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Acquisition of telicity in L2:
A psycholinguistic study of Japanese learners of English

Keiko Kaku

Thesis submitted to the
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Abstract

This dissertation investigates the acquisition of the semantics of telicity by Japanese learners of English with emphasis on a particular grammatical phenomenon, the neutral perfective reading of simple past predicates (Singh, 1991), which is available in Japanese but not in English. Three main points are of interest in this dissertation: First, we examine whether or not Japanese learners of English learn to derive the telicity of a simple past predicate despite lack of explicit classroom instruction. Second, we investigate potential factors that may assist L2 learners in discovering a target-like representation of the predicate telicity in English. Finally, we aim at revealing the L2 learners' developmental profile for the acquisition of the semantics of telicity.

Two experimental tasks, a morphological task and a truth-value judgment task, were conducted which included three proficiency levels of L2 learners (beginner, intermediate and advanced), as well as native speakers of English and Japanese. Empirical data from the experimental tasks indicated that Japanese learners of English succeeded in progressing towards target-like representation of telicity. While the beginners directly transferred the L1 Japanese representation of the semantics of predicate telicity onto their target language, the intermediate and advanced levels dissociated the telicity of the English simple past predicates from that of the Japanese past predicates. That is, they learned to invalidate the neutral perfective reading of English predicates. We postulate that L2 learners' progress in the acquisition of the semantics of English predicate telicity can be accounted for by the acquisition of Det/Num morphology and by a Bayesian learning model: This learning model helps learners use L2 input to make form-meaning inferences on the predicate telicity and aids them to gradually acquire the most appropriate representation of English predicate telicity.

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List of Abbreviations

Acc	accusative
Adj	adjectives
ANOVA	the analysis of variance
Asp	aspect
AspP	aspect phrase
Bare-sg	bare singular noun
Cl	classifier
Det	determiners
DP	determiner phrases
Gen	genitive
L1	first language
L2	second language
N	noun
Nom	nominative case
NP	noun phrase
Num	number
NumP	number phrase
Obj	object
PerfP	perfectivity phrase
S	sentence
Top	topic marker
UG	Universal Grammar
VP	verb phrases

1 Introduction

This dissertation is a psycholinguistic study of the acquisition of the semantics of predicate telicity by Japanese learners of English. We investigate three main points: (1) the possibility that Japanese learners of English learn to derive the telicity of English simple past predicates despite lack of explicit classroom instruction; (2) potential factors contributing to L2 learners' progression in the aspectual domain, and (3) L2 learners' developmental profile for the acquisition of the semantics of telicity.

Our investigation makes use of a particular grammatical phenomenon, the neutral perfective reading of a predicate (Singh, 1991), which is available in Japanese but not in English. The term 'neutral perfective' refers to the capacity of a perfective predicate in some languages to indicate an event that did not reach its culmination point. This phenomenon is illustrated in examples in (1) and (2).

- (1) a. \sqrt Lisa erased the star. (complete event)
b. # Lisa erased the star but some of it still remains.
- (2) a. \sqrt Risa-wa hoshi-o keshita (complete/incomplete event)
Lisa-Top star-Acc erased
'Lisa erased (a/the) star(s).'
- b. \sqrt Risa-wa hoshi-o keshita keredo mada nokotte-iru
Lisa-Top star-Acc erased but still remains
'Lisa erased (a/the) star(s) but it still remains.'

The above sentences exemplify the distinction between the availability of the neutral perfective reading. In (1)a, the English simple past sentence *Lisa erased the star* refers to a complete event: The star has been erased completely. However, the sentence becomes semantically infelicitous when it is followed by an utterance suggesting non-completion of a event, such as *but some of it still remains*, as illustrated in (1)b. These examples indicate that the English simple past sentence (1)a is not an appropriate description of the event where the star is erased incompletely. By contrast, where Japanese is concerned, a simple past predicate ‘erased’ in (2)a can refer to both a complete event and an incomplete event. This means that the Japanese simple past sentence (2)a is appropriate as a description of both complete and incomplete scenarios. The semantically felicitous sentence (2)b confirms the availability of the neutral perfective reading of a predicate in Japanese.

From a morpho-syntactic point of view, this difference in availability of the neutral perfective reading between English and Japanese can be attributed to at least two factors at the level of Determiner Phrase (DP): the initial setting of the nominal feature boundedness of bare nominals and the projection of the Det(erminer) and Num(ber) categories (Kaku and Kazanina, 2007; Kaku, Liceras and Kazanina, 2007; Kaku, Liceras and Kazanina, 2008 a, b). The English simple past sentence with a predicate ‘erased’ in (1)b is semantically infelicitous since the object DP in the first clause is bounded by Det(erminer). This bounded feature in the DP percolates all way up to the VP level and the resulting predicate refers to a complete event (thereby rendering (1)b is infelicitous). However, a Japanese simple past sentence can refer to an incomplete event as in (2)b because the object DP in the first clause is unbounded. This unbounded feature in the DP

is neutral with respect to the entailment of event completion, thereby allowing both complete and incomplete events.

Acquiring the English type of telicity marking is not a trivial task for Japanese learners of English since there is no explicit classroom instruction on the abstract features of Det/Num morphology or on how to compute English predicate telicity. Moreover, the acquisition of the semantics of predicate telicity requires progression from a superset to a subset interpretation for the simple past without the benefit of information about the ungrammaticality in the target language (i.e., negative evidence). A superset-subset interpretation in this dissertation means that a Japanese simple past sentence can refer to either a complete event or an incomplete event (i.e., superset), whereas what is considered to be the equivalent English simple past sentence can only refer to event completion (i.e., subset). In order to investigate whether adult Japanese learners of English learn to invalidate the neutral perfective reading of a predicate when an object DP is bounded, we designed two experimental tasks: a morphological task that examines L2 learners' Det/Num morphological knowledge and a truth-value judgment task that investigate L2 learners' semantic interpretation of predicate telicity.

Examining the acquisition of the abstract semantic knowledge in the aspectual domain would provide us with a better understanding of whether the acquisition of abstract semantic interpretation of telicity is possible, and if so, how L2 learners develop the semantic representation of telicity. Furthermore it leads us to investigate possible contributing factors to L2 learners' semantic progress. In what follows, we introduce the main issues addressed in this dissertation.

L1 transfer and language development in L2 acquisition

According to the Full Transfer Full Access hypothesis (Schwartz and Sprouse, 1996), L2 learners start out with their L2 development by utilizing their L1 grammar (i.e., the so-called ‘L1 transfer’). Evidence for L1 transfer, especially at the initial state of L2 acquisition, has been provided by many studies (Gass and Selinker, 1994; Schwartz and Sprouse, 1996, 2000b, among others). This L1 transfer phenomenon has been observed in various linguistic domains, such as the overt morphology-syntactic level (e.g., L1 transfer in word order in child L2 acquisition, see Hazneder 1997; L1 transfer at the DP level in adult L2 acquisition see Liceras, Valenzuela and Diaz, 1999) and the covert semantic level (e.g., the acquisition of the semantics of Russian aspect by Slabakova, 2005 and Japanese by Gabriele, 2005, among others).

In this dissertation, we show that Japanese learners of English transfer their L1 Japanese telicity marking mechanism in the early stages of their L2 acquisition. Gradually, this L1 transfer becomes less observable and, at the intermediate level and advanced levels, learners show progress toward the target-like representation and interpretation of English predicate telicity.

Contributing factors to the acquisition of the semantics of telicity

A substantial amount of L2 research dealing with different language pairs suggests that L2 learners learn some constructions in their target grammar even though they are not explicitly taught in the classroom. In fact, many studies have reported that L2 learners

come to realize the differences between L1 and L2 in the course of L2 acquisition and acquire the new value of their target grammar (at least, performed beyond the change level) (Schwartz and Sprouse, 1994, 1996; among others).¹ The acquisition of the semantics of aspect is not an exception: L2 learners come to acquire the target-like representation of aspect marking over time (Slabakova, 1997, 2001, 2003 and 2005). In other words, interlanguage grammars are not fixed, they are changing representations during the course of development.² Interestingly, the question as to ‘what contributes to such progress’ has not received much attention in L2 acquisition research, especially in the generative approach (White, 2003: 151). Investigation into how interlanguage develops and what factors contribute to the learners’ language progress is needed for a comprehensive understanding of the mechanism of L2 acquisition (Carroll, 1999a. b; Gregg, 1996; Klein and Martohardjono, 1999).

In this dissertation, we focus our argumentation on what leads to the acquisition of predicate telicity on two possible contributing factors: the acquisition of Det and Num morphology, which we considered as purely linguistic in nature, and L2 learners’ form-meaning inferences based on the input with a Bayesian probabilistic learning model (Tenenbaum and Griffiths, 2001). The latter is more cognitive in nature: Upon encountering L2 input, learners make inferences. The Bayesian learning model helps L2 learners to gradually eliminate the competing hypotheses (inferences) in learners’ hypothesis space. In other words, this learning model aids learners to gradually acquire

¹ The new value of grammar is often referred to as ‘parameter resetting’ in the generative approach to L2 acquisition literature. Parameter (re)setting compares L2 acquisition to a switch (off/on). It implies that L2 acquisition occurs in an abrupt manner (Schwartz and Gubala-Ryzak, 1992). In this dissertation, however, we will not use the term *parameter (re)setting* since, as it has been widely reported in recent L2 literature, L2 acquisition does not necessarily take place in an abrupt manner and, in many cases, resetting a parameter can proceed in a step-wise manner (Liceras, 1989).

² We will be using the terms ‘non-native’ grammar and ‘interlanguage’ indistinctly. The term interlanguage, which was initially used by Selinker (1972), indicates a system that reflects second language learners’ L2 knowledge that is not fully acquired, yet approximating the target language.

the target representation of predicate telicity. We utilize this model as a proposal intended to conceptualize how input could be processed by learners and what kind of inferences L2 learners may draw in the learning process. Ultimately, we use the Bayesian learning model to account for why a Canada group performed better in invalidating the neutral perfective reading of a predicate than a Japan group even though both groups are comparable in terms of placement test results but different with respect to the duration of English immersion (section 5.3).

We argue that both the acquisition of DP morphology and the Bayesian learning model could account for the acquisition of predicate telicity and that those factors act in parallel. The organization of this dissertation is as follows.

Chapter 2 introduces theories of aspect in English and Japanese and provides a theoretical account of why English and Japanese differ with respect to the availability of the neutral perfective reading.

In **Chapter 3** we discuss theories of L2 acquisition as well as research conducted within the various frameworks. In particular, we show some developmental profiles of L2 acquisition, including the role of L1 and L2 learners' progress in the course of L2 acquisition. Additionally, we discuss two streams of studies that explore the potential contributing factors in L2 development that are of interest for our purposes: morphology as a contributing factor and learners' form-meaning inferences on the bases of input with the Bayesian learning model.

In **Chapter 4**, we formulate our research questions for the present study of the acquisition of the semantics of predicate telicity by Japanese learners of English. We also provide a detailed description of the experimental tasks, including the stimuli and the

conditions, as well as the results. In reporting results, we first deal with the role of L1 and show that Japanese learners of English transfer their L1 Japanese grammar onto the L2 English grammar. This L1 transfer was observed at the overt morphological level (omitting Det morphology) and covert semantic level (incorrectly accepting the neutral perfective reading, especially at the beginner level). The results further show that this L1 transfer phenomenon is observed to a lesser degree in higher proficiency levels, which is indicative of the fact that advanced learners (and many intermediate learners) moved away from their L1 representation of the semantics of telicity.

In **Chapter 5**, we discuss the data in order to investigate the potential contributing factors for the progression of the semantics of predicate telicity by Japanese learners of English. We argue that L2 learners' semantic progression in the aspectual domain can be explained both by the covert internalization of Det and Num morphology and L2 by learners' form-meaning inferences with the Bayesian learning model.

In **Chapter 6**, we conclude the dissertation, and provide suggestions for future research and propose some possible applications of our findings for L2 language instruction.

2 Theoretical background

2.1 Tense and Aspect

It is important that, before we deal with the concept of telicity, we differentiate between the concepts of tense and aspect. Tense is a deictic category that usually appears on verbs and allows us to locate an event on a time line in relation to the time of speech i.e., temporal locations (Smith, 1991:136). As Comrie (1976:1-3) puts it, “Tense relates the moment of the situation in relation to some other time, usually to the moment of speaking.” For example the sentence *Ken wrote a letter* refers to a *writing a letter* event that occurred prior to speech time. Although some languages such as Classical Hebrew and Mandarin Chinese do not distinguish tenses, three kinds of tense (i.e., past, present and future) are commonly observed in most languages (Comrie, 1976).³ Consider the following examples in English.

- (3)
- a. John is walking.
 - b. John walked.
 - c. John was walking.
 - d. John will walk.
 - e. John will be walking.

Example (3)a shows an event in the present time which is located temporally simultaneously with the moment of speaking. Examples (3)b and (3)c, however, describe

³ According to Smith (1991:137), temporal locations in languages such as Mandarin Chinese and Classic Hebrew are indicated by adverbials such as deictic adverbials (e.g., *now* and *last Thursday*), anaphoric adverbials (e.g., *then*, and *at that time*), and reference adverbials (e.g., *Oct 20th*, and *3:00 p.m.*).

events that happen in the past which are located prior to the moment of speaking. Examples (3)d and (3)e indicate events in the future which are located subsequent to the moment of speaking.

Aspect, on the other hand, is concerned with how events evolve in time i.e., whether or not an event is ongoing or has reached the culminating point (Comrie, 1976). Aspect can be described by verbs, verb phrases (VP) and sentences (Comrie, 1976; Smith, 1991; among many others). In Smith's (1991) terminology, aspect in verbs/verb phrases refers to 'situation aspect' (also refers to *Aktionsart*⁴, lexical aspect, inherent aspect, VP aspect)⁵ whereas aspect at a sentence level refers to 'viewpoint aspect', which is also known as 'grammatical aspect'. *Situation aspect* classifies verbs and verb predicates into four classes based on their semantic properties: *statives*, which have no internal structure (e.g., *love*); *activities*, which are on-going dynamic events without an inherent goal (e.g., *walk*); *accomplishments*, which have successive events in time with an inherent endpoint (e.g., *eat an apple*); and *achievements*, which have an inherent culmination point but in which the process towards the endpoint is instantaneous (e.g., *die*) (Vendler, 1967).

Viewpoint aspect (i.e., aspect at the sentence level) captures an event either partially (imperfective) or as a whole (perfective). In particular, when a sentence is imperfective, which in English is expressed by a progressive form such as *Ken was walking to school*, the sentence indicates the status of the event (i.e., ongoing event) without specifying a starting point and/or end point. Thus the sentence *Ken was walking to school* does not indicate when it started and whether or not Ken actually arrived at school. However when a sentence is perfective, such as *Ken walked to school*, then the sentence captures the

⁴ The term *Aktionsart* comes from the German word meaning 'kind of action'

⁵ The terminology 'VP aspect' is used by Slabakova (1997), Tenny (1994), and Travis (1992), among others.

event as a whole and entails event completion based on the telic value of the VP predicate (*walk to school*). Thus the sentence *Ken walked to school* entails that *Ken arrived at school*. Notice that the difference between the two examples is attributed to only the verb form, that is whether it is a simple past form or a past progressive form. This indicates aspect at the sentential level interacts with the property of situation aspect: In simple past sentences, the aspect at the sentential level coincides with that at the VP level (predicate telicity). In past progressive sentences, on the other hand, aspect at the sentential level only entails a part of events without specifying if the events reached their culminating point. We will see this in more detail in sections 2.2 and 2.3.

2.2 Situation aspect

In this section we focus on the conceptual side of situation aspect and leave the technical side (e.g., how telicity is computed) to section 2.6.

Situation aspect encodes the aspectual property of the verb/verb phrase and it is often marked by the semantic feature telicity, which indicates whether or not a verb/verb phrase encodes an inherent endpoint. Traditionally, an event with an inherent endpoint is referred to as *telic* (e.g., *erase a star*) while an event without one is referred to as *atelic* (e.g., *drink milk*). This situation aspect is often referred to as Vendler's aspectual verb classification (1967) in which verbs are categorized based on semantic properties (stativity, durativity and telicity) and their restrictions on time adverbials (e.g., *in/for* tests).^{6,7} In this section, we introduce a widely-accepted verb classification and aspectual

⁶ Early research on situation aspect was developed by Kenny (1963) and Ryle (1949) (cited in Dowty, 1979:53). They examined verbs and classified them based on their semantic properties of them.

⁷ *In/for* tests are commonly used to test the verb class based on its compatibility with a time adverbial phrase such as *in X time* and *for X time*. When a verb predicate or a verb predicate in a sentence indicates event completion such as accomplishments (and, in some cases, achievements), it should be compatible with *in X time*. On the other hand, when

value that each verb class represents through one of the most influential piece of work on this topic by Vendler (1967).

Before examining Vendler's verb classification, let us first consider why a classification of verb class can be important. Consider the examples in (4).

- (4) a. Ken is finding an answer.
 b. *Ken is knowing an answer.

These examples show the syntactic difference between the verbs. In particular, the verb in example (4)a *find* can combine with the progressive form *-ing*, entailing an event in progress, whereas the verb in example (4)b *know* cannot appear with the progressive form. Importantly, these examples show that it is not the case that all verbs can be compatible with the progressive marker *-ing*. Let us consider examples in (5).

- (5) a. A train was arriving at the station.
 b. Ken was running.

Examples in (5) demonstrate the difference in semantic entailment of the verbs. For example, (5)a *A train was arriving at the station* does not imply *A train arrived at the station*. However, (5)b *Ken was running* implies *Ken ran*. Consequently, some verbs show different semantic implication.

a sentence refers to an incomplete event (activities), it should be compatible with *for X time*. Other types of tests are presented in section 2.2.1.

In view of the syntactic and semantic behavior observed in verbs such as those exemplified in (4) and (5), researchers have categorized verbs according to differences owing, for instance, to internal features (e.g., Kenny, 1963; Ryle, 1949; Vendler, 1967 cited in Dowty, 1979:53). Notably, Vendler (1967) is credited for his work in distinguishing four verbs categories based on semantic properties (stativity, durativity and telicity) and their restrictions on time adverbials (e.g., in/for tests).⁸

Vendler (1967) classifies verbs into the following four categories: *states*, *activities*, *accomplishments* and *achievements*. *States* (or *statives*) are homogeneous and static and have no internal structure which changes over time. *Activities* are homogeneous, ongoing, dynamic situations with no inherent goal (i.e., *atelic*). *Accomplishments* involve an activity which progresses towards an inherent culmination point in time, after which the event can no longer continue (i.e., *telic*). *Achievements* have an inherent culmination point, in which the duration of time leading up to this point is instantaneous (i.e., *telic*). Dowty (1979) further refined Vendler's classification and thus, the classification of verbs is also referred to as the Vendler-Dowty classification. We acknowledge Dowty's contribution to verb classification, however, we use the term 'Vendler's classification' in this dissertation. Examples of verbs from Vendler's four categories are listed below.

⁸ See footnote ⁷ for the in/for test.

<i>States</i>	<i>Activities</i>	<i>Accomplishments</i>	<i>Achievements</i>
know	run	paint a picture	recognize
believe	walk	make a chair	spot
have	swim	deliver a sermon	find
desire	push a cart	draw a circle	lose
love	drive a car	push a cart ⁹	reach

(Dowty, 1979:54, partially modified)

Each verb class has internal characteristics that enable us to differentiate them from each other. These internal characteristics are indicated by contrasting features: [+/- static], [+/- telic] and [+/- duration] (Smith 1991).¹⁰ Table 1 shows the schematized situation types categorized by these three features.

⁹ 'Push a cart' is often classified as 'activity' because the entailment relation holds (such as 'Ken was pushing a cart' entails 'Ken pushed a cart'). However, we classified 'push a cart' in the accomplishments category (as Dowty: 1979:54 also categorized it as an accomplishment) due to the notion of *repair reading* (Kearns, 2000). Based on this notion, there are two readings available for 'Push a cart': one in which Ken was involved in an action of car-pushing (*Ken was pushing a cart* in an activity sense) and the other, *Ken pushed a cart to a place where it is supposed to be*. Because the predicate 'push a cart' is not our experimental stimuli (the target predicates used in our experiments are listed in appendix 5), we do not discuss this matter further.

¹⁰ Based on Vendler's classification, Smith (1991) later proposed a fifth class called *semelfactives* which include instantaneous event such as *knock* and *caught*, and whose semantic features are [-Static], [-Durative] and [-Telic]. Since the focus of our study is on accomplishment verbs, we will not adopt Smith's semelfactives in this dissertation.

Table 1: Features of situation types

Situations	Static	Durative	Telic
States	[+]	[+]	n/a
Activities	[-]	[+]	[-]
Accomplishments	[-]	[+]	[+]
Achievements	[-]	[-]	[+]

(Smith, 1991: 30, partially modified)

As seen in Table 1, [+/- static] divides situation types into two classes: *states* and *events*. *States* are static and they consist of an undifferentiated moment with no endpoint, whereas *events* are dynamic and involve agency, activity and change (Smith, 1991).

[+/- durative] classifies the event types as either durative [+ durative] or instantaneous [- durative]. Since achievements are instantaneous events, they are categorized as [- durative] whereas the others are classified as [+ durative] (i.e., states, activities and accomplishments).

The feature [+/- telic] is only relevant to events, but not to states, since events have an internal structure which would make a distinction between either telic or atelic (telic events have inherent goals, whereas atelic events do not). Activities which do not have inherent endpoints are atelic, whereas accomplishments and achievements are telic as they have intrinsic endpoints.

2.2.1 Tests of situation aspect

As seen in above, the characteristics of each situation type (static, durativity and telicity) help us classify verbs and verb predicates. This section introduces some of the widely-used linguistic tests (mostly from Dowty, 1979: 55-62) that enable the categorization of verbs and verb predicates. Table 2 shows the summary of four tests introduced in this section.

Table 2. Criteria for distinguishing verbs

	Statives	Activities	Accomplishments	Achievements
Pseudo-cleft constructions	*	√	√	√
Progressive form <i>-ing</i>	*	√	√	√
Does " <i>V-ing</i> " entail " <i>V-ed</i> "?	n/a	√	*	*
Can the verb appear as a complement of <i>finish</i> ?	n/a	n/a	√	*

n/a indicates that the test does not apply to this class.

The first test is meant to distinguish statives from eventives. One way to do this is to examine whether or not a verb can appear in the pseudo-cleft construction. Consider (6):

- (6) a. Statives: *What Tom did was know the answer.
 b. Activities: What Tom did was run.
 c. Accomplishments: What Tom did was paint the picture.
 d. Achievements: What Tom did was find his key.

Examples in (6) show that only eventive verbs (*activities*, *accomplishments* and *achievements*) can appear in this construction. Another dimension that distinguishes statives from eventives is related to their compatibility with the progressive form. Examples of this are provided in (7).

- (7) a. Statives: *Tom is knowing the answer.
 b. Activities: Tom is walking.
 c. Accomplishments: Tom is building a house.
 d. Achievements: Tom is dying.

As the examples in (7) show, statives cannot be used in a progressive form. The progressive form indicates that an event is in progress in the present, past or future. In order for an event to be progressive, it has to have an action component. Because statives lack this element of ‘action’, a progressive form is not available for statives.¹¹

The third test can distinguish activity verbs from non-activity verbs (accomplishments and achievements) by examining the relationship between the progressive and perfective forms of the predicates. Examples are given in (8).

¹¹ However, progressive marking with statives is possible for some cases such as *I am loving it* or *Ken is living in Tokyo*. In such cases, the predicates indicate the vividness or temporariness of the situation (Smith, 1991; Shirai, 2000).

- (8) a. Ken is walking.
- b. Ken walked. Walk: activity
- c. Ken is building a house.
- d. Ken built a house. Build a house: accomplishment
- e. A train is arriving at a station.
- f. A train arrived at a station. Arrive at a station: achievement

For activity verbs, *V-ing* entails *V-ed*, whereas for accomplishment and achievement verbs, this entailment does not hold. In (8)a, for instance, a sentence with an activity verb *walk*, such as ‘Ken is walking’, entails ‘Ken walked’, as in (8)b. However in the accomplishment and the achievement verb classes, the sentence *Ken is building a house* in (8)c does not entail *Ken built a house* in (8)d. The same is true in the sentence with the achievement verb in (8)e as (8)f *A train is arriving at a station* does not entail *a train arrived at a station*. The absence of the entailment relationship with accomplishment from (8)c and (8)d, or with achievement from (8)e to (8)f is often referred to as the *Imperfective Paradox* (See Dowty, 1979: 133 and Vendler, 1967:100).

Next we introduce a test that distinguishes accomplishments from achievements by examining whether a verb can be a complement of the aspectual verb *finish*. More specifically, what the test shows is that, if a verb can appear as a complement of the aspect verb *finish*, it is an accomplishment; whereas if it cannot, then the verb is an achievement as the examples in (9) show.

- (9) a. Ken finished building a house. accomplishment
b. # Ken finished recognizing his friend. achievement

These four tests are widely used to distinguish English aspectual verb classes. In the following section, we are going to examine Japanese aspectual verb classes.¹²

2.2.2 Situation aspect in Japanese

In this section, we examine Japanese situation aspect and demonstrate that Japanese situation aspect can be categorized according to Vendler's classification.

Shirai (1993, 1998, and 2000) examines Japanese verbs/verb phrases with regard to stativity, duration and telicity, which are features used in Vendler's four-verb categorization. Shirai employs linguistic tests by Vendler (1967), Dowty (1979), Robinson (1990), Kuno (1973) and Nakau (1976) and shows that Japanese verbs/verb predicates can also be categorized in Vendler's verb quadruple-classification.

The following are some tests that Shirai (2000) uses to examine Japanese a verb/verb predicate. The first test distinguishes statives from eventive verbs. In Japanese, statives in simple non-past form indicate present situation, whereas the same form with dynamic verbs refer to habitual or future situation (Kuno, 1973; Nakau, 1976). Because Japanese (as well as English) has an explicit marking system for eventives to indicate an ongoing

¹² In addition to the tests introduced here, a number of other tests have also been used. (see Dowty 1979: 60).

event (the progressive forms *-te-iru* and *-ing* respectively), only statives can receive these characteristics (present situation) in a simple non-past form.¹³

(10) a. Huzisan-ga mieru.
Mt Fuji-Nom be: visible
'(we) see Mt. Fuji'

b. Ken-ga odoru.
Ken-Nom dance
'Ken is going to dance' or 'Ken dances'

(examples from Shirai, 2000:338, partially modified)

(10)a shows the sentence with the stative verb *mieru* 'be visible' and it refers to a present-tense situation of seeing Mt. Fuji. The sentence with the eventive verb *odoru* 'dance' in (10)b, on the other hand, does not refer to a present-tense situation. Rather, it denotes either a future situation or a habitual situation. Thus (10)b corresponds to either *Ken is going to dance* in the future or *Ken dances regularly* in a habitual sense. An important point is that when a sentence with an eventive verb refers to a present situation, the sentence must be in the progressive form *-te-iru* e.g., *Ken-wa odot-te-iru* 'Ken is dancing'.

Compatibility of a Japanese verb with the progressive aspectual morpheme *-te-iru* can be used to differentiate statives from eventives. Examine example (11).

¹³ The simple present form can refer to an event progress with eventives in most Romance languages, as well as German, Korean and Classic Japanese (Shirai, 2000:338).

- (11) * Inu-ga niwa-ni i-te-iru.
 Dog-Nom backyard-at be-te-iru
 ‘There is a dog in the backyard.’

Similar to what was shown in the English diagnostic test, statives are usually not compatible with the progressive marker *te-iru* in Japanese.¹⁴

Another useful test to distinguish statives from eventives is the use of case markers (Kuno, 1973; Nakau, 1976). Examine examples in (12).

- (12) a. Tom-wa eego-ga dekiru.
 Tom-Top English-Nom can do
 ‘John knows English.’ Statives
- b. * Tom-wa eego-o dekiru.
 Tom-Top English-Nom can do
 ‘John knows English.’

¹⁴ Shirai (2000) did not use this test and pointed out that some Japanese statives are compatible with the progressive morpheme *-te-iru*.

(i) Sore-wa tiguu/tigat-te i-ru
 That-Top be: different/be: different-Asp
 ‘That is wrong’

(Shirai, 1998: 139, partially modified)

Example (i) shows that both choices (the simple present form or the imperfective form) are available for expressing the stative form with very subtle difference. Although we introduced this test as one of the diagnostic tests to distinguish stative verbs from dynamic verbs, the application of the test is somewhat unclear.

- c. Tom-wa ringo-o tabeta.
 Tom-Top apple-Acc ate
 ‘Tom ate (an/the) apple(s).’ Accomplishment
- d. *Tom-wa ringo-ga tabeta.
 Tom-Top apple-Nom ate
 ‘Tom ate (an/the) apple(s).’

In Japanese, a direct object of statives is marked by the nominative case *-ga* as in (12)a. However the sentence becomes ungrammatical when the object bears the accusative case *-o* as exemplified in (12)b. Conversely, example (12)c shows that a sentence is grammatical when the direct object of eventives is marked by the accusative case *-o*, whereas it is ungrammatical when the object is marked by nominative case *-ga* as shown in (12)d (Kuno, 1973; Nakau, 1976).¹⁵

Let us now examine tests which distinguish activity verbs from non-activity verbs (accomplishments vs. achievements) within eventive verbs. In order to examine this, an entailment test ‘Does he is *V-ing* entail he *V-ed*?’ can be used. As seen in the English test (in section 2.2.1), it examines the telicity of verb predicates. Let us first examine the English examples.

¹⁵ Another language that shows that object case marking affects the predicate telicity is Finnish. When the object is marked accusative, the predicate refers to a complete event (telic), whereas when the object is marked partitive, the predicate is neutral with respect to event completion (atelic) (Kiparsky, 1998:2-3 and 5, cited in Rosen, 1999:4).

- (13) a. *Ken was walking.*
 b. *Ken walked.*
 c. *Ken was eating two apples.*
 d. *Ken ate two apples.*

English examples (8)a and (8)b are repeated here as (13)a and (13)b respectively. Example (13)a shows that the verb *walk* is activity because *Ken was walking* entails *Ken walked*. The verb predicate *eat two apples* in (13)c is accomplishment because *Ken was eating two apples* does not entail *Ken ate two apples*. This entailment test can be applied to Japanese. Examine (14).

- (14) a. *Ken-wa hashit-tei-ta.*
 Ken-Top run-Asp-past
 ‘Ken was running.’
- b. *Ken-wa hashitta*
 Ken-Top run-past
 ‘Ken run.’

As in English, Japanese also has a past progressive form and a simple past which are *Ken-wa hashit-tei-ta* ‘Ken was run-ing’ in (14)a and *Ken-wa hashitta* ‘Ken run’ in (14)b respectively. Examples (14)a and (14)b show that the past progressive form *Ken-wa hashit teita* ‘Ken was running’ entails *Ken-wa hashitta* ‘Ken ran’. This demonstrates that

hashiru ‘run’ is an activity verb. Examples (15)a and (15)b, on the other hand, demonstrate that the past imperfective predicates do not entail past perfective: *Ken-wa futatsu-no ringo-o tabe teita* ‘Ken was eating two apples’ does not entail *Ken-wa futatsu-no ringo-o tabeta* ‘Ken ate two apples’.

- (15) a. Ken-wa ni-ko-no ringo-o tabete-ita.
 Ken-Top two-Cl-Gen¹⁶ apple-Acc eat-Asp-past
 ‘Ken was eating two apples.’
- b. Ken-wa ni-ko-no ringo-o tabeta
 Ken-Top two-Cl-Gen apple-Acc eat- past
 ‘Ken ate two apples.’

This difference establishes that Japanese also distinguishes between accomplishment and activity.

The third test is used to distinguish accomplishments from achievements. Recall that the difference between the two aspectual classes is whether a verb predicate refers to an event that has duration, that is, whether the event climax is reached over a period of time, as in (8)d (accomplishment), or momentarily, as in (8)f (achievement). Thus, this test examines whether or not a predicate with time adverbials focuses on either the beginning of events or the endpoint of events. In particular, the time adverbial *after X time* focuses on the beginning of events whereas *in X time* usually refers to the endpoint of events (Shirai, 2000). Consequently, if both verb predicates with *in X time* and *after X time*

¹⁶ See section 2.5.1 for details of numerically quantified nouns in Japanese.

convey the same meaning (e.g., *a train will arrive in 10 minutes* = *a train will arrive after 10 minutes*), then the predicate is an achievement (due to the fact that an achievement is an instantaneous event which does not have the distinction of a beginning and an end point). If, on the other hand, the meaning of the predicate differs thereby indicating the beginning of event in a sentence with time a adverbial *in X time* and the end of event in a sentence with *after X time*, then the predicate is an accomplishment (e.g., *Sally will make a doll in 30 minutes* does not necessarily mean the same as *Sally will make a doll after 30 minutes*). Japanese examples are given in (16).

(16) a. Ai-wa sanjyuppun-go-ni ningyo-o tukuru.¹⁷

Ai-Top thirty minutes-after doll-Acc make

‘Ai will make a/the doll(s) after 30 minutes’

b. Ai-wa sanjyuppun-de ningyo-o tukuru.

Ai-Top thirty minutes-in doll-Acc make

‘Ai will make a/the doll(s) in 30 minutes’

The time adverbial *sanjyuppun-go-ni* ‘after 30 minutes’ in example (16)a highlights the beginning of doll making. However *sanjyuppun-de* ‘in 30 minutes’ in (16)b focuses on the end state of doll making. This difference between the sentences shows that the predicate *ningyo-o tsukuru* ‘make a/the doll(s)’ falls into an accomplishment group. Now examine examples (17).

¹⁷ In Japanese, there is no future tense marker. Present tense in dynamic verbs conveys future tense.

(17) a. Densh-ga sanjyuppun-go-ni eki-ni tsuku.

Train-Nom thirty minutes-after station-to arrive

‘A train will arrive at a station after 30 minutes.’

b. Densh-ga sanjyuppun-de eki-ni tsuku

Train-Nom thirty minutes-in station-to arrive

‘A train will arrive at a station in 30 minutes.’

The predicate *eki-ni tsuku* ‘arrive at the station’ is classified as achievements because the difference we observed in the accomplishment examples in (16) is not present in examples (17). In other words, the semantic difference between the two types of time adverbial phrases is not present because achievements are instantaneous events which do not depict a clear distinction between the beginning and an end point of events.

To summarize, based on the results of the tests that differentiate verbs/verb predicates, we can conclude that Japanese verbs can also be categorized according to Vendler’s four-type verb classification.¹⁸ This Vendler-type verb classification also applies to many other languages, such as Bulgarian (Lindstedt, 1985), Chinese (Li and Thompson, 1981; Smith, 1985), English (Dowty, 1979; Smith, 1983), Finnish (Markkanen, 1979), French (Rohrer, 1978; Smith, 1986), Georgian (Holiskey, 1981), German (Hoepelman and Rohrer, 1981), Kikuyu (Johnson, 1981), Lakhota (Foley and Van Valin, 1984), Polish

¹⁸ Kindaichi (1976) takes a different approach for classifying Japanese verbs. Unlike Vendler’s verb classification, which takes telicity (telic/atelic) into consideration, Kindaichi (1976) classified Japanese verbs based on the behavior of verbs under the *-te iru* construction (the progressive morpheme) which measures duration of verb predicates (Uesaka, 1996). *-te iru* is an aspectual morpheme roughly equivalent to that of English *-ing*. This classification is often used in dealing with viewpoint aspect but it lies outside the scope of this dissertation.

(Weist et al., 1984), Russian (Timberlake, 1982), and Spanish (Talmy, 1985) (The list is based on Smith and Weist, 1987: 388).

It is important to mention that this verb classification is based solely on the verb properties. That is, the classification focuses on how a verb itself behaves with respect to its internal feature (e.g., stativity, durativity, and telicity). However the Vendler-type of verb classification does not fully explain why verbs in the accomplishment class consist of a verb and its object e.g, *paint a picture*, whereas verbs in other classes are classified purely based on their verb property (Dowty, 1979:62). In the next section, we show that verb predicates, but not solely verbs, play an important role for deriving telicity at the VP level.

2.2.3 Aspect is compositional: from situation aspect to predicate telicity

We have reviewed the four-types of situation aspects and the semantic properties possessed by each verb class. As mentioned above, a commonly-held idea of the early work on verb classification advocated by Kenny (1963), Ryle (1949), and Vendler (1967) is that the classification is based on the characteristics of verb itself. However this idea runs into difficulties.

For example, a verb *walk*, which is categorized as an activity in Vendler's classification, could also be categorized as an accomplishment when it is accompanied by a goal prepositional phrase, as shown in (18).¹⁹

¹⁹ As mentioned in section 2.2.2, Vendler's original classification does not acknowledge this type of observation (see Dowty, 1979: 62).

- (18) a. John walked. Activity
 b. John walked to school. Accomplishment

The verb *walked* in (18)a is an activity since *John was walking* entails *John walked*. However the same verb in (18)b behaves as an accomplishment since *John was walking to school* does not entail that *John walked to school*. Critically, the difference in verb class demonstrates the difference as to whether verb predicates entail event completion. The activity predicate *walked* refers to either a complete event or an incomplete event (atelic), whereas the accomplishment predicate *walked to school* indicates a complete event (telic). A similar distinction can be made in the case of the examples in (19).

- (19) a. John drank milk. Activity
 b. John drank a glass of milk Accomplishment

The verb *drank* in (19)a is categorized as an activity based on the entailment test and the verb predicate does not entail event completion. However the same verb now can be categorized as an accomplishment in (19)b due to the lack of the entailment relationship: *John was drinking a glass of milk* does not entail *John drank a glass of milk*. It follows from these examples that adding a prepositional phrase (*to the school*) or a bounded (or quantized) object DP (*a glass of milk*) changes the aspect type from activity to accomplishment.

Importantly, the difference in the semantics of predicate telicity can be built on the bases of the predicates that utilize the same verb e.g., *Ken walked* (a complete or an

incomplete event) vs. *Ken walked to school* (a complete event). Thus, classifying verbs based only on verb property (e.g., static, durative and telic) per se does not seem to provide accurate information as to whether predicates entail event completion. Considering these facts, Dowty (1979), Ritter and Rosen (1996), Tenny (1994), and Verkuyl (1972, 1989, 1993, 1999) argue that the classification should take into account the compositional property of the verb phrase and the sentence, not solely verb meaning itself. This idea, that is, that aspect should be compositional, is especially relevant for our study since a similar observation can be made in Japanese aspect at the VP level (predicate telicity). More specifically, we are interested in the predicate telicity with the accomplishment verb class because the computation of predicate telicity in this class is claimed to be based on the semantic feature of object DP (boundedness). In other words, the semantic property of object DP determines the semantics of predicate telicity.

In the following, we will review the concept of ‘compositionality of aspect’ as proposed by Verkuyl (1972, 1989, 1993, 1999). Then, we further discuss details on the derivation of predicate telicity with simple past accomplishment predicates in English and Japanese in section 2.6.

Verkuyl (1972, 1989, 1993, 1999) is the pioneer of the idea of compositional aspect and his research is recognized as some of the most influential on the topic of aspect. His main argument is that aspect should be considered as a compositional property of sentences and verb phrases, and not merely a property of verb meanings. Verkuyl’s aspect construal consists of two binary features [+/- ADD-TO] and [+/- Specified Quantity of A (SQA)], where A is the denotation of a head noun.²⁰ The feature [+/- ADD-TO]

²⁰ In Verkuyl’s account, nominals in the subject position also receive [SQA] feature. Consider example (ii).

determines whether a verbal property is eventive. For example, eventive verbs such as *eat* and *drink* are [+ ADD-TO] whereas stative verbs such as *want* are [- ADD-TO]. The feature [+/- SQA] pertains to the boundeness of nominals and their property, or lack thereof, to be countable or measurable. In order for verb predicates to refer to a complete event (telic), both features [ADD-TO] and [SQA] have to be positive (i.e., [+ ADD-TO] and [+SQA]).

For instance, bounded count nouns such as *an/the apple* and/or *three apples* are marked [+SQA], whereas plural count nouns such as *apples* or mass nouns such as *milk* are marked [-SQA]. Examples are given in (20).

- (20)
- | | | | |
|----|-----------|------------------------|------------------------------|
| a. | ate | an/the/three apple(s). | |
| | [+ADD-TO] | [+SQA] | (predicate telicity: telic) |
| b. | ate | apples | |
| | [+ADD-TO] | [-SQA] | (predicate telicity: atelic) |
| c. | drank | milk | |
| | [+ADD-TO] | [-SQA] | (predicate telicity: atelic) |
| d. | wanted | an/the apple | |
| | [-ADD-TO] | [+SQA] | (predicate telicity: atelic) |

Examples in (20) show the value of the features in each category ([+/-ADD-TO] and [+/-SQA]) and predicate telicity (telic or atelic). It is important to note that, as mentioned

(ii) Ken ate an apple
 [+SQA] [+ADD-TO] [+SQA]

In (ii), the nominal in the subject position *Ken* receives the feature [+SQA] since the noun 'Ken' is countable (i.e., we can see a person named Ken as one individual). Since our experiment stimuli use nominals that are countable value [+SQA], we do not apply this boundedness feature to nominals in the subject position in this study.

above, when predicate telicity is telic, the predicate refers to a complete event. Conversely, when predicate telicity is atelic the predicate does not entail event completion. In other words, it can refer to either a complete event or an incomplete depending on contexts. The predicate telicity in (20)a is telic because the feature value of both [ADD-TO] and [SQA] are positive i.e., [+ADD-TO] and [+SQA]. Thus predicates refer to a complete event. However, if either one of the features is negative, the predicate telicity is atelic and the predicate refers to either a complete event or an incomplete event as in (20)b, (20)c, and (20)d. In particular, predicate telicity in (20)b and (20)c are atelic due to the feature value of an object DP is [-SQA] i.e., bare plural nouns *apples* [-SQA] and a mass noun *milk* [-SQA]. Predicate telicity in (20)d is atelic because the verb *want* is not eventive ([-ADD-TO]).

As we mentioned earlier, of particular interest to our study is accomplishments with bounded object DP which correspond to the verb features [+ADD-TO] and [+SQA] in Verkuyl's account. Specific details of how telicity is computed are given in section 2.6.

2.3 Viewpoint aspect

As mentioned briefly in 2.1, *viewpoint aspect* refers to an aspectual value at the sentential level and is concerned with whether an event is ongoing (imperfective) or if has reached its culminating point (perfective). It has been reported that viewpoint aspect is marked by the presence or absence of an aspectual morpheme on dynamic verbs. In English, for example, perfective is marked by a zero morpheme on verbs i.e., simple past form, whereas imperfective is indicated by the progressive morpheme *-ing* (Smith, 1991: 220).

An interesting part of this viewpoint aspect is how it interacts with telicity at the VP level.²¹

- (22) a. Ken erased three stars. VP= complete event, S=perfective
b. Ken was erasing three stars. VP=complete event, S= imperfective

In example (22)a, the predicate itself entails event completion (because object DP is bounded) and the overall sentence is perfective. This shows that, in English, a simple past accomplishment sentence refers to a complete event, and importantly, this coincides with telicity at the VP level. In other words, a simple past form did not introduce its own telicity at the sentential level. Example (22)b, on the other hand, shows that the sentence is imperfective: The sentence does not entail event completion despite the fact that VP predicate refers to a complete event (telic). It only indicates that the event was on-going and it does not entail the event reaching its culminating point. This means that the past progressive form *was eating* only focuses on the medial part of the event without a starting and/or an endpoint as represented schematically in (21)b. Telicity at the VP level has a starting point (*I*) and an inherent endpoint (*F*), yet grammatical viewpoint of the imperfective only captures the middle portion of the event without both ends. As a result, viewpoint aspect refers to an interpretation that the event is/was ongoing at some time

²¹ In fact, in perfective, the semantic value of viewpoint aspect varies according to the semantics of situation aspect (i.e., stative, activity, accomplishment and achievement). For example, sentences such as *Ken had a cat* (statives) have two readings; one is that the state of having a cat has ended (*termination*) at some point of the past and Ken no longer has the cat, and the other is a sentence with an open ending. That is, the state of having a cat is not ended and continues into the present. Eventive verb classes, on the other hand, interact with perfective form differently. For example sentences such as *Ken ate an apple* (accomplishment) and *Ken died* (achievement) refers to a complete event (Smith, 1991:221).

without specifying when it started and if it reached its inherent endpoint that predicate telicity conveys.

2.3.2 Viewpoint aspect in Japanese

Viewpoint aspect marking system in Japanese is similar to that of English in that the Japanese perfective is realized without an aspectual morpheme i.e., simple past tense, whereas the imperfective is marked by an aspectual morpheme *-te-iru*. Morphologically, English simple past tense marker *-ed* and Japanese simple past tense marker *-ta* are considered to entail an equivalent semantic interpretation (Ogihara, 1998).²² The Japanese equivalent of the English examples in (22) is given in (23)a and (23)b.

(23) a. Ken-wa mitsu-no hoshi-o keshita. VP = complete, S = perfective
Ken-Top three-Gen star-Acc erased
'Ken erased three star(s) (completely)'

b. Ken-wa mitsu-no hoshi-o keshi-teita. VP = complete, S = imperfective
Ken-Top three-Gen star-Acc erased-ing
'Ken was erasing three star(s) (but it is ambiguous whether the three stars are completely erased)'

In both sentences, the predicates refer to a complete event (telic). This is because the object DPs (*mitsu-no hoshi* 'three-Gen star') are bounded i.e., quantized by

²² According to Takahashi (1976) and Kinsui (1997), past tense marker *-ta* also has a perfective function. Shirai (2000) argues, following Bybee et al.'s (1994) universal path of grammaticization, that Japanese past tense marker *-ta* is derived from a resultative marker *-tari* (classic Japanese).

numerals/quantizers. However, the aspectual value at the sentence level (viewpoint aspect) is different in the two sentences due to the aspectual morpheme *-te-iru* in (23)b. Similar to what was shown in the English equivalent sentence (22)b, the imperfective form does not capture the entire event denoted in the VP level but, merely indicates that the event was in progress at some point in the past.

Note that, although object nouns quantized by numerals in both English and Japanese behave as bounded objects, which contribute to the telic value at the VP level as in examples (20)a and (23)a, the properties of bare nominals between the two languages are different. Details of this will be discussed in 2.5.1.

In summary, there are two types of aspect: situation aspect (VP level) and viewpoint aspect (sentential level). We have examined English and Japanese verbs and shown that they can be categorized into Vendler's (1967) four-class verb types based on their properties of verbs and verb phrases. What is crucial to our study is the concept of "compositionality of aspect" advocated by Verkuyl (1972, 1989, 1993, 1999). Simple past sentences can refer to a complete event when both of the two binary features, [ADD-TO] (when a verb is eventive) and [SQA] (when the object DP is bounded) are positive. With respect to viewpoint aspect, it makes a distinction between perfective and imperfective: The former is marked by a simple past form in both English and Japanese and the latter is marked by the aspectual morpheme *-ing* and *te-iru* respectively. It is important to note that the telicity value at the sentence level in a simple past sentence coincides with that at the VP level. Thus, a simple past sentence (perfective) refers to a complete event when its predicate telicity is telic as seen in (22)a and (23)a. However, a past progressive sentence (imperfective) does not entail event completion regardless of

the telic value at the VP level because an imperfective sentence indicates that an event was ongoing without specifying if the event is completed or not, as in (22)b and (23)b.²³ Based on these examples, we assume that simple past predicates in both English and Japanese reflect the telicity value at the VP level (and thus, predicate telicity).

In this dissertation, we focus on the telicity of simple past accomplishment predicates. Specifically, we focus on accomplishments with bounded (quantized) count noun objects. In what follows, we will demonstrate that the object DP plays an important role for computing the predicate telicity value both in English and Japanese.

2.4 The role of the object DP in accomplishment predicates

As we have seen above, whether a simple past sentence can refer to a complete event depends on the aspectual value at the VP level. For example, when the predicate is telic (such as *ate the apple*, the predicate entails a complete event), then a simple past sentence with the predicate can refer to a complete event. When the predicate is atelic (such as *drank milk*, the predicate does not entail event completion), the sentence is neutral with respect to event completion.

This dissertation focuses on telicity derived from an accomplishment situation (a verb and its object DP) in simple past predicates. Before going into the details of the computation of telicity at the VP level, this section shows that predicate telicity of a simple past accomplishment sentence is largely influenced by the boundedness of its object DP.

²³ It has been reported that the aspectual implication of a sentence with achievement verbs in imperfective form is different in English and Japanese progressive form with achievement verbs. In English, achievements in imperfective indicate an event progression, whereas the same construction in Japanese entails an event completion. McClure (1995) attributes this difference between the two languages to the semantic difference of the progressive morphemes *-ing* and *-te-iru*.

In section 2.2, we have seen that the telicity of accomplishment predicates is telic in that they have an inherent endpoint (a predicate such as *ate an apple* refers to a complete event). Recall that one of the criticisms made regarding Vendler's verb classification is the fact that the properties of the object DP are not acknowledged (Dowty, 1979). That is, many of the examples categorized as accomplishments in his classification are the result of the combination of a verb and a bounded singular count noun (e.g., *eat an apple*). However, in fact, the telicity of predicate may change as a function of the object DP. Let us examine the following:

- | | | | |
|------|----------------------------------|-----------------------|------------|
| (24) | a. Ken ate an apple. | DP = <i>bounded</i> | VP= telic |
| | b. Ken ate apples. | DP = <i>unbounded</i> | VP= atelic |
| | c. Ken ate three/the apples. | DP = <i>bounded</i> | VP=telic |
| | d. Ken ate ice cream. | DP = <i>unbounded</i> | VP=atelic |
| | e. Ken ate a scoop of ice cream. | DP = <i>bounded</i> | VP=telic |

Examples (24)a-e are sentences containing accomplishment verbs with object DPs. Interestingly, the examples show variations with respect to predicate telicity at the VP level. For example, the telicity of the verb predicate (24)a, (24)c, and (24)e are telic because they refer to a situation where objects (*an apple, three apples, and a scoop of ice cream*) are completely consumed. This reading results from the fact that the object DP is bounded, as the object DPs *an apple, the apples, and a scoop of ice cream* specify the quantity of objects affected and are thereby considered *bounded*. Predicate telicity in (24)b and (24)d on the other hand, is atelic because they can refer to either a complete

event or an incomplete event, rendering predicate telicity neutral with respect to the event completion. The object DPs for these examples (*apples* and *ice cream*) do not specify the limit in terms of the quantity of the objects that the verb affects (i.e, unknown quantity of *apples* and *ice cream* affected). Thus, it is not the case that all accomplishment predicates entail event completion at the VP level. In fact, boundedness of object DPs in accomplishment situations plays an important role for computing predicate telicity (Dowty, 1979; Tenny, 1994; Verkuyl, 1973, 1999). This notion, as seen in 2.2.3, is known as ‘compositionality of telicity’ (Verkuyl, 1973, 1999). Let us examine another set of examples in (25).

- (25) a. Ken built houses.
b. Ken built three/the houses.

Here, as it was also the case with the previous examples, the only difference between (25)a and (25)b is the type of object DP. Only (25)a is true in a situation where Ken built two houses completely and the third one incompletely. (25)b is false in this situation as it requires that all three houses (or all houses in question) be built completely. Predicates such as those in (25)b which contain a bounded DP (*three/the houses*) refer to a complete event. Importantly, when an object DP is unbounded (e.g., *houses*), as in (25)a, the resulting predicate can refer to either a complete event or an incomplete event in simple past sentences. The same observation holds in Japanese, i.e., the boundedness of the object DP affects the telicity of a Japanese predicate, as illustrated in (26).

- (26) a. Ken-wa ie-o tateta.
 Ken -Top house-Acc built
 ‘Ken built a/the house(s).
- b. Ken-wa san-gen-no ie-o tateta.
 Ken-Top three-Cl-Gen house-Acc built
 Ken built three/the houses.

Only the sentence (26)a is true in a situation in which Ken built two houses completely and the third one incompletely. Thus, similarly to what was shown in the English examples above, the boundedness of the object DP is crucial for the computation of telicity in Japanese. However, an important difference between English and Japanese is the availability of the so-called *neutral perfective* reading (Singh, 1991, 1998).

2.5 The neutral perfective reading

The term *neutral perfective* (Singh, 1991, 1998) designates the capacity of a perfective predicate in some languages to refer to an event that did not reach its completion point.²⁴ To illustrate this phenomenon, consider the difference between the English examples in (27) and the Japanese equivalents in (28).

²⁴ Tsujimura (2003) classifies Japanese simple past as a perfective category in discussing the neutral perfective reading of a predicate. Although it is debatable as to whether the morpheme *-ta* in Japanese is a tense morpheme or an aspect morpheme (Ogihara, 1999: 327) examining this is out of scope of this dissertation and we use the terms a simple past sentence and a sentence in the perfective form interchangeably.

- (27) a. √ Lisa erased the star.
 b. # Lisa erased the star but some of it still remains.
- (28) a. √ Risa-wa hoshi-o keshita
 Lisa-Top star-Acc erased
 ‘Lisa erased (a/the) star(s).’
- b. √ Risa-wa hoshi-o keshita keredo mada nokotte-iru
 Lisa-Top star-Acc erased but still remains
 ‘Lisa erased (a/the) star(s) but it still remains.’

In English, the simple past accomplishment sentence *erased the star*, (27)a, implies that the star has been erased completely, as confirmed by the fact that the continuation *but some of it still remains* in (27)b is strongly infelicitous. On the other hand, the Japanese equivalent in (28)a is not only compatible with a scenario in which the star has been erased completely (a telic reading), but is also compatible with a scenario where the star is erased partially (an atelic reading), as witnessed by a well-formed (28)b. Hence, Japanese past perfective predicates have a neutral perfective reading. In addition to Japanese (Ikegami, 1985; Kageyama, 1996; Tsujimura, 2003), this phenomenon (also sometimes termed as the *event cancellation* phenomenon, Tsujimura, 2003) is observed in Chinese (Smith, 1991; Tai, 1984; Soh and Kuo, 2005), Hindi (Singh, 1991, 1998) and Thai (Koenig and Muansuwan, 2000).²⁵

²⁵ Examples of the neutral perfective reading in Chinese and Hindi are the following.

(i) Chinese (Tai, 1984)

Zhangsan sha-le Lisi lingei, Lisi dou mei si.
 Zhangsan killed Lisi but, Lisi did not die
 ‘Zhangsan killed Lisi, but Lisi didn’t die.’

(ii) Hindi (Singh, 1991)

Usne ci’Thii likhii par puurii nahiikii.

Given that the neutral perfective reading is available with simple past predicates in Japanese but not in English, Japanese learners of English must learn to reject simple past predicates in an incomplete event scenario in English.²⁶ This may pose a challenge for Japanese learners of English who are required to go from a superset (because a Japanese simple past sentence is neutral with respect to event completion) to a subset (because an English simple past sentence entails event completion) of readings available for a past accomplishment predicate in the absence of explicit instruction or negative evidence. In the following section, we investigate the difference in availability of the neutral perfective reading between English and Japanese through examining nominal arguments in both languages.

2.5.1 Difference between English and Japanese in Nominal Arguments

In this section, we demonstrate that the difference between the availability of the neutral perfective reading is due to differences between the nominal system in English and Japanese. Below, we account for these differences using Chierchia's theory.

According to Chierchia's (1998) account of crosslinguistic differences in the nominal system, nouns are either mass (individuals or kind) or count (predicates) in a language

He-Erg letter wrote-PERF but complete NEG do-PERF
 'He wrote a letter but did not complete it.'

(iii) Thai (Koenig and Muansuwan, 2000)

Surii téɛŋ klaan k^hurn téɛ jaŋ mâj sèd.
 Surii compose poem ascend but still not finish
 'Surii composed a/the poem, but has not finished it yet.'

Though event cancellation sentences are possible in the above-mentioned languages, the equivalent sentences in English are generally contradictory and infelicitous.

²⁶ As will be discussed in section 4.3.2.1.4, the telicity of the predicates cannot be completely predicted by object boundedness which are determined by Det/Num morphology. Types of nominals and verbs in the object DP also play a role in some cases.

like English. However, in languages such as Japanese and Chinese, all nouns are mass (individuals or kind). Importantly, Chierchia's (1998) account further highlights differences between properties of bare nominals among languages. The first difference in terms of bare nominals between English (and most Germanic languages) and Japanese (also Chinese) is whether or not there is a restriction for bare nouns to occur as arguments.

In English, the appearance of bare nominals in an argument position is restricted: Only mass nouns can appear in bare form. In Japanese, on the other hand, both mass and count nouns alike can appear in an argument position. Let us first examine English examples in (29) and (30).

(29) a. **An English bare count noun *apple* in object position**

* Ken ate apple

b. **An English bare count noun *elephant* in subject position**

* Elephant is/are big

(30) a. **An English bare mass noun *milk* in object position**

√ Ken drank milk

b. **An English bare mass noun *ice cream* in object position**

√ Ice cream is delicious

English, which is a language that has a mass/count distinction, does not allow for bare count nouns to occur in either subject or object position as exemplified in (29)a and (29)b.

Only mass nouns can appear in their bare form in both positions as in (30)a and (30)b.

Let us now examine Japanese examples (31) and (32).

(31) a. **A Japanese bare nominal *ringo* ‘apple’ in object position**

√ Ken-wa ringo-o tabeta.

Ken-Nom apple-Acc ate

‘Ken ate an/the apple(s).’

b. **A Japanese Bare nominal *zou* ‘elephant’ in subject position**

√ zou-wa ooki.

Elephant -top big

‘Elephants are big.’

(32) a. **A Japanese bare nominal *gyuu nyuu* ‘milk’ in object position**

√ Ken-wa gyuu nyuu-o nonda.

Ken-Nom milk-Acc drink

‘Ken drank milk.’

b. **Bare nominal *aisu kuriimu* ‘ice cream’ in subject position**

√ Aisukuriimu-wa oishii.

Ice cream-Tom delicious

‘Ice cream is delicious’

Unlike English, Japanese allows bare nominals, which are classified in English as count or mass, to appear in both subject position (31) and object position (32).

The second difference is whether the plurality/singularity distinction is present along with its morphological marking. English differentiates plurality from singularity. Count nouns in English have to be overtly marked for plural or singular. In addition, when nouns are plural, the plural marker *-s* is used. When nouns are singular, determiners *a/the* are used. Mass nouns, on the other hand, are allowed to occur in bare form as arguments (e.g., \surd *Ken ate ice cream/ \surd**Water is important*).

In Japanese, because all nouns are mass, no singular/plural distinction is observed.²⁷ When specific quantity needs to be mentioned in Japanese (and Chinese), a classifier is used to individuate mass nouns. In order to numerically quantify nouns, numerals need to appear with classifiers (e.g., *ni-ken* ‘two-Cl’ as in (33)a). In other words, numerals cannot be directly combined with bare nouns as in (33)b.

- (33) a. Go-ken-no ie
 Five-Cl-Gen house
 ‘Five houses’

²⁷ Chierchia (1998) also mentioned that the claim that all nouns in Japanese and Chinese are mass does not reject the possibility that there is some kind of distinction between mass and count (p. 335). An analysis by Doetjes (1997) cited in Cheng and Sybesma 1999) distinguishes substances such as *water* from aggregates such as *furniture*. According to Doetjes, the former is ‘mass nouns’ and the latter is ‘count nouns’. Soh and Kuo (2005), whose analysis we largely depend on in this dissertation, use this distinction for their analysis of Chinese. However, since our study focuses on the count noun in English, this distinction does not concern us here.

- b. *Go ie.
 Five house
 ‘Five houses’

It is important to mention that there are many classifiers in Japanese. Characteristics of nouns that are counted determine which classifiers to use. For example, a classifier *-ken* is used for counting houses, the classifier *-nin* for counting people, and the classifier *-hon* for counting slender, cylindrical objects such as pencils, etc. (For other types of classifiers, see Tsujimura, 1996:192).

Num+classifier, such as *go-ken* ‘five-Cl’ as in (33)a, behaves as a modifier and it can be placed before the noun that it modifies. In order to modify a noun numerically, the genitive particle *-no* is used after Num+ classifier, as in (33)a.²⁸

²⁸ There is another way of quantifying nouns numerically in Japanese (this is referred to as Quantifier Floating). In this construction, Num+Cl is separated from a noun that it modifies such as (i).

- (i) Ken-wa biiru-o go-hon nonda.
 Ken-Top beer-Acc five-Cl drank.
 ‘Ken drank five bottles of beer’.

Because the classifier *-hon* is restricted to slender objects, Num+Cl only modifies the object *biiru* ‘beer’ but not the subject noun *Ken* who is a person. See Tsujimura (1996:193) for more details on Quantifier Floating. In this dissertation, we use the order of Num(ber)+Cl(assifier)+Gen(itive), to Numerically quantify noun, as in (33).

2.6 Deriving the predicate telicity

As seen in section 2.2.3, aspect is compositional and its final value at the VP level is determined by the interaction of two binary features [+/- ADD-TO] and [+/- SQA] (Verkuyl, 1972, 1999). A verb predicate entails event completion only when both features have a '+' value. In other words, a verb has to be dynamic (thus [+ ADD-TO]) and the object DP has to be bounded (thus [+ SQA]).

In this section, we show how the semantic feature boundeness of the object DP influences the derivation of telicity in simple past accomplishment predicates in English and Japanese. In order to provide an account, we adopt an analysis by Jackendoff (1991). His analysis is similar to that of Verkuyl's aspectual computation system where it employs the concept of 'compositional aspect', that is, aspect as compositional properties of the semantics of a verb and the object DP.

We adopt a view where the contrast in availability of the neutral perfective reading in English versus Japanese results from differences at the level of DP²⁹ (provided that the equivalent verbs are chosen, see also Uesaka, 1996).³⁰ Specifically, we argue that the difference is derived from two properties: the initial setting of the nominal feature

²⁹ This difference at the DP level is often discussed in a similar way for other language pairs (Singh 1998 in Hindi; Soh and Kuo, 2005 in Chinese among others).

³⁰ It is widely accepted that the semantics of verbs are the same between English and Japanese. McClure (1995) examined the semantic difference in viewpoint aspect (*-te-iru* '-ing' construction) in English and Japanese. His analysis is also based on this assumption where the semantics of verbs are the same between English and Japanese and the semantic difference under the *te-iru* construction is attributed to the semantic difference of the imperfective marker *te-iru* '-ing'. In English, achievement verbs in progressive form entail the process approaching to the end point of and event. Thus example (i) below provides a situation where Ken is approaching death. However what is considered to be a Japanese equivalent sentence, as in (ii), entails event completion. Thus, the sentence (ii) indicates a situation where Ken is already dead. McClure (1995) examined this type of semantic difference in Japanese and English and claimed that the difference in interpretation of achievement verbs in progressive form is derived from the formal semantics of the aspectual operator PROG which is lexicalized as *be-ing* and *te-iru*. In other words, the semantics of the verbs *die* in English and *shinu* in Japanese is equivalent.

- | | |
|-----------------------------------|--|
| (i) Ken is dying. | (process approaching the endpoint of an event) |
| (ii) Ken-wa shin- <i>te-iru</i> . | (resultative) |
| Ken-Top die-ing | |
| "Ken is dead/*John is dying." | |

[boundedness] of bare nominals and the projection of the Det(erminer) and Num(ber) categories (Kaku and Kazanina, 2007; Kaku, Licerias and Kazanina 2007; and Kaku, Licerias and Kazanina, 2008). Our account of telicity in Japanese is largely based on Soh and Kuo's (2005) account of telicity in Mandarin Chinese, which in turn utilizes Jackendoff's (1991) classification of nominal features.

Jackendoff's (1991) theory classifies nominal arguments in English in terms of the binary conceptual features *boundedness* and *internal structure*. The boundedness feature ([+/-b]) reflects whether or not boundaries of an entity are in view or are of concern. The internal structure feature ([+/- i]) distinguishes an entity that can be divided into individual members from one that cannot. The features are exemplified in (34):

- (34)
- | | | |
|-------------|-------------|--------------------------|
| [+b, - i]: | individuals | (<i>a pig</i>) |
| [+b, +i]: | groups | (<i>a committee</i>) |
| [- b, - i]: | substances | (<i>water</i>) |
| [- b, +i]: | aggregates | (<i>buses, cattle</i>) |

For example, a singular count noun (*a pig*) and a mass noun (*water*) differ only in their value of the boundedness feature ([+b] versus [-b] respectively). A count noun is bounded since the boundaries of an entity are clearly definable and visible, whereas a mass noun is unbounded because its boundaries are not in view. Both singular count and mass nouns are marked as [-i] since neither of them can be subdivided into individual members. Plural count nouns (e.g. *buses*) are unbounded due to the fact that the entity *buses* does not have precise limits, but are marked as [+i], as they represent a collection of individual members.

It is important to note that it is the value of the feature [+/-b], and not of the feature [+/-i] on the object DP that is critical for calculating the telicity of the predicate.³¹ This is exemplified in (35).

(35) a. Ken ate an apple.

Object DP: [+b, -i]; Predicate interpretation: $\sqrt{\text{complete}}$ #incomplete

b. Ken ate custard.

Object DP: [-b, -i]; Predicate interpretation: $\sqrt{\text{complete}}$ $\sqrt{\text{incomplete}}$

The only difference between the two sentences in (35) lies in the value of the boundedness feature of the object DP. The DP *an apple* in (35)a is [+b], whereas that of *custard* in (35)b is [-b]. This change in the setting of the boundedness feature is sufficient to yield differences in the telicity of the overall predicate. For example, (35)a refers to a complete event i.e., an apple that is completely eaten, while (35)b does not entail event completion i.e., either custard is completely eaten or incompletely eaten.

Furthermore Soh and Kuo's (2005) proposal makes two important points. Firstly, various functional heads that project within a DP, e.g., determiners and plural markers, are considered to be functions that may change the value of the boundedness feature of their complement noun phrase.³² Secondly, Soh and Kuo adopt Chierchia's (1998)

³¹ Soh and Kuo (2005) used the internal structural feature to accommodate the feature change caused by mass classifier in Chinese (e.g., *bei* 'cup' in *liang bei juu* 'two glasses of wine'). In this dissertation, the internal structural feature is out of our scope because our focus is on the bounded count nouns, which by definition are bounded.

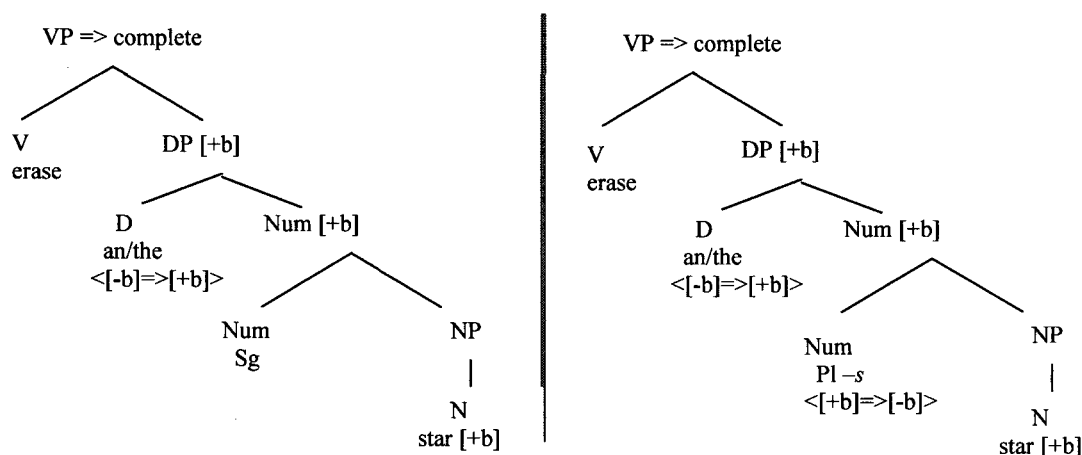
³² In their original account, plural morphology *-s* does not carry function. In addition, they claim that plural nouns enter the derivation in plural form with [-b] feature. However in our study, we assumed that bare nouns enter derivation with either [+b] or [-b] depending on Chierchia's (1998) bare nominal feature. The morphological operation is performed once bare nouns enter the derivation.

proposal concerning the cross-linguistic differences of bare nominals: English bare nouns may be either count or mass, whereas all nouns in Chinese (and, in our case, in Japanese) are mass.³³ The first assumption is illustrated by the derivation for an English DP in (36)a.

(36) Derivation of DPs ‘*erase a/the star*’ in English

(a) *an/the star* in English

(b) *the stars* in English



The bare noun *star* enters the derivation with the feature [+b]. In English (and other languages with overt determiners and number morphology; Déprez 2005), the number and the determiner-head projections are obligatory.³⁴ We suggest that determiners are functions that change the value of the feature [-b] on the complement phrase to [+b]³⁵

³³ Soh and Kuo (2005) examined the neutral perfective reading in simple past accomplishment sentences in Chinese and English. Specifically, they focus on creation predicates such as *make a cake*. The main questions are as to why the neutral perfective reading is available in certain verb predicates and what makes the reading possible in Chinese, but not in English. An example of the neutral perfective reading is given in (i).

- (i) Ta hua-le yi-fu-ha, keshi mei hua-wan.
 he draw-LE one-CL-picture but not draw-finish
 ‘He drew a picture, but he did not finish drawing it.’

The semantically felicitous sentence (i) shows that Chinese has the neutral perfective reading. Unlike Smith (1991) who attributed to difference in availability of the neutral perfective reading to the aspectual marker *le* in Chinese, Soh and Kuo argue that the difference lies in the nominal system of the two languages.

³⁴ The original idea to apply Déprez’s (2005) analysis to the acquisition of telicity by L2 learners is owed to Gabriele (2007).

³⁵ In Soh and Kuo’s (2005) original analysis, Det(erminers) (*a/the/this*) change the feature [-b] to [+/-b], i.e., Det: [-b]→[+/-b] to account for an ambiguous reading observed in a definite mass noun phrase (e.g., *the ice cream*). For example Jackendoff (1996:307) reports that predicates with definite mass noun DPs do not entail event completion. Although we acknowledge this point, because our study focuses on bounded count nouns, yielding an event completion

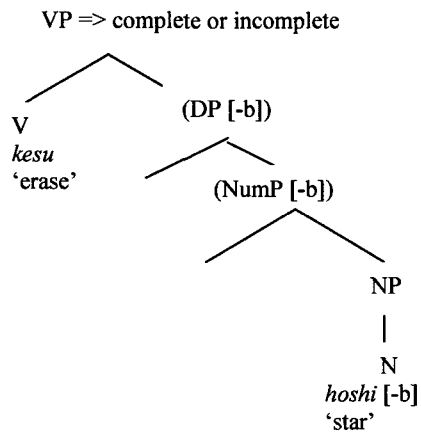
whereas the plural marker *-s* in English has an opposite effect (as in (36)b). In (36)a the feature value [+b] on the bare nominal remains unchanged in the course of derivation: Neither a Sg number or the Determiner has an effect because it merges with an already [+b] complement. Thus the resulting DP *an/the star* is [+b] at the uppermost level and when the DP merges with the verb *erase*, the entire VP denotes a complete event.

(36)b shows the derivation for the bounded English plural object DP *erase the stars*. The difference between the derivation (36)a and (36)b is the existence of the plural marker *-s* in (36)b. We assume that the function of the plural marker *-s* in English is opposite to that of determiners, the effect of which is to change the feature [+b] to the feature value [-b]. Thus the value of the feature at the Num level is [-b]. This feature value [-b], however, will be changed to [+b] when D is projected. Therefore, the resulting DP receives [+b] as a value and the entire VP entails event completion. Let us now turn to the derivation for the Japanese DP *hoshi* ‘an/the/∅ star(s)’ in (37)a.

reading, our analysis takes the position that Det has functions that change [-b] to [+b].

(37) Derivation of DPs ‘*hoshi-o kesu* ‘star-Acc erase’ in Japanese

(a) *hoshi* ‘star’ in Japanese

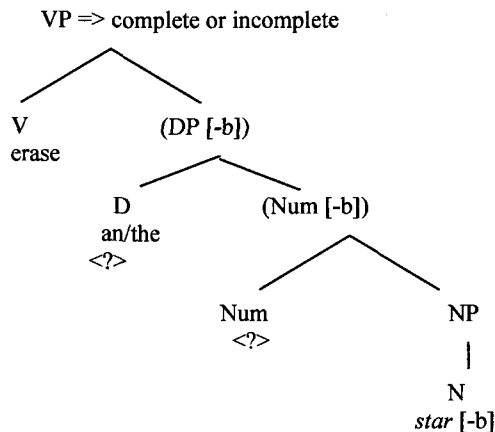


The Japanese bare noun enters the derivation with a feature value [-b]. The Det and Num projection is not obligatory in Japanese (as indicated by parentheses around these categories in (37)a). Consequently, no feature change takes place and the overall DP feature value is still [-b]. Therefore the VP which results after the DP is merged with the verb *kesu* ‘erase’ can refer either to a complete event or to an incomplete event. This account explains why the neutral perfective reading is available with past predicates in Japanese but not in English.

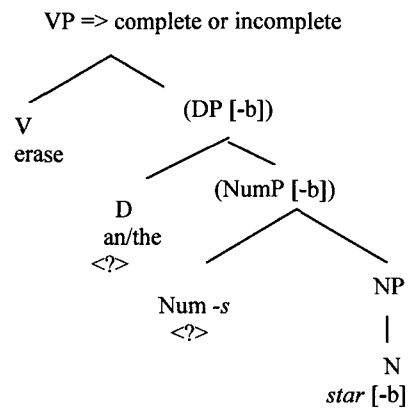
What kind of a computation of telicity would be possible if Japanese learners of English applied their L1 Japanese knowledge to the computation of telicity in English? The feature trees in (38) show cases in which Japanese learners of English employ their L1 Japanese nominal feature representation.

(38) Derivation of DPs '*erases the stars*' by Japanese learners of English who utilize their L1 representation of telicity marking.

(a) *erase the star*



(b) *erase the stars* in English



What (38)a shows is that the singular count noun *star* enters the derivation as [-b]. As mentioned, this is based on Chierchia's (1998) claim that all Japanese nouns are mass. Moreover, if the learners are not aware of the fact that the projection of Det and/or Num category is obligatory in English, and in addition, if the learners are unaware that determiners reverses the polarity of the [-b] value the resulting DP feature receives the value of [-b]. Consequently, the overall predicate telicity is neutral with respect to event completion; it could refer to either a complete event or an incomplete event.

A similar case is expected for the bounded plural object example in (38)b. If Japanese learners of English fail to properly incorporate/calculate the effect of Det and Num heads, the resulting DP could receive [-b] which then yields the atelic interpretation at the VP level (the predicate refers to either a complete event or an incomplete event).

This L1 transfer scenario makes a prediction regarding L2 learners' interpretation of telicity in English. Specifically, if the predicate telicity they calculated has the same representation that of their L1 Japanese, it is likely that the learners will accept English simple past predicates with an incomplete event (the neutral perfective reading).

Conversely, if they properly incorporate/calculate the effect of Det and Num heads, they should be able to correctly invalidate the neutral perfect reading. Thus from the L2 learning perspective, in order to derive the neutral perfective reading as an illicit interpretation for a simple past predicate in English, Japanese learners need to know that the nominal feature values [+/-b], which are relevant in calculating the telicity of the overall predicate, can be affected by the obligatory projections of the Det and Num categories.³⁶ This is what we will examine in our experiment in section 4.3.2.

2.7 Implication of predicate telicity for Japanese learners of English

We have examined aspectual interpretation in simple past and simple past progressive sentences in both English and Japanese. In English, a past progressive accomplishment sentence does not entail event completion even though a predicate has a bounded object (e.g., *Ken was eating an apple*). A simple past sentence with an accomplishment predicate, on the other hand, refers to either a complete event or an incomplete event based on the properties of the object DP. In particular, a simple past sentence entails

³⁶ Bley-Vorman (1997) differentiates the use of the term *learning* and *acquisition*. He uses the term *learning* to refer to *constructions* that L2 learners employ during foreign language learning and *acquisition* to refer to a language acquisition that is constrained by UG. Although the distinction of the two terms may be significant when addressing the issue of whether L2 learners have access to UG we use these terms interchangeably since L2 learners' access to UG argument is beyond the scope of this study.

event completion when the properties of object DP is bounded by Det or Num (e.g., *John ate a/the/three apple(s)*).

In Japanese, similar to English, a past progressive accomplishment sentence does not entail event completion (e.g., *John-wa ringo-o tabe-teita* ‘John apple was eating’). This is true because a sentence in the imperfective form does not indicate either the beginning or the ending of an event. However, the semantics of predicate telicity in a Japanese simple past sentence, which is of interest in this dissertation, shows crucial difference between English and Japanese. That is, a simple past sentence with an accomplishment predicate in Japanese can refer to either a complete event or an incomplete event depending on the context. This is because, in Japanese, all nouns are mass (Chierchia, 1998 and see section 2.5.1 for details), and the projection of the Det and Num category is not obligatory, which together allow bare nouns to appear in the object DP position. As a result, the object DP is not bounded and a simple past accomplishment sentence with a bare noun object (e.g., *John-wa ringo-o tabeta* ‘John apple ate’) in Japanese can refer to either a complete event or an incomplete event. The latter reading is what is called the neutral perfective reading (Singh, 1991).

Given this, Japanese learners of English need to learn that predicate telicity is influenced by the obligatory projection of Det and Num morphology. In other words, learners have to learn to invalidate the neutral perfective reading when the object DP is bounded.

3 Theoretical background in L2 acquisition

Issues discussed within the generative approach to L2 acquisition research can be addressed from two different perspectives. First, we can discuss the linguistic property of interlanguage grammars, namely, the nature of the interlanguage grammar which would comprise issues such as the role of L1 and whether interlanguage is UG-constrained (i.e., the property theory according to Gregg, 1996).³⁷ Second, we can take the developmental perspective and discuss how language development takes place from L1 language to the target L2 language, and what triggers this transition (i.e., the transition theory according to Gregg, 1996). The use of the terms ‘linguistic property’ and ‘developmental property’ in this dissertation is the equivalent of what has been referred to as the ‘logical problem’ and the ‘developmental problem’ respectively in the L1 literature.

It has been claimed that investigating both the linguistic property of interlanguage and the developmental property is necessary to gain a deeper understanding of the mechanism of L2 acquisition (Carroll, 1999 a, b, 2001; Felix, 1986; Gregg, 1996; Klein and Martohardjono, 1999; Schwartz and Sprouse, 1994). However, it has been pointed out that much of the focus in the generative approach of L2 acquisition research has concentrated on the linguistic property of interlanguage. For example, many researchers have been concerned with the issue of whether or not L2 learners have access to UG, or with the representation of interlanguage grammars at early stages of L2 acquisition in relation to their L1’s, to name a few (White, 2003). As a result, research on the linguistic

³⁷ As mentioned in footnote 2, the term interlanguage, which was initially used by Selinker (1972), indicates a system that reflects language learners’ L2 knowledge that is not be fully acquired, yet approximating the target language. According to Selinker, interlanguages are different from native languages (L1) because humans are genetically endowed to learn a first language whereas psychologically endowed to learn a second language (see Selinker, 1972 for details).

property of interlanguage has been considerably developed. However, the developmental property in L2 acquisition, in contrast, has not been as thoroughly researched as the linguistic property in this field.

In this dissertation, we are concerned with both the linguistic property and the developmental property. As far as the linguistic property is concerned, we assume the Full Transfer Full Access hypothesis (Schwartz and Sprouse, 1996) which claims that L2 learners utilize their L1 grammar (i.e., abstract features but not specific lexical items, White, 2002:61) at the early stage of L2 acquisition i.e., the initial state. It is to this stage that the theory refers as the Full Transfer hypothesis. This initial state later transforms into an interlanguage grammar when the L1 grammar can no longer be matched to the properties of L2 input. In other words, transformation from L1 grammars to L2 grammars occurs to accommodate new L2 input, many of which include new parameter resetting in relation to functional categories and feature values if necessary. Although this hypothesis does not guarantee that the L2 learners' resulting grammar will be the same as the target grammar, it claims that the resulting grammar is UG constrained (i.e., full access).

Based on the above-mentioned assumption, the linguistic property/logical problem of L2 acquisition that are examined in this dissertation are as follows. First, we will investigate whether the Japanese learners of English can acquire latent semantic knowledge of predicate telicity in the target language. Second, we will examine the learners' linguistic representation in the early stage of L2 acquisition and their language development profile. As for the developmental property, we examine what contributes to L2 learners' semantic progress in the aspectual domain of interlanguage. In other words,

we investigate the developmental problem of L2 acquisition to account for how differences between English and Japanese in the aspectual domain are learned.

In the following sections, we first discuss the role of L1 in early L2 acquisition and then examine the contributing factors for L2 language development (section 3.2).

3.1 L1 transfer in early L2 acquisition

In this section, we discuss the linguistic representation of interlanguage at the early stage of L2 acquisition focusing on the role of the native language in the L2 acquisition.

Given that adult L2 learners already have their mature L1 grammar, it has been proposed that L2 learners first use their existing knowledge (e.g., morpho-syntactic structure, functional categories, semantic principles, etc.) to learn an L2 language grammar (Gass and Selinker, 1994; Haznedar, 1997; Schwartz and Sprouse, 1996, 2000; Slabakova, 2000; White, 1985, 1986; among many others). This phenomenon, namely the fact that L2 learner use L1 knowledge in the target language, is referred to as ‘L1 transfer’. L1 transfer is a well-established phenomenon and a concept that has been used extensively. Furthermore, during the last thirty years and once L2 acquisition research joined the field of cognitive science, a considerable amount of research has been done intended to investigate the role of transfer in L2 acquisition.

For instance, we can see an example of L1 transfer at the morpho-syntactic level in a study by Liceras, Valenzuela and Diaz (1999). They examined the acquisition of the feature Number by L2 Spanish learners. Results showed that there was a difference in the incorrect use of bare singular noun (bare-sg) among L2 learners who had a different L1 value with respect to the nominal system. In particular, it was found that bare-sg mistakes

were never produced by L1 Romance language speakers, English speakers and other language speakers whose native languages overtly mark Number and Agreement in their morphology. However, speakers whose native language does not have an overt realization of those features (i.e., Korean learners of Spanish) incorrectly produced bare-sg forms.

Another example can be found in a study by Yuan (1998). Yuan investigated the acquisition of the long-distance reflexive *ziji* by L2 Chinese learners. The results showed L1 transfer effect in this domain: Japanese learners of Chinese were not significantly different from L1 Chinese because Japanese has a long-distance reflexive similar to the one in Chinese. English learners of Chinese, on the other hand, showed difficulty in accepting long-distance antecedents for the reflexives because English is a language that does not have a long-distance reflexive. Thus the results show that L2 learners transfer the anaphoric properties of their L1 reflexives to the target language grammar.

This type of L1 transfer phenomena is not limited to the “visible” part of grammar i.e., the morpho-syntactic domain.³⁸ It is, in fact, reported in the less “visible” part of grammar, namely, the semantic domain, which is closely related to our study. In the following section, we examine details of two studies that show L1 transfer at the semantic level: an L2 Russian study by Slabakova, 2005; and an L2 Japanese study by Gabriele, 2005.

³⁸ What we mean by “visible” is a phonologically realized and thus observable aspect of grammar.

3.1.1 Slabakova (2005)

Slabakova (2005) examined the acquisition of aspect by English learners of Russian, focusing on whether adult English-speaking Russian learners could acquire full linguistic competence in the domain of aspect and the relevant semantic-morphology mapping. Examining Slabakova's study is relevant to our study because it investigates how aspectual information (whether a sentence refers to a complete event and an incomplete event) can be encoded in Russian and whether L2 Russian learners acquire this mechanism in Russian. In addition, it also demonstrates L1 transfer in the semantic level of adult English learners of Russian. Specifically, Slabakova shows that low intermediate learners computed Russian aspect by utilizing their L1 English telicity marking mechanism.

Before examining Slabakova's (2005) study, let us first illustrate how aspectual information, namely whether a sentence refers to a complete event or an incomplete event, can be encoded in Russian. The encoding mechanism for aspectual information in Russian is parametrically different from that of English and Japanese (de Swart and Verkuyl, 1999; Piñon, 1995; Verkuyl, 1993, 1999). In Russian, aspectual information can be encoded through affixes that attached to verbs (Brecht, 1984 cited in Slabakova 2001:82).³⁹

Note that the aspectual phenomena investigated in our study operate at the predicate level, whereas Slabakova's investigation is concerned with the grammatical aspect at the sentential level. Although the locus of aspectual distinctions is different in

³⁹ According to Slabakova (2005), strictly speaking, aspect markers and perfective prefixes are not equivalent. This is evidenced by the fact that not all sentences with imperfective verbs are interpreted as an incomplete event and also not all sentences with perfective verbs refer to a complete event. However, based on the observation that 17 out of 19 perfective prefixes signal potential endpoint of the event encoded by the verbal root, Slabakova claims that examining English telicity and Russian aspect is comparable.

Japanese/English versus Russian, the essence is the same where event completion entailment is concerned.

As mentioned, Russian aspectual information can be marked through affixes. In particular, perfective forms are marked by prefixes on verbs whereas imperfective forms are encoded through affix-less V or prefix + V + suffix. Sentences in a perfective form can refer to an either complete or incomplete event, whereas sentences with an imperfective form only indicate a complete event. Slabakova (2005) focused on examining the perfective form which is marked by prefixes on verbs, and imperfective forms which are marked by affix-less verbs (simple form). Therefore, following Slabakova, we will focus on examining the role of prefixes in Russian aspectual marking system. In Russian, nineteen perfective prefixes, which also affect lexical properties, combine with verbs and add information on event completion entailment (Slabakova, 2005). Some examples are given in (39).

- (39) a. *pisat'* 'write, be writing'
b. *na-pisat'* 'write up'
c. *pod-pisat'* 'sign'
d. *do-pisat'* 'write to the end (something that was started before)'
e. *pere-pisat'* 'write out again'
f. *po-pisat'* 'write for a while' (Slabakova, 2005:65)

According to Slabakova, the prefix *na* (39)b is a pure aspect marker since it only adds an inherent endpoint to an event. Prefixes such as *pod-*, *do-*, and *pere-*, on the other hand,

add lexical meanings to the verbal root meaning. For example, *pod-* changes the verb meaning from *write* to *sign* and *do-* adds the meaning of finishing something but this event was interrupted and did not achieve completion. *Pere-* adds the meaning of ‘again’.⁴⁰

Example in (40)a and (40)b only differ with respect to the presence of the perfective prefix *s-*. As mentioned above, a sentence with the perfective prefix *s-* refers to a complete event as in (40)b. However the simple form, a sentence without a perfective prefix, encode an incomplete event as in (40)a.

(40) a. Maša jela tort. (incomplete)

Masha eat-Past cake-Acc

‘Masha was eating cake.’

b. Maša s-jela tort. (complete)

Masha PERF-eat-PAST cake-Acc

‘Masha ate (all of) the cake.’

Examples (41)a and (41)b are equivalents of (40)a and (40)b respectively, except for the fact that both objects, *tort* ‘cake’ in both cases, are bounded by *kusoček* ‘piece’.

⁴⁰ Slabakova (2005) claims that these perfective prefixes are to be considered derivational morphemes since they are instances of verbal morphology and carry some grammatical meanings. However not all perfective prefixes carry additional lexical meanings.

(41) a. Maša jela kusoček torta. (incomplete)

Masha eat-PAST piece cake-Gen

‘Masha was eating a piece of cake.’

b. Maša s-jela kusoček torta. (complete)

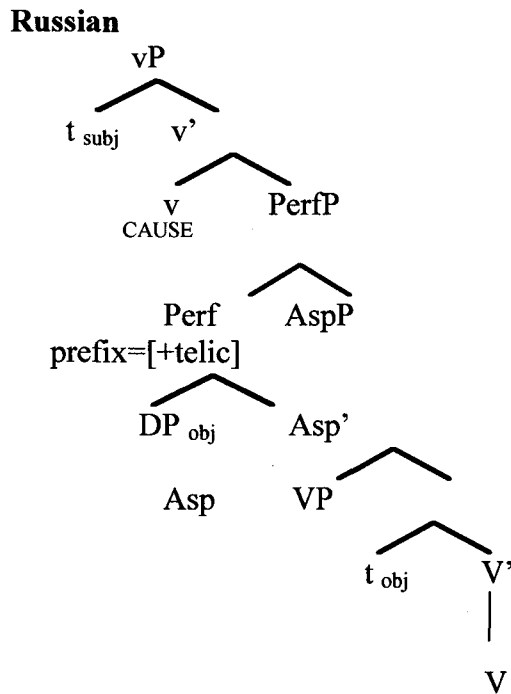
Masha PERF-eat-PAST piece cake-Gen

‘Masha ate (all of) the/a piece of cake.’

All examples (40) and (41) show that deriving aspectual information in Russian depends on the absence/presence of prefixes. More specifically, the predicate containing an unprefix verb (or an imperfective verb), or a perfective sentence/predicate (e.g., (40)a, (41)a) can refer to an incomplete event, whereas a sentence with a prefix (e.g., (40)b, and (41)b) refers to a complete event. Furthermore example (41)a shows that regardless of the boundedness of object (i.e., *kusoček torta* ‘the/a piece of cake’) the sentence without a prefix can still refer to an incomplete event. Based on these examples, it can be concluded that, unlike in English, a sentence in Russian can entail event completion not by means of the quantization of objects but by the insertion of perfective prefixes.

With respect to its syntactic derivation, aspect in Russian is checked in the head of a Perfectivity Phrase (PerfP). PerfP is in a higher aspectual projection than AspP (Slabakova, 1997, 2001 and 2005). This aspectual distinction in phrase structure is based on the syntactic decomposition of eventive verbs proposed by Pustejovsky (1991), Travis (1992), Hale and Keyser (1993) and Larson (1998).

(42)



(Slabakova, 2005:66)

As can be seen in the syntactic tree in (42), the head of the functional projection Perfectivity Phrase (PerfP) is the verb marked by a prefix (Slabakova, 2005). If a prefix is in the Perf⁰, which is a position where it can c-command the object, the whole VP can only refer to a complete event. If a prefix is not in the Perf⁰, no completion entailment is derived. Hence it is not the object boundedness but the presence or absence of prefixes which plays an important role for conveying aspectual information in Russian.⁴¹

Let us now examine Slabakova's (2005) study. Sixty-six learners of Russian (26 advanced, 20 high intermediate and 20 low intermediate) completed two tasks. The first task was a cloze test aimed at investigating learners' lexical knowledge of verbs and

⁴¹ See Borer (1994) for a different syntactic analysis of telicity.

perfective prefixes. This test's results were used as a measure of proficiency in Russian. The other task was an interpretation test. First, participants read a sentence and then they are asked to choose one of three options offering a possible continuation to the sentence they read. In this task, the participants had to choose the most appropriate continuation by determining whether a sentence referred to a complete event or an incomplete event.

In order to test L1 transfer effects, three conditions were created by manipulating the form of the object. It is important to mention that, as in Japanese, there are no articles in Russian. Thus, there is no overt Det on nominals. There were three experimental conditions differing in the type of object NP in English. Condition A included nouns whose English equivalents were plural bare nouns or mass nouns. Thus object DP had an unbounded value (e.g., *detej* 'children' as in Table 3 a and b). Condition B had nouns whose English equivalents were singular count nouns (e.g., *buterbrod* 'sandwich' as in Table 3 c and d). Condition C included nouns with demonstratives/quantifiers (e.g., *etot fil'm* 'this movie' as in Table 3 e and f). Examples are given in Table 3.

As we have seen above, English and Russian mark aspectual information differently. In English object DP boundedness influences whether the predicate can refer to a complete event or an incomplete event, whereas in Russian, presence/absence of a prefix on verbs determines the aspectual value of the predicate. Since there is no overt Det on nominals in Russian, Slabakova predicted that English learners of Russian, especially those in low proficiency levels, would draw completion entailment based on the form of the object, which means that they would transfer the aspect marking mechanism from their L1 English. In other words, sentences with bounded objects (e.g., *buterbrod* 'sandwich' in Condition B; and *etot fil'm* 'this film' in Condition C) would be interpreted

as a complete event and sentences with mass/bare plurals (e.g., *detej* ‘children’ in Condition A) would be interpreted as an incomplete event. Let us examine the experimental stimuli in Table 3.

Table 3: Examples of experimental stimuli (Slabakova, 2005: 70, partially modified)

	Condition A: Objects are mass and bare plural nouns	Condition B: Objects are countable and singular	Condition C: Objects are modified by overt demonstrative pronoun or quantifier
Imperfective	(a) Maša vezla detej domoj... Masha drove children home	(c) Daša ela buterbrod... Dasha ate sandwich	(e) Včera večerom ja smotrel etot fil'm... Yesterday evening, I watched this movie...
Perfective	(b) Maša pri-vezla detej domoj... Masha PERF-drove children home	(d) Daša s'-ela buterbrod... Dasha PERF-ate sandwich	(f) Včera večerom ja po-smotrel etot fil'm... Yesterday evening, I PERF-watched this movie...
Possible continuation	(i) no deti ješčo ne doma 'and the children are not at home yet' (ii) I deti uže doma. 'and the children are now at home' (iii) Oba A i B možny. 'both continuations above are possible'	(i) no ostalsja ješč kusoček. 'and there is some of it uneaten' (ii) iničego ne ostalos' ot buterbroda. 'and there is none of it left' (iii) Oba A i B možny. 'both continuations above are possible'	(i) no ne dosmotrel do konca. 'and I did not see it to the end' (ii) i dosmotrel do konca. 'and I watched it to the end' (iii) Oba A i B možny. 'both continuations above are possible'
Target-like answer	Imperfective: correct answer (iii) Perfective: correct answer (i)	Imperfective: correct answer (iii) Perfective: correct answer (ii)	Imperfective: correct answer (iii) Perfective: correct answer (ii)

There were equal numbers of sentences with imperfective verbs and perfective verbs (5 of each). Two answers (ii and iii) were possible for sentences with imperfective verbs. Since the imperfective focuses on the progress of the event but not on a culminating point, the answers ii and iii were counted as correct in Slabakova's study.⁴² Table 4 shows the results of the interpretation task with imperfective accomplishment by all participants groups.

⁴² However the answer where a sentence refers to an incomplete event (iii) was considered to be more salient than the answer (ii) (both a complete event and an incomplete event are possible) (Slabakova, 2005:70). This indicates that when there were enough contexts to support an incompletion event, native speakers of Russian interpreted the imperfective sentence as an incomplete event. This observation is important for our study on predicate telicity since a similar interpretation is available. For example, when a predicate whose object DP is bounded, the predicate entails event completion. However, when a predicate whose DP is unbounded, the predicate refers to either a complete event or an incomplete event depending on the context.

Table 4 Results: interpretation chosen with imperfective accomplishments by different participant groups (% of correct response).

		Native controls	Advanced	High intermediate	Low intermediate
Condition A	Complete	5.7	10.7	15	15
	Incomplete	26.2	46.9	42	25
	Both	68	42	43	60
Condition B	Complete	8.8	11.5	14	29
	Incomplete	28	45.5	46	21
	Both	63.2	43	40	50
Condition C	Complete	4.4	6.9	7	28
	incomplete	22.2	36.9	47	20
	both	73.4	56.2	46	52

Note: Expected target (=L2) answers are in the grey area. (Slabakova, 2005:72, partially modified)

Importantly, the results showed L1 transfer with respect to the interpretation of Russian imperfective sentences in the low intermediate group. In particular, as indicated by boxes in Table 4 (conditions B and C), the low intermediate learners incorrectly chose the ‘complete’ option as an appropriate continuation to the imperfective sentence with accomplishments when objects were bounded (e.g., *etot fil'm* ‘this movie’ in condition C, the incorrect choice of ‘complete’ option was 28%), or when objects were strongly associated with bounded object (e.g., *buterbrod* ‘sandwich’ in condition B, the incorrect

choice of ‘complete’ option was 29%). These incorrect choices were almost twice as frequent as compared to condition A (15%) whose object had strong association to unbounded object in English (e.g., ‘detej’ *childern* in Table 3 a and b). Thus these results indicated that the interpretation of a sentence by the low intermediate group was influenced by their L1 English aspect marking system. In other words, they focused on the object boundedness at the DP level. It is also important to mention that this type of L1 transfer seemed to occur at the early stages of L2 acquisition of Russian by English speakers.⁴³

If this type of L1 transfer is also expected in our L2 English study, we would assume that Japanese learners of English would transfer the neutral perfective reading and incorrectly accept an English simple past sentence in an incomplete event scenario. We will discuss this in detail in section 4.3.2.

3.1.2 Gabriele (2005)

Gabriele (2005) conducted a bi-directional study of the acquisition of grammatical aspect by Japanese learners of English and English learners of Japanese. As we saw briefly in section 2.3, both English and Japanese have an overt morphological means to mark grammatical aspect on verbs (i.e., imperfective: V+ *-ing* and V+*-te-iru* respectively). In

⁴³ Slabakova (2000, 2001), also report the presence of L1 transfer in the acquisition of English telicity by native speakers of Spanish and native speakers of Bulgarian. Spanish aspectual information can be encoded by object boundedness (see Nishida, 1994), which is essentially the same as in English whereas the aspectual information in Bulgarian is encoded in a similar fashion to that of Russian, i.e., through affixes on verbs. Thus, it is predicted that if learners transfer their L1 knowledge, we would observe a situation such as follows: native speakers of Spanish would interpret English telicity fairly well even in the low proficiency group whereas native speakers of Bulgarian would have problems judging complete event sentences but be proficient in interpreting incomplete event sentences. Results from an aspectual interpretation task (see Slabakova, 2000 for details of the experimental stimuli) suggest L1 transfer in the acquisition of telicity. More specifically, as expected, the L1 Spanish group performed better in both complete and incomplete event conditions whereas the L1 Bulgarian group showed difficulty in judging complete event sentences.

English and Japanese, a progressive sentence with an accomplishment predicate indicates an ongoing event without an explicit starting/end point (e.g., *Ken was eating an apple*). However, these languages differ when sentences with an achievement predicates in the progressive form are considered. In Japanese, when the progressive form is used with achievement verbs (e.g., *shinu* 'die'), the sentence refers to a complete event, i.e., *Ken-wa shin-te-iru* 'Ken is dead'. This is different from the English progressive sentence with an achievement verb since the English sentence indicates an event progression (e.g., *Ken was dying* indicates event progression sometime in the past).

Following McClure (1995), Gabriele assumes that the lexical semantics of the achievement verb *die* in English and *shinu* 'die' in Japanese are equivalent. The difference in the interpretation of the past progressive form with achievement verbs between the languages is attributed to how the progressive morphology is interpreted in English and Japanese. Thus Japanese learners of English have to learn that English progressive sentences with achievement verbs indicate an ongoing event. English learners of Japanese, on the other hand, need to learn that Japanese progressive sentences with achievement verbs refer to a complete event.

A story compatibility task (similar to truth-value judgment task) with 32 test story contexts was administered in both languages (English and Japanese). Let us examine some examples of experimental stimuli by Gabriele (2005). Participants heard each of the 32 narrated stories with a picture depicting an event such as (43) below. After each story, a target sentence appeared with one of the three options presented in (43)a, (43)b, and (43)c. Participants were asked to judge whether the target sentence was compatible with Picture 1 and Picture 2. The judgment was provided on a scale of 1-5 (1 being least

compatible and 5 being most compatible). For the L2 Japanese experiment, the stimuli were translated into Japanese. Table 5 below shows target sentences both in English and Japanese as well as the expected target-like answers from native speakers of English and Japanese (examples are from Gabriele, 2005: 124 and 318).

(43) Complete story context

- Picture 1: This is the plane to Tokyo. At 4:00 the plane is near the airport.
- Picture 2: At 5:00 the passengers are at the airport.

Table 5: Target sentences in English and Japanese and the expected target-like answers

Target sentences (English and Japanese)	L1 English (expected answer)	L1 Japanese (expected answer)
(a) The plane arrived at the airport. <i>Hikouki-wa kuukooni tsukimashita.</i>	5	5
(b) The plane is arriving at the airport. <i>Hikouki-wa kuukooni tsukiteimasu.</i>	1	5
(c) The plane was arriving at the airport. <i>Hikouki-wa kuukooni tsukiteimashita.</i>	5	5

The differences between English and Japanese arise with the achievements in the present progressive form (the shaded areas in the table above). In Japanese, a sentence with an achievement verb with *-te-iru* refers to a complete event, (i.e., the airplane is at the airport), whereas in English, the same construction refers to an ongoing event (i.e., the airplane is on the way to the airport). (44) shows an incomplete/ongoing story context and

Table 6 indicates target sentences both in English and Japanese in addition to the expected target-like answers from native speakers of English and Japanese.

(44) Incomplete/Ongoing Story context

- Picture 1: This is the plane to Tokyo. At 4:00 the plane is near the airport.
- Picture 2: There is a lot of wind. At 4:30 the plane is still in the air.

Table 6: Target sentences in English and Japanese and the expected target-like answers

Target sentences (English and Japanese)	L1 English (expected answer)	L1 Japanese (expected answer)
(a) The plane arrived at the airport. <i>Hikouki-wa kuukooni tsukimashita.</i>	1	1
(b) The plane is arriving at the airport. <i>Hikouki-wa kuukooni tsukiteimasu.</i>	5	1
(c) The plane was arriving at the airport. <i>Hikouki-wa kuukooni tsukiteimashita.</i>	5	1

In the incomplete/ongoing story context, Japanese and English show differences in the present progressive and past progressive form. Gabriele (2005) predicted that if there is L1 transfer phenomenon in the aspectual domain, it would be observable in the parts that show differences between English and Japanese (the shaded areas in (43) and (44)).

Results from the story compatibility task including (43) and (44) showed L1 transfer in both language groups. In particular, 23 out of 43 L2 English groups (beginner and intermediate learners) incorrectly accepted sentences in the progressive form in a

complete event scenario at least 75% of the time with high scoring of 4 or 5. For the L2 Japanese group, the results from 3 out of 9 learners show strong L1 transfer by incorrectly accepting incomplete event in an incomplete/ongoing context as in (44) at least 75 % of the time with scores of 4 or 5. In this context, the L2 Japanese learners incorrectly accepted achievements in the progressive form with an incomplete event reading. Thus similar to Slabakova's L2 Russian study, results from Gabriele (2005) also showed L1 transfer in the aspectual domain and this L1 transfer phenomenon also occurred at lower proficiency level.

3.1.3 Interim summary and implications

Results from the studies from Slabakova (2005) and Gabriele (2005) in 3.1.1 and 3.1.2 respectively, revealed that L2 learners transfer their L1 semantic knowledge in the aspectual domain at early stages of L2 development. However both researchers also claim that these L1 transfer phenomena are less observable in higher proficiency levels. In fact, Slabakova (2005) reported that L1 transfer effect was not found in the advanced and the higher intermediate groups. This means that L2 learners are moving away from their L1 aspectual marking mechanism and progressing towards the target-like one by calculating aspect based on present/absence of prefixes on verbs but not on object boundedness. A similar observation, namely less L1 transfer phenomenon, was also found in L2 Japanese data in Gabriele (2005). However, Gabriele also reported prolonged L1 transfer phenomenon in some advanced learners in L2 English data by showing that some learners still have difficulty in correctly rejecting sentences in the progressive form in a complete event context.

Considering the results obtained by Slabakova (2005) and Gabriele (2005), we can anticipate the following scenario with respect to L1 transfer. If the learners transfer their L1 representation of predicate telicity, we would expect incorrect acceptance of the neutral perfective reading in the simple past predicates with incomplete events in English. Let us turn to the examples in (45).

(45) a. Ken-wa ringo-o tabeta.

Ken-Top apple-Acc ate

‘Ken ate an/the apple(s).’

b. Ken-wa ringo-o tabeta krerdo mada nokotte-iru.

Ken-Top apple-Acc ate but still remains

‘Ken ate an/the apple(s) but it still remains.’

As seen in section 2.5, a Japanese simple past sentence with a bare noun object can refer to either a complete event and an incomplete event, as evidenced by the well-formedness of (45)b. In other words, native speakers of Japanese have two readings available for a simple past sentence containing accomplishment predicates. L1 English speakers, however, differ with respect to their semantic interpretation of predicate telicity. When the object DP is bounded, such as *an apple* in (46)a below, the resulting VP refers to a complete event, whereas when the object DP is not bounded such as *apples* in (46)b, the resulting VP does not entail event completion.

(46) a. Ken ate an apple.

b. Ken ate apples.

If L1 transfer includes transfer of the semantics of predicate telicity (assuming that L2 learners have not yet acquired Det/Num morphology and their semantic features),

Japanese learners of English would apply their semantic representation of a Japanese simple past sentence to an English simple past sentence. As a result, L2 learners may consider that an English simple past sentence would denote a complete and an incomplete event alike. In other words, Japanese learners of English may derive the telicity of the predicate without considering the semantic feature value of object DPs (i.e., boundedness). After a phase where L1 transfer is observed, we also expect progression towards the target-like representation of semantics of telicity by Japanese learners of English. Namely, we would anticipate that the learners will be able to correctly interpret the predicate telicity of a simple past sentence with an accomplishment predicate in English.

One of the main contributions that we hope to make in this dissertation is to provide insights with respect to the developmental issues in L2 acquisition, which leave room for more extensive research in the generative approach. In particular, we would like to examine how Japanese learners of English acquire the semantics of predicate telicity. We intend to identify contributing factors to the acquisition of semantics in the aspectual domain in a rather unconventional way: We first investigate if the acquisition of relevant morphology i.e., Det/Num morphology triggers the acquisition of semantic of predicate telicity. This is purely linguistic in nature (details in section 3.2.1). Second, we examine a more cognitive mechanism that learners can utilize. More specifically, this factor is concerned with inference that learners can draw on the basis of input available to them. This accords with a recent claims in cognitive science that learners make generalizations based on input with the Bayesian learning model (Tenenbaum and Griffiths, 2001). In order to examine how input available to learners may be used to make inferences on

language learning by means of the Bayesian learning model, in the following section 3.2.2.1, we first discuss various types of input available to the L2 learners (in section 3.2.2).

3.2 What factors contribute to L2 language development?

Even though research on the developmental problem of L2 acquisition is not as developed as research on the property problem (Carroll, 1996, 2001; Gregg, 1996), there are several studies on the developmental problem in L2 research. Some researchers have investigated how the target language grammar is acquired in the course of L2 acquisition by examining the contribution of metalinguistic abilities to L2 acquisition (Adjémian and Liceras, 1984; Liceras, 1986) or the role of input (Gass, 1985, 1997; Trahey, 1996; Trahey and White, 1993; White, 1991).⁴⁴ In this dissertation, however, we would like to go a step further and investigate what specific factors contribute to the learners' linguistic progression by examining both a domain-specific component and a domain-general element. By investigating triggering factors, we hope to be able to achieve a better understanding of the mechanism of L2 acquisition and this is what we wish to contribute with this dissertation.

In our study, we focus on two elements as potential triggering factors for the acquisition of the semantics of predicate telicity. The first factor is specifically linguistic in nature, namely we examine the role of DP morphology in the acquisition of predicate telicity. The second factor is not specifically linguistic but has a rather more cognitive nature. In particular, the second factor is concerned with inferences that learners who

⁴⁴ See also Gabriele (2005) for the discussion of the role of negative evidence and the subset principle in relation to the acquisition of viewpoint aspect.

utilize the Bayesian rule can draw on the basis of the input available to them. We will discuss details of each factor in section 3.2.1 and section 3.2.2.1 respectively.

3.2.1 Morphology as a triggering factor in L2 acquisition of the semantics of predicate telicity in English

First, let us clarify how the acquisition of relevant morphology could allow Japanese learners of English to derive a correct interpretation of the predicate with respect to its telicity. It is reasonable to entertain a scenario whereby L2 learners acquire English predicate telicity by capturing overt morpho-syntactic category. This is because, as mentioned above in section 2.6, English object DPs are either bounded or unbounded depending on the Det or Number morphology and this boundedness of object DP influences the predicate telicity. Thus, if the acquisition of the relevant morphology is accompanied by awareness of the abstract features carried by morphology, learning overt morphology may lead L2 learners to compute correct predicate telicity. In other words, if L2 learners learn Det and Num morphology, the acquisition of the overt morphology could allow them to acquire the semantics of predicate telicity i.e., whether the predicate has or lacks a completion entailment.

Let us now explore further the possibility of considering the Det/Num morphology as a trigger for the acquisition of the semantics of predicate telicity by examining the examples in (47).

(47) **Det/Num morphology on nominals**

English √

- a. John erased *a* star
b. John erased stars

Japanese ∅

- c. John-wa hoshi-o keshita
John-Top star-Acc erased
John erased a/the star(s)

Numbers on nominals

English √

- d. John erased two stars

Japanese √

- e. John –wa futatsu-no hoshi-o keshita
John-Top two-Cl star-Acc erased
John erased two star(s)

By observing the sentences in (47)a and (47)b, Japanese learners of English whose L1 equivalents are like (47)c may notice overt morphological differences such as Det/Num morphology on nominals. If the acquisition of morphological form plays a role in the acquisition of the article feature boundedness that Det and Num heads are assumed to carry, learners may be able to compute a target-like representation of predicate telicity. The same assumption can be made for the sentence with numerals on object DP in (47)d: Japanese learners of English may realize that a simple past predicate with numeral refers to a complete event in English which is the same as in Japanese in (47)e.⁴⁵

It is important to note that Japanese learners of English are instructed that English nouns have singular and plural forms and they are marked by Det and Num morphology. However, crucially, Japanese learners receive no instruction on the semantic value of Det

⁴⁵ However, it is worth mentioning that the correct interpretation of predicate telicity in (47)d may be attributed to direct L1 transfer rather than to the acquisition of relevant morphology and accompanying feature.

and Num (boundedness), nor on how to compute predicate telicity in English. Our study examines if Japanese learners of English learn the abstract property of object DP (object boundedness) via learning the relevant Det and Num morphology. It is in this sense that we characterize this factor as purely linguistic.

Research intended to determine whether the acquisition of overt morphology functions as a trigger for an abstract semantic feature was originally discussed in L1 acquisition in relation to the interface of morphology and syntax (Clahsen et al., 1994; Radford, 1990).⁴⁶ For example the Rich Agreement Hypothesis (Bobaljik 2004 cited in White, 2003: 161) is one of the hypotheses that address this issue. The central idea of this hypothesis is that the acquisition of morphology is a prerequisite for the acquisition of abstract syntactic feature strength ('strong' or 'weak'). The 'strong' feature motivates some syntactic consequences such as verb movement. It is claimed that children determine the strength of the functional category Inflection (I) based on the presence/absence of inflectional morphology on verbs (White 2003: 161). Because this hypothesis assumes a direct relationship between the emergence of overt morphology and its syntactic manifestation, it predicts that acquisition of relevant morphology (verbal agreement) triggers verb movement.⁴⁷ A similar claim is made by the Weak Continuity Hypothesis (Clahsen et al., 1994). Both hypotheses assume that the acquisition of overt morphology (e.g., inflectional morphology) triggers the acquisition of syntax (e.g., verb placement) (See White, 2003: 182 for details of the difference between the Rich Agreement Hypothesis and the Weak Continuity Hypothesis). In addition, Chierchia

⁴⁶ Radford (1990) does not assume causal relationship between the acquisition of morphology and acquisition of syntax. He argues that it is maturation that is relevant for the correct production of morphology and that of syntax (reported in White, 2003:182).

⁴⁷ There are counter-arguments on the view that overt emergence of inflectional morphology triggers verb raising. This argument is based on the fact that in some languages such as Afrikaans (du Plessis et al., 1987), verb raising occurs without inflectional morphology. See White (2003:161, and references therein) for more details.

(1994) also proposed morpho-syntactic bootstrapping in the acquisition of the mass/count distinction, according to which plural morphology *-s* serves as a cue for learners' mass/count noun distinction (see also Déprez, 2005 for a similar proposal). A strong connection between morpho-syntax and semantics in the aspectual domain is also advocated by Giorgi and Pianesi (1997). In this study, following White (2003), we refer to the Rich Agreement Hypothesis as a position that advocates that the acquisition of overt morphology triggers both abstract and overt syntactic properties. We later extend this concept to the interface between morphosyntax and semantics.

The Rich Agreement Hypothesis has also been discussed in second language acquisition research (Clahsen, 1988, 1990; Eubank, 1993, 1994, 1996; Meisel, 1991, 1997). For example, Vainikka and Young-Scholten (1994, 1996 a.b) put forward the Minimal Tree Hypothesis and Eubank (1993, 1994, 1996) advocates the Valueless Feature Hypothesis. Essentially, similar to the Rich Agreement Hypothesis, both hypotheses claim that overt morphology (free functional morphemes but not bound inflectional morphology) serves as a trigger for the relevant syntactic representation in the target language. Those who claim that the acquisition of overt morphology triggers the acquisition of syntax in L2 differ with respect to the implications regarding the availability of UG (Clahsen, 1998, 1990; Eubank, 1993, 1994, 1996; Meisel, 1991, 1997; Vainikka and Young-Scholten, 1994, 1996 a.b). In particular, for Vainikka and Young-Scholten (1994, 1996 a.b), L2 learners will eventually acquire the morpho-syntactic representation of the L2 grammar. However, for Clahsen (1998, 1990) and Meisel (1991, 1997), adult L2 learners do not have access to UG and thus variability between the overt

morphology and its syntactic representation is interpreted as a consequence of the unavailability of UG.

As we have indicated above, although we acknowledge the debate of availability of UG in L2 research, examining it is out of the scope of this dissertation. We assume that L2 acquisition is influenced by L1 grammar, especially at the early stages. In other words, we do not anticipate that an interlanguage or an L2 grammar will be instances of ‘wild grammar’ that contain principles which are not found in any natural language, at any stage in the L2 acquisition process, including at the beginning stage of L2 acquisition.⁴⁸ In addition, we also assume that the L2 grammar changes towards the target language grammar over time. Hence, this roughly amounts to an assumption that L2 grammars or interlanguage grammars are UG constrained. Our interest centers around how learners come to know the target language representation of predicate telicity without having either instruction nor negative evidence available to them.⁴⁹

Since our study deals specifically with the role of morphology in the acquisition of the semantics of telicity, in what follows, we review two studies, Montrul and Slabakova (2002) and Gabriele (2007) which suggest that the acquisition of relevant morphology could be a trigger for the acquisition of the semantic property in the aspectual domain.

⁴⁸ See Christie and Lantolf (1998) and Klein (1993, 1995) for arguments in favor of the *wild grammar* in L2.

⁴⁹ What we mean by “no explicit instruction” here is the instruction of how to compute English predicate telicity. As mentioned, our participants have received explicit instructions about the form of English nominals (i.e., sg/pl distinction and Det/ Num morphology) but not in relation to the semantic features of Det/Nm morphology nor on how to compute predicate telicity in English.

3.2.1.1 Montrul and Slabakova (2002)

Montrul and Slabakova (2002) examined the acquisition of the morpho-syntactic properties and the semantics of viewpoint aspect. More particularly they examined the acquisition of the aspectual interpretation of the Preterite and Imperfect tenses in intermediate and advanced English learners of Spanish.

According to Montrul and Slabakova (2002), Preterite sentences indicate a complete event, whereas Imperfect sentences refer to an incomplete event in Spanish. This aspectual information is marked by the inflectional morphology of the Preterite (e.g., *construyó* ‘**completely** built’) and Imperfect tenses (*construía* ‘**incompletely** built’). Examples of sentences with Preterite tense and Imperfect are given in (48).

- (48) a. Laura **construyó** una casa. Complete event
Laura built-Perf. one house
‘Laura (completely) built a house.’
- b. Laura *construía* una casa. Incomplete event
Laura built-Imp. one house
‘Laura (incompletely) built a house.’

As seen above, past tense morphology (indicated in bold in the examples) carries aspectual information as to whether a house-building event is completed, as in (48)a, or incompleted, as in (48)b. In addition, Preterite and Imperfect morphology in Spanish can appear in all aspectual verb classes i.e., states, activities, accomplishments and

achievements, which is different from a language like English, where aspectual morphemes cannot appear with stative verbs.

Montrul and Slabakova (2002) addressed two issues: (1) whether English learners of Spanish can acquire the semantic distinction of Spanish Preterite and Imperfect; and (2) whether there is a correlation between the acquisition of the semantics of Preterite and Imperfect and the acquisition of Preterite and Imperfect morphology.

Two tasks were carried out by 71 adult English learners of Spanish (intermediate and advanced). The first task was a morphological task which examined whether participants could distinguish Preterite and Imperfect tense in a passage. Thirty verbs, equally presented by Preterite and Imperfect (15 each), were provided in a passage. Participants were asked to choose the appropriate tense based on the context provided in a story. An example is given in (49) (words in bold are expected target-like answers).

(49) El jefe le (1) *daba/dio* el dinero a la empleada para depositarlo en el banco. La empleada (2) *trabajó/trabajaba* para la compañía pero no (3) *estuvo/estaba* contenta con su trabajo y (4) *quiso/quería* otro trabajo ...

“The boss gave the money to the employee to be deposited in the bank.

The employee worked for the company but was not happy with her job and wanted another job...”

The second test was a sentence conjunction judgment task to examine the semantics of the Preterite and Imperfect tenses. Each test sentence consisted of two coordinated clauses and these two clauses were linked by one of the two conjunctions, -y ‘and’ or

pero ‘but’. Participants were asked to judge the semantic compatibility of a sentence using a scale ranging from -2 (illogical) to 2 (logical). This task examined statives, accomplishments and achievements. Montrul and Slabakova (2002) predicted that English learners of Spanish would have difficulty in judging sentences with statives. This would be so because statives in Spanish show clear differences with respect to aspectual distinction between English and Spanish as we will see in example (50) and (51) below.

The materials were created such that when the Imperfect tense was used in the first clause, then the second clause was logical, whereas when the Preterite tense was used in the first clause, then the second clause became illogical. Examples are given in (50) and (51).

(50) La clase era (imperf) a las 10 pero empezó a las 10:30.

‘The class was at 10 (but not sure if it was started) but started at 10:30.’

-2 -1 0 1 2 **Expected target-like response: 2**

(51) La clase fue (pret) a las 10 pero empezó a las 10:30.

‘The class was at 10 (and it started) but started at 10:30.’

-2 -1 0 1 2 **Expected target-like response: -2**

In the first clause in example (50) the verb was in the Imperfect tense. In other words, the first clause was neutral with respect to event completion i.e., the class was at 10:00 but do not know if it actually started at 10:00. Thus the following clause ‘but started at 10:30’ was a logically possible choice as a continuation of the first clause.

However, the first clause in (51) was in the Preterite tense. This indicated that the first clause referred to a complete event. Thus the class was at 10:00 and started at 10:00. As a result, the continuation ‘but started at 10:30’ in (51) is semantically infelicitous as a logical continuation of the first clause.

The individual results showed that advanced and intermediate learners who had above 80% of accuracy (n=47) with the morphological test seemed to have acquired the semantics of the Preterite and Imperfect in Spanish (more than 80% of accuracy in all the three verb classes). On the other hand, intermediate learners who had less than 80% of accuracy (n=24) in the morphological test appeared not to be sensitive to the semantic contrast of Preterite and Imperfect (0% of accuracy in all three verb classes). Based on these results, Montrul and Slabakova (2002) concluded that knowledge of morphology precedes knowledge of semantics in Preterite and Imperfect aspectual domain.

3.2.1.2 Gabriele (2007)

Gabriele (2007) also investigated the relationship between the semantics and the relevant morphology in the acquisition of Japanese by English learners. In particular, she examined how English learners of Japanese understand aspectual properties of a sentence with bare nouns in Japanese (e.g., *kaado-o kakimashita* ‘wrote the card(s)'). Before describing Gabriele’s experiment let us recall Chierchia’s (1998) account of nominals in English and Japanese (in section 2.5.1). Due to the cross-linguistic differences on bare nominals, bare-sg nouns in Japanese can appear in an argument position.⁵⁰ In languages like English, on the other hand, count nouns must be marked either by determiners of plural marker *-s* and only mass nouns are allowed to appear in bare-sg form.

In light of these differences between Japanese and English, Gabriele examined how English learners of Japanese represent the connection between morpho-syntax and semantics in the aspectual domain. Gabriele’s (2007) study was different from the above mentioned study by Montrul and Slabakova (2002) in that the critical morpheme that was implicated in the calculation of telicity was a null (i.e., silent) morpheme. It was predicted that the interpretation of a Japanese simple past predicate with a bare noun object such as *kaado* ‘card’ was problematic for English learners of Japanese for the following reason: In English, count nouns such as ‘card’ require a morphological marking for Number and it is either singular as in *a/the card* or plural as in *(the) cards* but can never be in the bare form *card*. In particular, if L2 learners relied on their L1 English knowledge on nominals (count nouns must be marked morphologically), then they would have difficulty in calculating object boundedness of bare count nouns-like in Japanese (e.g., *kaado* ‘card’).

⁵⁰ Recall the option of classifier in Japanese, though its use is not obligatory in Japanese. In addition, there is a plural marker *-tachi* in Japanese but it is highly restricted as to its use. It is only used for conveying the meaning ‘us’.

This difficulty would further pose learners a challenge for determining if a simple past sentence with bare nouns can refer to a complete event or an incomplete event (e.g., *Ken-wa kaado-o kaita* ‘Ken wrote a/the card(s)’ and *kuruma made baggu-o haobimashita* ‘carried bag to the car’). On the other hand, when interpreting sentences with bare mass nouns (e.g., *juusu* ‘juice’), it was predicted that L2 learners would not have difficulty in interpreting predicate telicity. This is because the boundedness feature of bare mass nouns is unbounded ([-b]) and the predicate with a [-b] feature refers to either a complete or an incomplete event depending on contexts both in English and Japanese (for more details, see Gabriele, 2007).

Eighteen English-speaking learners of Japanese and twenty one L1 Japanese speakers participated in an interpretation task. This interpretation task involved Japanese bare nominals. In (52), we provide some examples with count nouns in Gabriele’s interpretation task (for the rest of the experimental stimuli, see Gabriele, 2007). In this task, participants examined pictures and listened to a story in Japanese. First, a context was provided. For each story, there were two versions of endings that showed whether the story referred to a complete event or an incomplete event. After each story, a target sentence was given to participants (either (52)a or (52)b) and they were asked to judge if the target sentence was true with respect to the story on a scale of 1-5 (5 being the most compatible with the story).

(52) **Count noun**

Context: Today is Ken's birthday. He received four presents. He wants to write thank you cards to his friends. Ken writes three cards. Then he starts to write the last card.

- **Complete:** He finishes the last card. Then he gives the cards to his friends.
- **Incomplete:** But Ken has to go to school. He cannot finish the fourth card.

The predicted judgment for Japanese native speakers

(a) *Ken-wa tanjoobi-ni kaado-o kakimashita.*

Ken-Top birthday-Det card-Acc wrote-Acc

'Ken wrote *a/the* cards(s)' on his birthday.'

Complete event 5 Incomplete event 5

(b) *Ken-wa tanjoobi-ni yonmai-no kaado-o kakimashita.*

Ken-Top birthday-Det four-Cl card-Acc wrote-Acc

'Ken wrote four cards on his birthday.'

Complete event 5 Incomplete event 1

(Gabriele, 2007:95-96, partially modified)

Recall that when objects are unbounded ([-b]), the predicate with a [-b] feature can refer to either a complete event or an incomplete event depending on the context. When, however, objects are bounded ([+b]), then a predicate with a [+b] feature can only entail event completion. Given this, in a complete event scenario, it was predicted that both (52)a and (52)b should receive scores such as 5 by L1 Japanese speakers (because object

boundedness of (52)a was [-b] and the one in (52)b was [+b]). For an incomplete event scenario, however, only (52)a was compatible with the scenario because, as mentioned, object boundedness of (52)a was unbounded ([-b]). Thus the predicate in (52)a referred to an incomplete event (scoring 5 would be expected). Conversely (52)b, whose object boundedness is bounded ([+b]), was incompatible with the incomplete event scenario since it required all four cards to be completely written.

Results showed that some L2 learners incorrectly rejected a sentence such as 'Ken wrote card' in the incomplete event scenario. This is because some learners interpreted a sentence with a bare count noun-like such that all four cards needed to be completely written. However, for a sentence with bare count noun-like, the mean response was 3.5 out of 5. This means that 70% of the time, English learners of Japanese correctly derived the feature of object boundedness. Similar results were observed in a count noun with a prepositional phrase such as *kuruma made baggu-o hakobimashita* 'carried bag to the car' (the mean responses were about 3.2 out of 5 translating to about 64% of the time, learners correctly interpreting the telicity of a simple past sentence based on its object boundedness). This suggests that English learners of Japanese are learning the function of the silent null morpheme in Japanese and how to interpret the telicity of a sentence with a bare count noun-like in Japanese.

In summary, based on the studies by Montrul and Slabakova (2002) and Gabriele (2007), we conclude that the acquisition of the relevant morphology could be a trigger for the acquisition of the semantics of telicity.

3.2.1.3 Variability and fossilization

Before we proceed with the discussion of the second triggering factor which is potentially implicated in the acquisition of the English semantics of telicity, let us make a small note on a well-observed phenomenon termed ‘variability’ of interlanguage system which we will discuss in more details in relation to our data in section 5.5.

In the morpho-syntactic literature, the term ‘variability’ is used to describe the L1 and L2 language learners’ optional use of verbal and nominal inflection and function words. Specifically, variability is observed in the domain of function words such as tense, agreement and determiners. This variability includes not only the learners’ optional use of target morphology, but also the incorrect use of the target morphology.

One of the main differences between L1 acquisition and L2 acquisition with respect to variability is how long it lasts (Juffs, 1996). In L1 acquisition, learners come to acquire the adult grammar after going through a variability stage that lasts a limited time. In other words, variability can be observed in the course of language development but will eventually cease. Thus, it is commonly assumed that L1 learners acquire the target grammar without exception. In L2 acquisition, however, variability may (and usually does) last longer than in L1 acquisition. In the generative approach, there are two opposing views as to the relevance of variability to L2 acquisition. Under the first view, variability reflects a grammatical impairment. In other words, the variability stage may last longer in L2 acquisition and this sometimes leads to a permanent grammatical deficit. This is often referred to as ‘fossilization’ (Selinker, 1972). Under the second view, variability is merely the reflection of a developmental phase. Thus, variability is understood as an ongoing mismatch problem between overt morphology and both covert

and overt grammatical representation in language use (i.e., morphology-syntax interface and morphology-semantics interface respectively). However, the belief is that the abstract grammatical representation is present in the early interlanguage grammar regardless of the absence of an overt morpho-syntactic representation. This view is often referred to as the 'Missing Surface Inflection Hypothesis' (Prévost and White 2000 a.b.).

There are many studies that support the Missing Surface Inflection Hypothesis in L2 research (Haznedar and Schwartz, 1997; Lardiere, 1998a,b, 2000; Lardiere and Schwartz, 1997; Prevost and White, 2000a,b; Robertson, 2000; Slavakova, 2003, among many others). For example, Slavakova (2003) examined the acquisition of aspect by English learners of Russian, with focus on the semantic-morphology mapping. Slavakova's (2003) study utilizes the same experimental design and materials as her (2005) study (e.g., the interpretation task and the cloze test, as seen in 3.1.1). The results from the experiments show that there is a mismatch between the use of Russian prefixes and the interpretation of a sentence with the prefixes. The results from the high intermediate group show that although learners correctly interpret a sentence with a perfective prefix as a complete event at a high rate of accuracy (80% correct responses), their correct production of the perfective markers was low (only 63% correct responses). In other words, this result can be taken as a piece of evidence that the learners are able to successfully interpret a perfective sentence in Russian as a complete event even though they failed to correctly provide an overt morpho-syntactic representation of perfective markers in Russian.

Because both our study and Slavakova's study are concerned with the morphology-semantic interface in the aspectual domain (as mentioned in 3.1.1,) it is worth

investigating whether Japanese learners of English also show a similar variability phenomenon in this domain. Namely, the morphology-semantic mismatch, which in our study manifests itself as L2 English learners' successful interpretation of a simple past sentence with bounded DPs as a complete event but familiar of providing the correct Det/Num morphology. We will discuss this variability issue in relation to our data in sections 5.1 and 5.5. Also we further investigate variability in relation to the Bayesian learning model in section 5.5.

3.2.2 Studies on input in language acquisition research

In section 3.2.1, we have seen that the acquisition of Det/Num morphology could trigger the derivation of object boundedness feature, which contributes to the computation of predicate telicity. We consider this factor as strongly linguistic in nature. In this section, we examine a factor which is more cognitive in nature. In particular, this second factor is concerned with form-meaning inferences that learners can draw on the basis of input that they observe. Importantly, as briefly mentioned above, this assumption accords with recent claims in cognitive science where the Bayesian learning model helps language learners derive generalizations from the input available to them (Tenenbaum and Griffiths, 2001). Such mechanism may allow L2 learners to infer that English simple past accomplishment predicates entail event completion on the basis of the positive and/or indirect negative evidence available to them rather than as a result of linguistic calculation of the object boundedness on the basis of Det/Num morphology as mentioned above.

A benefit of employing this learning model is that it allows us to investigate how learners make form-meaning inferences on the basis of input available to them. In addition, this approach suggests potential accounts for the variability phenomenon observed in our data (see section 5.5). We will discuss details of the Bayesian learning model and will present the application of the model to the specific learning addressed in this dissertation in section 3.2.2.1. Before presenting the Bayesian model, let us first examine the types of input that have been discussed in the L1 and L2 literature as well as some previous studies that investigate the role of input in L2 acquisition.

Traditionally two types of input to the learners can be distinguished: *positive evidence*, which provides learners with a set of target representations of grammar; and *negative evidence*, which carries information about ungrammaticality in target grammar.⁵¹ Another type of evidence has recently gained much attention, namely *indirect negative evidence* (or) *missing evidence*. In the case of indirect negative evidence the learners deduce evidence from their target grammar by observing absent structures in the target language. Thus, in order for learners to benefit from indirect negative evidence, learners have to be sensitive to what is missing from positive evidence. This requires learners to have a defined hypothesis space about the target grammar. Without it, learners are left to wonder if a particular sentence type is not present in their target language because it is not available in the language or because it is (accidentally) missing from the particular input to which the learners were exposed.

In acquisition research, it is positive evidence that is usually assumed to greatly contribute to both L1 and L2 acquisition (Ayoum, 2003; White, 2003). Positive evidence can be available to language learners through natural linguistic data and/or explicit instruction in classroom in L2 acquisition. However the degree to which negative evidence helps to shape language learning is different in L1 and in L2 acquisition: It has been claimed that negative evidence is not usually available to L1 learning children (Braine, 1971; Brown and Hanlon, 1970). However, for L2 acquisition, because some L2 learners are instructed in classroom settings, information about the ungrammaticality of their target language is available for certain aspects of grammar (e.g., syntax and morphology). As mentioned above, in our study, negative evidence (information on the unavailability of the neutral perfective reading in English) is not available for Japanese

⁵¹ The terms 'positive' and 'negative' evidence were first used by Gold (1967) from O'Grady (1997: 253).

learners of English due to the lack of explicit classroom instruction on object boundedness and how to compute telicity. Thus, in terms of the types of input available to the participants in our study, we will focus on positive evidence and indirect negative evidence.

Among previous L2 studies that investigate the role of input, we would like to mention White (1991) and Trahey and White (1993). These authors examined English adverb placement by francophone learners of English. More specifically, White (1991) investigated the role of explicit instruction (manipulating positive evidence) and negative evidence in the classroom while Trahey and White (1993) examined the role of positive evidence (primary linguistic data which did not include explicit instruction). Results from the two studies show that both positive (explicit instruction and natural linguistic data) and negative evidence aids L2 learners to acquire the target English type of adverb placement. In addition, a follow-up study (Trahey, 1996), which was conducted with the same participants one year after the initial experiment by Trahey and White (1993), showed that the English adverb placement in the target group was maintained. Although these previous input studies suggest that input (positive and negative evidence) plays a facilitative role in L2 acquisition, questions that still remain are how exactly input is analysed/processed by language learners and how learners make inferences based on input available to them.⁵² We need to know, for instance, what relevant input including target grammar structure facilitates learning.

⁵² There is a debate as to what results from White (1991), Trahey and White (1993) and Trahey (1996) indicate in relation to parameter resetting. Under Schwartz and Gubala-Ryzak's (1992) account, the acceptance of both the L1 French adverb placement and the L2 adverb placement structure show unsuccessful parameter resetting because their view of the relationship between L1 and L2 grammar should be mutually exclusive. In other words, if learners acquire L2 target adverb placement, the incorrect use of adverb i.e., L1 French adverb placement order in English sentences should not be observed. However White (1992b) interpreted this observed variability differently (i.e., variability of L1 and L2 types of adverb placement). In her view, the co-occurrence of L1 French adverb placement order and L2

In addition to the role of positive and negative evidence, the importance of indirect negative evidence in language learning has also been pointed out in the generative approach (Chomsky, 1981) and in the field of cognitive science (Landauer and Dumais, 1997; Merriman, 1999; Regier, 1996). Crucially for our study, some researchers have demonstrated how learners would process indirect negative evidence within a probabilistic learning model that utilized the Bayes rule (i.e., the Bayesian learning model advanced by Tenenbaum and Griffiths, 2001).

As mentioned above, the Bayesian learning model by Tenenbaum and Griffiths (2001) is a computational model which rationalizes language learning and generalization in a general Bayesian framework. The central idea is that a rational learner utilizes probabilistic inference to confirm or disconfirm a given hypothesis from a defined hypothesis space. Thus the Bayesian learning model is a method to conceptualize how input, especially positive and indirect negative evidence, can be processed by learners. Therefore it allows us to examine what kind of information may form the learning.

Before introducing the details of the Bayesian learning model, it is important to mention that, counter-intuitive though it may seem, recent research in both the generative approach (Chomsky, 2005) and the Bayesian probability learning approach (Tenenbaum and Griffiths, 2001) point to the Bayesian learning model being compatible with the generative approach. In particular, Tenenbaum and Griffiths (2001) claim that the model allows learners to formulate hypotheses within a given hypothesis space by a domain-specific or domain-general component (p631). In this dissertation, we assume that learners' hypotheses are formulated on the basis of their linguistic knowledge, i.e., the

English adverb placement order may be the instantiation of the L2 acquisition process i.e., L2 learners are trying to find out the correct adverb placement in their target language. Although we acknowledge this argument with respect to parameter settings, further investigation of this topic is outside the focus of our study.

knowledge of Det/Num morphology. More specifically, upon encountering evidence (a sentence with or without the morphology) in the input and recognizing the difference between a sentence with respect to the form of a sentence and the meaning of it, learners execute hypothesis formulation. We believe that this process requires a rather general cognitive learning mechanism. Arriving at the relevant hypotheses, then, may be derived from learners' linguistic knowledge of Det/Num morphology with relevant abstract features (i.e., object boundedness). In other words, learners linguistic knowledge of Det/Num morphology with an abstract feature is not "activated" until learners outline the hypothesis space by the method described above.

In addition, it is necessary to differentiate the concept of the Bayesian learning model from the other approaches that take hypothesis testing into account, e.g., 'hypothesis testing' and Optimality Theory.

The concept of hypothesis testing is often discussed in a non-generative approach of L2 acquisition research (Schachter, 1983, 1992). It is considered that hypothesis testing occurs when learners produce sentences in output, especially when L2 learners are in a conversational situation (Gass and Selinker, 2008). In other words, learners test their hypotheses about the target grammar by producing them. Learners come to know which of their hypotheses was right on the basis of the feedback from an interlocutor and/or the interaction with native or near native speakers. Under this view, because the learners' hypotheses are tested in output through interaction with interlocutors, it is not the case that hypothesis testing occurs every time the learners produce sentences (See Gass and Varonis, 1989; Swain, 1995 for studies on hypothesis testing). The Bayesian learning model, on the other hand, predicts that hypothesis testing occurs upon receiving input and

this probabilistic hypothesis testing remains active as long as the learners have outlined the defined hypothesis space. Thus, we believe that utilizing the Bayesian model allows us to examine how L2 learners process input and how their hypotheses are examined in the course of L2 acquisition.

Optimality Theory was originally developed as a phonological theory and, more recently, the application of this theory has been extended to syntax and semantics (see Gass and Selinker, 2008). In Optimality Theory, hypotheses or ‘candidates’ are tested in a hierarchical ranking system which is based on the ‘universal constraints’ and ‘ranking of the constraints’. The constraints are innate knowledge and consist of two types: ‘faithfulness constraints’, which are concerned with whether input coincides with output and ‘markedness constraints’ which insures the production of a well-formed output.

The central difference between Optimality Theory and the Bayesian learning model is that the former assumes universal constraints. In particular, in Optimality Theory, learners’ hypotheses are generated by constraints and the correct hypothesis will be chosen based on faithfulness constraints and markedness constraints. However, in the Bayesian model, it is the learners who define the relevant hypothesis space, outline the necessarily hypotheses and revise their hypotheses until they reach the correct one. To this end, this approach can propose a natural explanation for why some learners can acquire the target grammar earlier than other learners (variability). From the perspective of a Bayesian model, this difference may come from the fact that some learners are able to outline the relevant hypothesis space quicker than others. Thus, in this respect, examining the developmental issue within the Bayesian model allows us to explore new ground in relation to some of the developmental phenomena in interlanguage. We will

discuss in more details with respect to morpho-semantic variability in the aspectual domain (in section 5.5).

To our knowledge, there is no L2 acquisition research that examines the acquisition of predicate telicity in discussing the role of input with the Bayes' rule. We hope to shed some light on the area of how language acquisition occurs, in general, and how learners make inference on the basis of input available to them in aspectual domain, in particular.

3.2.2.1 Input with the Bayesian learning model

In this section, we examine the role of input in L2 acquisition using the Bayesian learning model. As mentioned in Chapter 1, we utilize the Bayesian learning model as a proposal intended to conceptualize how input could be processed by learners and what kind of inferences L2 learners may draw in the learning process. Later in the dissertation (section 5.3), we use the model to account for why the Canada group performed better in invalidating the neutral perfective reading of a predicate than the Japan group who has a similar proficiency level, but differ with respect to the duration of English immersion.

This model assumes learning is rational and proceeds in accordance with the Bayes' rule (Regier and Gahl, 2004; Tenenbaum and Griffiths, 2001), and it takes both positive and indirect negative evidence into account. In this dissertation, the use of the term "input" refers to both positive and indirect negative evidence within the Bayesian learning model. In what follows, we introduce a study of the L1 acquisition of the anaphoric use of *one* by Regier and Gahl (2004) with two purposes: First, to illustrate the Bayesian learning model introduced by Tenenbaum and Griffiths (2001); and second, to show how the Bayesian learning model works in the case of a learning scenario that goes from superset

to subset representation of the grammar, which represents our learning scenario for Japanese learners of English.

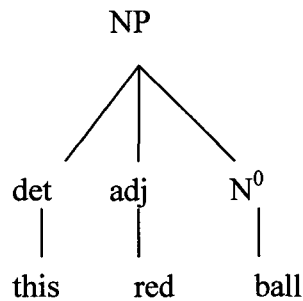
Regier and Gahl (2004) examine the L1 acquisition of the anaphoric use of *one*. Before going into Regier and Gahl's (2004) study, let us examine what is considered to be the correct syntactic analysis of anaphoric *one*. An example of anaphoric *one* is given in (53).

(53) I will play with this red ball and you can play with that one.

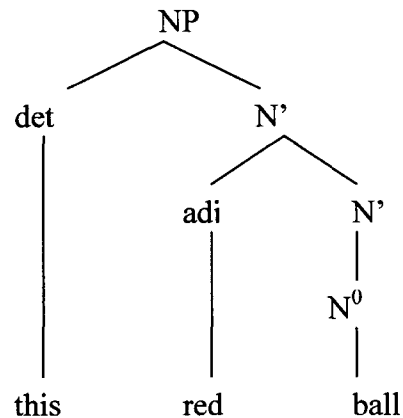
(Regier and Gahl, 2004:148)

It is widely accepted that anaphoric *one* refers to *red ball* in (53) (Lidz et al., 2003). In other words, anaphoric *one* substitutes the constituent *red ball* in a nested N' structure but not a flat N⁰ structure. These two possible syntactic structures are given in (54).

(54) (a) Flat structure



(b) Nested structure



(Lidz et al., 2003:60)

A nested hierarchical phrasal structure such as (54)b can accommodate the adult grammar where anaphoric *one* refers to N' (*red ball*) whereas the flat structure in (54)a cannot. For L1 learners to know the anaphoric use of *one*, they have to know that *one* functions as anaphora and can only refer to the nested structured phrase category N'. This is a serious challenge for learners because the syntactic information on anaphoric *one* is presumably not available in the input they receive: In sentences where anaphoric *one* refers to N' (N': *red ball*), there is an entailment causing the subset property (N⁰: *ball*) to be also true. In other words, learners may find it problematic to identify the correct analysis, i.e., an input that supports the correct syntactic structure (N': *red ball*) also supports the incorrect structure true (N⁰: *ball*). Furthermore, there is presumably no positive evidence pointing towards the correct syntactic analysis in input (i.e., the so-called *poverty of the stimulus*). Nevertheless children can acquire the adult representation of anaphoric *one*. Given this, some researchers attribute the success in acquiring this knowledge by L1 children to syntactic innate knowledge (Lidz et al., 2003).

However, Regier and Gahal (2004) argue against this account and demonstrate that the acquisition of syntactic knowledge is in fact possible through input with the Bayesian rule. They further claim that, in addition to positive evidence, indirect negative evidence (evidence which learners do not directly hear from available input) plays an important role in language development. In particular, the Bayesian learning model takes into account not only the role of positive evidence but also the effect of indirect negative evidence which has not been given much attention in acquisition research. Let us now examine Bayes' rule.

Recall that Tenenbaum and Griffiths (2001) proposed a computational model which rationalizes learning and generalization in a general Bayesian framework. A central idea is that a rational learner utilizes probabilistic inference to confirm or disconfirm a given hypothesis from a defined hypothesis space.

(55) **Bayes' Rule:**

$$p(h|x) = \frac{p(x|h) * p(h)}{p(x)}$$

Where h is a hypothesis in a hypothesis space that the learners outlined and x is the observed random positive evidence in the input. Importantly, this positive evidence can be obtained by means of a form-scenario matching. $p(x|h)$ is the likelihood, which measures the probability of observing evidence x given hypothesis h being true. $p(h)$ is the prior probability of the hypothesis being true.

It is also important to make some notes on the role of UG in L1 and L2 with respect to the outlining of hypothesis space in a Bayesian learning model. For L1 acquisition, we assume that learners organize the hypothesis space via a linguistic element (e.g., UG) and a general cognitive ability. However, as Foraker et al. (2009) point out, it is still not clear if a hypothesis space for a L1 child in a Bayesian learning model is constrained by linguistic components or non-linguistic cognitive elements and this point remains in debate. As it is not the focus of our dissertation to pursue this issue further, we assume that L1 learners have a defined hypothesis space in their language learning endeavor.

As for L2 acquisition, we assume that a relevant hypothesis space (complete events/incomplete events: telicity) can be delimited by L1 knowledge ('Japanese simple past sentences with a numeral object refer to a complete event' and 'Japanese simple past sentences with a bare object refer to either complete a complete or an incomplete event') and a general cognitive component (e.g., form-meaning matching). With respect to L2 learners' L1 knowledge, we assumed the Full Transfer (Full Access) Hypothesis (seen in section 3, Schwartz and Sprouse, 1996) which claims that L2 learners utilize their L1 grammar at the initial state of L2 acquisition. This hypothesis allows the assumption that L2 learners have access to both the L1 grammar and UG (White, 2003:16). Although further investigation may be needed, we assume that Japanese learners of English utilize their L1 knowledge to outline the relevant hypothesis space in telicity dimension and, due to UG, we do not anticipate the wild grammar in the initial state of the L2 acquisition.

Let us now consider how the Bayesian model works in the case of acquisition of the anaphoric *one*. Although it may not seem to be relevant to use a study on anaphoric *one* to exemplify the acquisition of predicate telicity in linguistic terms, the study on anaphoric *one* can be described in terms of restricting the grammar from superset to subset, which is also the type of situation our study of the semantics of predicate telicity addresses.

In the Bayesian learning model, it is assumed that learners outline an appropriate hypothesis space to a question. The question in Regier and Gahl's (2004) study is '*does an anaphor one in my sentence refer to a red ball?*' According to Regier and Gahl, four hypotheses can be proposed in response to this question. These four hypotheses are listed

in (57) and the example sentence containing an anaphoric one (53) is now repeated in (56) for convenience.

(56) I will play with this red ball and you can play with that one.

(Regier and Gahal, 2004:148)

(57)

Hypotheses	Syntactic structure	Prior probability $P(h)$
(h1): Anaphoric <i>one</i> in (56) must refer to <i>red ball</i> .	nested [N' <i>red ball</i>]	1/4
(h2): Anaphoric <i>one</i> in (56) need not refer to <i>red ball</i>	nested [N' <i>ball</i>]	1/4
(h3): Anaphoric <i>one</i> in (56) need not refer to <i>red ball</i>	nested [N ⁰ <i>ball</i>]	1/4
(h4): Anaphoric <i>one</i> in (56) need not refer to <i>red ball</i>	flat [N ⁰ <i>ball</i>]	1/4

Prior probability: $p(h)$ is the prior probability of the hypothesis being true. Because the probability of each hypothesis being true prior to the observation of the data is equal, Regier and Gahl assume an equal variance ($p(h)=1/4=0.25$) for these four hypotheses (h1, h2, h3 and h4 in (57))

Given that the prior $p(h)$ for each hypothesis receives equal probability ($p(h)=h1=h2=h3=h4=1/4$), it is the likelihood ($p(x|h)$): the probability of observed evidence x

given hypothesis is true) that provides crucial evidence for the four competing hypotheses from the learners' hypothesis space. Equation (58) shows how observed evidence x is processed in a Bayesian learning model.

$$(58) \quad p(\mathbf{x}/\mathbf{h}) = \begin{cases} \frac{1}{|\mathbf{h}|} & \text{if } \mathbf{x} \in \mathbf{h} \\ 0 & \text{otherwise} \end{cases}$$

Tenenbaum and Griffiths (2001) made an additional assumption in their Bayesian learning model. That is called the *size principle*. In (58), $|\mathbf{h}|$ indicates how many different outcomes are compatible with a given hypothesis (cardinality of the hypothesis space) and the likelihood $p(\mathbf{x}/\mathbf{h})$ is $1/|\mathbf{h}|$ if observed evidence is one of possible types of hypotheses. If the observed evidence does not fall into any possible hypothesis, this evidence will not be considered in the model (i.e., 0 otherwise). Thus, the likelihood $p(\mathbf{x}/\mathbf{h})=1/|\mathbf{h}|$ predicts the following: if there is a piece of evidence that is compatible with two hypotheses (\mathbf{h}_1 and \mathbf{h}_2) of which \mathbf{h}_2 is more restricted hypothesis than \mathbf{h}_1 (smaller cardinality of $|\mathbf{h}_2|$), \mathbf{h}_2 will be more supported ($|\mathbf{h}_2| < |\mathbf{h}_1|$).

Equation (59), which follows straightforwardly from (58), derives the likelihood $p(\mathbf{x}^n/\mathbf{h})$ of observing n numbers of occurrences of observed evidence \mathbf{x} .

$$(59) \quad p(x^n/h) = \begin{cases} \frac{1}{|h|^n} & \text{if } x \in h \\ 0 & \text{otherwise} \end{cases}$$

Equation (59) shows the exponential growth of the certainty of the validity of the correct hypothesis.

To sum up, in the Bayesian learning model, likelihood $p(x/h)$ in equation (58) and (59) receives higher probability with a hypothesis that best coincides with the observed evidence (usually more specific hypothesis) due to the *size principle*. As learning proceeds, and learners observe evidence x (through a form-scenario matching), the hypothesis that fits best in light of the evidence gains more support. Unsupported hypotheses, in turn, exponentially lose support until the probability eventually approaches zero, as seen in the equation (59).

Before examining the likelihood $p(x/h)$ of Regier and Gahl's four hypotheses, let's consider a few points. Regier and Gahl (2004) assume that observed evidence x is an n numbers of an individual observation that an anaphoric *one* referring to a correct analysis $N^?$ (thus, in this case *red ball*) while (53) is produced. Recall that evidence that anaphoric *one* refers to a red ball in (53) is obtained by a form-scenario matching. As mentioned above, they consider the four possible hypotheses as in (61) that represent what anaphoric *one* syntactically may refer to. It is important to mention that two of the hypotheses listed in (61) h3: nested [N^0 *ball*] and h4: flat [N^0 *ball*], are the ones that Lidz et al. claimed to be innately excluded from learners' hypotheses. In other words, in Lidz et al.'s analysis, learners do not consider hypotheses h3 and h4 at all.

Let us now examine likelihood $p(x/h)$ of each hypothesis. In order to calculate likelihood, we first need to consider the cardinality (i.e., $|h|$) of the hypothesis space. Regier and Gahl assume that there are C different colors of balls in the world. This C different colors of balls includes the crucial color *red* [recall that in (60) (repeated from (56) above) the anaphoric *one* refers to a red-colored ball] and thus, there is more than one possible color ($C > 1$).

In addition, as seen in (59), we need to consider the case where learners encounter n numbers of observations of evidence x , anaphoric *one* referring to ‘red ball’ (thus x^n). Considering these, (61) is the possible likelihood $p(x^n/h)$.

(60) I will play with this red ball and you can play with that one.

(Regier and Gahal, 2004:148)

(61) **Likelihood $p(x^n/h)$ of each hypothesis**

$$h1: p(x/nested: [N^1 \textit{ red ball}]) = 1/C^n$$

$$h2: p(x/nested: [N^1 \textit{ ball}]) = 1/C^n$$

$$h3: p(x/nested: [N^0 \textit{ ball}]) = 1/C^n$$

$$h4: p(x/flat: [N^0 \textit{ ball}]) = 1/C^n$$

(Regier and Gahl, 2004: 152, partially modified)

In order to explain how the correct hypothesis receives the higher probability and the unsupported hypothesis loses its support, let us assume that there are three colors in the world (e.g., red, blue and yellow and thus, $C=3$) and learners have n numbers of

observation x . Utilizing the size principle in (59), now the equation (61) is represented as (62).

(62) **Likelihood $p(x^n/h)$ of each hypothesis**

$$h1: p(x/nested: [N^1 \text{ red ball}]) = 1/1^n = 1$$

$$h2: p(x/nested: [N^1 \text{ ball}]) = 1/3^n$$

$$h3: p(x/nested: [N^0 \text{ ball}]) = 1/3^n$$

$$h4: p(x/flat: [N^0 \text{ ball}]) = 1/3^n$$

The denominator of Likelihood $p(x^n/h)$ can be obtained from the equation (59). As mentioned above, in (59), $|h|$ indicates how many different outcomes are compatible with the given hypotheses (the size principle). We assume that there are three colors in the world ($C=3$). Thus, the denominator of the each hypothesis $h2$, $h3$, $h4$ receives 3 as in (62). Importantly, the denominator of $h1$, which is the hypothesis that anaphoric *one* refers to *red ball* (but not the other-colored ball), receives 1 because an outcome ‘red ball’ is the only one which is compatible with $h1$. This means that $h1$ will be reinforced as the hypothesis better aligned with the input. In addition, the Bayesian learning model shows that the reduction of confidence in unsupported hypotheses shrinks exponentially with the exponent being the number of instances of exposure (i.e., $h2$, $h3$, and $h4$ in (61) and (62)).

Thus, Regier and Gahl (2004) claim that children can learn the adult representation of syntactic knowledge, which is traditionally considered as innate, through input with the Bayesian learning model. Simulation data by Regier and Gahl (2004) further show that only five exposures may be sufficient for the child to master the use of anaphoric *one* (i.e., anaphoric *one* refers to the nested construction N' but not the flat construction N^0). Moreover, they indicate that the data needed to support the development of the correct representation for anaphoric *one* can be supplied within 26.5 hours of language interaction.

To summarize, it is widely accepted that input plays an important role in both L1 and L2 acquisition. Nevertheless, the details of how the learners use linguistic input and moreover, how positive and indirect negative evidence contribute to learning remain unclear in acquisition research. As mentioned, the Bayesian learning model by Tenenbaun and Griffiths (2001) is a method intended to conceptualize how input, especially positive and indirect negative evidence, could be processed by language learners who are equipped with a Bayesian probabilistic learning mechanism. In addition, it allows us to examine what kind of inference the learners may possibly draw in the learning process. We will discuss how insights from Bayesian modeling can be applied in the process of L2 acquisition of the semantics of predicate telicity. We hope that this first attempt of application of the model in L2 acquisition sheds light on the developmental issue in L2 acquisition in general, and that it leads to a better understanding of the acquisition of predicate telicity in L2 interlanguage in particular.

3.3 Interim summary and implications

We have introduced two possible factors that may be relevant for the acquisition of predicate telicity by Japanese learners of English. The first factor is linguistic and it aims at determining whether morphology is a trigger for the acquisition of syntax or semantics. It has been proposed that the acquisition of the relevant morphology could serve as a trigger for syntactic movement (e.g., *the Rich Agreement Hypothesis*, Clahsen, 1988; Eubank, 1994; Meisel, 1997; Radford, 1990; Rohrbacher, 1999; Vainikka and Young-Scholten, 1994, 1996 a,b) or aspectual interpretation (e.g., *form-before-meaning*, Montrul and Slabakova, 2002). Therefore, in order to investigate if Det/Num morphology triggers the semantics of predicate telicity, we examine the existence of a correlation between the acquisition of morphology and the acquisition of the semantics of predicate telicity. We will see more details in section 4.1 and 5.1.

The second factor concerns learners' inferences that are drawn on the basis of input processed by the Bayesian learning model. Regier and Gahl (2004) demonstrated how evidence gained by a form-scenario matching can be used in L1 acquisition for determining the correct representation of anaphoric *one* which requires choosing a narrower (subset) hypothesis from a hypothesis space that contains broader (superset) hypotheses. In the next section, we present our study together with specific research questions and the description of the experimental tasks.

4 The Experiment

4.1 Research questions and hypotheses

We designed an experiment intended to investigate how predicate telicity is calculated by adult Japanese learners of English. Our aim was to answer the following research questions:

Q1: Can Japanese learners of English learn to correctly derive the telicity of simple past sentences in the absence of explicit instruction and negative evidence? In other words, will Japanese learners of English learn to reject English simple past sentences with accomplishment predicates in an incomplete event context?

Learning to invalidate the neutral perfective reading appropriately is not a trivial task for Japanese learners of English. This is because both superset and subset readings are available to Japanese speakers with regards to simple past sentences with accomplishment predicates, while in English, the available readings are restricted to the subset. Indeed, L2 learners have to move from the superset representation (Japanese: A simple past sentence such as *Ken-wa ringo-o tabeta* ‘Ken ate an/the apple(s)’ can refer to either complete or incomplete events) to the subset interpretation of predicate telicity (English: A simple past sentence with a bounded object such as *Ken ate an/the apple* always entails event completion). Furthermore, the computation of predicate telicity is not explicitly taught in formal L2 classroom settings. Thus, it is not surprising that Japanese learners initiate the learning process presuming that *English simple past predicates can refer to either a complete event or an incomplete event* based on their L1 grammar. However, this hypothesis will not always work: An accomplishment predicate whose DP is a bounded count noun ([+b]) is only compatible with a complete event in

English. Thus, in order for L2 learners to correctly compute English predicate telicity, the learners have to acquire proper English mechanism for computing telicity which relies on the function of Determiners and on Number morphemes.

Q2: What is the developmental profile of the L2 acquisition of the semantics of telicity?

This question aims to examine if the initial state of the interlanguage grammar of Japanese learners of English is influenced by the L1 grammar. In particular, if we assume a transfer model (e.g., the Full Transfer/Full Access Hypothesis, Schwartz and Sprouse, 1996), we would expect L1 transfer at the beginner level and a progression towards the target-language representation of telicity at the intermediate and advanced levels (though L1 transfer may persist). Thus, we examine the developmental profile of the L2 learners' acquisition of the semantics of predicate telicity.

Q3: If L2 learners show progress towards the target-like representation of predicate telicity, which factors contribute to this progression?

To approach this question, we will examine two possible factors. First, we examine the role of DP morphology for the acquisition of predicate telicity. This factor can be considered as strongly linguistic in nature in accordance with the analysis whereby the Det and Num categories affect the object boundedness, which, in turn, influences the predicate telicity. Thus, acquiring the DP morphology may be important for developing the correct representation of predicate telicity in L2. To investigate this specific question,

we examine if there is any correlation between the acquisition of DP morphology and the learners' success at invalidating the neutral perfective reading.

The second factor examined in this dissertation is not specifically linguistic but rather has a more cognitive nature. In particular, with this second factor, we examine how L2 learners make form-meaning inferences and further derive generalizations on English predicate telicity from input available to them with the Bayesian learning model. This learning model may allow L2 learners to infer that English simple past accomplishments entail event completion on the basis of the positive and/or indirect negative evidence available to them rather than as a result of linguistic calculation of the object boundedness on the basis of Det/Num morphology as mentioned above.

In this dissertation, we take the duration of immersion in English as a measurement for Japanese L2 learners' reception to positive/indirect negative evidence. We will provide more details on this in section 5.2.1. We explore the role of input (positive/indirect negative evidence) by comparing data between two groups that we called the Canada group and the Japan group, both of which showed comparable English proficiency level (the Quick Placement Test. Details of this test are provided in 4.2), yet differed with respect to the duration of their immersion in the target language. If L2 learners acquire the semantics of English predicate telicity as a result of making inferences on the basis of positive and/or indirect negative evidence they observe, we would expect better results from learners who had greater immersion in the target language than those with less. This will be presented in section 5.2.

Hypotheses: L2 learners' task

Let us first consider what kind of grammatical knowledge Japanese learners of English need to possess in order to correctly invalidate the neutral perfective reading in English simple past predicates.

We hypothesized that L2 learners need to have access to at least two pieces of information. Firstly, they need to know that the feature [+/-b] of object DP is relevant in calculating the telicity of the overall predicate. This, in principle, can be achieved through L1 transfer since such information is available in L1 Japanese, as exemplified by Numeral phrases in (26) i.e., object DPs with numerals such as *sangen-no ie* 'three houses' are marked as [+b] and the predicates with [+b] feature refer to a complete event. Given this, Japanese speakers possess the information that [+b] value on the DP generates a telic predicate.

Secondly, the L2 learners need to know that nominal features can be affected by obligatory projection of the Det and Num categories. This step is likely to be a challenge for L2 learners since the projection of Det and Num categories is not obligatory in Japanese. Because of this optionality of the projection of the Det and Num categories in their L1 Japanese, the projection of these categories may not be consistently implemented in their L2, namely English. If this were the case with Japanese learners of English, the learners could incorrectly accept the neutral perfective reading in English.

4.2 Participants

The study involved 196 Japanese learners of English (L2 English group) as well as English (L1 English) and Japanese (L1 Japanese) monolingual control groups of 20 speakers each. All L2 English participants had studied English in a formal setting at least 20 months prior to the experiment (mean 22.5 months, range 20-60).

Let us look at the L2 participants in more detail. 40 out of 196 participants were classified as advanced and 96 out of 196 participants were categorized as intermediate. The categorization into intermediate and advanced groups was based on the results of the Quick Placement Test (published by Oxford University Press and the University of Cambridge Local Examinations Syndicate, 2001) that evaluates the learners' vocabulary, grammar and reading skills. Participants who scored more than 70% were categorized as advanced group (mean, range 74.5%, 70-96.6) and those who fell into the range of 40-69% were classified in an intermediate group (mean, range 57.5%, 42-68).⁵³

The rest of the sixty L2 participants were 2nd year junior high school students in Japan and were classified as beginners. The beginners had had approximately 225 hours of English formal instruction (15 months, 3 classes x 50 minutes/week) at the time of the experiment. Due to their English proficiency level, we did not conduct the placement task which is used in the higher proficiency participant groups in this experiment. In order to

⁵³ Our criterion for the classification of participants (more than 70% of accuracy in the placement test being categorized in the advanced group) is based on two types of sources. One is the publically available entry requirements of some universities which use the same placement test as part of language assessment for students' admission. Some universities take 62-70% of accuracy on the Oxford Quick Placement test as the minimum language requirement to enter the university program (the requirement in the Universität Siegen is 62 points out of 100, and Wageningen University, 70 out of 100 points). The other source is from L2 acquisition literatures that use the placement test to classify their participants based on proficiency level. In two studies we consulted, their criterion for advanced learners is between 48-60 points out of 100 points. This is lower than the university entry requirement mentioned above (in Rezai, 2006, 70 % of accuracy is a cut-off point for advanced level whereas in Chantarasorn, et al, 2003, learners who have more than 55% of correct answers are considered to have reached at an advanced level). In our study, we therefore establish that it is a reasonable and conservative assumption that more than 70% accuracy is a valid criterion for an advanced level, using a balanced judgment based of the above-mentioned sources.

avoid potential errors which may be caused by the lack of English vocabulary in the beginner group, experimenters introduced new words at least 1 week prior to each experimental task.

The advanced group comprised learners who resided in Ottawa, Canada (the advanced Canada subgroup n=20, mean placement test score 79% range 70-96.6 %) and in Japan (the advanced Japan subgroup n=20, mean placement test score 70% range 70-88.6 %). The Canada and the Japan groups differed on their length of residence in an English-speaking country. In particular, participants who have resided in an English speaking country (in this study, Canada) more than 6 months were classified as the Canada subgroup (the mean length of residency was 177 months, range 6-396). Participants with less than 6 months residency in an English speaking country at the time of the experiment were categorized as the Japan subgroup (the mean length of residency, 2.3 month, range 0-5.5). The participants in the Canada group, although they vary in their occupation, work in Canada. The participants in the Japan group are undergraduate students at Tokyo Woman's Christian University, Tokyo, Japan and Japanese English teachers in Japan.

A similar sub-categorization was made in the case of the intermediate group. The intermediate Canada subgroup (the intermediate Canada group henceforth) consisted of 32 participants (mean placement test score 57% range 42-67) and the intermediate Japan subgroup (intermediate Japan group henceforth) comprised 64 participants (mean placement test score – 58% range 42-68.0). The length of residency (range) was 18.2 (6-60) months for the intermediate Canada group and 0 (0-0) months for the intermediate Japan group. Some of the participants in the intermediate Canada group were learning

English in ESL classes and some of them work in Canada. The participants in the intermediate Japan group are undergraduate students at Tokyo Woman's Christian University, Japan. The summary of the profile of the L2 English participants of the experimental groups is given in Table 7.

Table 7: L2 participants: Exponential group

	Beginners		Intermediate		advanced
	Japan	Canada	Japan	Canada	Japan
Number of participants	60	32	64	20	20
Placement results	N/A	57	58	79	77
Mean (range)		(42-67)	(42-68)	(70-97)	(70-89)
Duration of English immersion (on the day of the experiment)	0	18,2 (6-60)	0	177 (6-196)	2,3 (0-5,5)
Mean months (range)					
Age of first contact with English	N/A	12	10	12	12
Mean (range)		(12-12)	(5-12)	(12-12)	(12-12)
Mean years of study	1,25	13,9	7,9	43,5	27,0
Mean year (range)	(12,5-12,5)	(6-21)	(6-14)	(31-60)	(18-43)

The participants in the L1 English control group were recruited in Ottawa, Canada (mean age: range, 30,1: 20-45). The participants in the L1 Japanese control group were recruited in either Japan or Canada (26,9: 20-40).

The L2 English experimental groups and the L1 English control group performed two tasks: a morphological task and a truth value judgment task (Crain and Thornton, 1998; Gordon 1996). The L1 Japanese group performed a Japanese version of the truth-

value judgment task. The L2 English experimental groups answered a questionnaire about the participants' language background (see Appendix 1 for the questionnaire).

4.3 Morphological task

The aim of this task was to examine morphological knowledge of the Number morphology on determiner phrases (i.e., *singular* vs. *plural* distinction).

This task was administered in the form of a pen-and-paper questionnaire on the entire 196 L2 English group (beginners n=60, intermediate n=96, and advanced n=40) and 20 native speakers of English control group.

The participants' task was to read sentences that contained a blank and to change the word in parentheses into a correct form. Samples of the experiment stimuli are given in (63).

(63) a. **Condition A (Singular noun/object position)**

Lucy has ____ which likes to eat a lot. (cat)

Correct answer: Lucy has a cat/ the cat which likes to eat a lot.

b. **Condition B (Singular noun/subject position)**

____ was singing in the park. (bird)

Correct answer: a/the bird was singing in the park.

c. **Condition C (Plural noun/object position)**

Mike has _____ which like to play. (dog)

Correct answer: Mike has (the) dogs which like to play.

d. **Condition D (Plural noun/subject position)**

_____ were hopping in the woods. (rabbit)

Correct answer: (The) Rabbits were hopping in the woods.

The target word that is in parentheses was always a count noun in this task. The experimental items comprised 4 conditions created by a 2x2 design with factors *number* (singular/plural) and *position* (subject/object) of the target word. In conditions A and C the target words were in the object position in the main clause and had to match in number with the verb in the relative clause that modified the object. In conditions B and D, on the other hand, the target words occupied the main subject position and had to agree with the main verb. Conditions A and B required a singular DP (either the definite or the indefinite article) as a correct answer. Although it is infelicitous to provide a singular DP with the definite article in light of the definiteness, this type of answer was treated as correct due to the fact that both the definite and the indefinite article yields bounded feature [+b] and as a result, the predicate with [+b] feature indicates a complete event. In other words, the definite/indefinite distinction is not relevant to the bounded/unbound distinction of object DP (Filip, 1996:81 and Slabakova, 2001:3). Conditions C and D, on the other hand, required a plural DP with or without the definite article for a correct answer.

Twelve sets of experimental items were created and distributed along with two presentation lists using a Latin Square Design. All participants were randomly assigned to one of the lists. Each list contained 12 experimental stimuli (3 per condition) interspersed with 18 filler items. The morphological task took 10 minutes to complete. Two lists of the morphological task are included in Appendix 2 (List 1) and Appendix 3 (List 2).

4.3.1 Morphological task results

4.3.1.1 Overall results

Monolingual L1 English controls showed a ceiling performance on the morphological task (mean 98.0% of correct responses, range 92-100). Participants from the L2 English group were divided into two groups based on their performance in the morphological task: participants who made at most one error are considered to have reached a target-like level (n=52, 'high MT', mean error rate 3%) and participants who made two or more errors (n=144, 'low MT', mean error rate 51.8%). The high MT group included 36 out of 96 (37.5%) members of the intermediate group, 26 out of 40 (62.5%) members of the advanced group and none of the beginners (0%). The low MT group included all 60 beginners (100%), 70 out of 96 (72.9%) participants from the intermediate group and 14 out of 40 (35%) participants from the advanced group.

The overall results (Figure 1) from the morphological test by proficiency level show L2 learners' gradual development in the DP morphology.

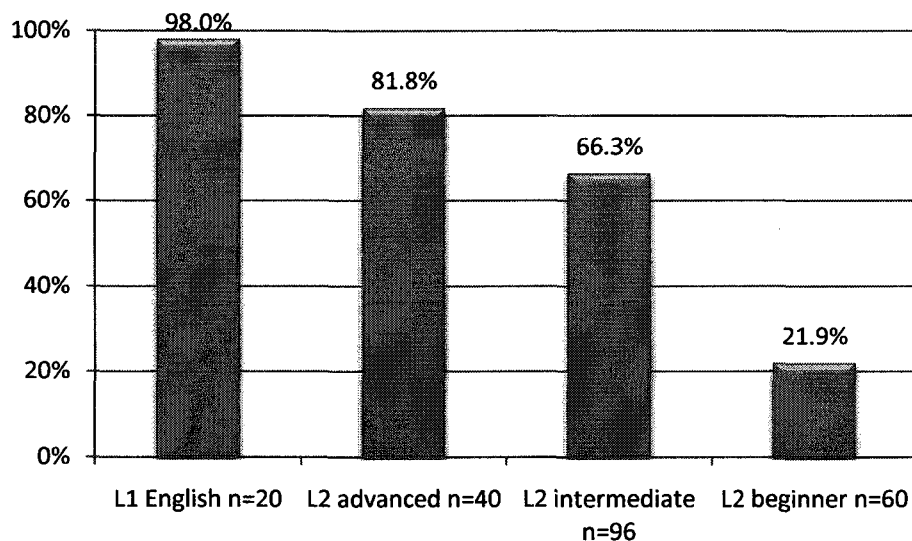


Figure 1 Percentage of correct responses in the morphological task (MT) by proficiency level

In particular, the advanced learners provided 81.8% of correct answers whereas the beginner group showed low accuracy rate (21.9% of correct responses). The L2 intermediate group fell into between the results from the advanced and the beginner group (66.3% of correct responses). A 1-way ANOVA performed on the performance on the morphological task between the four groups was significant ($F(3,12)=88.6, P<.001$). Post hoc tests (Tukey correction) further revealed that the L2 advanced group was significantly different from the L2 beginners group and the intermediate group (all p 's<.05). In addition, the advanced group was only marginally different from the L1 English group ($p=.05$). This indicates that the performance on the morphological task from the advanced group is better than the other L2 groups (the intermediate and beginner groups) and is closer to their target L1 English level of performance in the morphological task.

4.3.1.2 Type of mistakes

Figure 2 shows the results from the morphological task indicating the percentage of incorrect responses by each participant group. Importantly, the information in each bar of Figure 2 is derived from the corresponding bar in Figure 1.

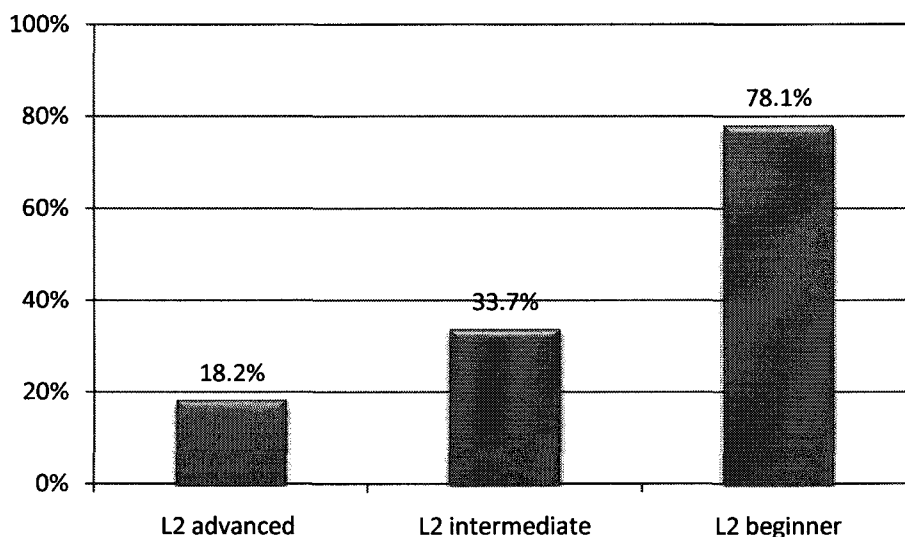


Figure 2 The morphological task results: percentage of incorrect responses by different participant group. Note that the information in each bar of this graph is derived from the corresponding bar in Figure 1. For example L2 advanced has 81.8% of correct responses which corresponds 18.2% of incorrect responses ($100\% - 81.8\% = 18.2\%$).

As seen, the advanced group provided fewer incorrect answers than those of the intermediate group and the beginner group scores place in between the two groups. (18.2%, 33.7% and 78.1% of incorrect responses respectively). Now let us examine the types of mistakes in the morphological task (Table 8).

Table 8: Type of mistakes found in the morphological task: percentage of incorrect responses.

	Advanced	Intermediate	Beginners
	N=40	N=94	N=60
Bare-Sg mistakes	11.5%	26.8%	61.3 %
Number mistakes	6.5 %	6.6%	13.7 %
Other	0.19%	0.34%	3.1%
Total	18.2 %	33.7%	78.1%

Table 6 shows that almost all errors seen in Figure 2 could be classified as one of two types. One is Bare-Singular (Bare-Sg) errors in which bare singular nouns (that are illicit in our contexts) were used in either singular or plural contexts. The other mistake type was Number errors which refers to incorrect use of the singular determiner *a* in plural contexts or of the plural *-s* (with or without the definite article) in singular contexts. Bare-Sg errors were more frequent than Number errors in all three L2 groups (advanced: 11.5% vs. 6.5%, intermediate 26.8% vs. 6.6% and beginners: 61.3% vs. 13.7%, respectively). Both types of errors are due to L1 transfer, as in Japanese the Det and Num projections are not obligatory.⁵⁴

⁵⁴ We acknowledge the possibility that Bare-Sg could be considered a *default option* for L2 English learners (i.e., regardless of L1 language). However, the results suggest that, at least in terms of the surface morphology, the Bare-Sg mistakes and Number mistakes are attributed to L1 transfer. This is also supported by a study by Liceras, Valenzuela and Diaz (1999). As seen in section 3.1, they examined the acquisition of feature Number by L2 Spanish learners. It was found that among Romance language speakers, English speakers, and other language speakers whose languages have overt morphology for Number and Agreement, L2 learners of Spanish never produced Bare-Sg mistakes. Speakers whose language does not have those features, however, produced Bare-Sg forms (i.e., Korean learners of Spanish). Hence the results of the morphological task suggest that the instances of Bare-Sg can be attributed to L1 transfer.

4.3.1.3 Duration of L2 immersion

Recall that (in section 4.1: Q3) we take the duration of immersion in English as a measurement for Japanese learners' reception to positive and/or indirect negative evidence in order to examine if L2 learners acquire the target English predicate telicity as a result of inferences that they draw on the bases of input they encounter. To investigate this, the data was further analyzed in relation to the duration of immersion in English. As seen in section 4.1, this factor is based on the participants' length of residence in an English-speaking country. In this categorization, the participants were divided into either the Canada group or the Japan group with 6 months-living an English speaking country as the cut-off point. This classification will be discussed in more detail in relation to the Bayesian learning model in the section 5.2.

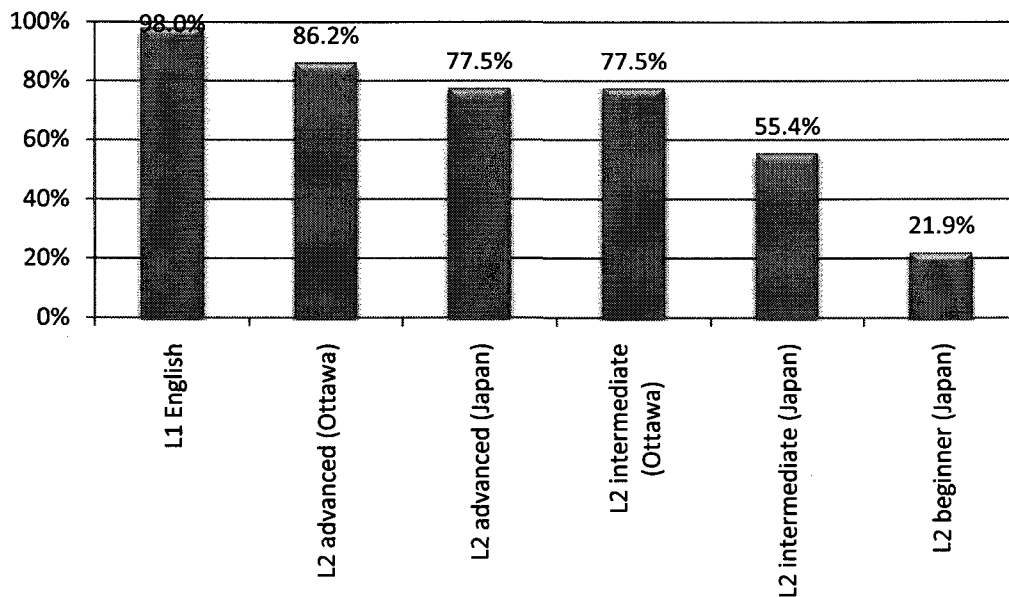


Figure 3 The morphological task results: percentage of correct responses by group.

Figure 3 shows the results for the morphological task of the L2 groups categorized by proficiency level and duration of English immersion. Numerically, the Canada groups (the advanced group 86.2% of correct responses, and the intermediate group 77.5% of correct responses) showed better performance than the Japan groups (the advanced 77.5% and the intermediate group 55.1%). A 1-way ANOVA on the morphological task with 6 groups was significant ($F(5,210)=63.8, p<.001$). Post hoc tests (Tukey correction) further indicated that both the Canada groups (intermediate and advanced) and the Japan groups (intermediate and advanced) were significantly different from the beginner group (all p 's $<.001$). In addition, the advanced Canada subgroup was only marginally different from the L1 English group ($p=.05$) whereas the advanced Japan subgroup was still significantly different from the L1 English group ($p=.032$). Note that, although the Canada and the Japan groups (both intermediate and advanced) were comparable with

respect to the performance in the placement test result, the Canada groups performed better than the Japan groups in this specific task.

A 2-way ANOVA on the morphological task with the proficiency level (intermediate/advanced) and the duration of English immersion (Canada/Japan) as between subject factors was performed in order to examine if the factors influence the L2 participants' acquisition of Det and Num morphology. In this analysis, the data from the beginner group is excluded due to the unavailability of data by a beginner Canada group.

There was a main effect for both the proficiency level ($F(1,132)=10.8, p<.001$) and the duration of English immersion ($F(1,132)=10.9, p<.001$). However interaction between the two factors was not significant ($F(1,132)=2.12, p=.15$). This means that the advanced group performed better than the intermediate groups (81.9%, 66.3% respectively) regardless of the duration of English immersion. In addition, the Canada subgroup performed better than the Japan subgroup (81.9%, 66.3% of correct responses respectively). Thus the Canada groups performed better than the Japan groups on the morphological task despite their comparable performance in the placement task.

In summary, the beginners showed L1 transfer in the morphological task whereas the intermediate and advanced indicated progression towards the target-like performance on this task. In addition, the data organized by duration of English immersion further revealed that the Canada group performed better than the Japan group.

4.3.2 Truth-value judgment task

The truth-value judgment task investigated the semantic representation of predicate telicity which Japanese learners of English assign to the English bounded predicate.

One hundred ninety six Japanese learners of English (60 beginners, 96 intermediates, 40 advanced) participated in this task as well as 20 native speakers of English (L1 English control group) and 20 native speakers of Japanese (L1 Japanese control group).

Participants watched scenarios that were acted out in front of them by means of a custom animated Power Point presentation. Each story was a combination of a narrated text and actions depicting an event which happened either completely or incompletely. The participant's task was to judge the truth-value of a target sentence in the given scenario. For example, in the *star-erasing* scenario (Figure 4), a girl named Lisa has a drawing of a star on a piece of paper and wants to get rid of it (Figure 4 A). She starts erasing the star with the eraser (Figure 4 B), and does it either completely (Figure 4 C) or incompletely (Table 9 B). The target sentence *Lisa erased the star* then appears on the screen and the participant is asked to judge if the sentence is true in the given scenario. Participants were instructed to choose an answer from one of the three choices *Yes*, *No* and *I did not understand the sentence*. Participants chose *Yes* if they think the target sentence is true with respect to a story and chose *No* if it is not true. The third option *I did not understand the sentence* was chosen in cases when participants did not know the meaning of the target predicates. Participants were also asked to provide a reason when they answered *No* in either English or Japanese.

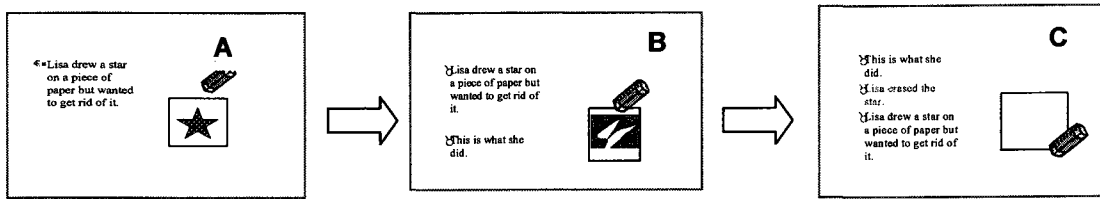


Figure 4 A sample scenario from the truth-value judgment task: the predicate *erase the star*

Table 9 exemplifies four conditions of the truth-value judgment task which were constructed in a 2×2 design with factors *event type* (complete vs. incomplete) and *number* of affected objects (singular vs. plural). In conditions A and B, which involved a singular physical object, the critical event was performed either completely (condition A) or incompletely (condition B). Accordingly, the target sentence contained a predicate with a singular bounded object DP (e.g., *a/the star*). Conditions C and D followed the same pattern with the difference that multiple objects (2 or 3, see Appendix 4 for details) were involved in the event and the target sentence contained a plural bounded object DP (e.g., *the stars*).

In addition to the L2 English group, two control groups (i.e., L1 English and L1 Japanese) were tested in order to assess how the L1 English and the L1 Japanese participants interpret sentences in each condition. The initial assumption was the following. The L1 English control group was expected to accept complete events (i.e., Condition A and Condition C) and predominantly reject incomplete events (i.e., Condition B and Condition D). The L1 Japanese control group, on the other hand, was expected to accept incomplete events as well as complete events due to the *neutral perfective* option observed in Japanese.





	Singular Object: <i>Lisa erased the star.</i>		Plural Object: <i>Lisa erased the stars.</i>	
C o m p l e t e	A	Expected answer L1 Japanese ✓ L1 English ✓	C	Expected answer L1 Japanese ✓ L1 English ✓
				
I n c o m p l e t e	B	Expected answer L1 Japanese ✓ L1 English X	D	Expected answer L1 Japanese ✓ L1 English X
				

Table 9: Summary of the four experimental conditions in the truth-value judgment task

Sixteen sets of four conditions were created based on sixteen different predicates which were all accomplishment verbs with bounded physical objects. Only a singular version of each predicate is listed here: *paint the door*, *build the house*, *erase the star*, *draw the picture*, *eat the orange*, *fill the glass*, *assemble the chair*, *untie the bow*, *empty the bottle*, *remove the cork*, *circle the star*, *shred the document*, *melt the candle*, *disassemble the table*, *unwrap the present*, *type the name*. Four presentation lists were created using a Latin Square Design and 16 fillers were added to each list. A complete list of the experimental stimuli is given in Appendix 5 (English stimuli) and Appendix 6 (Japanese stimuli).

The experiment was conducted individually or in groups of 2-25 people.⁵⁵ They watched a Power Point slideshow on a laptop screen or on a projector screen. The experimental session lasted approximately 40 minutes which included a 5-7 minutes break halfway through the task.

4.3.2.1 Results

4.3.2.1.1 Overall results by proficiency level

Figure 5 summarizes the results of the truth-value judgment task for all five groups of participants. It is important to note that Figure 5 shows the percentage of *yes* responses by condition. In other words, we expect both L1 English and L1 Japanese speakers to accept sentences in conditions A and C. However, we expect different results for the conditions B and D due to the fact that they are instantiations of the neutral perfective readings: L1 Japanese speakers would accept more of these sentences than L1 English speakers.

⁵⁵ Beginners (n=60) and intermediate Japan data (n=64) and a part of advanced Japan data (8 out of 20 participants) took the truth-value judgment task in classroom settings.

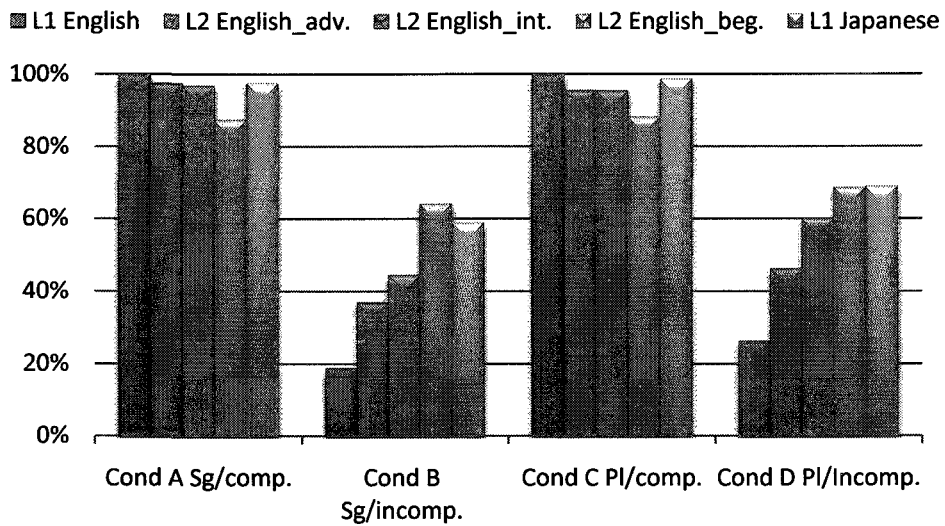


Figure 5 The truth-value judgment task results: percentage of *yes* responses by condition by experimental and control groups.

First consider the monolingual English group. Overall, the results showed an expected performance i.e., L1 English speakers accepted simple past accomplishment predicates with bounded objects in a complete event scenario (100% of *yes* responses in conditions A and C) but not in an incomplete event context (18.8% and 22.5% of *yes* responses in conditions B and D respectively).

The L1 Japanese speakers showed a similar performance to the L1 English speakers' in conditions A and C (97.5% and 98.7% of *yes* responses respectively). In conditions B and D, however, their acceptance rate was higher than that of the L1 English group (58.8% and 67.5% of *yes* responses respectively). This relatively high acceptance rate in conditions B and D confirms the existence of the neutral perfective reading in L1 Japanese. Note that our criterion for successful invalidation of the neutral perfective

reading by Japanese learners of English is based on how different L2 learners' judgments are with respect to L1 Japanese speakers. Further analysis of the L1 speakers' judgment on the neutral perfective reading is provided in section 4.3.2.1.4.

Results for the L2 English groups (L2 advanced, L2 intermediate, and L2 beginner group) indicated a high acceptance rate for target sentences in conditions A and C, which were numerically close to the rates shown by the monolingual groups (95.1%, 98.4%, 87.4% of respectively). Nevertheless, a 1-way ANOVA performed on the mean accuracy in conditions A and C between the five groups was significant (conditions A $F(4,231) = 8.53, p < .001$ and condition C $F(4,231) = 6.75, p < .001$). Post-hoc tests (Tukey correction) showed that the effect was driven by a difference between the L1 English and the beginner group ($p < .001$ condition A, and $p < .001$ condition C). This difference between the L1 groups and the L2 groups is due to a ceiling effect where all the participant groups showed at the top of the range, making even a relatively small difference between the groups result in statistical significance. For this reason, we do not consider the data from conditions A and C as problematic.

In the critical conditions B and D, a 1-way ANOVA performed with all five participant groups was significant (condition B: $F(4,231) = 17.5, p < .001$; condition D: $F(4,231) = 16.0, p < .001$). Post-hoc tests (Tukey correction) revealed that the beginner group was not significantly different from the L1 Japanese group (conditions B and D, both p 's $> .1$), but differed significantly from the L1 English (conditions B and D, both p 's $< .001$). On the other hand, the scores from the advanced group and the intermediate group were greater than the L1 English scores and lower than the L1 Japanese speakers' scores. Numerically, the advanced group scores were closer to those of the L1 English

group than to the intermediate group's scores (33.7% vs. 44.5% of *yes* responses in condition B and 46.3% vs. 60.1% of *yes* responses in condition D respectively).

The intermediate group in condition B is statistically significantly different from the beginner group ($p < .001$) but not significantly different from the advanced group ($p > .1$). In condition D, the intermediate group is not statistically different from the beginners ($p > .1$) but significantly different from the advanced group ($p < .05$).

The advanced group in condition B is significantly different from both L1 Japanese and L2 beginners (both p 's $> .05$) but not statistically different from intermediate ($p > .1$) and in addition, it is only marginally different from the L1 English group ($p = .053$). This suggests that advanced learners are clearly moving away from their L1 representation of telicity and progressing toward the successful invalidation of the neutral perfective reading.

A similar trend was observed in condition D. Post hoc tests (Tukey correction) revealed that the beginners and the intermediate groups were not different from L1 Japanese (both p 's $> .1$). The advanced learners, however, were statistically different from L1 Japanese and the beginner groups (p 's $< .001$). Nonetheless none of the L2 groups have yet reached L1 English representation of telicity (all p 's $< .05$).

To summarize, the data from the beginner group suggests L1 transfer from their L1 Japanese. The beginners incorrectly accept simple past sentences with a bounded object in an incomplete event context and their judgment was not significantly different from those of the L1 Japanese group.

Although there was no robust statistical effect in condition D, the data from the intermediate group in condition B shows a progression towards the L1 English

representation of telicity i.e., they are learning to invalidate the neutral perfective reading. The scores from the intermediate group were greater than those of the L1 English but lower than those of the L1 Japanese group and the beginners.

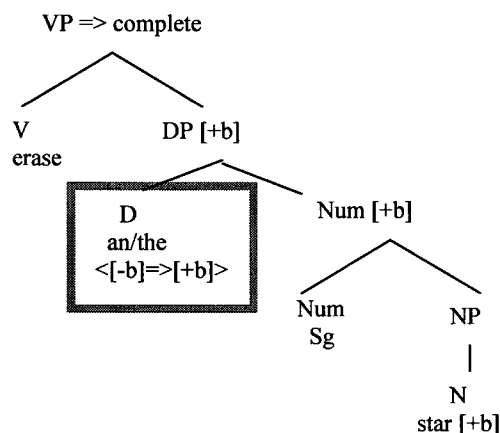
The data from the advanced group both in conditions B and D indicated clear progression toward the L1 English representation of telicity by showing successful invalidation of the neutral perfective reading. The data from the advanced group is significantly different from both the L1 Japanese and the L2 beginners. This indicates that the advanced learners moved away from their L1 representation of telicity and they are reaching towards their target telicity representation. This observed success was even stronger in condition B (singular object condition) than in condition D (plural object condition). The trend of the participants' being more successful in condition B (singular object) than in condition D (plural object) suggest that condition D is more problematic for L2 learners than condition B. We discuss this point further in section 4.3.2.1.2.

4.3.2.1.2 An account of why condition D is more difficult than condition B

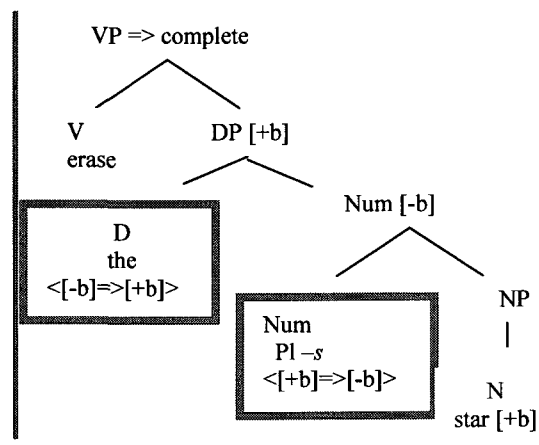
When comparing conditions B and D, we have seen that the data in the singular object condition (condition B) showed higher accuracy than the plural condition (condition D) for all participant groups. Why is the plural object (condition D) more difficult than the singular object (condition B)?

Recall that in English, Det (a/the) has the function of changing the unbounded feature to the bounded feature. Plural marker -s, on the other hand, has the opposite effect: changing the bounded feature to the unbounded feature. Functions of the Det and Num markers are highlighted in (64).

(64) a. Singular condition



b. Plural condition



L2 learners have to know the functions of Det/Num and apply these functions to the computation of predicate telicity. Especially as the tree in (64)b shows, there is an extra step for the feature change in plural condition D: The feature of N *star* turns into the feature value [-b] when the plural -s is merged and then changed into the feature value [+b] when the Det phrase is projected. However the feature derivation in condition B, as in (64)a, is simpler i.e., there is only one feature change, when the Det phrase is projected. Thus it may be the case that this extra operation makes the plural condition D more problematic for L2 learners than the singular condition B. This account is not implausible given that a similar trend (the acceptance of condition D is higher than condition B) was also observed in both L1 groups.

4.3.2.1.3 Data by verb predicates

It is widely assumed that predicate telicity is compositional (Verkuyl, 1972, 1989, 1993, 1999). In accomplishment predicates, which are of interest to this dissertation, the abstract feature of object boundedness influences the computation of predicate telicity (Jackendoff 1991; Sho and Kuo 2005). Given this, our initial assumption of the acceptance of the neutral perfective reading by native speakers of English and Japanese was the following. We predicted that L1 English speakers would consistently reject the neutral perfective reading (conditions B and D) whereas L1 Japanese speakers would overwhelmingly accept it. However the overall data in section 4.3.2.1.1 showed that the results from monolingual groups are somewhat different from what is theoretically expected. Take the data from condition B as an example: instead of correctly rejecting (thus 0% of acceptance rate), L1 English speakers accepted sentence with bounded objects in an incomplete event context in roughly 20% of all cases. L1 Japanese speakers, on the other hand, accepted the same type of sentences in about 60% of all instances, which is a lower acceptance rate than initially expected.

In this section, we examine the results of conditions B and D broken down by individual predicates. There are two reasons for doing this. The first reason is to gain a deeper understanding of the nature of the computation of the predicate telicity by L1 English and L1 Japanese speakers. In particular, we examine whether the trend observed in the average group data is confirmed in the by-item breakdown. In other words, a question we ask here is whether the approximately 20% of acceptance rate by L1 English speakers derived from the 20% of acceptance in all the target predicates or resulted from the variability across the predicates. This by-item breakdown data also allows us to

investigate if there is any predicate that demonstrates a clear opposition in the judgments of the two L1 groups. The second reason is to examine whether the Japanese learners of English learn to invalidate the neutral perfective reading. In order to examine this, we investigate a subset of predicates which showed an expected opposite pattern of responses in L1 English speakers and L1 Japanese speakers.

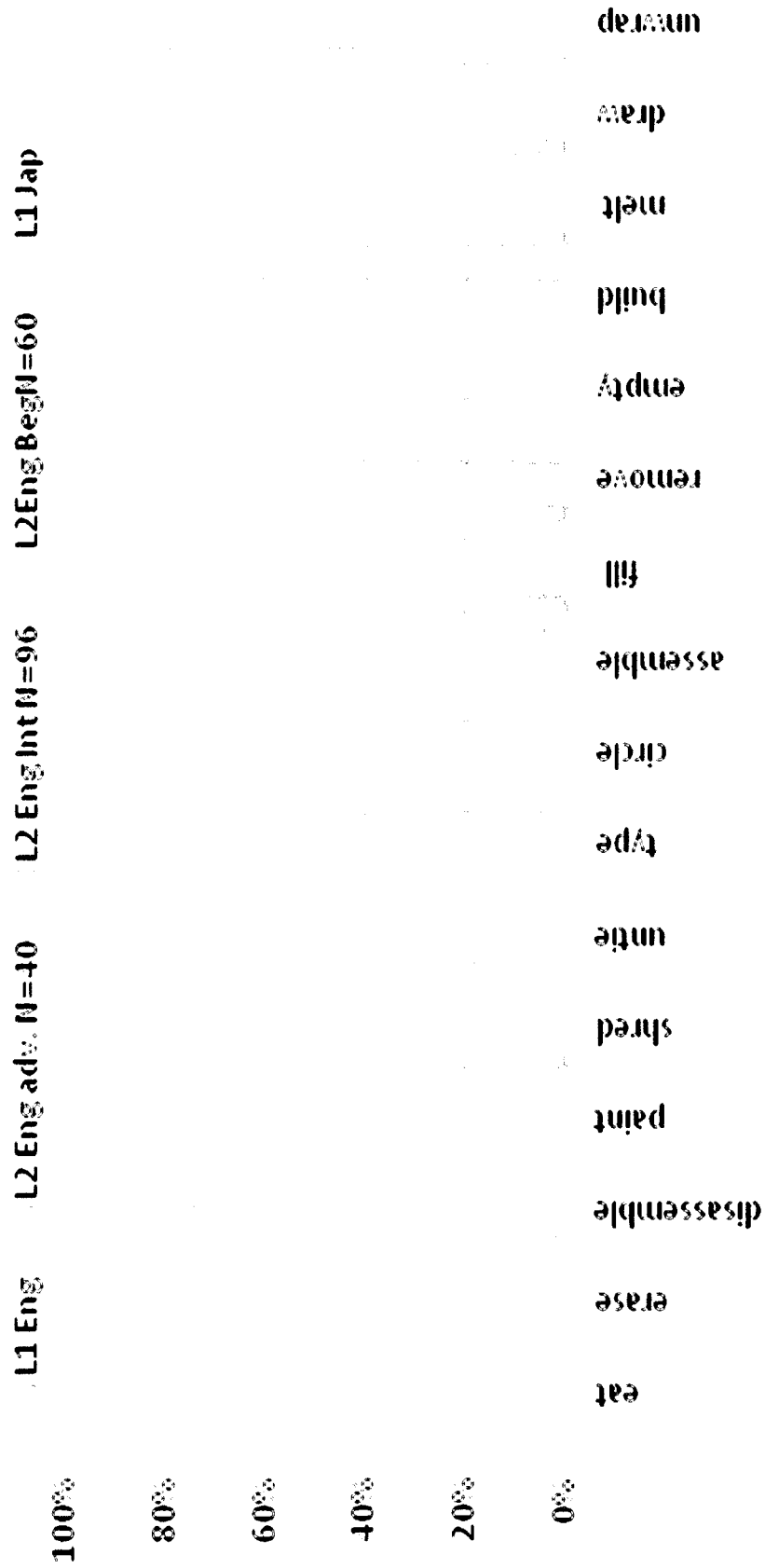


Figure 6 Condition B: breakdown of results of the truth-value judgment task by individual predicates % of yes responses.

Figure 6 shows the breakdown of the results from condition B by individual predicates. The L1 English data showed a bimodal distribution pattern. Specifically, for 13 out of 16 predicates, native speakers of English either did not accept the neutral perfective reading at all (*eat, erase, disassemble, paint, untie, type, circle, assemble, empty, build*) or accepted it at most 20% of the time (*shred, fill, and remove*). However, with the remaining three verbs (*melt, draw* and *unwrap*) they accepted the neutral perfective reading in, at least, 80% of cases which was somewhat unexpected.

The L1 Japanese results were similar to those in the L1 English data in terms of distribution. In particular, the L1 Japanese speakers overwhelmingly accepted (acceptance rate $\geq 80\%$) the neutral perfective reading in 8 out of 16 verbs (*eat, erase, untie, disassemble, paint, shred, melt, and draw*). For 6 verbs (*circle, assemble, remove, fill, empty* and *build*), the L1 Japanese speakers consistently rejected the simple past sentences with incomplete events (acceptance rate $\leq 20\%$). The remaining verbs (*type* and *unwrap*) showed an acceptance rate of 40% and 60% of *yes* responses respectively.

As seen, the individual predicate results from both L1 English and L1 Japanese speakers in Figure 6 show two patterns: a clear difference with respect to the acceptance of a neutral perfective reading between the L1 groups and variability between the L1 groups. For example, in 6 predicates (*eat, erase, disassemble, paint, shred, and untie*, indicated in the brackets in Figure 6) the judgment from both L1 groups were clearly different i.e., low acceptance of a simple past sentence with bounded objects in an incomplete event context from the L1 English speakers (acceptance rate $\leq 20\%$) and high acceptance of this kind of sentences from the L1 Japanese speakers (acceptance rate $\geq 80\%$). In other words, predicate telicity of this subset of verbs is computed by the

boundedness of object DP. However, for 3 verb predicates (*melt, draw* and *unwrap*), not only L1 Japanese but also L1 English speakers accepted the simple past sentence in an incomplete event scenario even though the object DP is bounded. In the other case, however, L1 Japanese speakers showed low acceptance with respect to the neutral perfective reading (*type, circle, assemble, fill, remove, empty* and *build*).

As mentioned above, 6 predicates (*eat, erase, disassemble, paint, shred, and untie*) showed an expected opposite pattern of responses in L1 English and L1 Japanese. The results for these predicates show a trend that is predicted by the theoretical analysis that derives the predicate telicity from the object feature boundedness. Thus in this dissertation, we use these 6 predicates to investigate if Japanese learners of English learn to invalidate the neutral perfective reading based on the object boundedness and the L2 developmental pattern associated with such progress, if it is indeed present. We take the minimum of 60% of acceptance difference between L1 English and L1 Japanese as a criterion for determining predicates that exhibit the expected opposite pattern of responses.

We found some unexpected results by L1 speakers in both languages i.e., L1 English speakers accepted the neutral perfective reading and L1 Japanese speakers rejected the neutral perfective reading for some predicates. This observation further provides a potential discrepancy between the theory and the empirical data, which we will discuss in detail in section 4.3.2.1.4.

Let us now re-examine the data from the L2 English groups using a subset of the predicates (*eat, erase, disassemble, paint, shred, and untie*) that showed an expected pattern of results in L1 English and L1 Japanese groups. As mentioned, the empirical data on these predicates supports the theoretical analysis which claims that computation of

telicity largely depends on the semantic feature of object boundedness. Thus, if Japanese learners of English are learning the English type of representation of predicate telicity, we could see progression in this subset of predicates.

A 1-way ANOVA performed on the 5 participant groups (L1 English, L2 advanced, L2 intermediate, L2 beginner and L1 Japanese) within the 6 clear predicates (*eat, erase, disassemble, paint, shred, and untie*, showed in the brackets in Figure 7) was significant ($F(4,25) = 20.9, p < .001$). Post hoc tests (Tukey correction) revealed that the advanced learners are significantly different from the L1 Japanese and the L2 beginner groups (both $p's < .05$) and they are only marginally different from the L1 English speakers. The intermediate learners showed marginal difference from the L1 Japanese ($p = .054$) yet they are not significantly different from the L2 beginners ($p > .1$). The data from the beginner group showed that the beginners are not significantly different from L1 Japanese ($p > .1$).

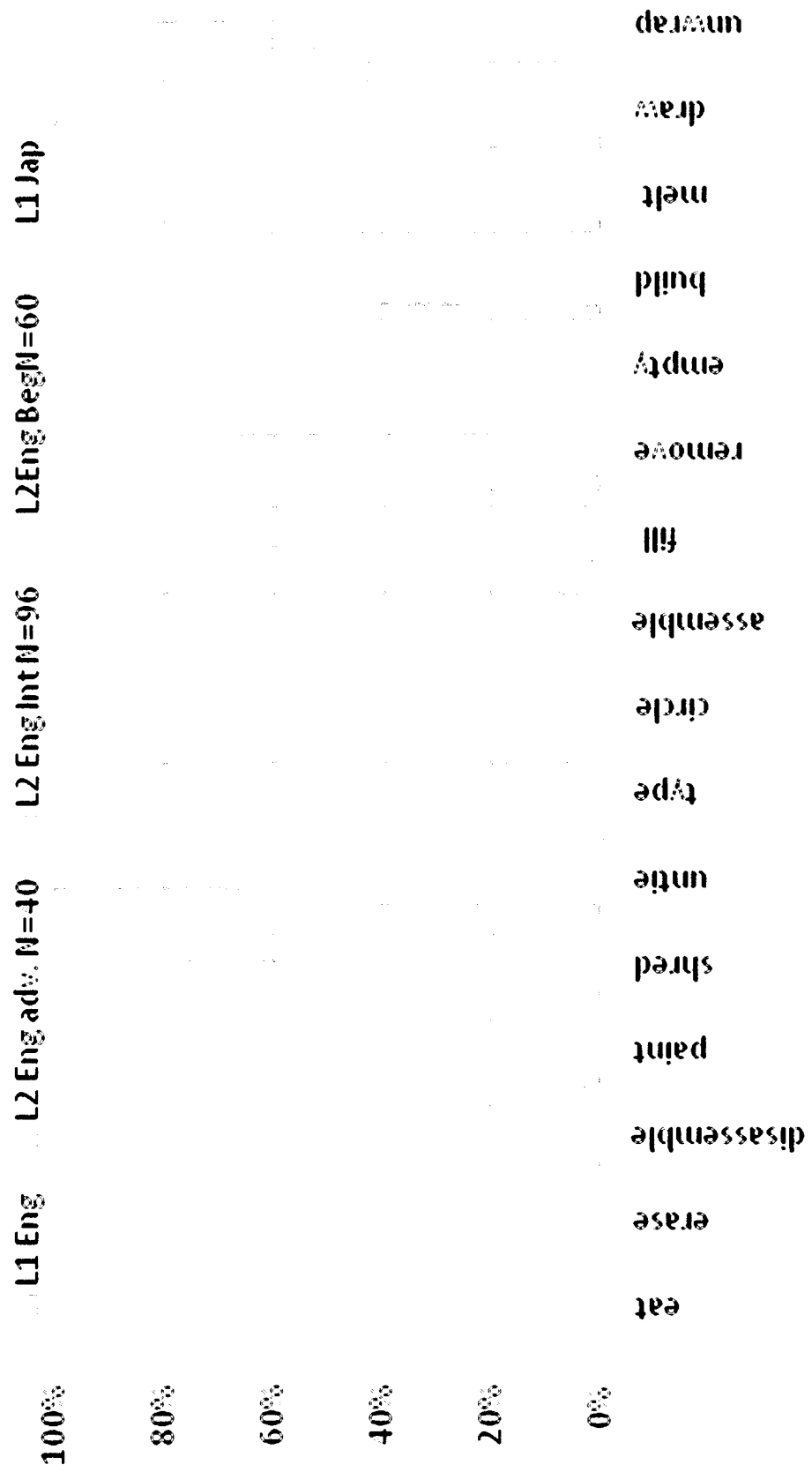


Figure 7 Condition D: breakdown of results of the truth-value judgment task by individual predicates % of yes responses

Figure 7 shows the breakdown of the results from condition D by individual predicates. Overall, the data show a similar trend to condition B: in 12 out of 16 predicates, L1 English speaker either did not accept the neutral perfective reading at all (*eat, erase, disassemble, paint, untie, type, circle, assemble, remove, empty,*) or accepted it at most 20% of the time (*shred* and *fill*). However, they accepted the neutral perfective reading of a simple past sentence with the verb (*draw*), at a high rate of 80%. For the remaining 3 verbs (*build, melt, and unwrap*), the L1 English speakers accepted between 40% and 75% of cases. Likewise, L1 Japanese data showed a similar observation as in condition B in that the consistent acceptance of the neutral perfective reading (acceptance rate more than $\geq 80\%$) in 10 out of 16 verbs (*eat, erase, disassemble, paint, shred, untie, type, assemble, melt, and draw*), and constant rejection (acceptance rate $\leq 20\%$) in 3 out of 16 verbs (*circle, remove* and *empty*) and intermediate acceptance (40% and 60%) in the rest of 3 verbs (*fill, build* and *unwrap*). It is worth mentioning that there is a high overlap between predicates that showed clear differences between L1 English and L1 Japanese and showed a similar pattern of acceptance/rejection between the L1 groups. This indicates that the variability observed in conditions B and D is not random but rather is consistent across predicates. This further indicates that the boundedness of object DP with accomplishment predicates may not be the only factor influencing predicate telicity for some accomplishment verb predicates as we will discuss in section 4.3.2.1.4.

A 1-way ANOVA performed on the group of 6 predicates showed that an expected opposite pattern of responses in English and Japanese (*eat, erase, disassemble, paint, shred, and untie*) for the 5 participant groups was significant ($F(4,25) = 24.6, p < .001$). Post hoc tests (Tukey correction) revealed that the L2 advanced learners are significantly

different from the L1 Japanese and the L2 beginners (both p 's < .05) although they have not reached the L1 English representation of telicity yet (p < .001).

In summary, the breakdown data in conditions B and D showed variability in the availability of the neutral perfective reading in both the English and Japanese monolingual groups. On one hand, there were predicates which showed clear differences between the L1 English and L1 Japanese groups (consistent rejection by L1 English speakers and consistent acceptance by L1 Japanese speakers). On the other hand, there were predicates that behaved similarly for both monolingual language groups i.e., both L1 English and L1 Japanese speakers accept some of simple past predicates with bounded objects in an incomplete context, and also reject some of them. This implies that object boundedness may not be the decisive factor for some of the predicates with respect to the computation of telicity. This suggests the need for further investigation of the predicate telicity on the basis of individual verb predicate (see 4.3.2.1.4).

4.3.2.1.4 Variability in the monolingual data

This section is concerned the variability observed in 4.3.2.1.3 in adult L1 data in relation to the interpretation of simple accomplishment sentences with bounded DPs. It is important to note that the variability we will discuss in this section is different from the one discussed in 3.2.1.3. Recall that the term variability used in 3.2.1.3 was used to indicate learners' optional use or incorrect use of the target-morphology (e.g., nominal inflection and feature words). However in this section, we use the term to indicate L1 speakers' less uniform interpretation of simple past predicates with bounded DPs.

We cannot deny the possibility that the variability observed in the data may be attributed to the experimental stimuli. More specifically, it was important that participants receive clear information as to what a targeted complete event was. Thus, if there was infelicity in the provided context, it may have given the participants an impression that a goal was reached even though the event acted out in the Power Point picture presented an incomplete event. Let us take a target sentence with a predicate 'melt a candle' as an example. First the context was provided *Grace wanted to make two small candles out of one big candle*. The Power Point animation showed that the candle started melting and stopped when half of it melted. Then the target sentence *Grace melted the candle* was presented. Both L1 speakers of English and Japanese had accepted the target sentence about 100% of the time even though the context intended to show that the candle was incompletely melted. The participants may have thought that a half-melted candle was enough to make the second candle. In other words, this half-melted candle may have been interpreted such that the melting-candle event had reached its goal. This kind of potential

infelicity in the experimental stimuli may be attributed to some of the variability observed in our data.

There may also be an alternative explanation for the variability observed in the L1 data. In theory, accomplishment predicates with a bonded object refer to a complete event (Verkuyl 1972, 1989, 1993, 1999).⁵⁶ Our experimental stimuli were also created based on this claim. However, the empirical data indicates that this approach may be too simplistic. Soh and Kuo (2005) reported that, in addition to its object boundedness, the type of object nouns together with creation verbs (e.g., *make* and *write*) contribute to predicate telicity. The idea is that predicate telicity with creation verbs depends on whether the object noun can be considered as what Soh and Kuo called a ‘relevant’ object. For example, a noun such as a *house* provides information as to what a house should be in our world: That is, a house is something that people can live in. Thus, a noun house can be considered to be a ‘relevant’ object for a building event only when the building event is completed and as a result a house that people can live in has been built completely. According to Soh and Kuo, this type of object class is called a No Partial Object (because, for example, a half-built house is not considered a house). Other examples of this class are *a cake* in a baking event and *a circle* in a drawing event.

Interestingly, an object noun such as *a picture* in a drawing event, on the other hand, is considered to be the relevant object even though the painting event is stopped before the completion of the picture. That is, the resulting picture is still called *a picture* even though it has not reached its endpoint. This type of object class is called an Allowed Partial Object. The point of interest here is that for this type of predicates with the Allowed Partial Object group, the object boundedness is not the primary factor for the

⁵⁶ Verkuyl’s analysis did not limit the verb class to accomplishment verbs but to all the dynamic verb class.

computation of telicity. In a sense, the nature of the object noun overrules the object boundedness feature which contributes to predicate telicity. Notice that the same verb of creation may yield different interpretations as to its event completion entailment depending on the type of object noun. Consider:

- (65) a. ?? Jack built a house for a month.
b. √ Jack built a Lego tower for three months. (Smollett, 2005)

As seen in (65)a and (65)b, both object nouns are bounded (*a house* and *a Lego tower*) and yet the compatibility with the time adverbial phrase *for three months*, which is compatible with an incomplete event, is different. Only (65)b is compatible with the time adverbial phrase *for three months*. This difference with respect to event completion entailment is attributed to the property of the object noun. According to Soh and Kuo's analysis, in principle, it is possible for a Lego tower to be added to indefinitely without having a culmination point (Allowed Partial Object), whereas it is usually not the case for a house (No Partial Object: A house is completed when people can live in it).⁵⁷

The idea that the type of object nouns, in addition to object boundedness, greatly influences the object boundedness in some verb predicate types explains some of our unexpected data i.e., a predicate that unexpectedly yielded low acceptance by the L1 Japanese speakers *build a house* 'No Partial Object' and unexpectedly high acceptance by the L1 English speakers *draw a picture* 'Allowed Partial Object'.

⁵⁷ Similarly, Smollett (2005) attributes the difference between the examples in (65) to world knowledge.

Smollett (2002) proposes an alternative analysis whereby the telicity of the predicate is partially determined by the verb origin. According to Smollett, Latinate verbs are equivalent of a Germanic verb plus particle.⁵⁸ Consider examples in (66).

- (66) a. Ken ate up an apple complete event
 b. Ken consumed an apple complete event
 c. *Ken consumes up an apple

A Germanic verb like *eat* with particle *up* in (66)a provides an aspectual value and makes the verb predicate only refer to a complete event. However this particle cannot co-occur with Latinate verbs such as *consume*, as is exemplified by the ungrammaticality of (66)c. In other words, the Latinate verb *consume* alone indicates a complete event in the simple past predicate, as in (66)b.

This account may explain some of our data. For example, the verbs *paint* (Latinate origin according to a criteria by Gropen et al., 1989) and *draw* (Germanic origin) both describe a *painting* event. Yet the results from the L1 English speakers show variability: in the *paint the door* predicate, L1 speakers rejected the neutral perfective reading as expected, whereas in the *draw the picture* predicate, they accepted the neutral perfective reading. It may be the case that at least part of the observed difference in acceptance of the neutral perfective reading within the similar verb category of accomplishments could also be attributed to the Latinate/Germanic verb distinction.

⁵⁸ In Smollett's (2002) analysis, the Latinate/Germanic distinction does not refer to etymological origin. Latinate verbs refer to a class of verbs with particular morpho-phonological properties (Gropen, Pinker and Hollander, 1989 cited in Smollett, 2002:285).

Levin and Rappaport Hovav (to appear) examined the idiosyncratic component of verb meanings which is often called *root* (the term adopted from Pesetsky, 1995). There are two types of major ontological roots which determine the associated event structure: result root and manner root (Levin and Rappaport Hovav, 1991, 1995; Rappaport Hovav and Levin, to appear).⁵⁹ The idea is that a *result root* (e.g., *clean* and *empty*) focuses on a state that results from some activity whereas a *manner root* indicates an activity, which is carried out to achieve a predicate-defined change. Under this account, these types of information are lexicalized in the root. Thus verbs such as *empty*, which are a *result root*, describe the result states that are brought about by removing materials from a place. This *result root*, however, does not specify how the result states come about. A *manner root*, such as *wipe*, describes actions which are usually accompanied by instrument, manner and means.

Given this, it is not unreasonable to assume that the predicates in the study which showed either overwhelming rejection of the neutral perfective reading (*circle*, *disassemble*, *fill*, *remove* and *empty* by L1 Japanese speakers) or acceptance (*melt* and *unwrap* by L1 English speakers) have an idiosyncratic lexical component.⁶⁰ In other words for at least some verbs, lexical information, independently from object boundedness, contributes to the computation of telicity. The individual predicates data indicate that not all accomplishment predicates with a bounded object entail event completion and suggests that the computation of telicity needs to be examined in relation to an even more refined categorization (e.g., with reference to the predicate roots as

⁵⁹ The notion of the *result* and *manner* roots is essentially similar to the concept of scalar and nonscalar structure (Beavers, 2008, Hay et al., 1999, Kennedy and Levin, 2008).

⁶⁰ Tenny (1994) claims that a predicate such as *melt an ice cube* could be interpreted as a kind of activity which does not actually imply the ice cubes being completely melted.

shown above or a semantically refined categorization of verb class such as scalar class verbs, see Beavers, 2008; Filip, 2008; Hay et al., 1999, Kennedy and Levin, 2008; Kennedy and McNally, 2008; Tenny, 1994; and scalar adjectives (see Kennedy and MacNally, 2008).

As seen, new theoretical literature development on aspect reveals that the computation and interpretation of telicity could be influenced by many other factors and this may explain the variability in judgments even within native speakers. However we have also seen that there are predicates that showed clear differences between the L1 English and the L1 Japanese groups based on object boundedness. Although we acknowledge this variability in the L1 data, this study takes this as evidence that L1 English and L1 Japanese are different with respect to the availability of the neutral perfective reading. Importantly, within the predicates that showed expected difference between L1 English and L1 Japanese group, L2 learners showed a clear progression towards an English representation of predicate telicity. This progression by L2 learners indicates that Japanese learners of English are learning to correctly invalidate the neutral perfective reading in English based on object boundedness.

4.3.3 Summary of results

The truth value judgment task results from the beginner group suggested a direct L1 transfer of the L1 Japanese representation of the semantics of predicate telicity. The results from the intermediate group, however, indicated progression towards the target-like representation of telicity in the L2. This progression was even clearer when considering the data from the advanced group. In other words, the results indicate that the

acquisition of the semantics of predicate telicity is possible by Japanese learners of English. These findings provide answers to our research questions 1 (4.1) (as to whether or not the acquisition of the semantics of predicate telicity is possible by Japanese learners of English) and 2 (4.1) (as to the developmental trend of the L2 acquisition of the semantics of telicity). These overall results are further supported by the individual predicate data. There was a group of predicates that showed an expected opposite pattern of responses in English and Japanese. Within this group of predicates, the data shows L2 learners' clear progression towards their target English predicate telicity.

In chapter 5, we examine two factors that contribute to the success at invalidating the neutral perfective reading by Japanese learners of English (our research question 3). The first factor is linguistic in nature and it is intended to explain the role of DP morphology for the acquisition of predicate telicity. The second factor is more cognitive in nature and it is concerned with learners' form-meaning inference and generalization about the semantics of telicity on the basis of positive and/or negative evidence they observe. We investigate this by examining how learners use the Bayesian learning model to derive generalizations from the input available to them.

5 Factors contributing to the invalidation of the neutral perfective reading by Japanese learners of English

5.1 Acquisition of morphology as a contributing factor

Recall that the truth-value judgment task results from the beginner group suggested a direct L1 transfer of the semantics of predicate telicity, whereas the results from the intermediate and the advanced groups indicated progression towards the target-like representation of telicity in the L2. The question then becomes: What allows Japanese learners of English to continue to invalidate the neutral perfective reading in English simple past predicates in an incomplete event context in the absence of any explicit instruction and negative evidence?

As mentioned in section 4.1, we hypothesized that the acquisition of English DP morphology could be a trigger for invalidating the neutral perfective reading by Japanese learners of English. To examine this, we investigated whether there were correlations between the performance on the morphological task and conditions B and D of the truth-value judgment task.

A Pearson's test performed on the pooled data from all L2 groups revealed a significant correlation between the correct production of the DP morphology in the morphological task and the correct rejection of the neutral perfective reading in the truth-value judgment task ($r=.39$, $p<.001$ two-tailed). However, this correlation did not hold within each of the three L2 groups [the beginner group ($r=.17$, $p=.19$), intermediate group ($r=.17$, $p=.1$) and advanced group ($r=.30$, $p=.062$) (all two-tailed)].⁶¹

⁶¹ r^2 gives the proportion of variation that can be explained by the given data. Thus for the data from the morphological task and truth-value judgment task whose $r=.3$, r^2 equals .09. This means that only 9% of the variation in the truth-

Table 10 A-F provides further evidence for the lack of a robust correlation between the correct production of morphology and the correct semantic representation of telicity in L2 speakers. These tables summarize the individual performance patterns of the all proficiency level learners across the morphological task and conditions B and D of the truth-value judgment task. Recall that each participant was tested on four trials in each condition of the truth-value judgment task and on 12 (6 singular and 6 plural) trials in the morphological task. Thus, in the truth-value judgment task, a participant could either accept the target sentence in all trials (# acceptance = 4), or consistently reject it (# acceptance = 0), or accept it in only some trials (# acceptance = 1, 2, or 3) (represented by each row in Table 10, A-F). Similarly, in either the singular or plural condition of the MT, a participant could always provide a correct answer (# correct=6) or always give a wrong answer (# correct = 0) or be somewhere in between (# correct = 5, 4, 3, 2 or 1) (represented column-wise in Table 10, A-F). Each cell indicates the number of participants with the corresponding scores in the truth-value judgment task and the morphological task respectively. Shaded cells indicate target-like performance.

value judgment task data can be attributed to the morphological data. Therefore, it is safe to conclude that there was no strong correlation in the advanced group.

Table 10: Performance of individual participants: the morphological task (MT) and the truth-value judgment task (TVJT).

beginners N=60

A: MT (Sg)/ TVJT (Condition B)

MT(Sg) # correct TVJT ConB: #acc.	0	1	2	3	4	5	6
4	11						
3	18						
2	26	2					
1	2						
0	1						

B: MT (Pl)/ TVJT (Condition D)

MT(Pl) # correct TVJT ConD: #acc	0	1	2	3	4	5	6
4	5	2	6	3	2	2	1
3	3		4	5	1	1	3
2	1	4	4	2	1	3	2
1	2				1		1
0					1		

intermediate (N=96)

C: MT (Sg)/ TVJT (Condition B)

MT(Sg) # correct TVJT ConB: #acc.	0	1	2	3	4	5	6
4	2					1	1
3	9		1	4	1	4	6
2	13	1	2	1	3	4	9
1	11	2		1	3	5	7
0	1				1	1	

D: MT (Pl)/ TVJT (Condition D)

MT(Pl) # correct TVJT ConD: #acc	0	1	2	3	4	5	6
4			4	2	3	1	7
3		1	2	6	6	6	14
2			5	1	2	5	13
1		1	1		1	1	3
0		1	1	3		3	

Advanced group (n=40)

E: MT (Sg)/ TVJT (Condition B)

MT(Sg) # correct TVJT ConB: #acc	0	1	2	3	4	5	6
4	1						
3						1	4
2	4					2	5
1	3					1	8
0					1	2	

F: MT (Pl)/ TVJT (Condition D)

MT(Pl) # correct TVJT ConD: #acc	0	1	2	3	4	5	6
4						1	1
3					2	3	4
2			1		1	3	10
1				1	1	2	7
0				1		1	

Table 10 A-F shows that learners' success in the production of the DP morphology is not a reliable indicator of their success at the invalidation of the neutral perfective reading. For example, the last column in each table shows that participants with high scores in the morphological task had a wide variation in the performance in the truth-value judgment task. Furthermore, learners with very poor performance of the English DP morphology (the first column) also showed a range of proficiencies where on the truth-value judgment task is concerned, although it is less observed in the advanced level.

In summary, although we found a correlation between the correct production of the DP morphology in the morphological task and the rejection of the neutral perfective readings in the truth-value judgment task when all the L2 groups were pooled together, such a correlation was not found within each L2 group. In fact, the data shows a considerable amount of morphology-semantics mismatch (variability) in the data from

the participants. This suggests that an appropriate production of the DP morphology may not be a prerequisite for a correct interpretation of the predicate telicity by L2 speakers.

It is important to note that the morphological task which investigated the learners' production of the DP morphology may only be an indirect measure of the degree to which the DP morphology has been internalized. Specifically, the learners may have a correct DP projection (covert internalization of DP), yet still fail to correctly instantiate it in production due to processing limitations. This type of morphology-semantic mismatch is often discussed in the Missing Surface Inflection Hypothesis, (Prévost and White, 2000b), which claims that abstract features may be present without an overt morphological manifestation.

The observed morphology-semantics mismatch in this study is similar to Slabakova's (2003) findings for English learners of Russian. As seen in section 3.2.1.3, L2 Russian learners showed difficulty in acquiring Russian aspect-marking morphology though they correctly computed the semantics of aspectual distinctions. It should be mentioned that aspect in Russian is often encoded through idiosyncratic verbal prefixes and remembering them may be especially costly for L2 learners. Thus, Slabakova's findings may be accounted for by the difficulties in memorizing an appropriate prefix, which may not be fully extendable to our case since morphological markers of DP boundedness in English are more regular. However, the morphology-semantic mismatch by Slabakova (2003) is still worth mentioning in relation to our study because both hers and our studies point to the fact that the lack of correct production of morphology does not necessarily result in a lack of associated abstract features.⁶²

⁶² See Lardiere (1998 a,b) and Lardiere (2000) cases of morphology–syntax mismatch.

A separate issue is whether the morpho-semantic mismatch (variability) is transient or permanent (section 4.3.2.1.4). It has been suggested that, in order to examine this, we need to examine L2 learners who are at the end state of L2 acquisition.⁶³ Several different criteria for identifying an end state grammar has been proposed in the L2 research (e.g., length of residence in a country where the L2 is spoken, or proficiency level). Longitudinal data is particularly to be believed the most reliable criterion in L2 learners' language development (Lardiere, 1998 a. b; cited in White, 2003:244). As it is tangential to the core purpose of this dissertation, we acknowledge that transiency or permanence of the morpho-semantic mismatch is unexplored in our study and we leave it for future research.

There is another possible factor that could account for the morphology-semantics mismatch in this study. As seen in section 3.2.1.1., Montrul and Slavakova's (2002) experiment predicts a rather direct relationship between the knowledge of morphology that encodes aspectual distinction (preterite/imperfective) and its semantic representation because the Preterite/imperfect morphology has a one-to-one morphology-semantic relation. However in our case the Det morphology, which we used to test learners' knowledge on boundedness, carries more than one feature such as definiteness and boundedness. In other words, learners may need to find what is tested in the interpretation task (i.e., truth-value judgment task). This difference may have been the explanation for morphology-semantics mismatch in our study.

It is true that English Det morphology can encode a wider range of meanings than Spanish preterite/imperfect morphology. Thus, one may argue that it is not surprising that

⁶³ The term *end state* refers to stages where learners (L1 and L2) arrive at a steady grammar stage. While in L1 acquisition, end state means adult L1 grammar, in L2 research it does not mean achievement of the target grammar.

there was no correlation between the correct use of morphology and the interpretation of semantics of predicate telicity. However, as far as definiteness is concerned, our data suggests that it may not be the case. More specifically, the data shows that our L2 participants seem to know that the boundedness feature is relevant and hence predicate telicity is relevant in the truth-value judgment task but not definiteness. For example, as appendix 4 shows, half of the target predicates contain the indefinite article *a*, and the rest of the target sentences contain the definite article *the*. Strictly speaking, the target sentences that contain the indefinite article *a* may not be appropriate in terms of definiteness (because the noun in question is already mentioned in a context). However, it is accepted that definiteness does not influence the computation of telicity (e.g., *Ken erased a star* vs. *Ken erased the star*, both refer to a complete event). Recall that in the truth-value judgment task, learners were asked to provide reasons when they answered 'NO'. If L2 learners are concerned with definiteness in the truth-value judgment task, they would have provided reasons such as 'the target sentence is not true because of the incorrect use of article'. Interestingly, almost no learners appeared to judge their target sentence based on the definiteness of determiners. This may suggest that Det morphology having more than one feature (i.e., definiteness) may not have affected the truth-value judgment task in this study.

5.2 Duration of English immersion

In section 5.1, our data showed that the correct production of Det and Num morphology may not serve as strong evidence that morphology is a trigger for the progression of the correct invalidation of the neutral perfective reading by Japanese learners of English.

In this section, we examine another possible factor: the duration of English immersion factor, which we mentioned in section 4.3.1.3. In order to examine the effect of English immersion in relation to the L2 learners' semantic progression, let us explore a hypothetical real-world example first.

5.2.1 English immersion and positive/indirect negative evidence

It is not unreasonable to assume that learners are exposed to more L2 input if they are in a country where the target language is spoken. In addition, it is also not implausible to assume that the quality of input available in a classroom setting and in a real-life setting is different. In classroom settings, learners obtain instruction on the grammatical structure of English (and overt evidence regarding which structures are ungrammatical). However, classroom instruction rarely goes beyond the morpho-syntactic structural level. In relation to our case, learners rarely have information on whether the event described by English simple past predicates that is complete or incomplete. Let us look further into this.

Imagine a situation where a learner of English resides in an English-speaking country. It is reasonable to assume that this learner will have chances not only to hear a grammatical sentence such as *Lisa erased the star*, but also to witness an event in which the star has been completely erased (the form-meaning matching). To hear a

sentence and witness an event together with semantic information (whether a sentence refers to a complete event or incomplete event) makes a crucial difference in terms of the quality of input available between classroom settings and real life settings (i.e., immersion in a country where the target language is spoken). A similar situation occurs with respect to indirect negative evidence. Recall that indirect negative evidence could help to shape learning when learners observe absent structures in the target language (sections 3.2 and 3.2.2.1). An example of indirect negative evidence that a learner can receive from a simple past sentence with a bounded object is when the sentence *Ken erased a star* does not entail event completion. Importantly, positive evidence could provide indirect negative evidence as long as learners have a hypothesis space.

Thus, we believe it is reasonable to assume that the longer learners stay in a country where the target language is spoken, the more chances they have to access positive evidence. Note that this type of evidence can be obtained by a form-meaning matching. Conversely, the absence of a certain interpretation (e.g., *Ken erased a star* refers to an incomplete event) serves as indirect negative evidence (provided that learners have outlined a relevant hypothesis on the predicate telicity in English). Given this, we use this duration of stay in an English-speaking country as a proxy to represent the amount of positive and indirect negative evidence that the learners can receive.

5.2.2 Reanalysis of the truth-value judgment task data: the English immersion factor

As seen in 5.2, we are concerned with form-meaning inferences that L2 learners draw about the target grammar on the basis of input available to them. We assume that the longer learners stay in a country where the target language is spoken, the more chances they have to be exposed to form-meaning matching. Encountering evidence (positive and indirect negative evidence) with Bayesian learning model allows L2 learners to make inferences on the target grammar and further arrive at the most appropriate representation of English predicate telicity on the basis of L2 input.

In this section, we re-analyze the data of the truth-value judgment task in order to examine how the duration of English immersion affects L2 learners' performance on this task. The data are re-analyzed by comparing the Canada group and the Japan group. This distinction between the Canada group and the Japan group is based on the criterion set in section 4.3.1.3 (The Canada group consists of both intermediate and advanced levels of learners who had stayed in an English speaking country for more than 6 months. The Japan group consists of the intermediate and advanced learners who had stayed in an English speaking country less than 6 months). Note that we excluded the Japan beginner group for two reasons: The first is the unavailability of the corresponding Canada beginner group. The second is due to the strong L1 transfer effect observed in the data. Recall that the results from the beginner group are not statistically different from those of L1 Japanese in the truth-value judgment task.

Figure 8 shows the truth-value judgment task results with the percentage of *yes* responses by condition and by L2 groups classified by the duration of English immersion factor.

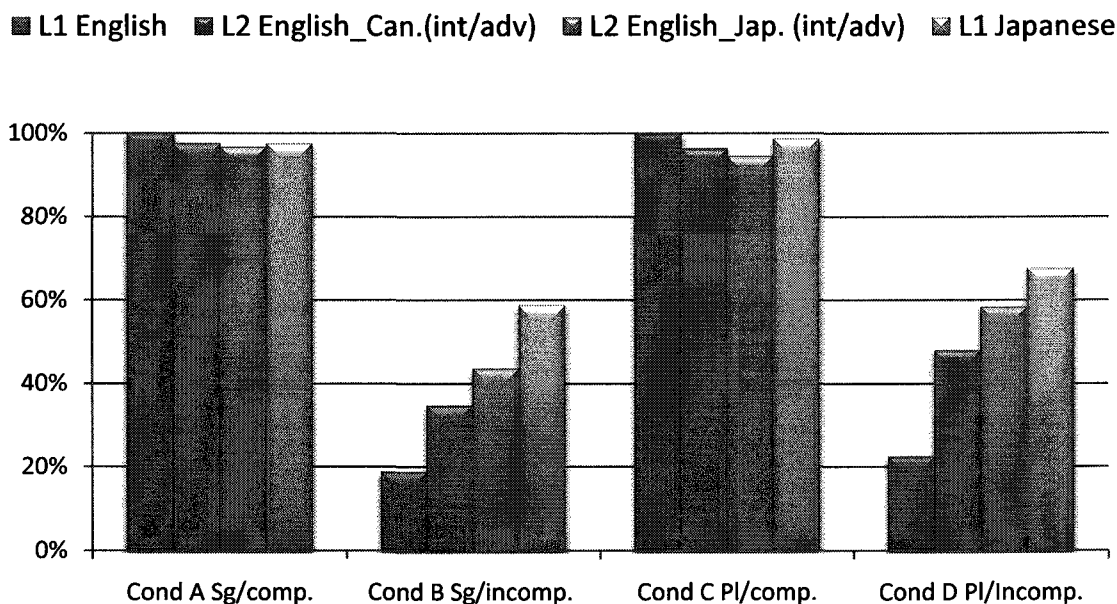


Figure 8 The truth-value judgment task results with the percentage of *yes* responses by condition and by L2 groups classified by the duration of English immersion factor.

Because the data from the L1 English and the L1 Japanese groups are the same as what was reported in section 4.3.2.1.1, we will concentrate on a discussion of the L2 group data here. The L2 Canada group comprised 54 participants and the L2 Japan group consisted of 84 participants for this analysis (both the Canada and the Japan groups include the intermediate and the advanced learners).

For conditions A and C, both the Canada group and the Japan group correctly accepted the simple past sentences in a complete event context. For the critical conditions B and D, a 1-way ANOVA performed with all four participant groups yielded significant

differences (condition B: $F(3,172) = 12.4, p < .001$, condition D: $F(3,172) = 14.2, p < .001$). Numerically, the Japan group incorrectly accepted the neutral perfective reading more often than those of the Canada group (43.6% and 34.7% of *yes* responses in condition B and 58.4% and 48.0% of *yes* responses in condition D respectively). It was further confirmed by post hoc tests (Tukey correction) that the Japan group and the Canada group are different from each other (condition B $p = .062$ marginally significant, condition D $p < .05$). This indicates that the Canada group performed better than the Japan group. Notice that the difference between the two L2 groups, which are comparable in the placement test, is the duration of English immersion.

This finding that the Canada group performed better in both the morphological task and the truth-value judgment task motivates us to further analyze the correlation between the morphological task and the truth-value judgment task as a function of the factors of the duration of English immersion (Canada/Japan) and of proficiency level (intermediate/advanced). A Pearson's test performed with these factors revealed significant correlation in the advanced Japan group ($r = .006, p < .05$). However, there was no significant correlation for the remainder of the groups (in the Canada group data: advanced $r = .006$, intermediate $r = .019$ both $p > .1$, in the Japan group data: intermediate $r = .17, p > .1$). This confirms our earlier claim (see section 5.1) that appropriate production of the DP morphology may not be a prerequisite in order to generate a correct interpretation of the predicate telicity by L2 speakers.

A 2-way ANOVA using the proficiency level (intermediate/advanced) and the duration of English immersion (Canada/Japan) as independent factors and the score (% of *yes* responses) in the truth-value judgment task as a dependent factor further confirms the

relevance of the duration of English immersion in the aspectual domain. There is a main effect of the duration of English immersion ($F=(1, 132)=7.26, p=.008$). However the main effect of proficiency was marginally significant ($F= (1, 132)=3.34, p=.070$). There was no significant interaction between the proficiency level and the duration of English immersion ($F=(1, 132)=.36, p=.55$). This means that the Canada group was better at invalidating the neutral perfective reading than the Japan group (43.9%, 54.2% of *yes* responses respectively). Results of the 2-way ANOVA suggest that the duration of English immersion contributes to the L2 learners' success rate in invalidating the neutral perfective reading.

The findings above may be surprising in light of a similar level performance by the Canada and the Japan groups in the placement test. It is important to note that what was measured in the placement test may not be compatible or transferable to other areas of language acquisition, for instance, to the acquisition of morphology and the correct interpretation of telicity that is the object of this study. This is due to the fact that, aside from morpho-syntactic properties, the placement test also measures knowledge of vocabulary. Furthermore, it may be the case that, because the acquisition of the semantics of predicate telicity is latent, a placement test may not measure this latent semantic knowledge. Although this may suggest that the Oxford Placement Test is an imperfect measure of the specific aspect of the grammar that we focus on, we still believe that using a standardized test is a useful and reasonable way to categorize participants into groups.

Because the results showed that the Canada groups (both the intermediate and advanced level) performed better in the morphological task and in the truth-value judgment task, one might argue that it is the acquisition of Det/Num morphology that

most determines success in the acquisition of the semantics of predicate telicity. It does ring true that the acquisition of morphology seems to play an important role for the acquisition of the semantics of predicate telicity. This is evident from the Japan groups that do not have the benefit of English immersion experience (which provides learners with opportunities to observe evidence by way of form-semantics matching), yet show progress in invalidating the neutral perfective reading in English. Thus it is plausible that the acquisition of Det and Num morphology plays a major role in the acquisition of the semantics of telicity. However, there is a limitation on the view that only the acquisition of morphology contributes to the progress in the semantics of predicate telicity.

One way of investigating whether the acquisition of morphology is the only factor that contributes to the progression of the semantics of telicity is to examine if there is a correlation between the two. This is based on a claim that the acquisition of morphology represents the acquisition of its abstract feature (the Rich Agreement Hypothesis as seen in section 3.2.1). Thus, we should expect a correlation between the correct production of Det/Num morphology and correct interpretation of predicate telicity. However, the correlation between the two was not present within each of the L2 groups (see section 5.1).

One may further argue that a lack of overt correlation does not exclude the possibility that the acquisition of morphology is the only contributing factor to the semantics of predicate telicity. As we have seen in 3.2.1.3, a lack of overt morphology does not necessarily entail the lack of abstract feature associated with it (the Missing Surface Inflection Hypothesis, Prévost and White, 2000 a, b). In other words, under this view, covert internalization of object boundedness is present and thus the lack of correlation

between the morphology and the semantics of telicity may not be enough to reject the claim that only the acquisition of morphology influences the semantics of telicity. Indeed, we reported some cases where there were correct interpretations of the semantics of predicate telicity in the absence of overt Det/Num morphology in our data. However, we still need more information to accept this exclusive view that only the acquisition of DP (covert/overt) influences the acquisition of the semantics of telicity. For example, it may have been convincing had we found a case where learners show zero instances of correct production of Det/Num morphology while constantly providing the correct interpretation of the semantics of predicate telicity. However, our data did not provide such a case. Thus, although we assume that the acquisition of morphology plays a large role in the acquisition of the semantics of telicity, we are unable to confidently accept the view that it is only the acquisition of morphology which contributes to L2 learners' semantic progression.

Alternatively, we believe a more reasonable explanation is that the acquisition of morphology (i.e., covert or overt internalization of DP morphology) and the duration of English immersion are both at play in the acquisition of semantics of telicity.

Summarizing, section 5.1 showed that a significant correlation between the correct production of the DP and Num morphology in the morphological task and the correct rejection of the neutral perfective reading in the truth-value judgment task was found when the data from all L2 groups were included. However, this correlation was not found within each of the three L2 groups. This morphology-semantics mismatch (variability) is often observed in L2 acquisition research and discussed within the *Missing Surface Inflection Hypothesis* (Prévost and White, 2000 a, b). Although we acknowledge the

necessity for further investigation of this issue, our data also suggest that covert internalization of object boundedness is contributing to L2 learners' progress in the acquisition of the semantics of predicate telicity.

In addition to the relevance of the acquisition of the relevant DP morphology with the semantics of predicate telicity, we examined the role of the duration of English immersion. The results show that the Canada group performed better than the Japan group which are comparable in terms of the proficiency level but are different with respect to the duration of English immersion. This suggests that the duration of English immersion may also be a contributing factor to the L2 learners' success at invalidating the neutral perfective reading.

In the following section, we investigate how the duration of English immersion could contribute to language acquisition by using the Bayesian learning model advanced by Tenenbaum and Griffiths (2001).

5.3 The derivation of form-meaning inferences on the English predicate telicity in the Bayesian learning model

In section 5.2, we investigated how the duration of English immersion affected L2 learners' interpretation of English predicate telicity through examining the performance of the truth-value judgment task. The reanalysis of the truth-judgment task showed that the learners who had longer exposure to English immersion (the Canada group) performed better than the learners who had less (the Japan group). This section is concerned with how L2 learners possibly make form-meaning inferences on the basis of

input available to them and how competing hypotheses can be confirmed or disconfirmed via use of the Bayesian learning model in the acquisition of the semantics of predicate telicity.

Recall that Tenenbaum and Griffiths (2001) proposed a computational model which rationalizes learning and generalization in a general Bayesian framework. This model assumes that learning is rational and governed by the general Bayes' model. The critical idea is that a rational learner utilizes probabilistic inference to confirm or disconfirm a given hypothesis from a defined hypothesis space. Let us first refresh our memory of the terms used in the Bayes' rule as seen in section 3.2.2.1.

(67) Bayes' Rule

$$p(h|x) = \frac{p(x|h) * p(h)}{p(x)}$$

Where h is a hypothesis in a hypothesis space that learners outlined and x is the observed evidence in the input. $p(x|h)$ is the likelihood of observing evidence x given hypothesis h being true. $p(h)$ is the prior probability of the hypothesis being true.

Now let us consider our case of predicate telicity in *erase a star* within the Bayesian framework. Recall that English simple past sentences with bounded DPs refer to a complete event. Thus, in our case, evidence x , which is observed evidence from input by learners, is *a complete event of erasing a star*, as exemplified in (68).

(68) $x = a \text{ complete event of erasing a star}$

Before we consider the assumptions that Japanese learners of English may make, let us comment on the relationship between a parametric approach and a domain-general approach in the current study. Regarding the parametric approach, the parameter in question is the learners' setting of +/- Det and +/- Num (L1 English learners set the +Det/+Num parameter whereas L1 Japanese learners have the -Det/-Num parameter) The motivation behind the parametric approach is the analysis whereby the Det and Num categories affect the object boundedness, which in turn, influences predicate telicity. However, recall that in section 4.3.2.1.4, the telicity of the predicate cannot be completely predicted by the object boundedness. In particular, while we found predicates whose telicity is determined by the object boundedness via Det morphology (6 out of 16 predicates), there were predicates whose object boundedness did not play a primary role with respect to the computation of telicity. Considering this, it may be necessary to modify our view from a purely mono-parametric approach to a multi-factor account of the neutral perfective phenomenon.

The Bayesian learning model can be viewed as part of a domain-general approach. However, as mentioned, this model allows for domain-specific elements (Tenenbaum and Griffiths, 2001:631). In fact we assume domain-specific linguistic components in the dissertation: We assume that the hypothesis space and the relevant hypotheses formation needed to trigger the Bayesian learning relies on Det/Num morphology. Upon encountering evidence (a sentence with or without the morphology) in the input and recognizing the difference between a sentence with respect to the form of a sentence and the meaning of it, learners execute hypothesis formulation. We believe that this process requires a rather general cognitive learning mechanism. Arriving at the relevant

hypotheses, then, may be derived from learners' linguistic knowledge of Det/Num morphology with relevant abstract features (i.e., object boundedness). In other words, learners linguistic knowledge of Det/Num morphology with an abstract feature is not "activated" until learners outline the hypothesis space by the method described above.

Now, we consider assumptions that Japanese learners of English may possess. We made three assumptions about the knowledge available to Japanese learners of English. First, we assumed that (as indicated throughout this study) telicity is compositional (Verkuyl, 1972, 1989, 1993, 1999) and is computed by the object boundedness which is derived from Det/Num morphology. Second, we assumed that L2 learners start out with the L1 representation of telicity for outlining a hypothesis space and relevant hypotheses. For a hypothesis space, we assume that learners transfer their L1 knowledge that simple past sentences can refer to a complete or an incomplete event. We think this is well motivated given the fact that their L1 has complete/incomplete distinction in simple past sentences. More specifically, in Japanese, a complete event reading is available when DP is bounded by numerals (such as *Ken-wa niko-no ringo-o tabeta* 'Ken ate two apples') whereas a reading of an incomplete event is available when the DP is unbounded by means of the use of bare nouns (*Ken-wa ringo-o tabeta* 'Ken ate apple'). With respect to the second assumption, we assume that the L2 learners' hypotheses in their hypothesis space are the following. *h1: Simple past predicate need not entail completion*, and *h2: Simple past predicate must entail completion*.

We believe that the assumption that L2 learners use their L1 knowledge, at least for the initial stage of L2 learning, is reasonable in light of sample evidence suggesting that L2 learners' grammar is largely influenced by their L1 (L1 transfer as seen in section 3.1).

Moreover, results from our morphological task (section 4.3.1.2.) and truth-value judgment task (section 4.3.2.1.1) support this assumption by demonstrating that Japanese L2 learners used Bare-sg noun in their English production (the use of Bare-sg noun and the incorrect use of Num morphology in the morphological task) and accepted the neutral perfective reading of a predicate in the truth-value judgment task.

Third, we assume that Japanese learners of English know, at least at the conceptual level, that English has a mass/count distinction which comes with Det/Num morphology. This assumption is based on the fact that explicit instruction in formal classroom settings is available for most Japanese learners of English (at least the L2 learners who participated in this study). Note that we also assume that the abstract features and function associated with Det and Num morphology are available to the learners. This is based on the idea that the morpho-syntactic form is closely related to its abstract feature (e.g., the Rich Agreement Hypothesis, see 3.2.1).

Let us consider a hypothesis space based on the above-mentioned assumptions. It is important to mention that, in the Bayesian learning model, it is the learner who outlines an appropriate hypothesis space for a question such as '*does my sentence need to entail completion?*' We assumed that L2 learners utilize their L1 knowledge of telicity until they realize that their L1 grammar does not accommodate the L2 data. Thus, in our case, it is reasonable to assume that the Japanese learners' hypothesis space is the same as that of their L1 and therefore, the learner's hypotheses would be defined as the following:

(69) **h1**: English *erased the star* need not entail completion.

h2: English *erased the star* must entail completion.

Prior probability, $p(h)$, is the prior probability of the hypothesis being true. For the sake of simplicity, if we assume the probability of each hypothesis being true prior to the observation of the data is equal, we expect equal variance ($p(h)=1/2=0.5$) for these two hypotheses (h1 and h2).

Given that the prior $p(h)$ for each hypothesis receives equal probability ($P(h)=h1=h2=0.5$), it is the likelihood ($p(x|h)$: the probability of observed evidence x given hypothesis is true) that provides crucial evidence that discriminates between the two competing hypotheses in the learners' hypothesis space. Recall that $|h|$ indicates how many different outcomes are compatible with given hypotheses. Therefore, the likelihood $p(x|h) = 1/|h|$ predicts the following: if there is piece of evidence that is compatible with two competing hypotheses (h1 and h2), of which h2 is more restricted than h1 in terms of cardinality, h2 will gain more support. Let us consider the likelihood $p(x|h)$ of our two hypotheses. Examine (70).

(70)

$$h1: p(x/\text{complete \& incomplete}) = 1/2 = 0.5$$

$$h2: p(x/\text{incomplete}) = 1/1 = 1$$

\Rightarrow $h2$ receives higher probability than $h1$ when learners encounter the supporting evidence where a sentence *Ken erased the star completely* refers to a complete event.

(70) shows that hypothesis 2 ($|h2|$) is more restricted than hypothesis 1 ($|h1|$). More specifically, the cardinality of hypothesis 1 ($|h1|$) is two: a complete event and an incomplete event of *erase a star*. Thus the likelihood $p(x|h)$ is 0.5. The cardinality of hypothesis 2 ($|h2|$), on the other hand, has only one: a complete event of *erase a star*. Therefore, the likelihood $p(x|h)$ is 1. As a result, $h2$ receives higher probability than $h1$ when learners encounter the supporting evidence of ‘erase a star’ referring to a complete event. This means that $h2$ will be reinforced as the hypothesis that is better correlated with the input that shows a completed event of a predicate *erasing a star*. Conversely, evidence that supports $h1$ (*erased a star* does not entail event completion) is missing in the input and likelihood of $h1$ is approaching to zero over time.

Thus, the important implication drawn from this model is not only that the better hypothesis (in our case $h2$: *English erased the star must entail completion*) gains more support by encountering supporting evidence, but also that the other hypothesis ($h1$: *English erased the star need not entail completion*), in turn, exponentially loses its

likelihood and over time, the likelihood of unsupported hypothesis becomes zero. As such, this model highlights the importance of the indirect negative evidence for the learners' inductive learning (Regier and Gahl, 2004).

Diagram 1 depicts a hierarchical Bayesian model for telicity learning by Japanese learners of English. This diagram pertains to cases where English simple past predicates with bounded DPs entail event completion.

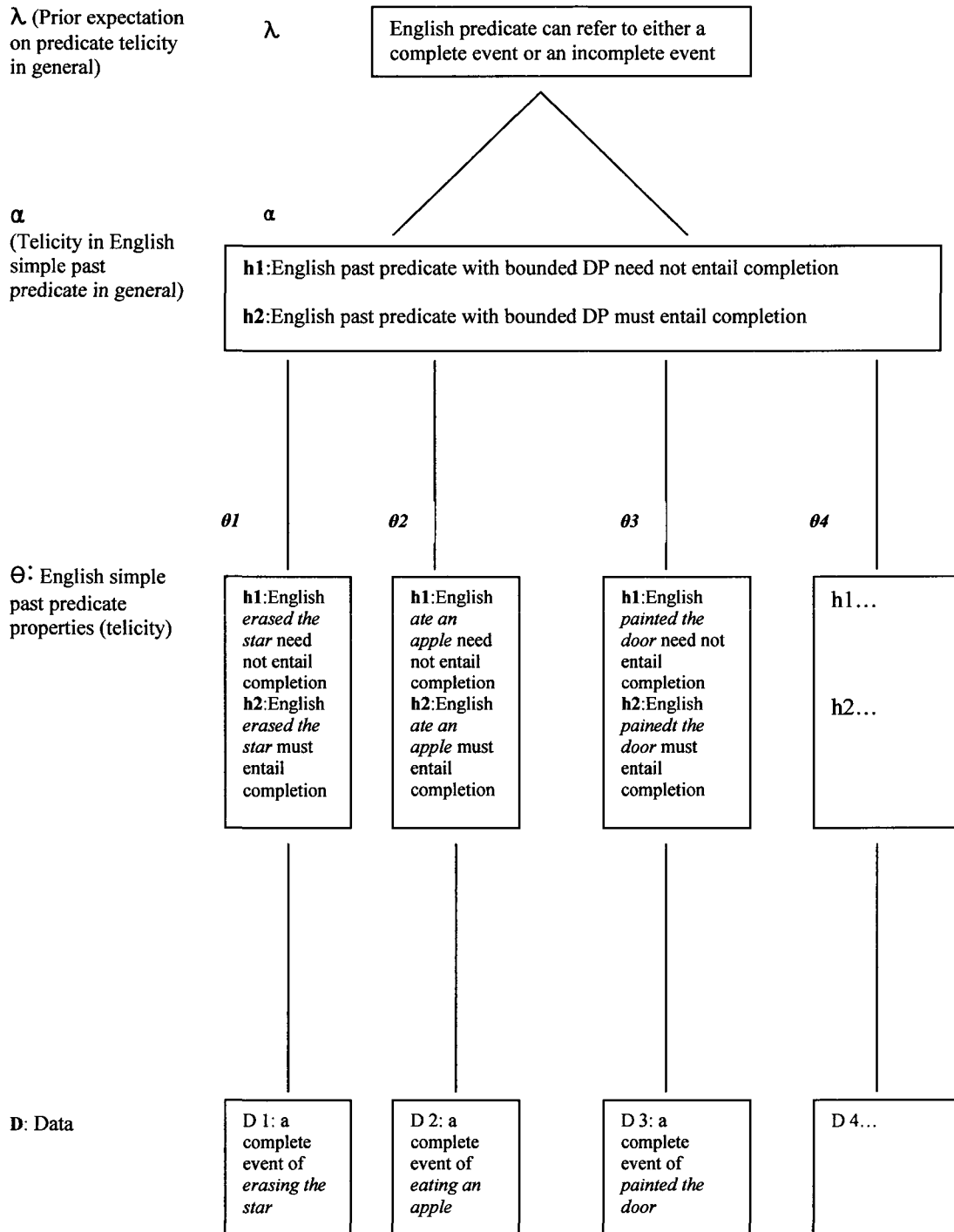


Diagram 1. A hierarchical Bayesian model for telicity learning (e.g., in the case of English simple past predicate with bounded DP=completion) by Japanese learners of English.

Let us imagine a case where Japanese learners of English are learning English predicate telicity: *Simple past sentence with bounded object entail event completion*. The learners' task is to invalidate the choice of accepting the neutral perfective reading which is commonly accepted in their L1 (Japanese). Thus, their hypotheses concerning the question 'does my sentence *Ken erased the star* need to entail completion?' are the following; (h1) *English erased the star need not entail completion* and (h2) *English erased the star must entail completion* (Θ_1 in Diagram 1).

Suppose a learner observes the data 1 (D1: *complete event of erasing a star*) by a form-meaning matching. With the Bayes' rule, h2: *English erased the star must entail completion*, receives higher probability than hypothesis h1: *English erased the star need not entail completion* based on the number of instances in which the supporting evidence was observed, as seen in (68). Importantly, the learner further outlines hypothesis space such as α (h1, *English past predicate with bounded object need not entail completion* and h2, *English past predicate with bounded object must entail completion*). This hypothesis space α contains a more generalized hypothesis with respect to event completion in English.

We believe it is with this that learners also make a distinction between English simple predicates with bounded objects (the ones we examined in this study) and English simple predicates with unbounded objects (e.g., DPs with mass noun/plural noun which yields the unbounded DP feature). We therefore assume that L2 learners who are aware of the mass/count distinction generate a hierarchical Bayesian model such as the one presented in Diagram 2.

λ (Prior expectation on predicate telicity in general)

α, β (Telicity in English simple past predicate in general)

Θ : English simple past predicate properties (telicity)

D: Data

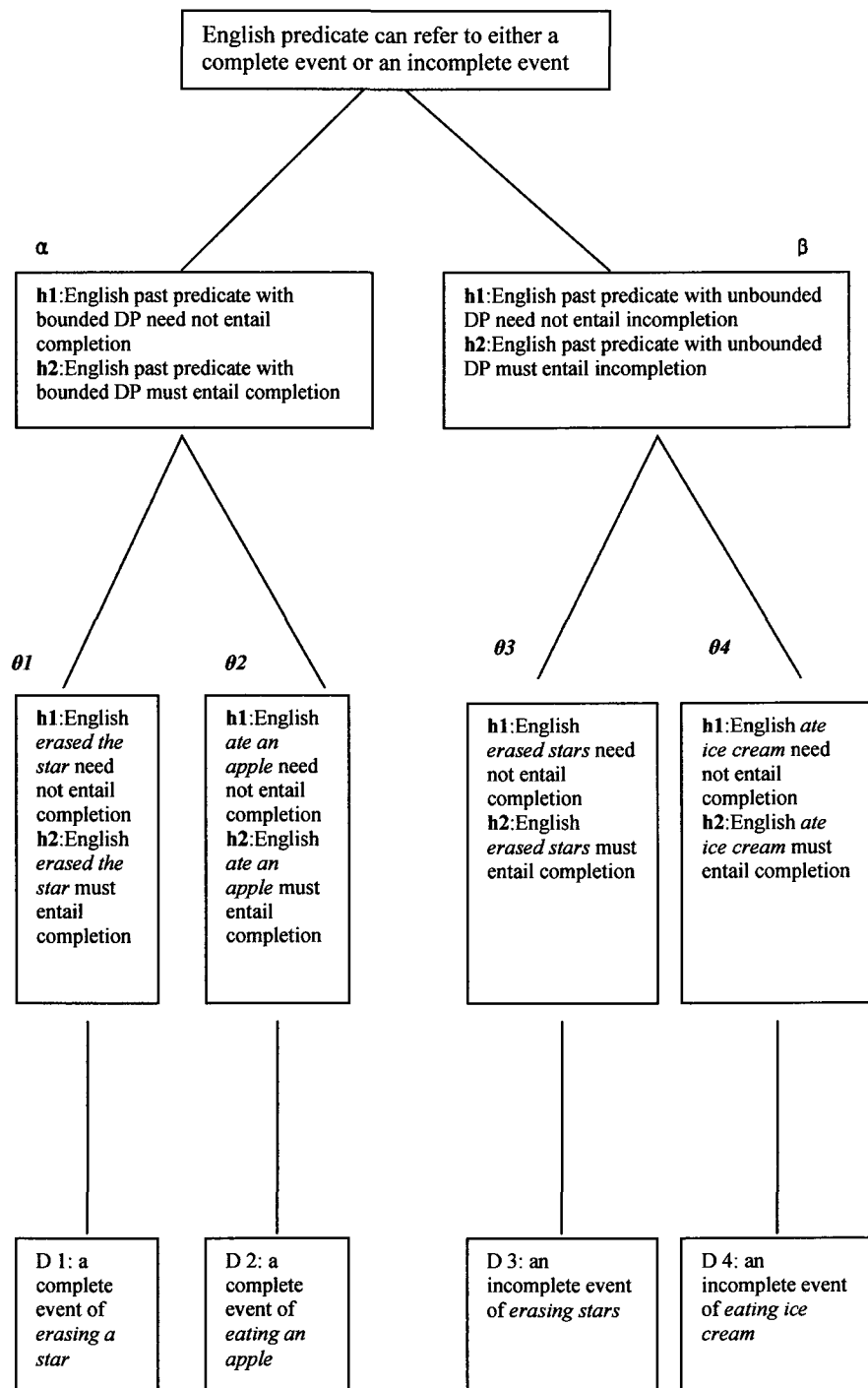


Diagram 2. A hierarchical Bayesian model for telicity learning by Japanese learners of English.

Diagram 2 depicts a hierarchical Bayesian model for telicity learning by Japanese learners of English. This is similar to Diagram 1, except for D3 and D4, where learners consider the bare plural DPs, and mass noun. The bare plural nouns and mass nouns yield unbounded feature in the DPs.

Let us examine D3 in Diagram 2, whose verb predicate contains an unbounded DP (i.e., *erase stars*). L2 learners create hypotheses in relation to a question such as ‘must my sentence *Ken erased stars* entail completion?’ Possible hypotheses are the following: *h1* English *erased stars* need not entail completion; and *h2* English *erased stars* must entail completion (θ_3 in Diagram 2).

Upon outlining the hypotheses, the observed data of *an incomplete event of erase stars* is processed through the Bayes’ rule.⁶⁴ In this case *h1: Erase stars need not entail completion* is better correlated with the input. Based on their hypotheses at the θ level, the learners further outline a hypothesis space in β (*h1: English past predicate with unbounded DP need not entail completion, h2: English past predicate with unbounded DP must entail completion*). Notice that a step from θ to β requires L2 learners’ knowledge of the function of Det morphology. More specifically, hypothesis α and β in Diagram 2 could not have been formulated unless the learner can distinguish mass from count nouns.

We assume that hypothesis space and relevant hypotheses formulation that needs to trigger the Bayesian learning relies on Det/Num morphology. As mentioned above, upon encountering evidence (a simple past sentence with or without the morphology) in input, learners execute hypothesis formulation. Learners’ hypotheses are derived from their

⁶⁴ To my knowledge, L1 acquisition research which takes the Bayesian learning model into account usually considers that learners acquire the target language via form-meaning matching. To this end it is important to note that learners may ‘test’ their inference through question/answer pairs. For example, ‘Did you write the thank you cards? The answer ‘Yes, I did’ will be used when the writing of thank you cards is completed and ‘No, only some cards are written’ when it is incomplete. I thank Alison Gabriele for this suggestion.

linguistic knowledge of Det/Num morphology with relevant abstract feature. The reason why we think hypothesis formulation in the Bayesian model depends on morphology in the acquisition of telicity is due to our belief that distinguishing mass nouns from count nouns at the conceptual level is harder for Japanese learners of English than relying on morphological difference at the DP level. According to Chierchia (1998), the reason for this is that all Japanese nouns are mass nouns. In addition, recall that in section 2.6, mass nouns and count nouns differ with respect to the boundedness features [+/-b]. A count noun is bounded because the boundaries of an entity are clearly visible/definable whereas a mass noun is unbounded because its boundaries are not clearly definable (Jackendoff, 1991). Anecdotally speaking, including myself as a native speaker of Japanese, though Japanese learners of English may not have problems distinguishing typical examples of count/mass nouns such as *apple* (count) vs. *water* (mass), making the mass/count distinction may become more problematic when considering mass nouns such as *cake* and *ice cream* that show rather clearer boundaries of entities than the ones in a typical mass noun such as *water*. In other words, it may be the case that L1 Japanese speakers consider the boundaries of entity, *cake* as similar to the one of *apple* based on the fact that *cake* can be more clearly definable than that of typical mass nouns, namely *water*. Hence, difficulty in distinguishing mass/count nouns at the conceptual level may lie in determining what makes boundaries of an entity definable. Although it is a guessing game at the moment, a point we would like to make here is that the step from θ to β in Diagram 2 suggests the importance of DP morphology. Without one, learners may be prone to outline wrong (irrelevant) assumptions.

The results from the truth-value judgment task analyzed by the duration of English immersion show better results for the Canada group than for the Japan group (in section 5.2.2). This suggests that having the opportunity to observe a form-meaning matching plays an important role with respect to the acquisition of English predicate telicity. However, this does not mean that the acquisition of DP morphology is not contributing to the progression in the aspectual domain. In fact, the Japan group, who had formal English instruction and little chance to observe the meaning of the sentence that is uttered, showed progression toward the target grammar. Indeed, the results obtained in the truth-value judgment task show a clear progression between the intermediate Japan group and the advanced Japan group in both conditions B and D (49.6% to 37.5% and 64.2% to 52.5% *yes* responses respectively). This suggests that the progression observed in our data between the two groups can be attributed to the acquisition of DP morphology. Therefore L2 learners' progress in the acquisition of the semantics of English predicate telicity can be explained by two factors. One factor is the L2 learners' acquisition of Det/Num morphology. The second factor is the Bayesian learning model which helps L2 learners use input to make form-meaning inferences regarding English predicate telicity and further aids them to gradually eliminate competing hypotheses that is not supported by available L2 input.

5.4 Accounts of why Japanese learners of English have not yet achieved the target-like representation/performance on predicate telicity

We have posited a learning scenario where the Bayesian learning model helps the L2 learners to deduce that the neutral perfective reading is not a licit reading in English simple past sentences with bounded object. We may then want to ask ‘how much information is enough for L2 learners to learn the mechanism of English predicate telicity?’ Regier and Gahl (2004) examined L1 children’s acquisition of anaphoric use of *one* within the Bayesian learning model seen in section 3.2.2.1. Their solution shows that as little as five exposures may be sufficient for child L1 learners to master the use of the anaphoric *one* (the anaphoric *one* refers to nested construction N’ but not flat construction N⁰). They further report that in order for children to receive these data that could support the use of the anaphoric *one*, 26.5 hours of interaction could be enough to supply these relevant data.

Given that only five exposures to the use of anaphoric *one* are sufficient for children to deduce the correct syntactic structure (nested construction) in English (Regier and Gahl, 2004: 152-153), we may wonder why our results from adult Japanese learners of English do not quite yet show the perfect target-like representation/performance of predicate telicity.

There are at least three possibilities for explaining this difference between Regier and Gahl’s L1 data and our L2 data. The first possibility is attributed to the difference between L1 child acquisition and L2 adult acquisition. In L1 acquisition, the acquisition of morphology may be representative as to whether abstract feature associated with the

overt morphology is fully in place. In other words, the acquisition of overt morphology is often a manifestation of the acquisition of abstract feature associated with it. Although variability (*mapping problem*) is also observed in L1, L1 learners are guaranteed to acquire the adult representation of L1 grammar.

For L2 acquisition, however, this rather strong connection between the overt morphology and its abstract feature is often not as strong as that of L1. As mentioned briefly in section 3.2.1, variability observed in L2 acquisition may persist even when L2 learners have reached a stable state. Ultimately for some structures, L2 language development may encounter the phenomenon known as fossilization (Selinker, 1972). However, our study does not examine data from L2 learners who are at the end state.⁶⁵ Therefore, our current data alone may not be enough to conclude that the acquisition of the semantics of telicity is not a likely candidate for fossilization. However, in our data from the truth-value judgment task, the results in the six clear predicates show progression towards the L1 English representation of predicate telicity. Specifically for the advanced learners, they are only marginally different from L1 English speakers. Given this, it is likely that acquisition of predicate telicity is acquirable by L2 learners and what we observed in the data may be the variability that is commonly observed in the L2 development.

The second difference between Regier and Gahl's (2004) L1 data and our L2 data may be attributed to the difficulty in outlining relevant hypotheses in the aspectual domain for adult L2 learners in view of Japanese. As mentioned above, a sentence with Numeral and Noun (e.g., *ni-ken-no ie* 'two-Cl-Gen house') entails event completion in

⁶⁵ As mentioned in footnote 59, the term *end state* refers to stages where learners (L1 and L2) arrive at steady grammar stage.

Japanese. In addition, Japanese has Verb-Verb compound constructions (V-V compound verbs henceforth). According to Matsumoto (1996:197), there are at least 1157 compound verbs in Japanese (based on Tagashira and Hoff's dictionary, 1986). The aspectual properties of V-V compound verbs are such that sentences with these V-V compound verbs can only refer to a complete event (e.g., *Ken-wa ringo-o tabe-tsukushi-ta* 'Ken-Top apple-Acc eat-exhaust-past' only refers to a scenario where an apple is completely eaten). Consequently, for these types of sentences which have overt morphological cues (i.e., a sentence with Numeral + nouns and a sentence with V-V compound verbs), the neutral perfective reading is not allowed. Thus, it may be the case that some Japanese learners of English may seek an overt morphological cue for marking event completion. If so, these learners may outline a hypothesis space without making reference to telicity, and evaluating instead a more basic presence/absence of the event of the type given by the predicate (i.e., for the predicate *x*: *erased the star*, learners evaluate whether or not the event of the 'star-erasing' type takes place). This leads us to think that it may be worth examining language learners' sensitivity to predicate telicity. Does predicate telicity have the same priority as other concepts such as tense, especially during language processing, or does one have priority over the other? Furthermore, do Japanese learners of English even consider event completion when they interpret a sentence? We will leave this question open to further research.

The third possibility of justifying the difference between Regier and Gahl's L1 data and our L2 data may be attributed to the very nature of the Bayesian learning model. In particular, in this model, learners outline a relevant hypothesis space based on observed data and their hypothesis space continue to be revised until a relevant hypothesis is

postulated. This means that the speed with which they can learn the target grammar (or the grammar in question) depends on how quickly they can outline the relevant hypothesis space.

For example, upon observing data D 1 in Diagram 2, learners outline the relevant hypothesis space (as in Θ_1) and examine the hypotheses (h1 and h2 in Θ_1). Learners further outline a more general hypothesis space (α) in relation to their first hypothesis space (Θ_1). The crucial point is that if learners were not able to gather enough information to postulate the relevant hypothesis space, they must create different hypotheses until till they reach the right ones. As mentioned above, we believe that relying on overt DP morphology is the most accessible way for the learners to learn the mass/count distinction in view of the fact that Japanese learners of English need to know the this distinction in English. This process may vary between individual learners and this may cause variability in learning the target grammar (see 5.5 for discussion).

To summarize, based on the Bayesian learning model, successful learning depends on how quickly learners can outline the relevant hypothesis space (α). Importantly, this depends on how detailed a hypothesis they can postulate (h1 and h2 in α). In our case, for example, a hypothesis (α); '*English past predicates with bounded objects must entail completion*' is better than a less detailed hypothesis such as '*Every English past predicate must entail completion*' to accommodate predicates with bounded DPs. This more detailed hypothesis, in turn, differentiates DPs with mass/plural nouns (unbounded) from DPs with singular count nouns (as in D3/D4 and D1/D2 in Diagram 2 respectively) and calls for a better hypothesis to accommodate this such as (α) and (β) in Diagram 2. Hence,

if learners have enough information to postulate the relevant hypothesis related to the higher level (α , β), the Bayesian learning model can largely contribute to learning.

5.5 A note on variability between learners and input variability

In sections 3.2.1.3 and 5.1, we discussed variability in the morpho-syntactic and semantic levels where the data showed optional use or incorrect use of the target morphology (in our study Det/Nm morphology). In the generative approach, this type of variability is often discussed in relation with the Missing Surface Inflection Hypothesis (Prévost and White 2000 a,b, see section 3.2.1.3 for details), which claims that a lack overt production of morphology does not necessarily mean a learners' lack of syntactic or semantic features associated with the morphology. It is often considered that this type of variability within learners is attributed to a performance error. In addition, we have discussed variability in L1 adult data (section 4.3.2.1.4). This variability in L1 is different from the above-mentioned L2 variability in that variability in L1 data presents with a less uniform interpretation of simple past sentences with bounded DPs found in some predicates. In this section we make notes on two points: variability between learners and input variability found in the L1 data in relation to the Bayesian learning model.

Let us start with variability between learners. As mentioned above, there are a number of studies that report variability in the generative approach of L2 acquisition research. Many of them are concerned with variability within learners and often this variability is attributed to individual learners' performance errors. However, variability is not only observable within-learner data. In fact, there are cases where different learners achieve the target-like aspect of grammar at different times (variability between learners). For

example, in our case, some learners may acquire the representation/interpretation of predicate telicity faster than other learners. Recall that in the Bayesian learning model, it is learners who outline hypothesis space and draw relevant hypotheses. In addition, learners keep revising a hypothesis space and hypotheses until they achieve appropriate ones. For example, in order for Japanese learners to acquire the semantics of English predicate telicity, they have to gather necessary information such as mass/count distinction in English. In addition, they need to know how to compute English telicity, which is different from their L1 mechanism. Not only do the L2 learners have to gather information on the computation of telicity, they also have to outline an appropriate hypothesis space and hypotheses. Considering this, individual differences in terms of outlining a hypothesis space and hypotheses may explain variability between learners.

There is another type of variability which we discussed in relation to L1 data in section 4.3.2.1.4. For example, in the *melt the candle* predicate, L1 English speakers unexpectedly accepted simple past sentences with bounded objects in an incomplete event context. This variability observed in L1 data is important in the Bayesian learning model because it indicates that not all evidence supports a hypothesis which states that simple past sentences with bounded DPs refer to complete events.

Let us entertain two types of scenarios Type A and Type B. Type A is an English simple past predicate with bounded object DPs which does not entail event completion (such as *melting a candle*). Type B, on the other hand, is a simple past predicate with bounded object DPs which entail event completion (such as *erasing a star*). Ideally, all events are of Type B, but as reported in 4.3.2.1.4, the L1 group data is not completely identical across predicates. Now let us imagine a scenario where a learner (P1) received

10 observations, 8 of which are of Type A and 2 of which are of Type B. Another learner (P2), on the other hand, received 10 observations, 2 of which are Type A and 8 of which are Type B. This is presented in Table 11 below.

Table 11: Hypothetical learning scenario by learners P1 and P2

	Learner P1	Learner P2
	Type A > Type B	Type A < Type B
Type A ('melted a candle' does not entail completion)	8	2
Type B ('erased a star' entails event completion)	2	8

It is plausible that the learner P1 considers Type A to be a more appropriate hypothesis than Type B based on the evidence available to the learner. The learner P2, on the other hand, assumes Type B is a more supported hypothesis than Type A on the basis of the evidence from input. As a result, P1 is likely to make an inference such as 'English simple past sentences with bounded objects does not entail event completion'. However, P2 makes the different inference, namely 'English simple past sentences with bounded objects entail event completion'. Thus, the difference in input may account for variability between learners. Note that this learning scenario with the Bayesian model could also account for variability within learners (suppose that P1 has 5 instances of Type A and 5 instances of Type B. Based on these observations, P1 may infer that English simple past sentences with bounded objects can refer to either a complete event or an incomplete event).

6 General conclusions and implications for L2 instruction

In this dissertation, we examined the acquisition of predicate telicity with focus on a particular grammatical phenomenon, the neutral perfective reading of predicates (Singh, 1991). We investigated three main points: (1) the possibility that Japanese learners of English learn to derive the telicity of English simple past predicates despite lack of explicit classroom instruction; (2) potential factors that may assist L2 learners in learning a target-like representation of the semantics of English predicate telicity; and (3) L2 learners' developmental profile regarding the acquisition of the semantics of telicity.

Empirical data for the morphological task and the truth-value judgment task showed that the acquisition of the semantics of English predicate telicity by Japanese learners is possible (chapter 4). Moreover, the data revealed a developmental trend for L2 learners of English. Specifically, the beginners directly transferred the L1 Japanese representation of the semantics of predicate telicity into the target language. In other words, they incorrectly accepted English simple past sentences with bounded DPs in an incomplete event context. At the intermediate and advanced levels, however, the semantics of the English simple past predicates was disassociated from that of the Japanese past predicates, and they were able to learn to invalidate the neutral perfective reading of English predicates.

We argue that L2 learners' progress in the acquisition of the semantics of English predicate telicity can be accounted for by the acquisition of Det/Num morphology and by a Bayesian learning model, which helps learners use L2 input to make form-meaning inferences on the predicate telicity and assists their gradual acquisition of the most appropriate representation of English predicate telicity (chapter 5). Although the data

suggested that these two factors were at play in the acquisition of predicate telicity by Japanese learners of English, questions remain about how much of the learners' semantic progress can be explained by a purely linguistic account (the acquisition of Det/Num morphology contributes to the semantic progression). This very question can be conversely stated as how much of the learners' semantic progress can be accounted for by more cognitive learning mechanisms such as the learners' form-meaning inferences based on input with the Bayesian learning model. Investigating these questions would provide a clearer and more complete understanding of the mechanism of the acquisition of semantics of telicity and furthermore, would contribute to a comprehensive account for the mechanism of L2 language acquisition. Isolating each factor and determining their relative contribution remain outstanding and is left for future research.

Because this study suggests that the semantic knowledge of predicate telicity can be acquired by both the acquisition of the relevant morphology and L2 learners' form-meaning inferences with the Bayesian learning model, we would like to make a note on how this finding can be applied to L2 language instruction. Given that morpho-syntactic knowledge (in our case, Det/Num morphology) is usually available to L2 learners through traditional classroom language instruction (see section 5.2.1), we will focus on how we can provide an environment where students have opportunities to make form-meaning inferences in L2 acquisition.

The data for the Canada group showed better results for interpreting English predicate telicity than the Japan group, despite the fact that both groups were comparable with respect to their English proficiency (section 5.2.2). This data suggests that English immersion may be an effective method for L2 learners to learn semantic knowledge with

the Bayesian learning model. Given this, immersion in a country where L2 learners' target language is spoken may augment traditional L2 instruction. However, since immersion may not be possible or practical, a possible proxy may be a method that involves technology such as Computer Assisted Language Learning (CALL, henceforth). CALL refers to a class of computer based type of learning which provides language learners with individual, self-paced learning opportunities. Technology of this character may allow language instructors to create and provide learning materials providing L2 learners with benefits similar to English immersion. In other words, L2 learners can have access to positive evidence that allows them to make form-meaning matching with the Bayesian learning model through a CALL program.⁶⁶ Let us take the telicity of a sentence such as 'John erased the star' as an example. Learners read and/or hear a grammatical sentence and witness the situation where a star has been completely erased. In the Bayesian learning model, upon observing evidence that provides a learner with the opportunity to make a form-meaning inference, a hypothesis that best matches the evidence gains higher likelihood than other competing hypotheses in learners' hypothesis space.

Another example of the abstract semantic knowledge is viewpoint aspect. In fact, the acquisition of L2 Japanese viewpoint aspect is often discussed in L2 acquisition research (Hirakawa, 2001; Ishida, 2004; among others). This is because the semantic interpretation of a sentence with the progressive form differs in English and Japanese. In English, an imperfective sentence with an achievement verb refers to an event in progression (e.g., a sentence such as *The airplane is arriving at the airport* refers to a scenario where the airplane is in the process of arriving at the airport), whereas its Japanese equivalent

⁶⁶ CALL is only one possible example. An exhaustive list is out of this study's scope.

construction entails event completion (a sentence such as *Hikooki-ga kuukoo-ni tui-te-iru* ‘Airplane-Nom airport-Det arrive-ing’ refers to a scenario where the airplane has arrived at the airport and is presently at the airport). Thus, it would be very beneficial to provide input or evidence where L2 learners can witness the truth-value of the target sentence. In this case, for example, it would be effective for a L2 learner to hear and/or read the sentence *Hikooki-ga kuukoo-ni tui-te-iru* (Airplane-Nom airport-Det arrive-ing) and witness a situation where the airplane has arrived at the airport. Providing this type of L2 input, which presumably facilitates learning with the Bayesian model, would contribute to the acquisition of target-like semantic knowledge by L2 learners. Investigating how the effectiveness of providing this sort of positive evidence (and subsequent indirect positive evidence) for L2 learners’ acquisition of semantic knowledge would, in turn, help to identify the relative contribution of the linguistic factor and the more general cognitive learning component to the acquisition of the semantic knowledge in the aspectual domain. This deeper understanding of L2 acquisition mechanisms in the linguistic field further enriches the pedagogical ground to enable better and more effective language instruction.

7 References

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8 Appendix

Appendix 1 General Questionnaire

L2 ENGLISH (L1 Japanese) Project. University of Ottawa

Questionnaire

GENERAL INFORMATION

1. Name:

2. Gender: F [] M []

3. Age: _____

4. Do you have any vision or reading problems? _____

5. Mother tongue: _____

6. Mother's dominant language: _____

7. Father's dominant language: _____

8. Language(s) spoken at home as a child:

9. Language(s) you spoke during the first five years of your life:

10. Language(s) studied in (please include English):

•Primary school:

•Secondary

school: _____

•University:

•Other institutions:

11. Languages you use:

•At Home: In Japan _____, In Canada _____, Others _____

•At School: In Japan _____, In Canada _____, Others _____

•At Work: In Japan _____, In Canada _____, Others _____

•When you dream: In Japan _____, In Canada _____, Others _____

12. Other languages you can:

•Read:

•Speak:

•Write:

13. What language do you feel most comfortable with at this time?

14. Are you presently studying in a program at the university? If so, what program?

15. Year at the university:

16. Are you presently studying English at the university level? If so, please give us university name and course number.

17. Contact with English outside classroom:

Present contact:

•Approximate hours/week:

•Context: (e.g. friends, family, clubs, etc.):

18. Previous contact:

•Have you ever visited an English-speaking country? YES [] NO []

IF, YES

•When?

•For how long?

L2 ENGLISH (L1 Japanese) Project. Language Acquisition Lab

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University of Ottawa. QUESTIONNAIRE -2-

Appendix 2 Morphological task (List 1)

(A)

Instructions:

This test consists of 30 short sentences. Each sentence has a blank and is followed by a word in parenthesis. For each sentence, please change the word given in parenthesis into the correct form so that it makes sense within the sentence and write it into the blank provided. Note that the word in parenthesis may already be in the correct form. The time limit is 10 minutes. Please do not spend too much time on any given item and do not go back to change your earlier answers. Examples are provided below.

このテストは30問の短い文から成り立っています。各文の右側に記載されている単語を、必要あれば文にふさわしい形にして括弧内に解答を記入してください（下の解答例を参照ください）。制限時間は10分です。各問題に時間をかけることなく、又一次度答えた問題に戻ることをないようにしてください。

Examples: 1. Mike () an apple yesterday. (eat)
2. Mary came to () house two days ago. (I)

Answers: 1. Mike (ate) an apple yesterday.
2. Mary came to (my) house two days ago.

1	Tom and Kelly are going to sell () house tomorrow.	(they)
2	() have stolen jewelry from the store.	(boy)
3	Naomi brings () dog everywhere she goes.	(she)
4	Lily has a sister who () pizza.	(love)
5	Tom has () which cut very well.	(knife)
6	Bob has dogs which () all day long.	(bark)
7	Hiro takes () digital camera with him everyday.	(he)
8	The man has cars which () well.	(run)
9	John takes () school bag to school everyday.	(he)
10	Two policemen patrol the city with () car.	(they)
11	Ken has a student who () Chinese at school.	(learn)
12	() were singing in the park.	(bird)
13	John has () which sleep all the time.	(turtle)
14	() has attacked the ship.	(whale)
15	Akiko donates () books to the library every year.	(she)

16	Amy owns () which play well.	(violin)
17	Taro has robots which () sushi for him.	(make)
18	Taro and Hana are going to watch () wedding video tonight.	(they)
19	() were hopping in the woods.	(rabbit)
20	Jorge has an uncle who () English in Paris.	(teach)
21	Mike has () which likes to play.	(dog)
22	The old men who () next door get up early.	(live)
23	Saki is going to give () child a present tonight.	(she)
24	Sean likes () which is full of photos.	(book)
25	() was very tired after carrying luggage.	(horse)
26	Lucy has () which likes to eat a lot.	(cat)
27	() was available at the camp.	(nurse)
28	Tom has an axe which () very well.	(chop)
29	Mary goes swimming with () friend	(she)
30	Dave will buy a bird which () very friendly.	(be)

Appendix 3: Morphological task (List 2)

(B)

Instructions:

This test consists of 30 short sentences. Each sentence is followed by a word in parenthesis. For each sentence, please change the word given in parenthesis into the correct form so that it makes sense within the sentence and write it into the blank provided. Note that the word in parenthesis may already be in the correct form. The time limit is 10 minutes. Please do not spend too much time on any given item and do not go back to change your earlier answers.

このテストは 30 問の短い文から成り立っています。各文の右側に記載されている単語を必要があれば文にふさわしい形にして括弧内に解答を記入してください（下の解答例を参照ください）。制限時間は 10 分です。各問題に時間をかけることなく、又一度答えた問題に戻ることをないようにしてください。

-
- Examples:** 1. Mike () an apple yesterday. (eat)
 2. Mary came to () house two days ago. (I)

- Answers:** 1. Mike (ate) an apple yesterday.
 2. Mary came to (my) house two days ago.

1	Tom and Kelly are going to sell () house tomorrow.	(they)
2	() have attacked the ship.	(whale)
3	() was singing in the park.	(bird)
4	John has () which sleeps all the time.	(turtle)
5	Two policemen patrol the city with () car.	(they)
6	Sean likes () which are full of photos.	(book)
7	Amy owns () which plays well.	(violin)
8	Bob has a dog which () all day long.	(bark)
9	Lucy has () which like to eat a lot.	(cat)
10	Dave will buy birds which () very friendly.	(be)
11	The man has a car which () well.	(run)
12	Tom has () cuts very well.	(knife)
13	Jorge has uncles who () English in Paris.	(teach)
14	() was hopping in the woods.	(rabbit)
15	Hiro takes () digital camera with him everyday.	(he)

16	Saki is going to give () child a present tonight.	(she)
17	() has stolen jewelry from the store.	(boy)
18	Mike has () which like to play.	(dog)
19	John takes () school bag to school everyday.	(he)
20	Naomi brings () dog everywhere she goes.	(she)
21	Taro has a robot which () sushi for him.	(make)
22	The old man who () next door gets up early.	(live)
23	Akiko donates () book to the library every year.	(she)
24	Tom has axes which () very well.	(chop)
25	Mary goes swimming with () friends.	(she)
26	Taro and Hana are going to watch () wedding video tonight.	(they)
27	Ken has students who () Chinese at school.	(learn)
28	() were available at the camp.	(nurse)
29	Lily has sisters who () pizza.	(love)
30	() were very tired after carrying luggage.	(horse)

Appendix 4 : 16 target predicates tested in the truth-value judgment task

Article used in the target sentence in the singular scenario	a	a	the	the
Numbers of affected objects in the plural scenario	2/3	3/5	2/4	3/4
Predicates	paint/ door	build/house	erase/star	draw/picture
	eat/orange	fill/ glass	assemble/chair	untie/bow
	empty/bottle	remove/cork	circle/star	shred/document
	melt/candle	disassemble/table	unwrap/present	type/name

Appendix 5 : *English 16 Target predicates in the truth-value judgment task*⁶⁷

	Predicates		Context	Target sentence
1	Paint/door	Sg/a	Ken wanted his yellow door to be red. He bought some red paint and a brush.	Ken painted a door.
		Pl/2/3	Ken wanted his yellow doors to be red. He decided to work on two doors.	Ken painted the doors.
2	Eat/orange	Sg/a	Matthew's lunch box had an orange in it.	Matthew ate an orange.
		Pl/2/3	Matthew's lunch box had oranges in it but there were too many of them so he decided that two would be enough.	Matthew ate the oranges.
3	Empty/bottle	Sg/a	Ken wanted to drink a bottle of orange juice but it smelled so bad that he decided to get rid of it.	Ken emptied a bottle.
		Pl/2/3	Ken wanted to drink bottles of orange juice but two of them smelled so bad that he decided to get rid of them.	Ken emptied the bottles.
4	Melt/candle	Sg/a	Grace wanted to make two small candles out of one big candle.	Grace melted a candle.
		Pl/2/3	Grace has several small candles. She would like to make one large candle out of two small ones.	Grace melted the candles.
5	Build/house	Sg/a	Bill is a carpenter. He wanted to make a house.	Bill built a house.
		Pl/3/5	Bill is a carpenter. He was asked to make several houses but he decided to make three.	Bill built the houses.
6	Fill/glass	Sg/a	Sally wanted to have a glass of water.	Sally filled a glass.
		Pl/3/5	Sally wanted to have three glasses of water.	Sally filled the glasses.
7	Remove/cork	Sg/a	Rob wanted to drink a bottle of wine. The bottle had a yellow cork. He wanted to open it.	Rob removed a cork.
		Pl/3/5	Rob was going to open bottles of wine for his guests. He decided to open three bottles.	Rob removed the corks.
8	Disassemble / Table	Sg/a	Ken needed to pack up his table so he decided to take it apart.	Ken disassembled a table.
		Pl/3/5	Ken was going to move out. He had many tables but he decided to take apart three of them.	Ken disassembled the tables.
9	Erase/star	Sg/the	Lisa drew a star on a piece of paper but wanted to get rid of it.	Lisa erased the star.

⁶⁷ Please see Table 9 for the four experimental conditions for this task.

		Pl/ 2/4	Lisa drew stars on a piece of paper. She decided to get rid of two of them.	Lisa erased the stars.
10	Assemble/ chair	Sg/the	Richard bought a new chair from IKEA and wanted to put it together.	Richard assembled the chair.
		Pl/ 2/4	Richard bought many chairs from IKEA and decided to put together two of them	Richard assembled the chairs.
11	Circle/star	Sg/the	Dan painted a star and wanted to draw a circle around it.	Dan circled the star.
		Pl/ 2/4	Dan painted some stars and wanted to draw circles around two of them.	Dan circled the stars.
12	Unwrap/ present	Sg/the	Phoebe got a present from her friend on her birthday and wanted to see what was inside.	Phoebe unwrapped the present.
		Pl/ 2/4	On her birthday, Phoebe got presents from her friends and decided to see what was inside two of them.	Phoebe unwrapped the presents.
13	Draw/ picture	Sg/the	Rika wanted to create a picture of a girl on the women's washroom door.	Rika drew the picture.
		Pl/ 3/4	Rika wanted there to be a picture of a girl on each of the women's washroom doors. She decided to work on only three doors.	Rika drew the pictures.
14	Untie/ bow	Sg/the	Mary made a bow using a red ribbon. She was not happy with it and decided to undo her work.	Mary untied the bow.
		Pl/ 3/4	Mary made bows using red ribbon. She was not happy with them and decided to undo three.	Mary untied the bows.
15	Shred/ document	Sg/the	Lucy wanted to discard document.	Lucy shredded the document.
		Pl/ 3/4	Lucy wanted to discard documents and she decided to get rid of three of them.	Lucy shredded the documents.
16	Type/ name	Sg/the	Mika wanted to make a name tag for her friend Sachiko.	Mika typed the name.
		Pl/ 3/4	Mika wanted to make name tags for her friends Sachiko, Rumiko and Tomoko.	Mika typed the names.

Appendix 6 : Japanese 16 Target Predicates in the truth-value judgment task⁶⁸

	Predicates		Context	Target sentence
1	Paint/door	Sg/a	ケンは黄色のドアを赤くしたかったので赤いペンキとブラシを買いました。	ケンはドアをペンキで塗りました。
		Pl/2/3	ケンは黄色のドアを赤くしたいと考えました。そこで2つのドアに取り掛かることにしました。	ケンはドアをペンキで塗りました。
2	Eat/orange	Sg/a	マシューはお昼にオレンジを持っていきました。	マシューはオレンジを食べました。
		Pl/2/3	マシューはお昼にオレンジを持っていきましたが、あまりにたくさんだったので2つだけにすることにしました。	マシューはオレンジを食べました。
3	Empty/Bottle	Sg/a	ケンはオレンジジュースを飲みたかったのですが、変なおいがしてきたのでそれを捨てることにしました。	ケンはジュースを空にしました。
		Pl/2/3	ケンはオレンジジュースを飲みたかったのですが、その内2本のジュースから変なおいがしてきたのでそれを捨てることにしました。	ケンはジュースを空にしました。
4	Melt/candle	Sg/a	グレイスは大きなろうそくをから小さなろうそくを2本作ることにしました。	グレイスはろうそくを溶かしました。
		Pl/2/3	グレイスは小さなろうそくを何本か持っていて、その内2本のろうそくを使って大きなろうそくを作ることになりました。	グレイスはろうそくを溶かしました。
5	Build/house	Sg/a	ビルは大工です。彼は家を作りたいと考えていました。	ビルは家を建てました。
		Pl/3/5	ビルは大工です。何軒かのうちを作るように頼まれましたが、その内3件を作ることにしました。	ビルは家を建てました。
6	Fill/glass	Sg/a	サリーは水を一杯飲みたいと思ったので水を汲むことにしました。	サリーはコップを水で満たしました。

⁶⁸ Please see Table 9 for the four experimental conditions for this task.

		Pl/ 3/5	サリーは水を3杯飲みたいと思ったので水を汲むことにしました。	サリーはコップを水で満たしました。
7	Remove/ Cork	Sg/ a	ロブはワインを飲みたいと思っていました。そのワインは黄色のコルクがついていて、それをあけようと考えました。	ロブはコルクをとりました。
		Pl/ 3/5	ロブはお客のために何本かのワインをあけようと考えていました。結局彼は3本のワインをあけることにしました。	ロブはコルクをとりました。
8	Disassemble /table	Sg/ a	ケンはお客のためにテーブルを取りはずすことにしました。	ケンはお客のためにテーブルを分解しました。
		Pl/ 3/5	ケンはお客のために、たくさんあるテーブルのうち、3つを取り外すことにしました。	ケンはお客のためにテーブルを分解しました。
9	Erase/star	Sg/the	リサは紙に星を書きましたが、やっぱり取り除くことにしました。	リサは星を消しました。
		Pl/ 2/4	リサは紙に星をいくつか書きましたが、その内2つを取り除くことにしました。	リサは星を消しました。
10	Assemble/ Chair	Sg/the	リチャードはIKEAで買った新しい椅子に取り掛かろうとしています。	リチャードは椅子を組み立てました。
		Pl/ 2/4	リチャードはIKEAで買った新しい椅子のうち2つを作ろうとしています。	リチャードは椅子を組み立てました。
11	Circle/star	Sg/the	ダンは星に色を塗った後、その内2つの星の周りに円を書くことにしました。	ダンは星を円で囲みました。
		Pl/ 2/4	ダンはお色をぬったあと、その内2つの星の周りに円を書くことにしました。	ダンはお色をぬいた星を円で囲みました。
12	Unwrap/ Present	Sg/the	フィービーは友達から誕生日のプレゼントをもらったので中に何が入っているのか見たくなくなりました。	フィービーはプレゼントをあけました。
		Pl/ 2/4	フィービーは友達からもらった誕生日プレゼントの内、特に2つに何が入っているのか見たくなくなりました。	フィービーはプレゼントをあけました。

13	Draw/ picture	Sg/the	リカは女性トイレのドアに女の子の絵がほしかったので、ドアにかくことにしました。	リカは絵を描きました。
		Pl/ ¾	リカは女性トイレのドアに女の子の絵がほしかったので、3つのドアにかくことにしました。	リカはドアに絵を描きました。
14	Untie/bow	Sg/the	メアリーは赤いリボンを作りましたが、満足できなかったため、もう一度やり直すことにしました。	メアリーはリボンをほどきました。
		Pl/ ¾	メアリーは赤いリボンを作りましたが、満足できなかったため、3つをもう一度やり直すことにしました。	メアリーはリボンをほどきました。
15	Shred/ Document	Sg/the	ルーシーは書類を処分しようとしています。	ルーシーは書類をシュレッダーにかけました。
		Pl/ ¾	ルーシーは書類を処分しようとしています。そしてその内3枚の書類を破棄することにしました。	ルーシーは書類をシュレッダーにかけました。
16	Type/name	Sg/the	ミカは友達のスチコのために名札を作りたいと考えていました。	ミカは名前をタイプしました。
		Pl/ ¾	ミカは友達のスチコ、ルミコ、トモコのために名札を作ろうと考えました。	ミカは名前をタイプしました。