he is が反対になってると
こ。
T: Great! Now, let me explain in Japanese.

T: そう、(2) と (4) では、wh 疑問文の前に “He knows” や “She
knows” がついていますね。これは “He knows” や “She knows”
で始まる文の中に wh 疑問文が組み込まれていると考えてください。
そうすると、wh 疑問文の中の語順が、「主語 + be 動詞」に
変わるのでです。疑問文では「be 動詞」が主語の前にくるけど、
他の文に組み込まれてしまった場合は主語がきて、その後で be
動詞が来るんですよ。他にも例を見てみましょう。
(黒板にモナリザの絵を拡大した紙を張る。)
T: Who is this? Anybody?
S: (無言)
T: OK. You don’t know who this is. I know who this is. This
is Mona Lisa.
(5) Who is this? と板書。)
((6) I know who this is. と板書。)
T: “Who is this?” の前に “I know” がつくと、”who this is” の語順に変わっていますね。疑問詞の Who はそのまま 2 つの文をつなぐ言葉として使われていますが、文頭ではないので小文字で始まっていることに注意してください。“I know”の文の中に “where this is” が組み込まれた形になりますから、これは疑問文ではありませんので、最後の？マークもいりません。
もう一つ例を見てみましょう
((7) Where is the bank? と板書。)
((8) I don’t know where the bank is. ～否定文 と板書。)
((9) Do you know where the bank is? ～疑問文 と板書。)
T: (8)は否定文、(9)は疑問文です。前につく文が否定文でも、疑問文でも、”where the bank is” と、”is” が “the bank” の後ろにきています。ときにかく、疑問文が他の文の中に組み込まれると、be 動詞が主語の後ろに来ることに注意してください。
最後にまとめてみましょう。
(「who疑問文が他の文の中に組み込まれる場合、つなぎの言葉には疑問詞 (who, what, when など) をそのまま用い、中を＜主語＋動詞～＞の語順に変える。」と板書。)
T: それでは、この語順の変化に気をつけ、練習問題をやってみましょう。
Appendix 4

練習問題 (after / before)

へ. 2つの絵の関係を表するために、「( )」内に before か after を補いましょう。

1. 
   a. She went shopping ( )
   b. She got sick ( )

2. 
   a. He had dinner at a restaurant ( )
   b. He visited a museum ( )
B. 二つの絵の関係を表す英文を、それぞれ before/after を使って書きましょう。

1. studied hard 　　　watched TV

2. washed her hands 　　　had breakfast
Appendix 5

練習問題 (wh-question の埋め込み)

A. 各絵の下に、質問の文があります。その文を使って、I know / I don't know に
続けて、表現してみましょう。知っていれば、さらにその文の後に、“It is ～。”
を補ってみましょう。

(例)

Who is this? → I know who this is. It is Mona Lisa.

1.

What is this?

2.

Who is this?
B. 以下は先生と生徒の対話をです。先生の質問の文（二重線の文）を使って、それぞれの生徒の下線部を補いましょう。

（例）
Teacher: F-san, look. Where is he standing?
Student F: I don't know where he is standing.
Teacher: Good try. How about you, G-san?

No. 1
Teacher: A-san, look at the picture on the blackboard. What is that?
Student A: I don't know ______________________
Teacher: Look again! Try to say something.

No. 2
Teacher: B-san, where is Utada Hikaru now?
Student B: I don't know ______________________
Teacher: I don't know, either. How about you, C-san?

No. 3
Teacher: D-san, what is our principal doing? principal 校長先生
Student D: I don't know. Do you know ______________________?
Appendix 6

Pre-test

以下の問題は、皆さんにどれだけ英語を理解しているか、把握（はあく）するためのものです。通常の成績には、含まれませんが、真剣に取り組んで、解答してみてください。なお、答えはすべて解答用紙に記入してください。

1 次の各間に、2つの絵が描かれています。2つの絵の関係を正しく表している英文を a～cの中から1つ選び、記号で答えてください。

1.

\[
\begin{array}{cc}
15:00 & 18:00 \\
\end{array}
\]

Jiro

a. Jiro played tennis before he played the guitar.
b. Jiro played the guitar before he played tennis.
c. Jiro played tennis after he played the guitar.

2.

\[
\begin{array}{cc}
11:00 & 16:00 \\
\end{array}
\]

Keiko

a. Keiko saw a movie after she watched birds.
b. Keiko watched birds after she saw a movie.
c. Keiko watched birds before she saw a movie.
3. 

- 11:00
- 15:00
- 云 → 雨

a. It rained before it was cloudy.
b. It was cloudy before it rained.
c. It was cloudy after it rained.

4. 

- 16:00
- 21:00
- 雨 → 雪

a. It snowed after it rained.
b. It rained after it snowed.
c. It snowed before it rained.

2 次の各文は、同じ意味を表しているものとして、文法的に正しい英文を一つ選び、記号で答えてください。

1. a. I know when your birthday is.
b. I know when is your birthday.
c. I know your birthday is when.

2. a. I asked you did you hear the news.
b. I asked you whether did you hear the news.
c. I asked you whether you heard the news.

3. a. I don't know what is Yoko doing now.
b. I don't know what Yoko is doing now.
c. I don't know Yoko is now doing what.
4. a. I asked Tom if his sister could swim.
   b. I asked Tom can his sister swim.
   c. I asked Tom whether can his sister swim.

① 私は、母に父から電話があったかどうかきいてみた。
   I asked my mother (ア) had called (イ) my father (ウ) whether.

② その書店が閉まる前に、ボブはその本を買いました。
   (ア) before (イ) Bob bought the book (ウ) the shop was closed.

③ 列車が出た後で、ジェーンは駅に着いた。
   (ア) after (イ) Jane arrived at the station (ウ) the train left.

④ 私は、その銀行がどこにあるかわかりません。
   I don't know (ア) is (イ) the bank (ウ) where.

⑤ 私は、運転ができるかどうかいていないのです。
   I'm asking you (ア) can (イ) drive (ウ) if (エ) you.

⑥ 部屋の掃除をしてから、私はテレビを見ました。
   (ア) after (イ) I cleaned my room (ウ) I watched TV.

⑦ 大郎がいつロンドンに発つのか私は知っています。
   I know (ア) is (イ) leaving for London (ウ) Taru (エ) when.

⑧ 風呂に入る前に、私はトイレに行った。
   (ア) before (イ) I went to the bathroom (ウ) I took a bath.
4. 次の各文を日本語に直してみてください。
① Akiko wrote a letter before she read a book.

② Ken washed his hands after he went home.

5. それぞれの書き出しに続けて、吹き出しの言葉を書くとすると、下線部をどのように書けばよいでしょうか。

1. When is Children's Day?

I don't know

2. What is Ann drinking?

Ann

I know

3. Is your dog pretty?

Do.

I'm asking you
Appendix 7

Post-test 1

以下の問題は、皆さんがどれだけ理解しているか、把握（はあく）するためのものです。通常の成績には、含まれませんが、真剣に取り組んで、解答してみてください。なお、答えはすべて解答用紙に記入してください。

1. 次の各間に、2つの絵が描かれています。2つの絵の関係を正しく表している英文を a～c の中から1つ選び、記号で答えてください。

1. 21:30

   Tatsuya

   ⇒

   22:00

   a. Tatsuya brushed his teeth after he took a bath.
   b. Tatsuya took a bath after he brushed his teeth.
   c. Tatsuya took a bath before he brushed his teeth.

2. 10:00

   Kumi

   ⇒

   11:00

   a. Kumi went to see a movie before she cleaned her room.
   b. Kumi cleaned her room before she went to see a movie.
   c. Kumi cleaned her room after she went to see a movie.
3. 午前 → 午後

a. It was sunny before it rained.
b. It rained before it was sunny.
c. It was sunny after it rained.

4. 7:00 → 10:00

a. It rained after it snowed.
b. It snowed after it rained.
c. It rained before it snowed.

2 次の各文は、同じ意味を表しているものとして、文法的に正しい英文を一つ選び、記号で答えてください。

1. a. I'm asking you do you have a ticket.
b. I'm asking you have you a ticket.
c. I'm asking you if you have a ticket.

2. a. I don't know what is this picture.
b. I don't know what this picture is.
c. I don't know this picture is what.

3. a. I asked Kenta whether he enjoyed the party.
b. I asked Kenta whether did he enjoy the party.
c. I asked Kenta did he enjoy the party.
4. a. I know where your key is.
   b. I know where is your key.
   c. I know your key is where.

( ) 内の語（句）を並べ換えて、日本語の意味を表す英語に直し、記号で解答してください。（ただし、文の先頭に来る語も小文字で書いてあります）。

① 父は、私によく眠れたかどうかきいてきた。
   Father asked me ((ア) could ((イ) I ((ウ) if ((エ) sleep well ).

② 私は寝る前に、本を読んだ。
   ((ア) before ((イ) I read a book ((ウ) I went to bed ).

③ 猫が入ってきた後、拓也はドアを開めた。
   ((ア) after ((イ) Takuya closed the door ((ウ) the cat came in ).

④ 文化祭がいつだか私は知りません。
   I don’t know ((ア) is ((イ) our school festival ((ウ) when ).

⑤ ビルには、ケイトと会ったかたずねた。
   I asked Bill ((ア) he ((イ) had met ((ウ) if ((エ) Kate ).

⑥ 私はシャワーを浴びてから、ラジオを聴きました。
   ((ア) after ((イ) I listened to the radio ((ウ) I took a shower ).

⑦ 太郎が何を読んでいるか私は知っています。
   I know ((ア) is ((イ) reading ((ウ) Taro ((エ) what ).

⑧ 列車が出る前に、バーバラは駅に着いた。
   ((ア) before ((イ) Barbara arrived at the station ((ウ) the train left ).

4 次の各文を日本語に直してみてください。
① My brother drank some coffee after he played a computer game.
② Rie listened to a CD before she cooked lunch.

5 それぞれの書き出しに続けて、吹き出しの言葉を書くとすると、下線部をどのように書けばよいでしょうか。

1. [図]
When is your birthday?
I don't know

2. [図]
Where is she going?
I know

3. [図]
Are you all right?
I'm asking you
Appendix 8

Post-test 2

以下の問題は、皆さんがどれだけ理解しているか、把握（はあく）するためのものです。通常の成績には、含まれませんが、真剣に取り組んで、解答してみてください。なお、答えはすべて解答用紙に記入してください。

1. 次の各間に、2つの絵が描かれています。2つの絵の関係を正しく表している英文をa～cの中から1つ選び、記号で答えてください。

13:00

Hideki

14:00

a. Hideki listened to music before he played catch.
b. Hideki listened to music after he played catch.
c. Hideki played catch before he listened to music.

2. 21:00

Aiko

22:00

a. Aiko talked on the telephone after she took a bath.
b. Aiko took a bath after she talked on the telephone.
c. Aiko took a bath before she talked on the telephone.
3.

17:00  
空前 ➝  晴

a. It snowed before it rained.
b. It rained before it snowed.
c. It rained after it snowed.

22:00

4.

午前 ➝ 午後

a. It was cloudy after it rained.
b. It rained after it was cloudy.
c. It rained before it was cloudy.

2 次の各文は、同じ意味を表しているものとして、文法的に正しい英文を一つ選び、記号で答えてください。

1. a. I don't know when is Earth Day.
b. I don't know Earth Day is when.
c. I don't know when Earth Day is.

2. a. I'm asking you whether can you speak English.
b. I'm asking you can you speak English.
c. I'm asking you whether you can speak English.

3. a. I know where he is studying.
b. I know where is he studying.
c. I know he is studying where.
4. a. I asked my boss whether he heard the news.
   b. I asked my boss did he hear the news.
   c. I asked my boss whether did he hear the news.

① 私は、太郎に、部屋の掃除を終えたかどうかきいてみた。
   I asked Taro ((ア) cleaned his room (イ) had (ウ) he (エ) if )

② ジュースを飲む前に、私は手紙を書いた。
   ((ア) before (イ) I drank some juice (ウ) I wrote a letter )

③ 私がドアに鍵をかけた後、皆が寝ました。
   ((ア) after (イ) everybody went to bed (ウ) I locked the door )

④ 私は、その写真が何だかわかりません。
   I don't know ((ア) is (イ) the photo (ウ) what )

⑤ 私は、アンに忙しいかどうかたずねた。
   I asked Ann ((ア) busy (イ) if (ウ) she (エ) was )

⑥ 車を洗ってから、私は夕食を料理しました。
   ((ア) after (イ) I cooked dinner (ウ) I washed my car )

⑦ 父がどこで働いているか私は知っています。
   I know ((ア) is (イ) my father (ウ) working (エ) where )

⑧ 箱子は結婚する前に、京都の友だちをたずねた。
   ((ア) before (イ) she got married (ウ) Tomoko visited her friend in Kyoto )
4. 次の各文を日本語に直してみてください。
① Mr. Kato read the newspaper after he ate breakfast.

② My sister did her homework before she watched a video.

5. それぞれの書き出しに続けて、書き出しの言葉を書くとすると、下線部をどのように書けばよいでしょうか。

1. What are you doing?

I don't know

2. Where is my cat?

I know

3. Are you angry?

I'm asking you

1年  組  番  名前
Appendix 9

Table of Analysis of Variance on Means of Each Test for Combined Three Tasks

<table>
<thead>
<tr>
<th>source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>A:Group</td>
<td>284.4268</td>
<td>1</td>
<td>284.4268</td>
<td>19.566</td>
<td>0.0000</td>
</tr>
<tr>
<td>error[S(A)]</td>
<td>857.6824</td>
<td>59</td>
<td>14.5369</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B:Test</td>
<td>238.8342</td>
<td>2</td>
<td>119.4171</td>
<td>27.123</td>
<td>0.0000</td>
</tr>
<tr>
<td>AB</td>
<td>156.5172</td>
<td>2</td>
<td>78.2586</td>
<td>17.775</td>
<td>0.0000</td>
</tr>
<tr>
<td>error[BS(A)]</td>
<td>519.5373</td>
<td>118</td>
<td>4.4028</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

+ p<.10, * p<.05, ** p<.01, *** p<.005, **** p<.001
Appendix 10

Results of Multiple Comparisons by Ryan procedure for Combined Three Tasks

[Comparison between Tests on the before / after group]

<table>
<thead>
<tr>
<th>pair</th>
<th>r</th>
<th>nominal level</th>
<th>t</th>
<th>p</th>
<th>sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 - 1</td>
<td>3</td>
<td>0.01666667</td>
<td>7.634</td>
<td>0.0000000</td>
<td>s.</td>
</tr>
<tr>
<td>3 - 2</td>
<td>2</td>
<td>0.03333333</td>
<td>0.313</td>
<td>0.7549182</td>
<td>n.s.</td>
</tr>
<tr>
<td>2 - 1</td>
<td>2</td>
<td>0.03333333</td>
<td>7.322</td>
<td>0.0000000</td>
<td>s.</td>
</tr>
</tbody>
</table>

MSe=4.402859, df=118, significance level=0.050000

[Comparison between Tests on the Wh-question group]

<table>
<thead>
<tr>
<th>pair</th>
<th>r</th>
<th>nominal level</th>
<th>t</th>
<th>p</th>
<th>sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 - 2</td>
<td>3</td>
<td>0.01666667</td>
<td>3.336</td>
<td>0.0011367</td>
<td>s.</td>
</tr>
<tr>
<td>3 - 1</td>
<td>2</td>
<td>0.03333333</td>
<td>2.502</td>
<td>0.0137182</td>
<td>s.</td>
</tr>
<tr>
<td>1 - 2</td>
<td>2</td>
<td>0.03333333</td>
<td>0.834</td>
<td>0.4059611</td>
<td>n.s.</td>
</tr>
</tbody>
</table>

MSe=4.402859, df=118, significance level=0.050000
Appendix 11

Table of Analysis of Variance on Mean Error Scores Attributed to the 'Subordinate-clause-first' and the 'Head-last parameter' Strategies of Each Test for Combined 3 Tasks

<table>
<thead>
<tr>
<th>source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>A:Group</td>
<td>287.9572</td>
<td>1</td>
<td>287.9572</td>
<td>22.035</td>
<td>0.0000 ****</td>
</tr>
<tr>
<td>error[S(A)]</td>
<td>771.0154</td>
<td>59</td>
<td>13.0680</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B:Test</td>
<td>271.1298</td>
<td>2</td>
<td>135.5649</td>
<td>28.563</td>
<td>0.0000 ****</td>
</tr>
<tr>
<td>AB</td>
<td>99.6107</td>
<td>2</td>
<td>49.8053</td>
<td>10.494</td>
<td>0.0001 ****</td>
</tr>
<tr>
<td>error[BS(A)]</td>
<td>560.0395</td>
<td>118</td>
<td>1.7460</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

+ p<.10, * p<.05, ** p<.01, *** p<.005, **** p<.001
Appendix 12

Results of Multiple Comparisons by Ryan procedure on Error Scores Attributed to the 'Subordinate-clause-first' and the 'Head-last parameter' Strategies for 3 Tasks

[Comparison between Tests on the before / after group]

<table>
<thead>
<tr>
<th></th>
<th>1: Pre-test</th>
<th>2: Post-test1</th>
<th>3: Post-test 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>mean</td>
<td>5.14</td>
<td>1.45</td>
<td>1.03</td>
</tr>
<tr>
<td>n</td>
<td>29</td>
<td>29</td>
<td>29</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>pair</th>
<th>r</th>
<th>nominal level</th>
<th>t</th>
<th>p</th>
<th>sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 3</td>
<td>3</td>
<td>0.01666667</td>
<td>7.172</td>
<td>0.0000000</td>
<td>s.</td>
</tr>
<tr>
<td>1 - 2</td>
<td>2</td>
<td>0.03333333</td>
<td>6.449</td>
<td>0.0000000</td>
<td>s.</td>
</tr>
<tr>
<td>2 - 3</td>
<td>2</td>
<td>0.03333333</td>
<td>0.723</td>
<td>0.4709468</td>
<td>n.s.</td>
</tr>
</tbody>
</table>

MS=4.746098, df=118, significance level=0.050000

[Comparison between Tests on the Wh-question group]

<table>
<thead>
<tr>
<th></th>
<th>1: Pre-test</th>
<th>2: Post-test1</th>
<th>3: Post-test 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>mean</td>
<td>5.69</td>
<td>5.56</td>
<td>3.91</td>
</tr>
<tr>
<td>n</td>
<td>32</td>
<td>32</td>
<td>32</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>pair</th>
<th>r</th>
<th>nominal level</th>
<th>t</th>
<th>p</th>
<th>sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 3</td>
<td>3</td>
<td>0.01666667</td>
<td>3.271</td>
<td>0.0014075</td>
<td>s.</td>
</tr>
<tr>
<td>1 - 2</td>
<td>2</td>
<td>0.03333333</td>
<td>0.230</td>
<td>0.8188699</td>
<td>n.s.</td>
</tr>
<tr>
<td>2 - 3</td>
<td>2</td>
<td>0.03333333</td>
<td>3.041</td>
<td>0.0029056</td>
<td>s.</td>
</tr>
</tbody>
</table>

MS=4.746098, df=118, significance level=0.050000
Appendix 13

Table of Analysis of Variance of Each Test for a Sentence-picture Matching Task

<table>
<thead>
<tr>
<th>source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: Group</td>
<td>63.0031</td>
<td>1</td>
<td>63.0031</td>
<td>15.760</td>
<td>0.0002 ****</td>
</tr>
<tr>
<td>error[S(A)]</td>
<td>235.8602</td>
<td>59</td>
<td>3.9976</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B: Test</td>
<td>117.3519</td>
<td>2</td>
<td>58.6759</td>
<td>45.420</td>
<td>0.0000 ****</td>
</tr>
<tr>
<td>AB</td>
<td>24.6306</td>
<td>2</td>
<td>12.3153</td>
<td>9.533</td>
<td>0.0001 ****</td>
</tr>
<tr>
<td>error[BS(A)]</td>
<td>152.4403</td>
<td>118</td>
<td>1.2918</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

+ p<.10, * p<.05, ** p<.01, *** p<.005, **** p<.001
Appendix 14

Results of Multiple Comparisons by Ryan procedure for a Sentence-picture Matching Task

[Comparison between Tests on the before / after group]

<table>
<thead>
<tr>
<th>pair</th>
<th>r</th>
<th>nominal level</th>
<th>t</th>
<th>p</th>
<th>sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 - 1</td>
<td>5</td>
<td>0.01666667</td>
<td>8.549</td>
<td>0.00000000</td>
<td>s.</td>
</tr>
<tr>
<td>3 - 2</td>
<td>2</td>
<td>0.03333333</td>
<td>0.924</td>
<td>0.3572671</td>
<td>n.s.</td>
</tr>
<tr>
<td>2 - 1</td>
<td>2</td>
<td>0.03333333</td>
<td>7.625</td>
<td>0.00000000</td>
<td>s.</td>
</tr>
</tbody>
</table>

MSe=1.291868, df=118, significance level=0.050000

[Comparison between Tests on the Wh-question group]

<table>
<thead>
<tr>
<th>pair</th>
<th>r</th>
<th>nominal level</th>
<th>t</th>
<th>p</th>
<th>sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 - 1</td>
<td>3</td>
<td>0.01666667</td>
<td>4.289</td>
<td>0.0000369</td>
<td>s.</td>
</tr>
<tr>
<td>3 - 2</td>
<td>2</td>
<td>0.03333333</td>
<td>2.310</td>
<td>0.0226541</td>
<td>s.</td>
</tr>
<tr>
<td>2 - 1</td>
<td>2</td>
<td>0.03333333</td>
<td>1.980</td>
<td>0.0500786</td>
<td>n.s.</td>
</tr>
</tbody>
</table>

MSe=1.291868, df=118, significance level=0.050000
Appendix 15

Table of Analysis of Variance on Mean Error Scores Attributed to the ‘Subordinate-clause-first’ and the ‘Head-last parameter’ Strategies of Each Test for a Sentence-picture Matching Task

<table>
<thead>
<tr>
<th>source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>A:Group</td>
<td>63.0031</td>
<td>1</td>
<td>63.0031</td>
<td>15.760</td>
<td>0.0002</td>
</tr>
<tr>
<td>error[S(A)]</td>
<td>235.8602</td>
<td>59</td>
<td>3.9976</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B:Test</td>
<td>117.3519</td>
<td>2</td>
<td>58.6759</td>
<td>45.420</td>
<td>0.0000</td>
</tr>
<tr>
<td>AB</td>
<td>24.6306</td>
<td>2</td>
<td>12.3153</td>
<td>9.533</td>
<td>0.0001</td>
</tr>
<tr>
<td>error[BS(A)]</td>
<td>152.4403</td>
<td>118</td>
<td>1.2918</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

+ p<.10, * p<.05, ** p<.01, *** p<.005, **** p<.001
Appendix 16

Results of Multiple Comparisons by Ryan procedure on Error Scores Attributed to the 'Subordinate-clause-first' and the 'Head-last parameter' Strategies for a Sentence-picture Matching Task

[Comparison between Tests on the before / after group]

<table>
<thead>
<tr>
<th></th>
<th>1: Pre-test</th>
<th>2: Post-test1</th>
<th>3: Post-test 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>mean</td>
<td>2.97</td>
<td>0.69</td>
<td>0.41</td>
</tr>
<tr>
<td>n</td>
<td>29</td>
<td>29</td>
<td>29</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>pair</th>
<th>r</th>
<th>nominal level</th>
<th>t</th>
<th>p</th>
<th>sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 3</td>
<td>3</td>
<td>0.01666667</td>
<td>8.549</td>
<td>0.00000000</td>
<td>s.</td>
</tr>
<tr>
<td>1 - 2</td>
<td>2</td>
<td>0.03333333</td>
<td>7.625</td>
<td>0.00000000</td>
<td>s.</td>
</tr>
<tr>
<td>2 - 3</td>
<td>2</td>
<td>0.03333333</td>
<td>0.924</td>
<td>0.3572671</td>
<td>n.s.</td>
</tr>
</tbody>
</table>

MSe=1.291868, df=118, significance level=0.050000

[Comparison between Tests on the Wh-question group]

<table>
<thead>
<tr>
<th></th>
<th>1: Pre-test</th>
<th>2: Post-test1</th>
<th>3: Post-test 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>mean</td>
<td>3.13</td>
<td>2.56</td>
<td>1.91</td>
</tr>
<tr>
<td>n</td>
<td>32</td>
<td>32</td>
<td>32</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>pair</th>
<th>r</th>
<th>nominal level</th>
<th>t</th>
<th>p</th>
<th>sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 3</td>
<td>3</td>
<td>0.01666667</td>
<td>4.289</td>
<td>0.0000369</td>
<td>s.</td>
</tr>
<tr>
<td>1 - 2</td>
<td>2</td>
<td>0.03333333</td>
<td>1.980</td>
<td>0.0500786</td>
<td>n.s.</td>
</tr>
<tr>
<td>2 - 3</td>
<td>2</td>
<td>0.03333333</td>
<td>2.310</td>
<td>0.0226541</td>
<td>s.</td>
</tr>
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</table>

MSe=1.291868, df=118, significance level=0.050000
Appendix 17

Table of Analysis of Variance of Each Test for a Re-arrangement Task

<table>
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<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>A:Group</td>
<td>31.9403</td>
<td>1</td>
<td>31.9403</td>
<td>11.120</td>
<td>0.0015  **</td>
</tr>
<tr>
<td>error[S(A)]</td>
<td>169.4694</td>
<td>59</td>
<td>2.8723</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B:Test</td>
<td>7.3391</td>
<td>2</td>
<td>3.6695</td>
<td>3.283</td>
<td>0.0410  *</td>
</tr>
<tr>
<td>AB</td>
<td>21.2844</td>
<td>2</td>
<td>10.6422</td>
<td>9.521</td>
<td>0.0001  ****</td>
</tr>
<tr>
<td>error[BS(A)]</td>
<td>131.8958</td>
<td>118</td>
<td>1.1177</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

+ p<.10, * p<.05, ** p<.01, *** p<.005, **** p<.001
Appendix 18

Results of Multiple Comparisons by Ryan procedure for a Re-arrangement Task

[Comparison between Tests on the before / after group]

<table>
<thead>
<tr>
<th></th>
<th>1: Pre-test</th>
<th>2: Post-test1</th>
<th>3: Post-test 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>mean</td>
<td>2.03</td>
<td>3.03</td>
<td>3.03</td>
</tr>
<tr>
<td>n</td>
<td>29</td>
<td>29</td>
<td>29</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>pair</th>
<th>r</th>
<th>nominal level</th>
<th>t</th>
<th>p</th>
<th>sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 - 1</td>
<td>3</td>
<td>0.01666667</td>
<td>3.602</td>
<td>0.0004638</td>
<td>s.</td>
</tr>
<tr>
<td>3 - 2</td>
<td>2</td>
<td>0.0333333</td>
<td>0.000</td>
<td>1.0000000</td>
<td>n.s.</td>
</tr>
<tr>
<td>2 - 1</td>
<td>2</td>
<td>0.0333333</td>
<td>3.602</td>
<td>0.0004638</td>
<td>s.</td>
</tr>
</tbody>
</table>

MSe=1.117761, df=118, significance level=0.050000

[Comparison between Tests on the Wh-question group]

<table>
<thead>
<tr>
<th></th>
<th>1: Pre-test</th>
<th>2: Post-test1</th>
<th>3: Post-test 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>mean</td>
<td>2.09</td>
<td>1.44</td>
<td>2.06</td>
</tr>
<tr>
<td>n</td>
<td>32</td>
<td>32</td>
<td>32</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>pair</th>
<th>r</th>
<th>nominal level</th>
<th>t</th>
<th>p</th>
<th>sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 2</td>
<td>3</td>
<td>0.01666667</td>
<td>2.483</td>
<td>0.0144384</td>
<td>s.</td>
</tr>
<tr>
<td>1 - 3</td>
<td>2</td>
<td>0.0333333</td>
<td>0.118</td>
<td>0.9060848</td>
<td>n.s.</td>
</tr>
<tr>
<td>3 - 2</td>
<td>2</td>
<td>0.0333333</td>
<td>2.365</td>
<td>0.0196797</td>
<td>s.</td>
</tr>
</tbody>
</table>

MSe=1.117761, df=118, significance level=0.050000
Table of Analysis of Variance on Mean Error Scores Attributed to the 'Subordinate-clause-first' and the 'Head-last parameter' Strategies of Each Test for a Re-arrangement Task

<table>
<thead>
<tr>
<th>source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>A:Group</td>
<td>35.0287</td>
<td>1</td>
<td>35.0287</td>
<td>12.739</td>
<td>0.0007 ****</td>
</tr>
<tr>
<td>error[S(A)]</td>
<td>162.2280</td>
<td>59</td>
<td>2.7496</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B:Test</td>
<td>12.7406</td>
<td>2</td>
<td>6.3703</td>
<td>5.758</td>
<td>0.0041 ***</td>
</tr>
<tr>
<td>AB</td>
<td>13.6149</td>
<td>2</td>
<td>6.8074</td>
<td>6.154</td>
<td>0.0029 ***</td>
</tr>
<tr>
<td>error[BS(A)]</td>
<td>130.5380</td>
<td>118</td>
<td>1.1062</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p<.10, * p<.05, ** p<.01, *** p<.005, **** p<.001
Appendix 20

Results of Multiple Comparisons by Ryan procedure on Error Scores Attributed to the 'Subordinate-clause-first' and the 'Head-last parameter' Strategies for a Re-arrangement Task

[Comparison between Tests on the before / after group]

<table>
<thead>
<tr>
<th>pair</th>
<th>r</th>
<th>nominal level</th>
<th>t</th>
<th>p</th>
<th>sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 3</td>
<td>3</td>
<td>0.01666667</td>
<td>4.120</td>
<td>0.0000707</td>
<td>s.</td>
</tr>
<tr>
<td>1 - 2</td>
<td>2</td>
<td>0.03333333</td>
<td>3.496</td>
<td>0.0006673</td>
<td>s.</td>
</tr>
<tr>
<td>2 - 3</td>
<td>2</td>
<td>0.03333333</td>
<td>0.624</td>
<td>0.5336968</td>
<td>n.s.</td>
</tr>
</tbody>
</table>

MSe=1.106255, df=118, significance level=0.050000
Appendix 21

Table of Analysis of Variance of Each Test for a Translation Task

<table>
<thead>
<tr>
<th>source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>A:Group</td>
<td>10.7316</td>
<td>1</td>
<td>10.7316</td>
<td>10.847</td>
<td>0.0017  ***</td>
</tr>
<tr>
<td>error[S(A)]</td>
<td>58.3721</td>
<td>59</td>
<td>0.9893</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B:Test</td>
<td>4.6361</td>
<td>2</td>
<td>2.3180</td>
<td>5.089</td>
<td>0.0076 **</td>
</tr>
<tr>
<td>AB</td>
<td>9.2481</td>
<td>2</td>
<td>4.6240</td>
<td>10.152</td>
<td>0.0001 ****</td>
</tr>
<tr>
<td>error[BS(A)]</td>
<td>53.7464</td>
<td>118</td>
<td>0.4554</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

+ p<.10, * p<.05, ** p<.01, *** p<.005, **** p<.001
Appendix 22

Results of Multiple Comparisons by Ryan procedure for a Translation Task

[Comparison between Tests on the *before* / *after* group]

<table>
<thead>
<tr>
<th></th>
<th>1: Pre-test</th>
<th>2: Post-test1</th>
<th>3: Post-test 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>mean</td>
<td>1.03</td>
<td>1.79</td>
<td>1.69</td>
</tr>
<tr>
<td>n</td>
<td>29</td>
<td>29</td>
<td>29</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>pair</th>
<th>r</th>
<th>nominal level</th>
<th>t</th>
<th>p</th>
<th>sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 - 1</td>
<td>3</td>
<td>0.01666667</td>
<td>4.280</td>
<td>0.0000382</td>
<td>s.</td>
</tr>
<tr>
<td>2 - 3</td>
<td>2</td>
<td>0.03333333</td>
<td>0.584</td>
<td>0.5605508</td>
<td>n.s.</td>
</tr>
<tr>
<td>3 - 1</td>
<td>2</td>
<td>0.03333333</td>
<td>3.697</td>
<td>0.0003328</td>
<td>s.</td>
</tr>
</tbody>
</table>

MSe=0.455478, df=118, significance level=0.050000

[Comparison between Tests on the *Wh*-question group]

<table>
<thead>
<tr>
<th></th>
<th>1: Pre-test</th>
<th>2: Post-test1</th>
<th>3: Post-test 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>mean</td>
<td>1.09</td>
<td>0.75</td>
<td>1.22</td>
</tr>
<tr>
<td>n</td>
<td>32</td>
<td>32</td>
<td>32</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>pair</th>
<th>r</th>
<th>nominal level</th>
<th>t</th>
<th>p</th>
<th>sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 - 2</td>
<td>3</td>
<td>0.01666667</td>
<td>2.778</td>
<td>0.0003608</td>
<td>s.</td>
</tr>
<tr>
<td>3 - 1</td>
<td>2</td>
<td>0.03333333</td>
<td>0.741</td>
<td>0.4602499</td>
<td>n.s.</td>
</tr>
<tr>
<td>1 - 2</td>
<td>2</td>
<td>0.03333333</td>
<td>2.037</td>
<td>0.0438502</td>
<td>n.s.</td>
</tr>
</tbody>
</table>

MSe=0.455478, df=118, significance level=0.050000
Appendix 23

Table of Analysis of Variance on Mean Error Scores Attributed to the 'Subordinate-clause-first' and the 'Head-last parameter' Strategies of Each Test for a Translation Task

<table>
<thead>
<tr>
<th>source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>A:Group</td>
<td>9.6929</td>
<td>1</td>
<td>9.6929</td>
<td>19.949</td>
<td>0.0000****</td>
</tr>
<tr>
<td>error[S(A)]</td>
<td>28.6677</td>
<td>59</td>
<td>0.4858</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B:Test</td>
<td>5.1915</td>
<td>2</td>
<td>2.5957</td>
<td>6.365</td>
<td>0.0024***</td>
</tr>
<tr>
<td>AB</td>
<td>3.2898</td>
<td>2</td>
<td>1.6449</td>
<td>4.034</td>
<td>0.0202*</td>
</tr>
<tr>
<td>error[BS(A)]</td>
<td>48.1192</td>
<td>118</td>
<td>0.4077</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

+ p<.10, * p<.05, ** p<.01, *** p<.005, **** p<.001
Appendix 24

Results of Multiple Comparisons by Ryan procedure on Error Scores Attributed to the 'Subordinate-clause-first' and the 'Head-last parameter' Strategies for a Translation Task

[Comparison between Tests on the before / after group]

<table>
<thead>
<tr>
<th>pair</th>
<th>r</th>
<th>nominal level</th>
<th>t</th>
<th>p</th>
<th>sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 2</td>
<td>3</td>
<td>0.01666667</td>
<td>2.673</td>
<td>0.0085808</td>
<td>s.</td>
</tr>
<tr>
<td>1 - 3</td>
<td>2</td>
<td>0.03333333</td>
<td>2.467</td>
<td>0.0150434</td>
<td>s.</td>
</tr>
<tr>
<td>3 - 2</td>
<td>2</td>
<td>0.03333333</td>
<td>0.206</td>
<td>0.8374424</td>
<td>n.s.</td>
</tr>
</tbody>
</table>

\[ \text{MSe}=0.407796, \text{ df}=118, \text{ significance level}=0.050000 \]

[Comparison between Tests on the Wh-question group]

<table>
<thead>
<tr>
<th>pair</th>
<th>r</th>
<th>nominal level</th>
<th>t</th>
<th>p</th>
<th>sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 - 3</td>
<td>3</td>
<td>0.01666667</td>
<td>3.328</td>
<td>0.0011684</td>
<td>s.</td>
</tr>
<tr>
<td>2 - 1</td>
<td>2</td>
<td>0.03333333</td>
<td>0.783</td>
<td>0.4352099</td>
<td>n.s.</td>
</tr>
<tr>
<td>1 - 3</td>
<td>2</td>
<td>0.03333333</td>
<td>2.545</td>
<td>0.0122288</td>
<td>s.</td>
</tr>
</tbody>
</table>

\[ \text{MSe}=0.407796, \text{ df}=118, \text{ significance level}=0.050000 \]