The Acquisition of the English Article System
by Japanese Learners of English as a Foreign Language:
Learning Noun Countability

by

Ayako Tsuzuku

A Dissertation Submitted in Conformity with the Requirements

for the Degree of Doctor of Philosophy in English Linguistics

Graduate School of Letters

Doshisha University

March 2022

ABSTRACT

The acquisition of the English article system is notoriously difficult for learners of English as a second language or a foreign language, especially when these learners do not have any article systems in their first language. The Japanese language is one of the languages which lack articles in their linguistic system. Many Japanese learners of English have difficulty with the appropriate use of English articles. One reason for their difficulty with English article usage is considered to stem from their inadequate understanding about noun countability. Noun countability is an essential factor underlying the English article system. More specifically, it directly concerns the choice between the indefinite article and the zero article. A conventional approach which has been used in Japan for a long time, however, simply explains the relationship between the categorization of English nouns and article choice: it does not fully provide the concepts of noun countability. Accordingly, most Japanese learners do not understand the entire concept of noun countability, or they do not know how they should judge it. The present study, therefore, examined the extent to which learning noun countability prompts Japanese learners' appropriate usage of English articles.

Two experiments were administered in the study. Experiment 1 investigated how Japanese learners understood and judged noun countability. The experiment particularly focused on the relationship in countability judgement between English nouns and their Japanese translations. Forty-three Japanese undergraduates were asked to judge the countability of target English nouns, using a seven-point scale. The target words were 109 English nouns which can appear in both count and mass contexts. The participants also judged the countability of Japanese translations of these English nouns on the same seven-point scale. Regarding the Japanese translations, there were two conditions. In one case, a single Japanese translation is applied for both count and mass meanings of an English noun. In the other case, an English noun has different Japanese translations for each count and mass meaning. It was predicted that countability judgement of English nouns with different Japanese translations

would be easier than those with the single Japanese translations, because Japanese learners could distinguish the countability of English nouns in reference to the difference in Japanese translations. Results showed that there were positive correlations in Japanese learners' countability judgements between English nouns and their Japanese translation in both conditions ($n = 59$, $r = .819$, $p < .001$ for English nouns with single Japanese translations; $n = 50$, $r = .407$, $p < 0.01$ for English nouns with different Japanese translations [count meaning]; $n = 50$, $r = .398$, $p < 0.01$ for English nouns with different Japanese translations [mass meaning]). The result indicates the correspondence in countability judgement between the two languages and the possibility that English noun countability may affect countability judgement on Japanese translations. Thus, the results of Experiment 1 did not confirm the hypothesis that Japanese translations could make it easier to distinguish the countability of English nouns. It is, however, noteworthy that the countability of more than half of the Japanese translations was judged separately from countability judgement of their English counterparts. In other words, the participants' countability judgements of these Japanese translations agreed with the countability type that the Japanese translations specify. These Japanese translations might be helpful for Japanese learners to properly understand English noun countability.

A reason for Japanese learners' difficulty with English articles may relate to learning approach. As mentioned above, the conventional approach does not provide full descriptions of noun countability. Experiment 2, therefore, investigated whether Japanese learners could understand noun countability and use English articles appropriately via an alternative learning approach: a cognitive linguistics approach. Cognitive linguistics attracted increasing attention in research on second language acquisition, and many studies demonstrated that second or foreign language learners took advantage of cognitive linguistic insights. In a cognitive linguistics approach, noun countability is explained in terms of the concepts of individuation and boundedness, which are the criteria for judging the countability of nouns. Experiment 2 examined the relative effectiveness of the cognitive linguistics approach in longitudinal

training for English article usage, comparing with the conventional approach. The experiment consisted of four phases: a pretest, training, an immediate posttest, and a delayed posttest. Target words were English nouns which could appear in both count and mass contexts. These target words consisted of concrete and abstract nouns: thirty English nouns were prepared for each type of noun. Half of the 60 target words (i.e., 15 nouns for each type of noun) were also used in the training. The rest of the target words only appeared in the article tests. In the article test, each test item and its article appeared in a single blank in a question. Participants were asked to choose the appropriate answer from two choices: the item with the indefinite article or one with the zero article. Fifty-four Japanese undergraduates participated in the experiment. They were divided into two groups: the cognitive linguistics approach group and the conventional approach group. The participants took the training course on the internet individually. After completing a set of training, they took the immediate posttest. Four weeks after the immediate posttests, they took the delayed posttest. The data were analyzed, using a statistical technique called generalized linear mixed effects models (GLMMs). The results showed that there was no significant difference between the cognitive linguistics approach group and the conventional approach group. The participants in both groups improved their accuracy of English article usage equally (pretest: $EMMEAN$ = 0.73 and 0.73, SE = 0.08 and 0.08; immediate posttest: $EMMEAN$ = 1.70 and 1.70, SE = 0.13 and 0.14; delayed posttest: $EMMEAN$ = 1.55 and 1.55, SE = 0.13 and 0.13 for the CL approach and the conventional approach, respectively). Moreover, the results showed some significant interactions between variables, suggesting that accuracy of English article usage was affected by the countability of English nouns. In light of the longitudinal learning effects, the results revealed that the accuracy of countable use of English nouns remained unchanged in the delayed posttest (pretest: $EMMEAN$ = 0.60, SE = 0.08; immediate posttest: $EMMEAN$ = 1.47, SE = 0.13; delayed posttest: $EMMEAN$ = 1.55, SE = 0.13), but the accuracy of uncountable use decreased four weeks after the training (pretest: $EMMEAN$ = 0.86, SE = 0.08; immediate posttest: $EMMEAN$ = 1.98, SE = 0.14; delayed posttest: $EMMEAN$ = 1.55, SE = 0.13). Importantly, the

overall results demonstrated that the participants achieved better performance on English articles through explicit learning from the cognitive linguistic insights (pretest - immediate posttest: *estimate* = 0.52, *SE* = 0.14, *z* = 3.81, *p* < .001; pretest - delayed posttest: *estimate* = 0.80, *SE* = 0.12, *z* = 6.45, *p* < .001). This finding indicates that both the conventional learning approach and the cognitive linguistics approach are useful for Japanese learners to understand noun countability and English article usage.

ACKNOWLEDGMENTS

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICIES

Chapter 1

INTRODUCTION

The article system is one of the most complicated grammatical items in the English language. Although articles are the most frequently occurring items in English, their usage is extremely complex. When a speaker uses English nouns, he or she necessarily chooses the appropriate one from three kinds of English articles: the definite article *the*, the indefinite article *a* or *an*, and the zero article. The most felicitous article for a context is selected through interaction of multiple heterogeneous principles underlying English article usage (e.g., countability, definiteness, specificity). The complexity of the English article system can be attributed to the fact that the multiple principles are related to a single article's use.

Countability is an important principle pertaining to English article usage. It concerns referentiality in noun phrases: it relates to the decision on whether a referent of a noun is countable or uncountable. Because English nouns make the distinction between count and mass statuses, noun countability is an essential factor in English article usage. More specifically, it directly affects the article choice between the indefinite article and the zero article.

Research on second language acquisition (SLA) and foreign language learning (FLL) has investigated second language (L2) or foreign language (FL) learners' English article use. A number of studies have reported that the English article system is a difficult grammatical category to fully acquire (Butler, 2002; DeKeyser, 2005; Master, 1994, 1995, 1997; Snape & Yusa, 2013). They argue that English article usage by L2 or FL learners is quite different from that of native English speakers, and that learners do not achieve full understandings of English article usage even after years of English learning. SLA researchers also point out that the English article system is difficult particularly for learners who have no such system or a very different system in their first language (L1) (DeKeyser, 2005; Master, 1997).

Japanese learners of English as a foreign language (EFL), who do not have an article system in L1, struggle with appropriate English article usage. In the worst case, they may not even pay attention to the existence of articles. A possible reason for their difficulty with English articles is English noun countability. Most English nouns have distinctive features of countability (i.e., count and mass). Importantly, countability is a flexible feature in that the countability of a noun is determined by how a speaker conceives a referent in a context. Although English nouns have a preference for either of the two countability types, learners are usually required to judge the countability of nouns. However, it may be hard for Japanese EFL learners to make accurate judgements on the count and mass statuses of English nouns, because their article-less L1 (Japanese) also does not make the distinction between countable and uncountable nouns. They may not be able to use English articles appropriately, unless they understand the complex, flexible nature of English noun countability.

Another possible reason for Japanese EFL learners' difficulty with English articles relates to their learning approach. Learning approach affects learners' cognitive styles and notions. The conventional learning approach which has been used in Japan for a long time explains noun countability and article usage as follows: mass nouns are marked with the zero article while count nouns are used with the indefinite article or the zero article according to the number of a referent (e.g., Ando, 2005; Sugiyama, 1998). Furthermore, the conventional approach considers noun countability as a fixed grammatical feature of a noun, focusing on the classification of English nouns (e.g., common, material, and abstract nouns). The conventional approach does not fully explain the concept of noun countability. It is possible, therefore, that most Japanese EFL learners have not learned appropriate concepts of "countable" and "uncountable," or they may not even know how they should judge noun countability. They might have inadequate or inappropriate understandings of noun countability and English article usage.

The purpose of the present study is to explore an effective way for learning the complex English grammar, the article system. More specifically, this study, focusing on Japanese EFL

learners' countability judgement and English article usage, investigated the effectiveness of a different learning approach from the conventional one: a cognitive linguistics (CL) approach.

Recently, insights from CL have attracted attention among SLA and FLL researchers and language teachers. The fundamental premise of CL is that language reflects the way people conceive the world on the basis of individual experiences. Thus, CL considers language as a medium between human cognition and the world, and focuses on the interaction between language and human representation of the world (Ohori, 2002). Many cognitive linguistic insights originate from the linguistic knowledge of native speakers. Thus, CL can provide L2 or FL learners with an opportunity to deepen their understandings of how language and cognition interplay in L1 speakers' minds. In fact, many empirical studies using cognitive linguistic insights reported that L2 learners take advantage of the CL approach (e.g., Verspoor & Lowie, 2003; Yasuda, 2010).

As mentioned above, the conventional learning approach to English article usage does not provide Japanese EFL learners with adequate explanations of noun countability. This could be a reason for Japanese EFL learners' difficulty in understanding the English article system. There may be a need for a novel approach. CL illustrates that the grammatical distinction between count and mass nouns corresponds to a conceptual distinction in the speakers' minds, using such notions as *boundedness* and *individuation*. These notions present detailed descriptions of countable and uncountable statuses of nouns, and the criteria for judging noun countability. These cognitive linguistic notions may help Japanese EFL learners understand the nature of noun countability: the grammatical distinction between count and mass is not fixed and noun countability is basically determined based on the speaker's perception. The main aim of this study is to examine the usefulness of the CL approach in learning English noun countability and article usage.

The present study consists of two experiments. The first experiment examined Japanese EFL learners' countability judgements of English nouns and their Japanese translations. How do Japanese EFL learners understand and judge noun countability despite the fact that the

Japanese language does not make the count-mass distinction of nouns? In particular, Experiment 1 focused on the relationship in countability judgement between English nouns and their Japanese translations. It explored the usefulness of Japanese translations for distinguishing count and mass meanings of English nouns. The second experiment aimed to explore an effective learning approach for noun countability and English article usage. More specifically, Experiment 2 investigated whether the CL approach is more effective than the conventional approach in helping Japanese EFL learners understand the English article system.

This thesis contains five chapters. Chapter 2 provides a brief literature review regarding the English article system and the CL approach, introducing relevant experimental studies on these two issues. The rationale for the present study is also presented at the end of Chapter 2. In Chapter 3 and Chapter 4, the two experiments and their results are reported in detail separately. Chapter 5 provides general discussion on the overall findings of this study. The limitations of the study, educational implications, and recommendations for future research are also discussed in this final chapter.

It should be noted that some technical terms are used interchangeably in this study. Specifically, such terms as *SLA* and *FLL*, *L2* and *FL*, and English as a second language (*ESL*) and *EFL*, are not distinguished from each other. The terms *mass* and *uncountable* are also interchangeable.

Chapter 2

LITERATURE REVIEW

2.1 Overview

This chapter aims to review the research on the three issues which the present study investigated. First of all, the English article system, one of the most complicated grammatical categories in the English language, is introduced. The overall system of English articles is described, providing discussion of the major principles underlying English article usage. Second, research on the acquisition of the English article system by ESL learners is considered. It is well known that many ESL learners have trouble using English articles appropriately. Here, their difficulties with English articles are discussed. Third, CL, whose insights have received recent attention in the field of SLA, is introduced. A number of studies have demonstrated the effectiveness of the CL approach in L2 learning. Empirical studies using cognitive linguistic insights are explored here.

2.2 The English Article System

English articles are the most frequently occurring items in the English language. According to the frequency count of COBUILD (Collins Birmingham University International Language Database) by Sinclair (1991), the definite article *the* is the most frequent word in a corpus of 20 million words, and the indefinite article *a* is in the fifth position (after *of*, *and*, and *to*). Master (1997) also found that the zero article is the most frequent, the definite article the second, and the indefinite article the sixth most frequent word in a 200,000-word corpus from five genres of text (research journals, science magazines, news magazines, novels, and plays). These analyses indicate that articles are essential

elements of the English language. Their usage, however, is extremely complex. This complexity can be attributed to the fact that the English article system consists of multiple heterogeneous principles. Through interaction of these principles, the appropriate article for a context is determined. The four major principles underlying English article usage are definiteness, specificity, genericity, and countability.

2.2.1 Definiteness

Crompton (2011) stated that the English article system is marked with *definiteness*. The literature on definiteness is summarized in Lyons' (1999) cross-linguistic study. According to Lyons, definiteness is a grammaticalization of the concept of identifiability: a marker of definiteness "directs the hearer to the referent of the noun phrase by signaling that he is in a position to identify it" (pp. 5–6). In sum, definiteness is a discourse-related concept on identifiability of referents. In the English language, definiteness is characterized with the definite article *the*.

Definiteness concerns a shared knowledge of a referent between a speaker and a listener. In other words, definiteness is related to both the speaker's and the listener's perspectives. When the referent is identifiable to both the speaker and the listener, it is conceived as the definite referent marked with the definite article. For example, when the speaker says, "*I went to the coffee shop yesterday*," the utterance implies that the listener already knows the referent, the coffee shop. On the contrary, when the referent is contextually novel and cannot be identified, it is conceived as the indefinite referent denoted by the indefinite article *a/an* or the zero article depending on its number. If the speaker says, "*I went to a coffee shop yesterday*," it indicates that the referent is contextually novel and unidentifiable to the listener, and the listener does not know the coffee shop. Definiteness is concerned with the general knowledge of participants in a discourse, or contextual or situational information available to them.

As Lyons (1999) noted, although a majority of languages imply the definite status of referents pragmatically, some languages (e.g., English, French) grammaticalize the concept of

definiteness and have overt grammatical markers of definiteness. The markers are typically definite articles. Spanish, for example, also encodes definiteness in its article system. As with English, the Spanish definite article is used when a referent is contextually and situationally identifiable to the listener. Examples are provided in (1a) and (1b) (taken from García Mayo, 2008, pp. 554–555).

(1a) *¿Me pasas el mando a distancia de la tele?*

    Can you pass me the TV control?

(1b) *No nos gusta el novio que tiene ahora Elisa.*

    We don't like the boyfriend Elisa has now.

As seen in the sentences above, Spanish requires the use of the definite article in referring to definite referents. In addition, there are several variations in the Spanish definite article: *el* and *la* for masculine and feminine singular and *los* and *las* for masculine and feminine plural. The use of these definite articles is determined on the basis of gender and number features of the preceding nouns.

2.2.2 Specificity

Specificity is another concept relating to referentiality. It refers to the speaker's knowledge or state of mind (Ionin, et al., 2004). When the speaker has a particular person or object in mind as the referent, it is regarded as the specific referent. The crucial difference between specificity and definiteness is the state of knowledge between the speaker and the listener: while definiteness concerns a shared knowledge of the referent between the speaker and the listener, specificity only concerns the speaker's knowledge.

Specificity also differs from definiteness in that its property is not morphologically marked in the English language. English makes a distinction between definite and indefinite referents with articles, such as the definite article *the* for definite contexts and the indefinite

article *a/an* or the zero articles for indefinite contexts. Specificity, by contrast, is not morphologically encoded in the English article system: the difference between specific and unspecific referents is not reflected in English article use. To illustrate the unmarked property of specificity, compare the following two sentences (taken from Lyons, 1999, p. 176):

(2a) *Peter intends to marry a merchant banker, even though he doesn't get on at all with her.*

(2b) *Peter intends to marry a merchant banker, though he hasn't met one yet.*

In (2a), a specific referent (i.e., a merchant banker who Peter doesn't get along with) exists in Peter's mind. In (2b), by contrast, there is no specific referent in Peter's mind because he has not met a merchant banker yet. Regardless of the actual existence of the referent (i.e., *a merchant banker*), the indefinite article *a* is used in both sentences. The English indefinite article *a* can be used in both specific and unspecific contexts. In other words, the English article system does not encode the specific-unspecific distinction. Specificity itself, therefore, does not concern article choice in the English language. In some other languages, on the other hand, specificity is morphologically marked in article systems. In the Samoan language, for instance, one article (*le*) marks specific definite and specific indefinite contexts, while another article (*se*) marks unspecific definite and unspecific indefinite contexts (Ionin, 2006).

2.2.3 Genericity

As mentioned above, definite articles refer to the definite status of referents. In the English language, however, the definite article *the* does not necessarily encode definiteness. It can also encode *genericity*. According to Krifka et al. (1995), genericity refers to a class or a well-established kind of entities. In English, the definite article is usually used with singular count nouns for generic interpretation. Ionin and Montrul (2010) analyzed English generic sentences, referring to the study by Krifka et al. (1995). For instance, when we consider the sentence "*The lion is a dangerous animal,*" both specific and generic interpretations are

possible. In this context, *The lion* can denote either a specific lion or the entire kind of lions. Some predicates such as *be extinct*, however, are compatible only with the generic interpretation. Considering the sentence "*The dodo bird is extinct*," only the generic interpretation is possible because a specific individual of an entire kind cannot be extinct.

As well as singular nouns with the definite article, bare plurals are used for generic interpretation in English, as in "*Lions are dangerous*" (Ionin & Montrul, 2010). Genericity is one of the most complicated aspects of the English article system.

2.2.4 Countability

Countability is an important principle underlying English article usage. It concerns whether a referent of a noun is countable or uncountable. Depending on the countability of the referent, the English language makes a distinction between count nouns and mass nouns. There are some rules and principles relating to the count-mass distinction of English nouns. These principles can be described from several standpoints. Three different perspectives of noun countability are introduced in the following subsections.

2.2.4.1 The Syntactic Perspective

In the English language, some syntactic properties distinguish between count nouns and mass nouns. In order to illustrate the syntactic differences between count and mass nouns, consider the count nouns *cat*/*book* and the mass nouns *water*/*money*. Count and mass nouns take different kinds of quantifiers. Mass nouns can be preceded by the indefinite quantifiers, such as *much* and *little* (e.g., "*I poured much water*" but not "*I saw much cat*"), while plural count nouns can be used with the indefinite quantifiers, such as *many* and *few* (e.g., "*I saw many cats*" but not "**I poured many waters*"). With respect to article usage, singular count nouns take the indefinite article *a*, but mass nouns do not (e.g., "*I read a book*", but not "**I received a money*"). Count nouns can also be proceeded by numerals and pluralized with plural markers such as the -*s* suffix, but mass nouns cannot (e.g., "*I read two books*" but not

"*I received two moneys"). Mass nouns are always marked with the zero article and appear in the singular form, while count nouns are distinguished with articles according to the number of a referent (i.e., the indefinite article *a* for singular nouns and the zero article for plural nouns). Thus, the count-mass distinction of English nouns is associated with some syntactic rules such as selection of quantifiers and articles. Definiteness, however, is not limited by countability or number of the referent: the definite article *the* can be used for both count and mass syntax.

2.2.4.2 The Ontological Perspective

In general, the count-mass distinction is thought to reflect a distinction of some properties of real-world entities: the ontological distinction between things or objects and stuff or substance. Quine (1960) argued that mass nouns denote cumulative referents which change in quantity but not in quality. For instance, if you add some *water* to *water*, the blended entity is still *water*. *Water* is, therefore, a continuous entity which has a homogeneous structure. Count nouns, on the other hand, change in both quantity and quality. You cannot add *a cat* to *a cat* in the same manner as *water*, because *a cat* is a discrete entity which has a heterogenous structure. Instead, you will understand this situation as *two cats*. Count nouns denote discrete, heterogeneous objects (e.g., *cat*, *book*), while mass nouns refer to continuous, homogeneous substance (e.g., *water*, *mud*).

Although the difference between object and substance appears to be intuitively plausible in distinguishing between count and mass syntax of nouns, it is unlikely that the ontological distinction can fully represent the count-mass distinction. There are some problems with the ontological perspective. First, we often see the same kind of entity used in both count and mass contexts (e.g., "*I'll buy a cake for my daughter's birthday*" and "*Would you like some cake for dessert*?"). In the former example sentence, *cake*, with the indefinite article *a*, is regarded as a discrete thing, while it is treated as stuff in the latter sentence. The examples indicate that the same kind of entity can appear with different ontological properties.

In other words, the ontological properties are not fixed features that real-world entities inherently hold. The fact also shows that a noun cannot be labelled as either a count noun or a mass noun. The syntactic labels such as count nouns and mass nouns do not represent intrinsic properties of each individual noun. Second, some nouns belong to different syntactic classes (i.e., count and mass), even though their referents appear to be similar to each other. For example, *pebble* appears in count syntax but *gravel* in mass syntax, even though they seem to denote very similar entities (Wierzbicka, 1985; Wisniewski et al., 2003). Such nouns are not applicable to the explanation in terms of the ontological properties.

If both syntactic and ontological views do not provide sufficient descriptions for the count-mass distinction, what determines count and mass properties of nouns? As an answer for this question, Wierzbicka (1985) discussed why *oats* should differ from *wheat* in grammatical form and proposed that the different grammatical behavior of the two words results from their semantic differences. Thus, the count-mass distinction of nouns needs to be described from another point of view: the conceptual-semantic perspective.

2.2.4.3 The Conceptual-Semantic Perspective

The conceptual-semantic perspective emphasizes relationships between grammatical form and meaning. More specifically, it assumes that there should be a certain difference in meaning between count and mass syntax, as Wierzbicka (1985) claimed that the difference in grammatical behavior reflects that in meaning. The examples of *cake* ("*I'll buy a cake for my daughter's birthday*" and "*Would you like some cake for dessert*?") show that the same kind of entity appears in both count and mass syntax. It indicates that when the same entity is used in a different grammatical form, it is recognized differently in a speaker's mind. In other words, whether a noun appears in count or mass syntax depends on how the speaker conceptualizes the referent of the noun.

The conceptual-semantic view focuses on how the speaker conceptualizes real-world entities. Wisniewski et al. (2003) proposed a hypothesis for the conceptual orientation toward

the count-mass distinction: the *cognitive individuation* hypothesis. According to the hypothesis, "a speaker uses a count noun or mass noun when conceptualizing some aspect of reality as an individual or a non-individuated entity, respectively" (p. 586). More specifically, if the speaker conceptualizes a referent as an individual, it appears as a count noun. In contrast, when the speaker interprets the referent as a non-individuated entity, it appears as a mass noun. Discrete objects are usually conceptualized as prototypical individuals and labelled as count nouns, while continuous substance tends to be construed as non-individuated entities and appear as mass nouns. The cognitive-semantic account, however, is more ambiguous than the ontological distinction. Wisniewski et al. mentioned that the notion of individuals can include many types of entities that are not objects, such as sounds (e.g., *a knock*), emotional states (e.g., *a fear*), physical events (e.g., *a party*), mental events (e.g., *a dream*), and bounded substance (e.g., *a puddle*). Similarly, the notion of non-individuated entities includes sounds (e.g., *thunder*), emotional states (e.g., *anxiety*), physical events (e.g., *sleep*), mental events (e.g., *reasoning*), and even categories consisting of diverse objects (e.g., *underwear*). All referents of count nouns are conceptualized as individuals and those of mass nouns as non-individuated entities in the speaker's mind.

A central concept of the cognitive individuation hypothesis is *construal*. According to the cognitive individuation hypothesis, whether a reality is construed as an individual or a non-individuated entity is dependent on a speaker's conceptualization and thus flexible to some extent. The notion of construal can explain why the same kind of entity appears as both count and mass nouns. For example, when the speaker interprets *leg* as an individual, he or she uses count syntax, *a leg*. The input of *a leg* gives the meaning of one leg that separates from another leg (e.g., "*She has a broken leg*"). In particular contexts, however, the speaker finds a different perceptual characteristic of *leg*: the construal of *leg* as a non-individuated entity. Consider a situation in which you visit a religious place where people are asked not to show their skin, but you are wearing short pants. Someone may say, "*You should not show much leg.*" In this case, *leg* is construed as a non-individuated entity (i.e., some part of one's

legs) and hence appears in mass syntax. Different syntax reflects different conceptualization.

The conceptual-semantic perspective is broadly accepted, so that many researchers illustrate the count-mass status of nouns and article choice from this point of view. Master (1997), for example, explained the functions of articles in terms of *boundaries*. A boundary forms the individuated state of a referent: a referent with a boundary is regarded as discrete. The indefinite article *a* has the function to create a boundary. Thus, a noun occurring with the indefinite article denotes a bounded, countable referent. *Wine*, for example, is generally used in mass syntax because liquid is a homogeneous, non-individuated entity. However, the sentence, "*You will know soon if it is a good wine*," is undoubtedly acceptable. In this sentence, the indefinite article serves to create a boundary, which conveys the meaning "a kind of" or "a type of." With this boundary-creating function, some referents which are generally perceived as non-individuated entities can also occur with the indefinite article. On the other hand, the function of the zero article is to remove a boundary that makes a referent discrete. A noun with the zero article refers to a boundless, uncountable entity. For example, the noun *chicken* is often used in count syntax (e.g., "*A chicken came into my yard.*"), and it refers to the animal which is a kind of bird kept for its eggs or meat. However, when we use the noun in mass syntax (e.g., "*I do not like chicken.*"), we mean the meat of the animal, so that the original shape or outline of the animal do not remain. When a bounded entity loses its boundary, it appears as a mass noun.

In sum, when a noun is used as both countable and uncountable, these meanings are usually different. The difference in meaning relates to different conceptualization. Bloom (1990) pointed out some relationships between language, cognition, and real-world entities. The way a speaker construes a reality is reflected in the semantic level (i.e., an individual or a non-individuated entity). The semantic features are associated with the syntactic features, count and mass. Thus, a reality in the world is recognized through human cognition (i.e., conceptualization) and represented in certain grammatical forms.

2.3 Difficulty with L2 Acquisition of the English Article System

Many SLA researchers claim that the English article system is one of the most difficult grammatical items for ESL learners to acquire fully (Butler, 2002; DeKeyser, 2005; Master, 1994, 1995, 1997; Snape & Yusa, 2013). They state that ESL learners usually do not achieve complete understandings of the article system, even though they study English for years. Butler (2002), for instance, revealed that there was a large gap in performance on article usage between Japanese EFL learners and native English speakers, even though the learners were at the most advanced proficiency level of English. Park (1996) also insisted that EFL learners tend to repeat the same errors on English articles, even if they are proficient enough to correct their errors when the mistakes are pointed out.

In this section, potential causes for the ESL learners' difficulty with English articles are discussed. Empirical research on the effectiveness of instructional treatments for appropriate English article usage is also reviewed.

2.3.1 Potential Causes of ESL Learners' Difficulty with English Article Usage

It is well known that ESL learners have difficulty with the appropriate use of English articles. However, the primary causes of their difficulty are still unrevealed.

The difficulty of appropriate English article usage appears to be attributed to the inherent properties of English articles. Specifically, the English article system does not consist of one-to-one correspondences between form and meaning. Linking one form to one meaning is a common strategy in language learning. This strategy is supported in the traditional belief that some one-to-one relationships exist between form and meaning as the natural condition of a language (Bolinger, 1977). In the English article system, however, multiple functions are represented by one morpheme. That is, a single article often encodes multiple aspects underlying article usage. For example, the definite article *the* is used in both definite and generic contexts, as in the following sentences: "*The dog barks*" and "*The dinosaur is extinct*"

(taken from Snape & Yusa, 2013, p. 166). The former sentence refers to a specific dog which the listener can identify (i.e., a specific/definite interpretation). The latter sentence, by contrast, is acceptable when it refers to the entire kind of dinosaurs (i.e., a generic interpretation). The example sentences show that both definite and generic interpretations are encoded with a single morpheme *the*. Master (2002) argued that such multiple functions of English articles would be a huge burden for ESL learners who generally search for one function per form. The multiple heterogeneous properties that English articles hold may increase the complexity of English article usage.

Moreover, English articles are function words which are based on abstract relations with the other elements, especially nouns, in a sentence. Article choice relates to referential properties (e.g., definiteness, countability) of nouns, which are interactional factors in determining the most appropriate article for a contextual situation. In other words, English article usage depends on a speaker's judgement on the referential properties of nouns. Importantly, research on L2 learners' English article usage (e.g., Thomas, 1989) points out that the learners' incorrect usage of articles often comes from erroneous understandings of referentiality. One of the common problems relating to referentiality would be learners' fluctuation between the concepts of definiteness and specificity. The two concepts are associated with the distinction between the definite article *the* and the indefinite article *a*. In terms of definiteness, the use of *the* presupposes that both the speaker and the listener are aware of the unique referent which is confirmed based on prior discourse or general knowledge. The speaker cannot use the definite article *the* unless the listener also shares the knowledge of the referent. The appropriate use of the definite article, therefore, requires the speaker to evaluate whether the discourse situation satisfies the presupposition for the use of *the* (Ionin et al., 2008). If there is no information of the referent in the listener's knowledge, the indefinite article *a* must be used.

The use of the indefinite article *a* is also related to specificity, which only concerns the speaker' point of view. A specific context is marked with *a* and requires a particular referent

in the speaker's mind. In the English article system, however, the use of *a* is possible not only for specific referents but also for unspecific referents: the English indefinite article can be used in both specific and unspecific contexts. The specific-unspecific distinction, therefore, unlike definiteness, has nothing to do with article choice in the English language. Despite the fact that the difference between definiteness and specificity is essential for the appropriate use of *the* and *a*, ESL learners are unlikely to realize that English articles encode definiteness rather than specificity.

Another problem on referentiality is noun countability. Of the referential properties, countability could be the most complicated one. Many SLA researchers agree with the claim that noun countability is a flexible and abstract property. Allan (1980), for instance, argued that although most nouns may prefer either count or mass status, the countability of nouns cannot be determined without a context in which they are used. Iwasaki et al. (2010) also mentioned that "most count nouns can be used in mass sentence contexts, and most mass nouns can be used in count sentence contexts given a suitable conceptual context" (p. 191). Regarding the choice of countability type (i.e., count or mass), Gally (2010) provided the following examples. The noun *orange*, which is often used as a count noun, can appear in mass syntax when referring to its flavor (e.g., "*She tasted orange in the cocktail*"). Similarly, nouns which generally appear in mass syntax (e.g., *hydrogen, oxygen*) can be used as count nouns in particular situations (e.g., in scientific contexts, "*The water molecule contains two hydrogens and one oxygen*"). From the conceptual-semantic perspective, the grammatical distinction between count and mass corresponds to a conceptual distinction in the speakers' mind: when a person uses a count or a mass noun, he or she recognizes a referent as a countable individual, or as an uncountable, non-individuated entity, respectively. In other words, the count-mass status of nouns is conceptually derived (e.g., Middleton et al., 2004; Wisniewski et al., 2003). Due to the arbitrary property of noun countability, it may be hard for ESL learners to appropriately distinguish between countable and uncountable nouns, that is, between the indefinite article and the zero article. Some SLA researchers insist that the

grammatical distinction between countable and uncountable nouns seems to be particularly troublesome for learners of English (e.g., Gally, 2010; Master, 1987).

Besides the intralinguistic difficulty of the English article system, an interlinguistic reason could be probable: while some languages (e.g., English, French, Spanish) have article systems, other languages (e.g., Chinese, Japanese, Korean) do not have them. For SLA researchers, whether L2 learners are capable of constructing target-like linguistic representations or not is a crucial question, especially in the domains where target L2 features are not present in the learners' L1s. Ionin (2013) mentioned that "no one disputes that learners make many errors with morphology of the target language, omitting and/or misusing tense/agreement marking, determiners, gender marking, and clitics" (p. 506). A number of studies investigated whether L2 learners can acquire novel L2 features that are not available in their L1s. Hawkins and Liszka (2003), for example, examined the use of the English past-tense marker *-ed* in obligatory contexts, comparing Japanese learners whose L1 marks past tense and Chinese learners whose L1 does not mark past tense. The results showed that the usage rate of *-ed* by Chinese learners was much lower than that by Japanese learners (63% suppliance by Chinese learners, and 92% by Japanese learners). Hawkins and Franceschina (2004) also argued that gender features on determiners and adjectives in the Spanish language are difficult to acquire for learners whose L1s do not morphologically mark gender (e.g., English). The results from these previous studies demonstrated that some L2 features may be hard to comprehend or master when the equivalent features or notions do not exist in learners' L1 grammar. Articles are also morphosyntactic features that are not present in some languages (e.g., Japanese, Korean, Russian). Article systems, therefore, are difficult to acquire for those whose L1s do not have them or that use a very different system (DeKeyser, 2005).

Empirical research has been conducted in order to investigate English article usage by ESL learners who are native speakers of article-less languages. Ionin et al. (2004), for example, examined English article usage by Russian and Korean speakers whose L1s lacked article systems, focusing on their article choice between the definite article *the* and the

indefinite article *a*. The results showed that the speakers of the two languages made particular errors in the two types: the overuse of *the* in specific indefinite contexts and the overuse of *a* in unspecific definite contexts. Their article use in specific definite and unspecific indefinite contexts, in contrast, was accurate. Ionin et al. suggested that these ESL learners fluctuated between the two options: sometimes they used *the* for marking definiteness (and *a* for indefiniteness), and other times they also used *the* for marking specificity (and *a* for unspecificity). As a consequence, they could perform accurately on specific definite contexts and unspecific indefinite contexts, where the two options gave them the same article choice. On the other hand, when definiteness and specificity are in conflict (i.e., specific indefinite and unspecific definite contexts), the learners fluctuated between *the* and *a* and failed to use them properly. Furthermore, Ionin et al. (2008) reported that Spanish learners of English, whose L1 has similar semantics on definiteness to English, could transfer the semantics of Spanish articles to English article usage. The Spanish ESL learners correctly used *the* and *a* in definite and indefinite contexts respectively and their article errors showed no particular patterns, like native English speakers. From these findings of previous studies, it can be argued that ESL learners of article-less L1s have difficulty in understanding the concepts of definiteness and specificity, and the relationships between the concepts and article choice.

The count-mass status of nouns is another difficulty for L2 learners of L1s without articles. Master (1987) claimed that noun countability is the most persistent problem for article usage by L2 learners' whose L1 does not contain an article system. For example, the Japanese language is a classifier language, so that it does not require its speakers to pay attention to the countability of nouns. Yamada and Matsuura (1982) explained that Japanese learners of English have difficulty in using English articles, because the Japanese language does not differentiate between countable and uncountable nouns.

Some empirical studies demonstrated that ESL learners of L1s that do not distinguish noun countability are usually not capable of using English articles properly. Yoon (1993), for example, examined the perception of English noun countability, comparing native speakers of

English and Japanese learners of English. The study focused on how their perceptions related to their choice of the zero article or the indefinite article in indefinite contexts. The results showed that native English speakers and Japanese speakers perceived certain types of nouns in an opposite way: only 61 percent of the Japanese learners used the indefinite article in the obligatory contexts while 95 percent of the native speakers used it. Yoon found that many of the Japanese learners' errors resulted from their fixed notions on noun countability. Specifically, when the Japanese learners intuitively judged a noun as mass, they did not change their judgement, even though the noun appeared in the count context and required the indefinite article. Yoon also found that most of the nouns that learners judged as countable were concrete nouns (e.g., person, farm), while those judged as uncountable were abstract nouns (e.g., appreciation, burden). It suggested that abstractness of nouns affects their choice of count or mass syntax.

Inagaki (2014) reported the difficulty in Japanese ESL learners' acquisition of the English count-mass distinction. He examined how Japanese ESL learners interpreted count-mass syntax in English using a quantity judgement task. The participants were asked whether two large objects (e.g., two large shoes) were more than six tiny objects (e.g., six tiny shoes). They were also asked whether two large portions of substance (e.g., two large blobs of mustard) were more than six tiny portions of substance (e.g., six tiny blobs of mustard). The target words were provided with either count or mass syntactic cues (e.g., "*more shoes*" or "*more mustard*"). Each word was presented with a photo containing two large objects or portions and six tiny objects or portions, and a question "*Who has more X(s)?*". The two large objects or portions always had a greater volume in total than six tiny objects or portions. If the participants chose six tiny objects or portions as the greater quantity, it means that they judged the quantity of the target based on number. When they chose two large objects or portions, in contrast, it indicates that they judged the quantity based on volume. In short, the number-based judgement or the volumed-based judgement corresponded to the participants' interpretations of the target as individuals or non-individuals, respectively. The results showed

that Japanese ESL learners correctly judged count and mass nouns based on number and volume, respectively: they chose six tiny shoes and two large blobs of mustard as greater quantity. However, when they judged count-mass flexible nouns (e.g., *string(s)*, *chocolate(s)*), they did not change their judgements according to the count or mass syntax in which target words appeared. In other words, they failed to change interpretations depending on whether the target nouns were used in count or mass syntax (e.g., "*strings*" or "*string*"). The results, therefore, suggested that they had difficulty using the syntactic difference between count and mass as a cue to clarify the meanings of nouns. Inagaki concluded that Japanese ESL learners' struggle with the count-mass distinction stems from their failure to map count syntax to individuals and mass syntax to non-individuated entities.

The Chinese language is also a classifier language. Liu and Lu (2020) examined Chinese EFL learners' misconceptions on English noun countability and errors in their English article use. Liu and Lu designed a forced-choice task which asked Chinese EFL learners to choose the indefinite article and the zero article for target English nouns in sentences. They also conducted stimulated recall interviews with the learners to elicit explanations for their choices. The analyses of task performance and interviews revealed that the Chinese EFL learners' article errors primarily resulted from incorrect or incomplete understandings of the count-mass distinction. The main causes of their misconception were associated with overreliance on translational equivalents and classifiers in Mandarin, and overreliance on problematic experience with English. Liu and Lu concluded that the Chinese EFL learners used both L1 and L2 experiences to judge noun countability, and their errors arose when there were differences between their L1 and the target L2, or when their L2 experience was insufficient or misleading.

Lastly, ESL learners' lack of attention to articles could be one reason for their incorrect English article usage. They may pay little, if any, attention to articles. According to Master (1997), some learners make little effort to learn the English article system because article errors rarely lead to overt misunderstanding. Other learners may feel that they have already

acquired the article system although they actually have not. In fact, a learners of English from Master's (1995) study commented as follows: "Without being pointing out, I probably never pay much attention to the usage of articles. The reason is because articles were taught at early stages, and thus I assume them as a[n] easy thing" (p. 203). An English teacher in Yamada and Matsuura's (1982) study also mentioned that his students' articles usage "bears little or no resemblance to established English practice; the students seem to use articles almost randomly" (p. 50). These studies indicate that ESL learners are likely to pay little, if any, attention to English article usage and do not even realize the complexity of the English article system. Their lack of attention to article usage, therefore, may possibly lead to inadequate understandings of the English article system.

2.3.2 The Effectiveness of Instructional Treatments for Learning the English Article System

Some SLA researchers argue that complex linguistic rules which involve abstract concepts for describing a grammar are resistant to any type of explicit learning (e.g., VanPatten, 2011). The English article system, because of its complexity of rules, is often considered to be unlearnable and therefore unteachable, and that instruction and error corrections play no role in acquiring the system as an L2 (Dulay et al., 1982). According to DeKeyser (2005), the English article system strongly resists instructional treatments, because it expresses "highly abstract notions that are extremely hard to infer implicitly or explicitly from input" (p. 5). Butler (2002) also stated that effective teaching of English articles remains an "elusive" goal. While many SLA researchers claimed the ineffectiveness of instruction on the English article system, some empirical studies have been conducted to examine its effects. They have shown mixed results: some studies reported positive effects of interventions for improving appropriate English article usage, but others found limited effects.

Snape and Yusa (2013), for example, showed limited effects of instruction on English article usage. They investigated whether explicit instruction could help Japanese learners of

English achieve target-like performance on English article choice. The participants were provided with explicit instruction of English article semantics over a period of three weeks. Their instruction focused on definiteness-specificity distinctions, and genericity, explaining the relationship between these principles and English article usage. The total amount of time devoted to instruction was 210 minutes. The results showed that explicit instruction on definiteness, specificity and genericity did not greatly improve the Japanese learners' English article usage. Snape and Yusa pointed out that the instruction on English article semantics may have been difficult to understand, because the differences between definite, indefinite, and generic contexts is very subtle. The participants might have been confused with the complexity of the English article system such as the semantics of definiteness and specificity, and the concept of genericity. Snape and Yusa concluded that instruction on article choice, in comparison with other areas of grammar, is so complex that it cannot be adequately taught in such a short period of time.

Snape et al. (2016) conducted a follow-up study with a longer period of intervention. They provided Japanese learners with weekly 60-minute lessons on English articles over nine weeks, targeting genericity. The results showed that the instruction helped the learners significantly improve their English article usage on genericity on three posttests (three-week, nine-week, and 12 week). Using the same study, Umeda et al. (2017) conducted a delayed posttest one year after the explicit instruction on English article semantics. They found that the Japanese learners' performance on English article usage returned to the pretest levels. Umeda et al. suggested that the effects of explicit instruction on English articles are likely to be retained when explicit instruction is provided over a sustained period.

On the other hand, Master (1994) indicated that systematic instruction contributes to ESL learners' understanding of the English article system. In his study, ESL learners were taught major principles of the English article system (e.g., the distinction between countable and uncountable, singular and plural, definite and indefinite, and specific and generic) over nine weeks. The results revealed that a total of six-hour instruction contributed to a significant

increase in the posttest scores on their English article usage. Bitchener and Knoch (2010) also highlighted the importance of explicit instruction on English articles. They investigated whether written corrective feedback could help ESL learners increase the accuracy for English article usage. The participants received three types of corrective feedback toward article errors that they made in written narratives: direct feedback with metalinguistic explanation, indirect feedback (i.e., circling of errors), and direct metalinguistic feedback and oral instruction on English article usage. The results showed that the ESL learners who received any of these three types of corrective feedback improved the target article usage in an immediate posttest, although only the learners with direct written corrective feedback sustained their improvement on a 10-week delayed posttest.

Although some promising results were reported regarding the effectiveness of instruction on the English article system, one should be cautious about generalizing these findings. Several researchers point out that some studies focused only on "a relatively well-defined aspect which can be easily understood by most learners" (R. Ellis et al., 2008, p. 357). For example, in Bitchener and Knoch's (2010) study, the two functional uses of English articles were targeted and explained as follows: the indefinite article *a* for a previously mentioned referent and the definite article *the* for a subsequently mentioned referent. Such instruction does not contain any explanations of complex aspects of English article usage. Furthermore, a majority of these studies (e.g., Master, 1994) did not clarify the relationship between instruction effects and distinct aspects of the English article system (e.g., countability, definiteness). They only reported the increase in the mean scores on the posttests after the instructional period. In sum, these previous studies seem to fail to reveal the effectiveness of broad and systematic instruction on English articles, and the relationship between instruction effects and multiple aspects of English article usage. Furthermore, it should be noted that much research on explicit instruction of L2 English article usage has focused on definiteness-specificity distinctions, and genericity (the use of *a* and *the*). There is little longitudinal research examining intervention effects on noun countability (the use of *a* and the zero article).

2.4 Cognitive Linguistic Insights into SLA

For SLA researchers, finding effective ways of language learning is a major concern; L2 learning approaches are crucial issues in SLA research. In an attempt to apply linguistic theories to practice, early SLA studies adopted the concepts of linguistic universals such as linguistic typology (Greenberg, 1963) or generative grammar (Chomsky, 1965), as their theoretical orientations. Recently, principles and concepts from CL have been incorporated into L2 learning and instruction. While both generative linguistics and linguistic typology focus exclusively on linguistic form, CL provides insights into the relationships between form and meaning (Littlemore, 2009). A general view of CL and empirical research with the use of the CL approach are introduced in the following sections.

2.4.1 Cognitive Linguistics

CL is a relatively new school of linguistics. CL is not a single specific theory, but it is a theoretical framework that adopts common principles or assumptions. Specifically, CL is an approach that sees language from aspects of human cognitive activities, such as thought and cognition. According to Littlemore and Juchem-Grundmann (2010), CL provides "a detailed description of the cognitive processes that are at work in language and thought enabling people to extract linguistic knowledge from language use" (p. 1). The fundamental concept underlying CL is that language reflects patterns of human cognition or thought. In other words, CL assumes that language reflects the way in which people construe the world (Ohori, 2002). This assumption is an important view of CL which is distinct from other schools of linguistics. Evans and Green (2006) mentioned that "to study language from this perspective is to study patterns of conceptualisation" (p. 5). In sum, CL aims to describe the interplay between language and human conceptualizations of the world (Langacker, 2008). From the cognitive linguistic perspective, therefore, language is considered to be a medium between the human internal world (i.e., cognition, thought) and the external world.

CL is affected by some areas other than linguistics, such as psychology and philosophy. For example, Sapir and Whorf, who were both linguists and anthropologists, proposed a hypothesis that speakers of a different language construe the world differently (Sapir, 1921; Whorf, 1956). Whorf describes the hypothesis as follows:

It was found that the background linguistic system (in other words, the grammar) of each language is not merely a reproducing instrument for voicing ideas but rather is itself the shaper of ideas, the program and guide for the individual's mental activity, for his analysis of impressions, for his synthesis of his mental stock in trade. . . . We dissect nature along lines laid down by our native languages. (pp. 212–213)

The Sapir-Whorf hypothesis is divided into two different theories on the relationship between language and human thought: linguistic determinism and linguistic relativity. The strong version of the hypothesis is linguistic determinism, which claims that language entirely determines human thought. In other words, linguistic determinism holds that language shapes the way in which people (i.e., native speakers of a language) construe the world. On the other hand, the weak version of the hypothesis, linguistic relativity, states that structures of a language may affect the speaker's cognitive process. Although most modern linguists agree that linguistic determinism is indefensible, research in the field of CL supports the Sapir-Whorf hypothesis and explores how people construe the external world through language.

Since CL emerged out of dissatisfaction with traditional approaches to language, it takes a negative stance toward traditional linguistics and the universality of language. In earlier linguistics, linguistic form and structure are determined by formal rule systems independently of meaning. In other words, from the traditional perspective, the relationship between form and meaning is arbitrary. This traditional approach is most prominently associated with generative grammar proposed by Chomsky (1965). He claimed the existence of a universal grammar, a set of innate universal principles that all humans are equipped with

to acquire their native language. The concept of universal grammar is also closely related to the nativist perspective, claiming that language ability is autonomous independently of other cognitive abilities and that linguistic competence is incorporated in the human brain at birth.

In contrast, CL sheds light on various phenomena of language in terms of the meaning of language. From the viewpoint of CL, language cannot be understood without the contexts in which words are used, because the meaning of a sentence and a word is determined in the contexts. CL, therefore, does not separate linguistic ability from non-linguistic cognitive activities, but stresses human sensory-motor experiences and embodied knowledge obtained through those experiences. Cognitive linguists do not see language as the output of innate cognitive universals that are specific for language, but as a reflection of embodied cognition (Evans & Green, 2006).

2.4.2 Experimental Studies on the Effectiveness of the CL Approach

In recent research on SLA, the CL approach has received much attention as a method of effective language learning and teaching. Cognitive linguistic insights fundamentally originate in linguistic knowledge and representations that people (more specifically, native speakers of a language) implicitly acquire. Thus, the advocates for the CL approach claim that it can provide L2 learners with an opportunity to understand deeply how language and thought work together in the mind of L1 speakers. Along with the increasing attention being given to the CL approach, a growing number of studies have introduced cognitive linguistic insights into L2 learning. These studies argue that cognitive linguistic insights into the relationship between language and human cognition facilitate SLA (Boers, 2013; Robinson & Ellis, 2008). It is noteworthy that the CL approach has made some contribution to SLA by providing L2 learners with overt explanations of how language reflects human representations of the world.

Theoretical studies focusing on the CL approach also suggest that L2 learners benefit from cognitive linguistic insights into the relationship between linguistic form and meaning

(e.g., Littlemore, 2009; Robinson & Ellis, 2008). In early research on SLA, the mainstream approach to SLA was memorization and pattern practice of grammatical rules, which is supported by the theory of behaviorism (Skinner, 1957). The traditional approach that only emphasizes linguistic form had also been adopted for a long time. Such form-focused instruction, however, did not lead to complete understandings of L2 systems. Instead, recent observation on SLA claims that language acquisition requires constructing the close network between form, meaning, and the function of language (Long & Robinson, 1998). Since the fundamental principle of CL is mapping between linguistic form and meaning, the CL approach seems to correspond to this claim. The CL approach, therefore, has received attention as an alternative approach.

As well as theoretical studies, a number of empirical studies using the CL approach have been conducted. These empirical studies reported that the CL approach led to greater performance in language learning than the traditional method that pays much attention to linguistic form (e.g., Tyler et al., 2010; Verspoor & Lowie, 2003). A considerable number of studies have examined the effectiveness of the CL approach, introducing various cognitive linguistic concepts into L2 learning.

As one of the successful instructions using cognitive linguistic frameworks, conceptual metaphors are commonly used in L2 vocabulary learning. The Conceptual Metaphor Theory is a framework proposed by Lakoff and Johnson in their book *Metaphors We Live by* (1980). They assume that human thought, experience, and everyday activities are fundamentally metaphorical in nature. Metaphor is a correspondence between different conceptual domains. More specifically, metaphor is a phenomenon where we reason and understand an event in an intangible domain in terms of another comprehensible domain. According to Boers (2013), conceptual metaphors illustrate "how we project our knowledge of concrete, familiar domains of life onto abstract domains in an attempt to come to grips with the latter" (p. 212). In CL, conceptual metaphors are described as mappings from source domain onto target domain. For example, in the case of the LOVE IS A JOURNEY metaphor, JOURNEY is a source domain

and LOVE is a target domain. This means that LOVE can be conceptualized in terms of JOURNEY. This metaphor exists in such expressions as "*We should go our separate ways*" or "*Our relationship is at a crossroads*."

The basic premise of CL is that the way in which people think is fundamentally metaphorical in nature (Lakoff & Johnson, 1980). Cognitive linguists argue that "metaphor is a central feature of human language" (Evans & Green, 2006, p. 38). In other words, metaphors reflect the nature of human thought. Whichever language we speak, our language use is full of metaphorical expressions. Metaphors show us how people construe a reality and why the reality is described in a particular expression. Thus, metaphors seem to be useful in L2 learning in that they describe how human metaphorical thoughts are reflected in the L2 and help learners acquire correct L2 usage.

Empirical studies using conceptual metaphors have often targeted phrasal verbs. Boers (2000), for instance, investigated whether conceptual metaphors made phrasal verbs (e.g., *set up*, *break down*) easier to learn. Boers used orientational metaphors underlying many prepositional and phrasal verbs (e.g., MORE IS UP, LESS IS DOWN). The participants were 74 university students learning English in Belgium. They were divided into two groups: one was presented with phrasal verbs with the orientational metaphors, and the other with the same phrasal verbs listed alphabetically. After studying phrasal verbs for 10 minutes, the participants took a cloze test. The results showed that the participants provided with conceptual metaphors could select items more properly from the list of phrasal verbs when completing the text with gaps. Boers concluded that conceptual metaphors which involve basic and important concepts, such as UP/DOWN and IN/OUT, are useful for learning phrasal verbs.

Yasuda (2010) also reported the usefulness of conceptual metaphors in learning phrasal verbs. Yasuda examined whether orientational metaphors helped Japanese learners of English learn phrasal verbs. The participants were 115 university students enrolled in an English language program. The participants in the experimental group learned a set of phrasal verbs

with the use of conceptual metaphors (e.g., MORE VISIBLE/ACCESSIBLE IS UP, OFF IS DEPARTURE/SEPARATION), whereas those in the control group received the same input through traditional instruction (i.e., translation and memorization). After learning 30 target phrasal verbs, the participants in both groups engaged in a task where they filled in missing adverbial particles of the target phrasal verbs in the context of a sentence. The results showed that the participants in the experimental group performed significantly better than those in the control group. Yasuda suggested that the participants who were aware of orientational metaphors might have relied on metaphorical thought when choosing adverbial particles. This implies that orientational metaphors can help L2 learners produce appropriate adverbial particles in phrasal verbs.

Another cognitive linguistic notion, core meaning, is introduced in teaching multiple meanings of polysemous words. This instruction attempts to make non-basic uses of polysemous words more memorable by constructing associations with the basic uses that they are derived from (Boers, 2013). Verspoor and Lowie (2003) demonstrated that learning the core senses (i.e., basic uses) of polysemous words is useful for retention of their figurative senses (i.e., non-basic uses). In their study, 78 Dutch participants learned unfamiliar polysemous words under one of two conditions: the CL approach (i.e., learning how the core sense of a polysemous word is related to figurative senses) and the conventional approach (i.e., memorizing each meaning of a polysemous word with its L1 translation). The results showed that the participants in the CL approach were better at guessing and retaining figurative senses of polysemous words than those in the conventional approach. Verspoor and Lowie argued that the core senses of polysemous words helped the participants understand precisely nonliteral, figurative meanings, because the core senses enabled the participants to "create meaningful links between a core sense and a peripheral sense" (p. 567).

Furthermore, some studies reported that the CL approach is effective even for learning complex grammatical items. Tyler et al. (2010) demonstrated that schemas on force dynamics were helpful for noticing subtle differences among modal verbs (*might*, *must*, *could*, *would*,

should), which are difficult for ESL learners due to modals' epistemic uses. Modality deals with a speaker's particular attitude toward the content of a statement and is frequently expressed with modal verbs (Cruse, 2000). Modal expressions are generally divided into two types: deontic modality and epistemic modality. According to Kreidler (1998), deontic modality refers to the necessity for a person to do or not to do something (i.e., obligation or permission), while epistemic modality indicates possibility or probability of a certain proposition. Since one modal verb can deal with both deontic and epistemic modality, and one proposition can be expressed with more than one modal verb, L2 learners often have difficulty identifying the difference between the two types of modality.

From the cognitive linguistic perspective, epistemic senses of modals can be seen as extensions of basic force dynamics in the social-physical world to the conceptual domain of reasoning and logical prediction. In the study by Tyler and her colleagues, the participants who received the CL instruction were taught the relationships between human cognition and spatial-physical-social experiences in the real world, and how the force dynamics are related to the root and epistemic meanings of each modal. On the other hand, the traditional approach, which was based on a speech act perspective, simply explained the relationships between modals and their functions in speech (e.g., *may/can* refer to granting permission; *would/could/will/can* refer to asking for assistance). The results showed that the CL approach deepened the participants' knowledge of modal verbs and prompted their appropriate usage of modals more effectively than the traditional approach did. Tyler et al. suggested that epistemic uses of modals resulted from creating systematic schemas using force dynamics, although all the uses of modals through the traditional approach must have been memorized because the accounts from the speech act perspective have little connection to epistemic senses.

As introduced above, various concepts in CL, such as conceptual metaphors, core meaning, and image schema, seem to be applicable to L2 learning. CL is a flexible framework rather than a single theory of language: it constitutes a cluster of many partially overlapping approaches (Geeraerts, 2006). CL, therefore, could offer a broad range of pedagogical

possibilities. In particular, it is expected that the CL approach would have an effect on more complex grammatical items for L2 learners to use correctly, such as prepositions and articles. Such items are known to be difficult for L2 learners to fully acquire under the conventional instruction that only emphasizes forms of language. As an alternative instruction, the CL approach may have the potential to facilitate the acquisition of such complex grammatical items, because CL describes language in consideration of not only linguistic form but also meaning. Ungerer and Schmid (1996) claim that "[t]he liberation from the form/content division is probably the most important contribution that cognitive linguistics has made to pedagogical grammar and language teaching" (p. 273). Many SLA researchers approve the claim that constructing the links between linguistic form and meaning is crucial for language learning (e.g., Long & Robinson, 1998). Application of cognitive linguistic insights, therefore, can provide language learners with new observations on a target language.

2.4.3 Cognitive Linguistic Insights into the English Article System

In the conventional approach that has been widely adopted in L2 classrooms, either linguistic typology (Greenberg, 1963) or generative grammar (Chomsky, 1965) have been used as theoretical frameworks. The conventional approach to the English article system focuses on classification of English nouns and articles. For example, regarding the use of the definite article *the*, the conventional approach proposes simple classification of English articles according to uniqueness or identifiability. If the referent of a noun is unique or identifiable, regardless of noun countability, the noun occurs with the definite article. Otherwise, a count noun takes the indefinite article *a* and a mass noun takes the zero article. Noun countability, which concerns the choice between the indefinite article *a* and the zero article, is also explained in terms of classification of English nouns (e.g., common, abstract, and material nouns). More specifically, the conventional approach to the English article system simply illustrates the relationship between noun type and article choice, as in the explanation "abstract nouns are uncountable and thus take the zero article." In short, the

explanations of the English article system in the conventional approach appear to depend on simplistic classifications of nouns and articles, although actual English article usage is more complex.

Since CL is quite different from traditional linguistic theories, it can offer distinctive insights into the English article system. With respect to definiteness, for example, Evans and Green (2006) explained definite and indefinite interpretations, using the Mental Space Theory proposed by Fauconnier (1994), a cognitive linguistic theory of meaning construction. Mental spaces are conceptual domains that contain specific kinds of information. Mental spaces are generally constructed based on general, cultural and linguistic knowledge for eliciting information. However, because mental spaces are constructed "on-line," they have unique and temporal conceptual structures which are specific to ongoing discourse (Evans & Green, 2006). Mental spaces contain elements which are constructed on-line or pre-existing entities in the conceptual domains. Elements appear as noun phrases (NPs), which have a definite interpretation and an indefinite interpretation. While definite interpretation occurs with the definite article *the*, indefinite interpretation occurs with the indefinite article *a* or the zero article. NPs with indefinite interpretation typically bring new elements into discourse: the elements are unfamiliar to both the speaker and the listener, or have not been mentioned in discourse. NPs with definite interpretation presuppose that the elements are existing knowledge and thus already accessible: the elements are familiar to both the speaker and the listener, or have already been mentioned in discourse. Cognitive aspects, from the cognitive perspective, such as the mutual recognition of an entity between the speaker and the listener, are especially highlighted. In the Mental Space Theory, once a mental space is established, it is linked to other mental spaces constructed during discourse. At any point in discourse, one of the mental spaces becomes the base for new mental spaces. While new elements are introduced into the base by indefinite NPs, presuppositional elements with definite NPs are allowed to spread to neighboring mental spaces which are the relational network of mental spaces.

CL explains noun countability in terms of configurational structure. Talmy (2002) proposed the concept of *boundedness*, which includes two types of notion regarding configurational structure: a *bounded* state and an *unbounded* state. When a quantity is conceived as a continuity with no characteristic of finiteness, it is considered unbounded. When a quantity is conceived as an individuated unit entity, it has the bounded state. The concept of boundedness entails a related notion of a boundary. Talmy explained that "a boundary touches or constitutes the outermost portions of a bounded quantity" (p. 50). In other words, a boundary is an outline of the bounded quantity, and the bounded quantity exists within the boundary. Correspondingly, an unbounded quantity is conceptualized as having no outer boundary. In the application of this concept to nouns, unbounded quantities and bounded quantities correspond to referents of mass nouns and count nouns, respectively. Talmy took *water* (a mass noun) as an example of an unbounded quantity and *sea* (a count noun) as a bounded quantity. He demonstrated that *water* and *sea* are unacceptable and acceptable, respectively, in the grammatical construction "*in one hour*" which specifies the bounded state, as follows (taken from Talmy, 2002, p. 51):

(3a) *We flew over water in one hour.

(3b) We flew over a sea in one hour.

Talmy also provided another category of compositional structure, *dividedness*, which concerns internal segmentation of a quantity. If a quantity has some breaks in its composition, it is conceptualized as *discrete*. Otherwise, the quantity is considered as *continuous*. Although the notion of boundedness seems to cover that of dividedness, the two categories exist independently. For example, while the unbounded quantity (i.e., mass nouns), such as *water*, is internally continuous, other unbounded quantities (e.g., *timber*) have internally discrete compositions. However, unlike the category of boundedness, no grammatical elements appear to solely specify discrete or continuous states of a quantity. Talmy argues that this

configurational structure system is a schematic system that is applicable to not only countability, but also other closed-class forms such as aspect or tense markers.

2.4.4 Practical Application of the CL Approach to the Acquisition of the English Article System

CL can provide L2 learners with explicit descriptions of how language and thought work together in L1 speakers' minds. Advocates for the CL approach claim that understanding how language reflects one's mind could facilitate L2 learning. In fact, cognitive linguistic insights have attracted increasing attention in the field of SLA, and recent research demonstrates that the CL approach is more effective than the conventional approach in learning not only lexical items, but also complex grammatical items such as prepositions (e.g., Cho, 2010) and modal verbs (e.g., Tyler et al., 2010). There is, however, little, if any, research which applies the CL approach to the English article system. A majority of studies on L2 English article usage have been conducted in the framework of generative or universal grammar (e.g., Ionin et al., 2008; Snape & Yusa, 2013). More importantly, previous research on L2 English article usage has mainly focused on definiteness, specificity, and genericity. There are only a few studies examining the effectiveness of cognitive linguistic insights into noun countability. Kishimoto (2007) is one of them.

Kishimoto (2007) examined the effectiveness of a CL approach in teaching English noun countability and article usage. In her study, Japanese junior high school students were taught noun countability and English articles from the viewpoint of cognitive grammar. Kishimoto adopted Langacker's (2008) cognitive linguistic framework for nouns, which claims that the difference between countable and uncountable nouns lies in the bounding state of a referent. According to Langacker, if the bounding is clear for a speaker, he or she uses a countable noun. Otherwise, an uncountable noun is chosen. As the teaching material, Kishimoto created eight kinds of image schema for nouns which explained the relationships between noun countability and human construal. Kishimoto herself provided the participants

in the experimental group with the CL instruction for 20 minutes once or twice a week over two and a half months. The participants in the control group were instructed by other teachers through another approach for the same amount of time. All the participants took a pretest and a posttest before and after the instruction. The results showed that there was a statistically significant difference in accuracy rate on the posttest between the two groups, demonstrating that the CL approach was more effective in teaching English noun countability and article usage.

Cho and Kawase (2011) also reported the effectiveness of the CL approach in a classroom setting, even though the instruction time was much shorter than Kishimoto's (2007) study. They investigated whether the CL approach worked more effectively than the traditional approach in teaching English noun countability to Japanese EFL learners in the classroom. Eighty Japanese college students participated in their study. Cho and Kawase developed an original material based on the theory from CL: boundedness. They designed a worksheet so that the participants could recognize the concept of boundedness. More specifically, the worksheet was designed to help the participants become aware of the conceptual distinction between countable and uncountable entities, and verbalize the difference between countable and uncountable nouns. The traditional approach, on the other hand, adopted a grammar book which illustrates different classifications of countable and uncountable nouns (e.g., common, material, and abstract nouns). In both the CL and the traditional approach groups, classroom teachers taught English noun countability using the original materials for each teaching approach. The participants were instructed for 60 minutes in total: 20 to 30 minutes on instruction and 30 to 40 minutes on exercises and feedback. Considering the time devoted on a single grammatical topic in FL classroom, the participants received a one-shot instruction. In order to examine the effects of the two types of instruction, a pretest and a posttest were administered one week before and eight weeks after the instruction, respectively. The tests consisted of 20 sentences, and the participants were asked to choose an appropriate noun phrase for each sentence from a noun with the indefinite article,

a noun with the zero article, and a noun in the plural form. The results showed that the participants in the CL approach group performed significantly better than those in the traditional approach group on the posttest. Cho and Kawase claimed that the CL approach could be a practical method for teaching English noun countability and be applicable to FL classroom settings.

In contrast to the two empirical studies above, Akamatsu (2018) found there to be no clear advantage to using the CL approach. He investigated the extent to which Japanese learners of English acquired complex knowledge of the English article system, comparing the CL approach and the conventional approach that most Japanese schools adopt. Fifty-four Japanese EFL learners participated in his study. The participants learned noun countability and definiteness with provided materials over four weeks. There were two versions of the materials. One was based on cognitive linguistic insights into noun countability: discreteness and boundedness (Talmy, 2000). The other was the conventional-approach material which was based on pedagogical grammar and linguistic typology (Ando, 2005; Sugiyama, 1998). Regarding definiteness, the CL approach emphasized the mutual recognition of a referent between the speaker and the listener: the definite article is felicitous only when both the speaker and the listener can specify the referent. The conventional approach, on the other hand, simply explained the classification of English articles. Before and after learning the English article system, the participants took an original article test which assessed their English article usage for countability and definiteness. The article test asked them to select the most appropriate article from the zero article, the indefinite article, and the definite article in sentence contexts.

The results showed that both the CL approach and the conventional approach promoted equally the Japanese EFL learners' appropriate usage of English articles. Contrary to the findings from previous studies, the study did not demonstrate the superiority of the CL approach in FL learning. Akamatsu (2018) attributed the discrepant result to the abstractness of the cognitive linguistic insights into English article usage. He pointed out that because the

cognitive linguistic insights used in his study were abstract, the participants could not grasp the concepts and consequently might have misconceived them. In other words, although abstract concepts are flexible and thus applicable to complex grammatical items, it may be hard for EFL learners to fully internalize them. The CL approach, therefore, might not exhibit the assumed effectiveness in learning such complex linguistic systems as English articles.

Furthermore, Akamatsu (2018) indicated that the participants' prior knowledge of the English article system may have affected the learning effect of the CL approach. He argued that the participants in his study had already reached a certain level of understanding of English article usage when they started to learn through the CL approach. Kishimoto (2007) and Cho and Kawase (2011), on the other hand, targeted learners who had limited knowledge of noun countability and English articles. Specifically, the participants in Kishimoto's study were junior high school students, and those in Cho and Kawase's study were college students who took mandatory English class once a week. Because the participants in Akamatsu's study, most of whom majored in English, had already had decent understanding of the English article system, such prior knowledge may have reduced the effects of the CL approach.

Regarding the result of Kishimoto's (2007) study, another reason for the superiority of the CL approach could relate to the differences between the instructors. While Kishimoto herself taught noun countability and English article usage to the participants in the experimental group using the CL approach, those in the control group were instructed by other teachers. The fact that the two comparative groups received instruction from different instructors may have resulted in the finding favoring the CL approach.

Although previous studies have reported inconsistent results on the difference in instruction effects between the CL approach and the conventional approach, their overall findings suggest that the CL approach is effective in learning English noun countability and the article system. EFL learners appear to benefit from cognitive linguistic insights when learning English article usage as well as other English grammatical items.

2.5 Rationale of the Present Study

The article system is one of the most important English grammatical items, because articles are the most frequent items in the English language. While English articles are constantly occurring items, their usage consists of a highly complex system. The system holds multiple heterogeneous properties: definiteness, specificity, genericity, and countability. These properties, which concern referentiality, are completely different in function and semantics, and the most appropriate article for a context is determined through the interaction of these properties. One cause for the difficulty of English article usage comes from such inherent features of English articles.

Because of its complexity, the English article system is difficult to fully acquire for ESL learners. Many SLA researchers argue that ESL learners cannot achieve native-like article usage, even though they study English for years and are at the advanced proficiency level (Butler, 2002; Park, 1996). Thomas (1989) pointed out that learners' incorrect usage of English articles relates to referentiality. Although English article usage depends largely on a speaker's judgement on referential properties of nouns, learners often have erroneous understandings of referentiality. Ionin et al. (2008), for example, argued that learners fluctuate between the concepts of definiteness and specificity, that is, the use of the definite article *the* and the indefinite article *a*. Although specificity itself, unlike definiteness, does not affect the choice of articles in the English language, learners are unlikely to realize this fact.

Another referential property, countability, is also troublesome for ESL learners. Some researchers claim that the count-mass distinction of English nouns may be particularly problematic (e.g., Gally, 2010; Master, 1987). As mentioned earlier, the countability of nouns cannot be fixed because most nouns can be used in both count and mass contexts (Allan, 1980; Iwasaki, et al. 2010). In terms of the conceptual-semantic view, the count-mass status of nouns is derived from the speaker's construal (Middleton et al., 2004; Wisniewski et al., 2003). In other words, the grammatical distinction between count and mass nouns

corresponds to a conceptual distinction in the speakers' minds. If the speaker recognizes the referent as a discrete individual, he or she uses a count noun. Otherwise, he or she uses a mass noun. Due to the flexible property of noun countability, learners may have difficulty distinguishing between countable and uncountable nouns, that is, between the use of the indefinite article and the zero article.

In addition to the intralinguistic reasons outlined above, the difficulty of the acquisition of the English article system includes an interlinguistic issue. Master (1997) and DeKeyser (2005) claim that ESL learners whose L1 has no article system or a very different system show their struggle with English article usage. Many previous studies explored the interlinguistic problem (see Ionin et al. 2004, 2008 for the definiteness-specificity distinction; also see Inagaki, 2014; Yoon, 1993 for the count-mass distinction). These studies investigated English article usage by ESL learners of L1s without an article system (e.g., Japanese, Russian). The overall suggestion of these studies is that it may be hard for learners to acquire novel target-language features that are not present in their L1s.

Besides these intralinguistic and interlinguistic problems, another possible reason for ESL learners' difficulty with English articles concerns learning approach. Although article usage is influenced by referential properties of nouns, the conventional learning approach that has been widely adopted in L2 classrooms focuses on the classification of nouns and simply explains the relationship between English noun types and article choice. In short, because the conventional approach does not fully explain the concepts of referentiality, ESL learners do not have an opportunity to understand the appropriate concepts of it. This could be one of the reasons why many ESL learners have difficulty with proper English article use.

In association with the issue of learning approach, Japanese EFL learners, who have neither an article system nor the count-mass distinction of nouns in their L1, seem to have trouble dealing with referential properties of English nouns, especially countability. In Japan, the English article system is taught at the early stage of learning. Japanese EFL learners are supposed to memorize countability noun by noun, like "APPLE is a countable noun" or

"WATER is an uncountable (or mass) noun." Consequently, as many previous studies show, Japanese EFL learners tend to regard English noun countability as a fixed rule and determine the countability of English nouns without considering the contexts in which they occur. Yoon (1993) revealed that Japanese EFL learners judged the countability of English nouns intuitively and used English articles (the indefinite article or the zero article) out of context. Yoon suggested that because the Japanese EFL learners rely on their fixed notions of English noun countability in choosing English articles, they failed to change English articles according to the context. Similarly, Butler (2002) mentioned that Japanese EFL learners (especially those with low proficiency) tend to regard English noun countability as "a fixed or static entity" (p. 466). Furthermore, Takahashi (2013) pointed out Japanese EFL learners' fixed and strong intuition about the relationship between the countability and abstractness of nouns: they tend to think of concrete or visualizable entities as countable and abstract entities as uncountable. In sum, Japanese EFL learners seem to have lists of countable nouns and uncountable nouns and retrieve a word from either list regardless of context (Butler, 2002). They may have some stereotypes about English noun countability and make a countability judgement based on the lists of countable and uncountable nouns, reflecting what Allan (1980) called "countability preference."

Because most English nouns actually can be used in both count and mass contexts, however, Japanese EFL learners' lists of countable and uncountable nouns do not always work. English nouns that Japanese EFL learners categorize as count nouns can occur in an uncountable way, and vice versa. According to the conceptual-semantic perspective or the cognitive individuation hypothesis (Wisniewski et al., 2003), countability judgement is based on a speaker's conceptualization of an object. In other words, whether English nouns are used in either a countable or uncountable way depends on how the speaker construes the contexts where nouns occur. Wierzbicka (1988) noted that "the fact that many words can be used as either countable or uncountable, depending on the meaning intended, shows that the grammatical characteristics in question are sensitive to changes in the conceptualization" (p.

507). Pica (1983) also argued that "article use may have more to do with communication and communicative competence than with grammar and linguistic competence" (p. 231). Thus, it is not practical to make static lists of countable and uncountable nouns and to consult them to determine the countability of English nouns. Instead, in order to properly use English articles, learners need to consider discourse and situations where English nouns are involved and find the correct meaning of the nouns. They need to notice that noun countability and the English articles system are context-oriented, flexible rules. Nevertheless, many Japanese EFL learners have learned noun countability and the English article system as fixed grammatical rules under the conventional instruction that mainly focuses on grammatical (i.e., syntactic) aspects of language.

The present study, therefore, employed the CL approach as a new insight into noun countability and English article usage. As mentioned earlier, CL focuses not only on the form of language but also on meaning. Since the difference in grammatical form reflects that in meaning (Wierzbicka, 1985, 1988), taking the meaning of nouns into consideration should be important in countability judgement and English article usage. Moreover, CL describes how language reflects human cognition and shows L2 learners how these two things work together in the L1 speakers' minds. ESL learners, therefore, can obtain deeper observations into the English language through explanations from cognitive linguistic insights. In fact, the CL approach has been introduced into SLA research and a number of empirical studies have demonstrated the positive effects of the CL approach (e.g., Boers, 2000, 2001; Cho, 2010; Tyler, et al., 2010; Verspoor & Lowie, 2003; Yasuda, 2010). These studies used cognitive linguistic notions, such as conceptual metaphors, core meaning, and image schemas.

The present study adopted the concept of boundedness proposed by Talmy (2002) as the cognitive linguistic insight into noun countability. Talmy explains that countability judgement requires a speaker to estimate the state of boundedness or discreteness. With the use of this cognitive linguistic concept, Akamatsu (2018) examined the effectiveness of the CL approach on Japanese learners' English article usage for countability and definiteness. The results

showed that the CL approach, as well as the conventional approach, improved the learners' usage of English articles. This indicated that there was no difference in the effectiveness of improving Japanese learners' English article usage between the CL approach and the conventional approach. This finding contradicts other previous studies which asserted the superiority of the CL approach in learning noun countability and English article usage (e.g., Cho & Kawase, 2011; Kishimoto, 2007). The present study, therefore, also reexamined whether the CL approach is superior to the conventional approach in learning such a complex English grammatical item as the English article system.

Furthermore, the present study also attempted to investigate the claim that systematic and explicit instruction prompts ESL learners' understandings of the English article system. Because many studies have demonstrated the complexity and difficulty of English article usage, many SLA researchers consider the English article system as unlearnable and unteachable (Butler, 2002; DeKeyser; 2005; Dulay et al., 1982; VanPatten, 2011). They argue that such complex and abstract linguistic rules as English articles are strongly resistant to explicit instruction or learning. With respect to the effectiveness of instruction on the English article system, previous research has shown mixed results. Snape and Yusa (2013), for example, reported the limited effectiveness of explicit instruction on non-generic (i.e., definite and indefinite) and generic use of English articles. The results showed that explicit instruction over three weeks did not appear to help Japanese EFL learners notice and understand the subtle differences between non-generic and generic contexts. Their follow-up studies (Snape et al., 2016; Umeda et al., 2017) revealed that a longer period of instruction contributed to the learners' appropriate article usage on genericity, but in a delayed posttest provided one year after the instruction, their performance returned to the pretest level. Some studies, on the other hand, reported positive effects of explicit instruction on ESL learners' English article usage (e.g., Bitchener & Knoch, 2010; Master, 1994). They highlighted that systematic and explicit instruction helps ESL learners understand the English article system. Some SLA researchers, however, are suspicious about such promising results because these studies focused on well-

defined and, therefore, easy-to-understand aspects of English article usage (e.g., R. Ellis et al., 2008). Moreover, most studies reporting favorable results on the effectiveness of instruction simply compared the mean scores on a pretest and a posttest, and hardly mentioned the relationship between instruction effects and distinctive aspects of English article usage (e.g., definiteness or countability).

Since previous research reported inconsistent results on the effectiveness of explicit instruction of English article usage, the present study aimed to clarify whether explicit instruction improves Japanese EFL learners' usage of English articles. This issue is worth examining from a theoretical point of view, because a relatively novel approach for learning the English article system, the CL approach, was introduced in this study. Snape and Yusa (2013), which reported the limited effectiveness of explicit and successive instruction on English article usage, used the generative approach (i.e., universal grammar) as their theoretical framework. It is possible that the traditional approach (i.e., the generative approach) was a reason for the limited learning effects. Snape and Yusa suggested that accuracy in the Japanese EFL learners' use of English articles varied according to inherent properties of English article usage (e.g., definiteness, specificity), and the variability appeared to result from their preconceptions affected by their L1 or erroneous hypotheses that they made. The present study, therefore, explored the possibility that Japanese EFL learners can change their cognitive styles or fixed notions through explicit and successive learning using the CL approach.

Furthermore, this study examined Japanese EFL learners' usage of English articles, focusing on a single referential property: countability. Although there are multiple distinctive properties relating to English article usage, noun countability is the most obstinate difficulty for ESL learners of L1s without articles and the count-mass distinction of nouns (Master, 1987). Previous studies demonstrated that such learners have difficulty with noun countability and thus are incapable of using English articles appropriately (Inagaki, 2014; Liu & Lu, 2020; Yoon, 1993). In learning the English article system, countability is a principal problem that

Japanese EFL learners should overcome. In addition, it may be confusing for learners to learn multiple aspects of English article usage simultaneously. Akamatsu (2018), in his study examining Japanese EFL learners' article usage, used seven measures as indices of distinctive aspects of English article usage for countability and definiteness (e.g., abstract mass nouns, individuated abstract or material nouns, contextually specified referents). Learning these multiple properties of English article usage may have forced his participants to bear a heavy cognitive burden, because the concepts of these properties are not obvious enough to understand instantly. The participants' cognitive overload might have reduced learning effect of the CL approach in his study. Because the present study also adopted the cognitive linguistic insights which were unfamiliar to Japanese EFL learners, it was important to decrease the learners' cognitive burden as much as possible. Thus, the target English grammar in this study was article usage relating to countability only. Lastly, there is little longitudinal research of intervention effects on English article usage for noun countability. A majority of previous studies on explicit instruction of L2 English article usage have focused on definiteness-specificity distinctions, or genericity. From the above, the present study attempted to shed light on Japanese EFL learners' article usage in terms of noun countability (i.e., the use of *a* and the zero article).

In summary, the present study investigated Japanese EFL learners' understanding of noun countability and their usage of English articles. This study also aimed to illuminate the effectiveness of explicit instruction of the English article system on the learners' appropriate article usage. The investigation adopted the cognitive linguistic concept (i.e., boundedness) as a novel insight into noun countability and English article usage. From both a theoretical and a practical point of view, this study explored the potential that the CL approach facilitates an opportunity for Japanese EFL learners to gain deeper understandings of noun countability and the English article system.

Chapter 3

EXPERIMENT 1

3.1 Overview

As previous research (e.g., DeKeyser, 2005) has claimed, the English article system is one of the most difficult items to acquire for ESL learners whose L1s do not have article systems or have very different systems, and such a grammatical item is strongly resistant to instructional treatment. One of the possible reasons for Japanese EFL learners' difficulty in the appropriate use of English articles concerns noun countability. Article usage, especially the use of the indefinite articles *a(n)* and the zero article, is influenced by noun countability. In other words, understanding English noun countability is crucial for mastering appropriate usage of English articles. Previous research, however, has revealed EFL learners' difficulty in noun countability and article use. Master (1990), for example, pointed out the domination of the zero article and the delayed acquisition of the indefinite article. He attributed the lag to difficulty in controlling the count-mass distinction of English nouns. Yoon (1993) also suggested that when Japanese speakers intuitively judged an English noun as a mass noun, they did not change their judgement, even though the noun appeared in the count context and required the indefinite article. These results demonstrate that Japanese EFL learners struggle with the countability shift between count and mass. Their struggle seems to be reasonable, however, because the Japanese language does not distinguish the countability of nouns: Japanese nouns always appear in mass syntax as bare nouns. Japanese EFL learners, therefore, do not have a habit of paying attention to noun countability in their L1. Regarding the grammatical distinction between count and mass, one question arises: do Japanese EFL learners make the count-mass distinction of nouns despite the fact that Japanese nouns always mark mass syntax? If so, how do they understand and judge noun countability? Experiment 1,

therefore, investigated the extent to which Japanese EFL learners understand noun countability and how they judge it.

More specifically, Experiment 1 focused on the relationships in Japanese EFL learners' judgement of noun countability between English nouns and their Japanese translations. When an English noun is translated into Japanese, there are two types of Japanese translations according to the countability of the English noun. One is the case where the same Japanese translation is provided for both count and mass meanings (e.g., *stone* is translated as 石 [*ishi*] for the count and the mass meanings), and the other the case where different Japanese translations are applied depending on the countability type (e.g., *chicken* is translated as にわとり [*niwatori*] for the count meaning and 鶏肉 [*keiniku*] for the mass meaning). In the latter case, there is a one-to-one correspondence in countability type between English nouns and their Japanese translations.

There were two research questions in Experiment 1. Firstly, the experiment aimed to examine the relationship in noun countability between English and Japanese, when an English noun has the same Japanese translation both for count and mass meanings. In that case, a single Japanese translation represents both count and mass meanings. Japanese nouns, however, do not fundamentally concern countability. In other words, while a single English noun may possibly represent both countable and uncountable meanings, its Japanese translation does not have such a feature as noun countability. How do Japanese EFL learners judge the countability of English nouns and their Japanese translations? Moreover, what is the relationship in noun countability between the two languages?

Secondly, Experiment 1 investigated whether Japanese EFL learners' judgement on countability would be easier when an English noun has different Japanese translations each for count and mass meanings, than when the same Japanese translation is applied. In the case where an English noun has a different Japanese translation for each countability type, both languages correspond to each other in light of noun countability. It is predicted that such a correspondence would help Japanese EFL learners judge appropriately English noun

46

countability, because they can rely on the difference of Japanese translations in judging whether the English noun is count or mass. In contrast, when the same Japanese translation is applied to both the count and the mass meanings of an English noun, the learners cannot distinguish noun countability by Japanese translations. Japanese EFL learners may have more difficulty in judging countability when English nouns have the same Japanese translations for both count and mass meanings. If Japanese translations induce clear understanding of English noun countability and appropriate use of English articles, Japanese EFL learners will decrease the difficulty of acquisition of the English article system. Experiment 1, therefore, also explored the potential usefulness of Japanese translations in learning the count-mass distinction of English nouns. The research questions of Experiment 1 were as follows:

RQ1. What is the relationship in countability judgement between English and Japanese nouns?

RQ2. If there is a relationship in countability judgement between the two languages, how do Japanese translations and their English counterparts affect each other, especially in the case of English nouns with different Japanese translations for count and mass meanings?

3.2 Method

3.2.1 Participants

Forty-three Japanese EFL learners participated in Experiment 1. They were all Japanese undergraduate students who mainly studied English in a university in Japan. They had received formal English education in Japan for approximately six to eight years at the point of this experiment. None had experience living or studying abroad for more than three months. All the participants took the vocabulary size test (Nation & Beglar, 2007). Following much SLA research demonstrating high correlations between learners' vocabulary size and their L2

proficiency, especially L2 reading and writing (e.g., Ibrahim et al., 2016; Zareva et al., 2005), Experiment 1 employed the participants' vocabulary size as the index of their English proficiency. The mean score on the vocabulary size test was 57.4 (*SD* = 8.7). Their estimated vocabulary size ranged from 4,100 to 7,700 (*Max* = 10,000; *Mean* = 5,740; *SD* = 870).

3.2.2 Materials

One hundred and thirty-two common English nouns were used in Experiment 1 (see Appendix 1 for stimulus words). The target words were 109 English nouns which can be used in both count and mass syntax. The noun *fire*, for example, can appear in both count and mass contexts. In the count context, *fire* needs to take the indefinite article *a* (e.g., "*A fire broke out on the ferry*") or to be pluralized (e.g., "*Two big fires made the headlines in the paper*"). On the other hand, the *mass* context allows the noun to be used as a bare noun with the zero article (e.g., "*Horses are afraid of fire*").

Regarding Japanese translations for the target English nouns, there are two patterns of translations according to the countability type of English nouns. In one case, an English noun has a different Japanese translation for its count and mass meaning. For example, the noun *chicken* is translated into Japanese as にわとり [*niwatori*] in the count context (e.g., "*I keep chickens on my farm*"), while *chicken* is translated as 鶏肉 [*keiniku*] in the mass context (e.g., "*I had chicken for dinner*"). In the other case, the same Japanese translation is applied regardless of the countability type of an English noun. The noun *egg* is often used in both count and mass contexts (e.g., "*I eat two eggs every morning*" for count syntax, "*You have egg on your chin*" for mass syntax). *Egg* has the same Japanese translations for both count and mass meanings: it is translated as 卵 [*tamago*] in either syntax. Fifty nouns of the target English words had different Japanese translations for each count and mass meaning (see Appendix 1.2), and the rest of the target words (i.e., 59 English nouns) had the same Japanese translations for both count and mass meanings (see Appendix 1.1). In sum, the target Japanese translations were 159 words in total: 100 words for 50 English nouns with different

translations for each count and mass meaning, and 59 words for English counterparts with the same translations for count and mass meanings.

As fillers or dummy items, 23 English nouns were prepared (see Appendix 1.3). The majority of the fillers were collective nouns (e.g., *furniture*, *luggage*), which generally denote mass syntax. There were also nouns which have the same forms for both the singular and the plural (e.g., *cattle*, *fish*). The same number of Japanese translations for the filler English words were prepared (i.e., 23 Japanese words).

All the Japanese translations used in Experiment 1 were made in reference to the *Genius English-Japanese Dictionary* (Konishi & Minamide, 2001) and the *Kenkyusha's English-Japanese Dictionary For The General Reader* (Matsuda, 1999).

3.2.3 Procedure

The participants were asked to judge the countability of the 109 target English nouns, using a seven-point scale. The scale was from 1 for *absolutely uncountable* to 7 for *absolutely countable*. The intermediate value, 4, means that the countability of a noun cannot be decided. They also judged the countability of 159 Japanese translations of these English words on the same seven-point scale. The target words were randomly displayed in isolation on a computer screen one by one. The seven-point scale was also displayed on the screen under the target words. The participants were asked to press the keys corresponding to the numbers of the scale.

In order to counterbalance the two languages, the participants were divided into two groups. One group judged the countability of English nouns first, and then, that of Japanese translations. The other group started with judgement of the countability of Japanese translations.

All the participants took the vocabulary size test after judging the countability of English nouns and their Japanese translations.

3.2.4 Data Analysis

The collected data were analyzed using SPSS. Correlation analyses were carried out in order to examine the relationship in Japanese EFL learners' countability judgement between English nouns and their Japanese translations. The analysis was based on the mean values of each English noun and its Japanese translation of the participants' responses.

3.3 Results

Overall results showed positive correlations in Japanese EFL learners' countability judgement between English nouns and their Japanese translations. It is suggested that the learners' countability judgement of English nouns was related to that of Japanese translations. The mean values of each English noun and its Japanese translation are given in Appendix 1. This section reports the results of correlation analyses, which show the relationships in countability judgement between English nouns and their Japanese counterparts.

With respect to the countability judgement on the English nouns with the same Japanese translations for mass and count contexts, there was a strong positive correlation between English nouns and their Japanese translations ($r = .819$, $p < .001$). The result indicates that the participants' countability judgements on English nouns corresponded to those on Japanese translations of the English nouns (see Figure 3.1).

Regarding English nouns with different Japanese translations for mass and count contexts, there were 100 Japanese translations for 50 English target nouns, because each English noun had two Japanese translations depending on the countability type: one for the count meaning and the other for the mass meaning. The results revealed that there were weak positive correlations in the participants' countability judgement between English nouns and their Japanese translations, regardless of the difference in the countability type of Japanese translations. For Japanese translations with count meanings, the participants' noun-countability judgement was correlated between English and Japanese ($r = .407$, $p < 0.01$). The

same result was observed among Japanese translations with mass meanings ($r = .398$, $p < 0.01$) (see Figure 3.2).

The overall results suggest that Japanese EFL learners' countability judgement on Japanese translations was related to those on English nouns. It is noteworthy, however, that the participants judged the countability of 54 Japanese translations independently of the countability of their English counterparts, although the result showed no statistical significance.

Figure 3.1. *The Scatterplot Depicting the Cross-Linguistic Relationship in the Mean Values of Noun Countability for the English Nouns with the Same Japanese Translations in Mass and Count Contexts*
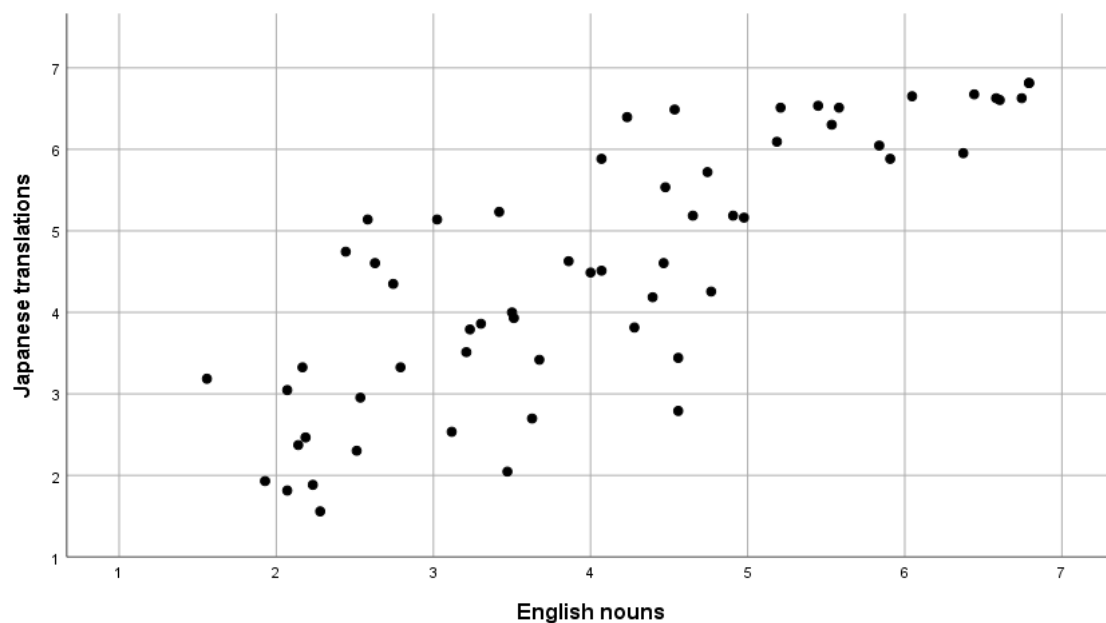
Figure 3.2. *The Scatterplot Depicting the Cross-Linguistic Relationships in the Mean Values of Noun Countability for the English Nouns with Different Japanese Translations in Mass and Count Contexts*
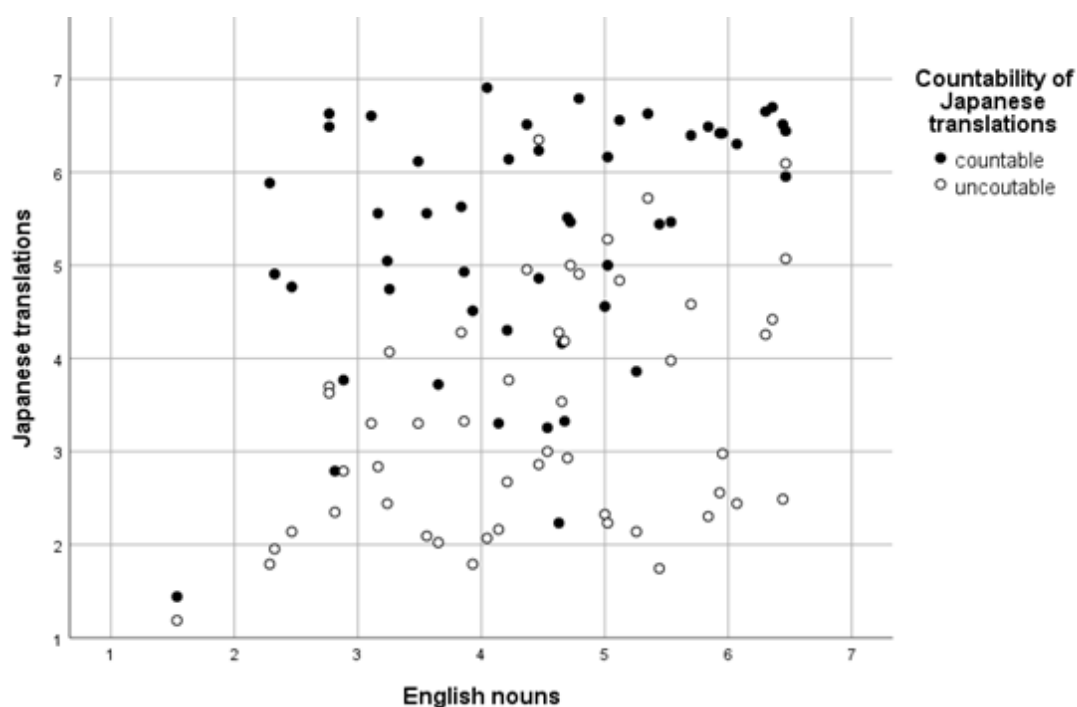
3.4 Discussion

3.4.1 Overview

The overall results showed positive correlations in Japanese EFL learners' countability judgement between English nouns and their Japanese translations. This suggests that the learners' countability judgement on English nouns was related to that on their Japanese translations. English nouns with the same Japanese translations for both count and mass meanings, however, showed stronger correlations with their Japanese translations than did those with different Japanese translations. Experiment 1 investigated the relationship in countability judgement between English and Japanese nouns, and the potential of Japanese translations in facilitating the countability judgement of English nouns. In the subsequent sections, the following two issues are discussed: (1) the strong correlation between English

nouns and their Japanese translations, and (2) the potential usefulness of different Japanese translations for count and mass meanings.

3.4.2 The Strong Correlation Between English Nouns and Their Japanese Translations

The first purpose of Experiment 1 was to investigate the relationship in countability judgement between English nouns and their Japanese translations. In the case of English nouns with the same Japanese translations for mass and count contexts, the results showed a strong positive correlation in countability judgement between English and Japanese nouns. On the other hand, the results of English nouns with different Japanese translations showed positive yet weak correlations in both count and mass meanings between English and Japanese. The overall findings suggest that the countability of English nouns corresponded to the countability of Japanese translations for these English nouns, and vice versa. It was questionable whether Japanese EFL learners could judge the countability of Japanese nouns because Japanese nouns are syntactically different from English nouns in that the Japanese language does not mark count syntax for nouns. It was therefore expected that Japanese speakers' countability judgement on Japanese translations would be different from that on English nouns due to the syntactic difference between the two languages. However, contrary to this expectation, the results showed that there was a strong correlation in countability judgement between English nouns and their Japanese translations in the case that Japanese translations were identical in both mass and count contexts.

There are two possible reasons for the strong correlation between English nouns with the same Japanese translations for mass and count contexts, and their Japanese counterparts. One reason may be that noun-countability judgements of Japanese translations were influenced by those for their English counterparts. It is possible that the countability of English nouns affects that of Japanese translations. Because Japanese is a language whose morpho-syntactic rules do not always require its speaker to indicate noun countability, Japanese speakers usually do not need to pay attention to noun countability when they use

Japanese nouns. For most Japanese speakers, therefore, it may be not until they start to study English that they encounter the concept of noun countability. Because of this linguistic feature of the Japanese language, when Japanese learners of English think about the countability of Japanese nouns, it is plausible that they would rely on their knowledge of English noun countability.

There is a claim that insists on interconnection between languages in the bilingual mind. Cook (2016), for example, proposes the concepts of "multi-competence." He defines multi-competence as "the overall system of mind or a community that uses more than one language" (p. 3). The inter-relationship between two languages changes through a continuum from total separation to total integration of languages. L2 users' multi-competence moves between the two poles over time. Each language in multi-competence exists interconnectedly and the knowledge of an L1 and an L2 are integrated in the bilingual mind. The integrated knowledge functions as a whole system and, therefore, affects a bilingual's cognition in either language.

Some previous studies in support of the notion of multi-competence demonstrated the potential that L2 systems influence learners' L1 systems such as lexicon, semantics and conceptual representations. Pavlenko and Malt (2011), for example, investigated how Russian-English bilinguals name household objects (e.g., cups, glasses, and mugs) and compared their naming patterns with those of native speakers of Russian and English. The bilingual participants in their study were shown pictures of common household objects and asked to name them in their L1 (i.e., Russian). The results showed that bilinguals' naming patterns were largely affected by the age when they moved to the United States of America (U.S.A.): the younger they were when they moved to the U.S.A., the more strongly the L2 (i.e., English) affected their L1 naming patterns. Athanasopoulos et al. (2011) also examined the perception of color categories by Japanese-English bilinguals. Unlike English, Japanese has an additional term ("*mizuiro*" indicating *light blue* in English) for what English speakers call *blue*. They examined the extent to which Japanese-English bilinguals were sensitive to the distinction between blue and light blue. The results showed that the bilingual who used

Japanese more frequently were more sensitive to the distinction between the two blue colors than those who used English more frequently. Athanasopoulos et al. suggested that the accessibility of a perceptual category depends on whether a person is immersed in a linguistic community where the particular perceptual category is frequently used. In sum, these findings of previous studies indicate that experience with an L2 could affect conceptual representations of learners' L1.

From the point of view of multi-competence, it is possible that when Japanese EFL learners judge the countability of Japanese nouns, they elicit information on noun countability from their integrated knowledge. The grammatical feature of noun countability is obviously more salient in English than in Japanese. Noun countability is, therefore, linked strongly to English in the learners' minds. In other words, Japanese EFL learners consider a Japanese noun's countability via knowledge accumulated in learning English nouns. Accordingly, their judgements on the countability of Japanese translations are necessarily affected by the countability of English nouns. Especially in the case of English nouns with the same Japanese translations for count and mass meanings, Japanese translations are the exact same whichever countability the English nouns mark. English nouns and their Japanese translations, therefore, are in one-to-one correspondence, regardless of the countability type that English nouns represent. In this case, English and Japanese nouns strongly link to each other, and thus the influence of English noun countability becomes robust.

Another potential reason for the correspondence in countability judgement between English and Japanese nouns is that language does not affect their judgement on noun countability. Nouns in some languages (e.g., English, French) make syntactic distinctions between count and mass, while those in other languages (e.g., Japanese, Chinese) do not normally mark countability syntactically. Referents of nouns, however, are the same in all languages regardless of whether languages make count-mass distinctions. In other words, language users construe objects similarly regardless of which language they use or whether the language has count-mass syntax. If language users decided noun countability solely

according to the referents of nouns, there would be no difference in countability judgement between speakers of any language.

Some research has showed no influence of language on noun countability. Barner et al. (2009), for instance, examined whether count-mass syntax affects speakers' construal of entities in the world. Specifically, they investigated how count-mass language speakers (i.e., English speakers) and classifier language speakers (i.e., Japanese speakers) perceive words, using two tasks (object-substance rating and quantity judgement tasks). The results did not show that English and Japanese speakers construed referents of nouns differently. Concerning the object-substance rating task, Barner and his colleagues expected that because Japanese nouns do not mark countability and are all treated as mass nouns, Japanese speakers would be less likely to construe referents of nouns as "object" than English speakers. English and Japanese speakers, however, showed considerable agreement in their ratings for the target nouns, despite the fact that the Japanese language lacks a count-mass distinction of nouns. The same result was observed in the quantity judgement task. Although it was expected that English speakers were more likely to depend on number, the result showed that English and Japanese speakers similarly judged quantity based on number. Barner et al. concluded that count-mass syntax does not affect speakers' construal of nouns, but all languages share a universal ontology of entities independent of syntax.

Fundamentally, countability judgement is based on a person's perception; it requires one to judge the referent of a noun as a discrete individual or an unindividuated entity. When a person who can use multiple languages construes objects, he or she judges the countability of a noun in a similar manner regardless of the language he or she uses. Thus, the Japanese EFL learners in the present study may have judged the countability of the target nouns based on non-linguistic perception (i.e., construal of referents of nouns), and their noun-countability judgement did not show linguistic influence (i.e., the existence of count-mass syntax). The fact that the Japanese language does not make the distinction of count-mass syntax appears to have little, in any, effect on Japanese EFL learners' noun countability judgement.

3.4.3 The Potential Usefulness of Different Japanese Translations for Count and Mass Meanings

The second purpose of Experiment 1 was to investigate how English nouns and their Japanese translations affected each other in Japanese EFL learners' countability judgement, especially in the case of English nouns with different Japanese translations for count and mass meanings. The results showed that there was a weak but positive correlation in countability judgement between English and Japanese, when English nouns had different Japanese translations for mass and count contexts. The results contradicted the prediction mentioned above; it was expected that the countability of Japanese translations would be judged depending on their distinctive meanings according to countability type (i.e., count or mass). More specifically, it was predicted that, in the seven-point scale, the Japanese translations for mass meanings would take the values below 4.0, whereas those for count meanings would take the values above 4.0. The results of the Japanese translations, however, ranged from 1.2 and 6.9 regardless of their distinctive meanings for count and mass syntax. This result indicates that the participants did not judge the Japanese words based on the countability type that each Japanese translation denotes. If the prediction was right, there would have been no correlation between English and Japanese. The results, however, showed a positive correlation between English nouns and their Japanese counterparts, suggesting that the countability judgement on Japanese translations was related to that on English nouns rather than the distinctive countability type which the Japanese translations represent. In sum, the finding of English nouns with different Japanese translations for count and mass meanings was similar to that of English nouns with single Japanese translations.

The two possible reasons for the correspondence in noun-countability judgement between English and Japanese were proposed in the former subsection. The first reason reflecting the perspective of multi-competence (Cook, 2016), which insists the predominant influence of English over Japanese in countability judgement, seems to be more plausible. This is because the results showed the cross-linguistic relationships not only in noun-

countability judgement between English and Japanese in the English nouns with the same Japanese translations for mass and count contexts, but also those with different Japanese translations. It is reasonable that noun-countability judgement receives the bidirectional influence of the two languages in the case of the nouns with the same Japanese translations, because English nouns and their Japanese translations correspond to each other independently of countability. The correlations between English and Japanese, however, were also found to be statistically significant for the English nouns with different Japanese translations. More specifically, the countability judgement on Japanese translations corresponded to that on English nouns, regardless of the countability type that Japanese translations denote. These results might suggest that there is no influence of distinctive meanings of Japanese translations for each count and mass context on noun-countability judgement. This also implies that English noun countability possibly affects countability judgement on Japanese nouns which syntactically lack the count-mass distinction. As mentioned above, because the Japanese language does not have the count-mass distinction in syntax, Japanese EFL learners may necessarily rely on their knowledge of English nouns in thinking about the countability of Japanese nouns. It should be noted, however, that these findings only suggested the plausibility of cross-linguistic effects on noun-countability judgement, because this study did not compare Japanese EFL learners with Japanese monolinguals.

Although the overall results showed the correspondence in countability judgement between English nouns and their Japanese translations, it is noteworthy that the countability of more than half of the target Japanese nouns (i.e., 54 out of 100 Japanese translations) was judged separately from the countability judgement of their English counterparts, when English nouns had different Japanese translations for count and mass contexts. This study focused on whether Japanese EFL learners can judge the countability of English nouns more easily when the English nouns have different Japanese translations for each count and mass meaning, compared to English nouns with the same Japanese translation for both meanings. In the latter case, the learners cannot use Japanese translations in specifying the distinctive

countability type of an English noun, because a single Japanese translation is applied to both count and the mass meanings. On the other hand, when an English noun has different Japanese translations for each countability type, the Japanese translations can represent the distinctive countability type of the English noun. It was, therefore, predicted that Japanese EFL learners might decide the countability of an English noun by referring to the distinctive Japanese translations for each countability type of the noun. In other words, the learners were expected to rely on the different Japanese translations in judging whether an English noun denotes count or mass meanings.

The results of Experiment 1 showed the participants judged the countability of 54 Japanese translations independently of their countability judgement of the English counterparts. This means that the countability of some English nouns and that of their Japanese translations were independent of each other. This finding suggests that some Japanese translations have the potential to distinguish the count-mass status of English nouns. If Japanese translations can be used to distinguish the countability types of English nouns, Japanese EFL learners can associate each countability type of English nouns with distinctive Japanese translations. Accordingly, they would find the difficulty of judging English noun countability reduced. Furthermore, if Japanese translations induce the syntactically appropriate use of English nouns (i.e., the choice between count and mass syntax), Japanese EFL learners will have less of a struggle with English article usage. These findings from Experiment 1, therefore, appear to imply that some Japanese translations might be useful in deciding the countability of English nouns, and thus facilitate the acquisition of the English article system.

3.5 Conclusion

Experiment 1 investigated the relationships in Japanese EFL learners' countability judgement between English nouns and their Japanese translations. The results showed

positive correlations between English and Japanese in both conditions: English nouns with the same Japanese translations for count and mass meanings, and those with different Japanese translations. The results demonstrate the cross-linguistic relationship in noun-countability judgement between the two languages, suggesting the influence of English noun countability on countability judgement of their Japanese translations. It is possible that Japanese EFL learners, whose L1 makes no count-mass distinction of nouns, judge the countability of Japanese nouns depending on that of their English counterparts. The overall results, therefore, may suggest that distinctive meanings of Japanese translations according to countability type had no effect on Japanese EFL learners' countability judgement of Japanese nouns.

Experiment 1 also focused on the potential usefulness of Japanese translations in distinguishing the count-mass status of English nouns. More specifically, this study examined whether English nouns with different Japanese translations for both count and mass syntax would make it easier for Japanese EFL learners to judge their countability types, due to the correspondence between distinctive countability types of English nouns and different Japanese translations for both count and mass syntax. Although not having statistical significance, the results showed that the countability of more than half of the Japanese translations was judged separately from the countability of their English counterparts, indicating that the countability of some English nouns and that of their Japanese translations were independent of each other. This finding suggests that some Japanese translations may have the potential to be useful for distinguishing count and mass meanings of English nouns. If Japanese EFL learners could refer to Japanese translations in deciding the countability of English nouns, they would use the count-mass syntax of English nouns more correctly. Accordingly, the potential usefulness of Japanese translations in noun-countability judgement would lead to the appropriate usage of English articles by Japanese EFL learners.

As for the limitations of Experiment 1, it is possible that some Japanese translations may not be reliable in expressing mass-count meanings. All the Japanese translations used in Experiment 1 were selected in reference to two English-Japanese dictionaries. It may be the

case, however, that the count and mass meanings of Japanese translations from the dictionaries did not reflect the Japanese learners' sense of count and mass distinctions. In other words, the dictionaries may fail to provide appropriate Japanese translations for distinctive countability types. Therefore, the results of this study might have been derived from inappropriate Japanese translations. The results showed that the participants' countability judgement did not rely on Japanese translations for distinctive countability types, and rather might have received the influence of the countability of English nouns. If Japanese translations were consistent with the participants' sense of count-mass distinctions, different observations might have been found. Thus, there is still the possibility that Japanese translations facilitate countability judgement of English nouns, although this study could not demonstrate the usefulness of Japanese translations. In addition, this study did not conduct follow-up interviews with the participants. It would be worth asking them about the reasons for their answers. With the interviews, more conclusive findings might have been obtained.

Chapter 4

EXPERIMENT 2

4.1 Overview

Experiment 1 investigated the relationship in countability judgement between English nouns and their Japanese translations. It was predicted that when Japanese translations distinguished distinctive countability types, they might facilitate judgement of English noun countability by linking each countability type of English nouns to different Japanese translations. The results, however, showed positive correlations between English and Japanese in both conditions: English nouns with the same Japanese translations for count and mass meanings, and those with different Japanese translations. The results did not demonstrate the usefulness of Japanese translations. Experiment 2, therefore, aimed to explore another effective way for learning the English article system without consideration for Japanese translations.

As mentioned in Chapter 2, one of the possible reasons for Japanese EFL learners' difficulty in the appropriate use of English articles is associated with a learning approach. Article usage is influenced by noun countability. The conventional learning approach that most Japanese schools adopt, however, does not fully explain the concepts of noun countability, because it explains only the relationship between types of English nouns and article choice; the conventional approach simply says that a countable singular English noun takes an indefinite article, and an uncountable English noun takes the zero article. Accordingly, Japanese EFL learners who have been educated in the conventional approach do not understand the appropriate concepts of noun countability or know how they should judge the countability of English nouns. Experiment 2, therefore, examined whether Japanese EFL learners could understand noun countability and use English articles appropriately via a

learning approach that differed from the conventional approach: a CL approach. Many empirical studies (e.g., Boers, 2000, 2001; Verspoor & Lowie, 2003; Yasuda, 2010) showed the usefulness of cognitive linguistics insights in SLA. Because cognitive linguistic insights are originally based in the linguistic knowledge that L1 speakers implicitly acquire, advocates for the CL approach claim that cognitive linguistic insights help L2 learners understand how language and thought work together in the mind of L1 speakers. In CL, noun countability is explained in terms of clearness of a boundary. The concept of boundaries seems to be appropriate as an explanation for the English article system, because this concept can explain properly noun countability that underlies English article usage. The application of cognitive linguistic insights may provide Japanese EFL learners with new and deeper observations on noun countability and the English article system, even though their knowledge of English article usage has already been developed using the conventional approach. If cognitive linguistic insights provided the learners with deeper understanding of noun countability, their difficulty in acquiring the English article system would be decreased. It is important to examine whether the CL approach is indeed more effective than the conventional approach in improving Japanese EFL learners' knowledge of the English article system. The research question of Experiment 2 was as follows:

RQ. Do Japanese EFL learners understand the English article system more appropriately through the CL approach?

4.2 Method

4.2.1 Participants

Fifty-four Japanese EFL learners participated in Experiment 2. They were all Japanese undergraduates who belonged to the department of English at a university in Japan. They had received formal English education in Japan for approximately six to eight years at the time of

the experiment. None had lived or studied abroad for more than one year. The participants were divided into two groups in terms of learning approach: a CL approach group and a conventional approach group. Twenty-seven participants were placed in each of two groups. Two participants in the conventional approach group were removed from subsequent analyses because they did not accomplish their tasks. Consequently, the analyses of the study were carried out on 52 participants (i.e., 27 participants for the CL group and 25 for the conventional group).

4.2.2 Materials

All the participants took two kinds of intelligence test: Raven's Progressive Matrices and Number Series Task. Both intelligence tests measure cognitive function, especially reasoning ability. They also took a vocabulary size test (Nation & Beglar, 2007). Moreover, they were asked to take an original article test which assessed their ability to use English articles appropriately. The article test consisted of 60 target words and 20 dummy items (see Appendix 2.1 and 2.2 for stimulus words). All the target words and the dummy words were English nouns which could appear in both count and mass contexts. With respect to the target words, two sentences were created for each noun by manipulating their countability types. That is, two types of question items were made for each of the 60 target words: one for the count context and another for the mass context. For the items occurring in the count context, the participants needed to choose the indefinite article as the correct answer. The zero article was the correct choice in the mass context. Regarding the dummy items, two questions were prepared for each word. Unlike the target words, the correct answers for dummy items were either the indefinite article or the zero article. In other words, two questions made from a dummy noun appeared in either the count or the mass context. In total, 120 sentences for the target words and 40 sentences for the dummy items were prepared. In order to create appropriate and reliable test sentences, native speakers of English proofread all sentences. All the sentences used in the article test are given in Appendix 3.1 and 3.2.

These target words also consisted of concrete and abstract nouns. The same number of nouns were prepared for each type; 30 items were concrete nouns and 30 items abstract nouns. The abstractness of each target word was decided with reference to the study by Brysbaert et al. (2014). Brysbaert et al. asked over 4,000 residents in the United States of America to rate the abstractness of 37,058 English words using a 5-point scale ranging from abstract to concrete. According to the scale, abstract words had lower ratings while concrete words had higher ratings. In the present study, English nouns which were rated under 2.5 points were chosen as abstract nouns and those above 4.0 points were chosen as concrete nouns (see Appendix 2.1 for the ratings by Brysbaert et al.). In addition, half of the 60 target words (i.e., 15 concrete nouns and 15 abstract nouns) were also used in a training phase for Experiment 2. The rest of the target words appeared only in the article test.

In the article test, each test item and its article appeared in a single blank in a question. The participants were asked to choose the appropriate answer from two choices: the item with the indefinite article or one with the zero article. When question items appeared with adjectives, the adjectives were also put in the blank. Example sentences of the target words and dummy items are given below.

1. glass: a concrete noun
    a. Be careful with that vase; it is made of *glass*. (the zero article)
    b. I filled *a glass* with water. (the indefinite article)

2. failure: an abstract noun
    a. I'm not afraid of *failure*. (the zero article)
    b. His latest novel was *a failure*. (the indefinite article)

3. hair: a dummy word for the zero article

    a. She used to have *long hair*.

    b. Why is coconut oil good for *hair*?

4. straw: a dummy word for the indefinite article

    a. She sucked the lemonade through *a straw*.

    b. I put *a straw* in it, and I drank it.

There were two versions of training materials for learning the English article system and English noun countability. Each material focused on a specific learning approach: the approach based on cognitive linguistic insights relating to noun countability and the conventional approach which has been widely adopted in English education in Japan. The materials for the CL approach group (see Appendix 4.1) were based on the concepts of *boundedness* proposed by Talmy (2000). According to Talmy, English article usage requires a speaker to decide whether the referent of a noun is countable or uncountable. English native speakers are, therefore, sensitive to the individuation and boundedness of objects. For example, if the referent of a noun has an unclear outline, it is recognized as an uncountable, non-individuated substance. On the contrary, when the referent of a noun has a clear outline, it is recognized as a countable, individuated object. The concepts of individuation and boundedness are applicable to explanations of noun countability underlying English article usage. In particular, the concepts can explain why abstract or material nouns, which are introduced as mass nouns in the conventional approach, come to be countable in some cases.

The materials for the conventional approach group (see Appendix 4.2) were developed with reference to English grammar books (Ando, 2005; Sugiyama, 1998). It focused on classification of English nouns (e.g., common, abstract, collective, and material nouns). This approach, as pedagogical grammar, has been employed for many years in Japan. In other words, the participants in the conventional approach group learned the English article system

and noun countability in the way they had experienced before. Despite the difference in learning approach, the materials were written in the participants' L1 (i.e., Japanese), and contained the same visual aids and sample sentences.

4.2.3 Procedure

Experiment 2 consisted of four phases: a pretest, training, an immediate posttest and a delayed posttest. At the pretest stage, all the participants were asked to take four kinds of test: two intelligence tests (Raven's Progressive Matrices and Number Series Task), the vocabulary size test, and the original article test. All the tests were administered using computers. Figures, questions and possible answers were displayed on a screen. The participants considered the correct answers from possible choices and simply pressed a single key corresponding to their choice. Based on the results of the pretest, the participants were divided into two groups in such a way that each group was equivalent in intelligence, vocabulary size, and ability of English article usage. The two groups were the CL approach group and the conventional approach group.

In the training phase, the participants were asked to carry out six sets of training on English article usage. They took the training courses on the internet individually, and learned the English article system and English noun countability throughout the courses. Depending on the group to which each participant belonged, two different training materials were prepared. Because these materials adopted different approaches for learning the English article system, they were completely different from each other in terms of explanations and feedback (see Appendix 5.2 and 5.3 for sample feedback). One training set was conducted repeatedly until the participants got a perfect score on practice questions (see Appendix 5.1 for sample practice questions). The training courses took the participants from one week to three weeks.

Immediately after completing all six sets of training, the participants took the immediate posttest. Four weeks after the immediate posttest, they took the delayed posttest.

The two posttests were identical to the original article test administered in the pretest, consisting of the same test items, which were randomized in each test.

4.2.4 Measures

As a statistical technique for analysis, Experiment 2 adopted generalized linear mixed-effects models (GLMMs). Instead of the default use of ANOVA, mixed-effects models have been prevailing recently in the field of SLA (see Cunnings, 2012), because they can provide benefits to SLA researchers. In conventional statistical methods such as ANOVA, two separate analyses have been conducted to examine subject and item variation: one for data averaged over subjects and another for data averaged over items. The conventional techniques cannot take both subject and item variances into account simultaneously. The alternative way offered by mixed-effects models, called crossed random effects models, make it possible to consider both subjects and items at the same time. In other words, with mixed-effects models, SLA researchers can analyze both subject-level and item-level features simultaneously. Furthermore, mixed-effects models allow random variance to be taken into account by modelling what are called random-effects structures. There is always some unexplained variance in experimental observations. For example, it could be that the performances of most participants are correlated in a way, but there is no such observation in other participants. It is beneficial to take such variance into account statistically, instead of eliminating it as error variance. Mixed-effects models can consider various possible situations or observations.

Mixed-effects models consist of two kinds of effect: fixed and random effects. Fixed effects are independent variables which include categorical factors or continuous predictors. Any factors or predictors that researchers choose can be included in models as fixed effects. Random effects are associated with some variance in observations, such as unexplained differences between subjects or items. There are no complete explanations for why and how different subjects or items affect variation in an observation. By modelling random effects, researchers can take into consideration unexplained variance relating to subjects and items.

In Experiment 2, seven measures for the mixed-effects analysis were prepared. Each measure was a predictive variable which was considered as affecting the participants' performance on English article usage in the article tests.

Approach

Experiment 2 aimed to examine whether Japanese EFL learners could benefit from the CL approach when learning noun countability and the English article system, compared to the conventional approach. It was predicted that the difference of learning approach would affect the participants' English article usage accuracy. More specifically, the CL approach might have more positive effects on appropriate English article usage than the conventional approach. Since CL is based on linguistic representations of L1 speakers, the cognitive linguistic insights into noun countability (i.e., boundedness and individuation) are thought to be more natural than explanations in pedagogical grammar. Approach, therefore, was set as one of the fixed effects. Approach was a categorical variable with two levels (i.e., the CL approach or the conventional approach).

Test

The original article test was administered three times through Experiment 2: the pretest, the immediate posttest, and the delayed posttest. The training period when the participants learned the English article system and noun countability was interposed between the pretest and the immediate posttest. In order to examine the effects of training on appropriate English article usage, Test was set as a fixed effect. Especially, the delayed posttest, which was implemented four weeks after the immediate posttest, concerned the duration of the effect of the training. Test was a categorical variable with three levels (i.e., the pretest, the immediate posttest, and the delayed posttest).

Countability

Experiment 2 focused on the acquisition of the English article system by Japanese EFL learners. English article usage, especially the proper use of the indefinite article and the zero article, is strongly influenced by noun countability. Noun countability, therefore, is one of the major factors which could affect the participants' performance on article usage. The target words were English nouns which can be used in both count and mass contexts. The article tests contained 60 questions where the target nouns needed the indefinite article as the correct answer, and 60 questions where the target nouns took the zero article. That is, two types of question were created from a single target noun: one for countable use and another for uncountable use. Countability was a fixed effect and a binary variable (i.e., countable use or uncountable use).

Abstractness

As a factor affecting judgement on English noun countability, this experiment focused on abstractness of English nouns. Pedagogical grammar in the conventional approach often explains that abstract nouns are treated as uncountable nouns which are used without the definite article and not pluralized, while concrete objects which are taught as common nouns are countable. Abstractness of English nouns, therefore, would affect the countability judgement of Japanese EFL learners who had received English education through pedagogical grammar. Thirty concrete nouns and 30 abstract nouns were chosen as the target words in this study, based on the concreteness ratings by Brysbaert et al. (2014). Abstractness was set as a fixed effect which was a categorical variable with two levels (i.e., abstract nouns or concrete nouns).

Learnedness

Half of the 60 target words (i.e., 15 concrete nouns and 15 abstract nouns) were used in the training period in the experiment. The rest of the target words appeared only in the article

tests. In other words, the participants had encountered half of the target words at the training phase before they took the posttests, while they saw the other half only in the tests. At the pretest stage, there was no distinction of learnedness of the target words. By examining response accuracy for the target words in terms of learnedness, it would be revealed whether the participants could apply what they learned through the training to the items which appeared only in the tests. If they showed good performance only on the items which they learned at the training phase, this would indicate merely the result of memorization. Learnedness was set as a fixed effect which was a binary variable (i.e., items that were learned in advance or those that appeared only in the article tests).

Participant

Participant was set as a random effect. As mentioned above, random effects are for unexplained variance in observations. The participants in the study were taken from different classes in an English department at a university. Furthermore, they had been taught English by different teachers in different junior high and high schools. Accordingly, it was unrealistic to assume that all the participants had had the exact same experiences with English. Since their past experiences with English were an uncontrollable variable which might have influenced their response accuracy in the article tests, the individual differences of the participants were also taken into account statistically.

Item

Item was also set as a random effect. The target words in Experiment 2 were selected from a huge number of English nouns. Each word had latent features which were not identified as fixed effects. For example, each target item is presumably different in familiarity or frequency, and the differences might have affected the participants' responses. These latent features such as familiarity and frequency were, however, uncontrolled in this experiment and thus considered as unexplained variables. Individual differences of the target items would be

71

expected, so Item was included as a random effect.

4.2.5 Data Analysis

Crossed random effects models were used to simultaneously examine the influences of both learning approaches (the CL approach and the conventional approach) and item characteristics (abstractness, countability and learnedness) on the participants' response accuracy for the article tests. The models explained the effects of learning approaches and item characteristics at both the subject and the item levels. The models also considered unexplained random variance pertaining to participants and items. The analyses were carried out using the lme4 software package in R (Bates et al., 2014). The dependent variable was a binary response (i.e., correct or incorrect). Five fixed effects were set: Approach, Test, Countability, Abstractness, and Learnedness.

Approach was a categorical variable with two levels (the CL and the conventional approach). The variable, Approach, was set as a fixed effect in order to compare the effects of the CL approach and the conventional approach in learning the English article system. Test was also included as a fixed effect in order to examine the effectiveness of the article training. Test had three levels (the pretest, the immediate posttest, and the delayed posttest).

Countability, Abstractness and Learnedness referred to the influences of word characteristics on the participants' response accuracy. Countability was associated with the countability of the target nouns. By manipulating their countability types, two distinct sentences were generated from each target noun: one for a count context and another for a mass context. Countability, therefore, was a binary variable (countable use or uncountable use). Abstractness was a variable with two levels (abstract nouns or concrete nouns). The target words were also divided into two categories according to their learnedness. Half of the target words were used in the training phase while the other half appeared only in the article tests. Learnedness was a fixed effect with two levels (items with training experience or items without prior experience). Participant and Item were included as random effects because

72

random variation relating to person-specific and item-specific differences was expected.

First of all, an unconditional model (Model 0) was made. Only random intercepts, Participant and Item, were added in this model. The model estimated random variation of both unexplained differences among participants and the differences among items. In R programs, each model is specified as a formula that describes independent and dependent variables. In the present study, the dependent variable was the binary response (correct or incorrect) for the article tests. The independent variables of Model 0 were the two intercepts, Participant and Item. The formula for Model 0 was as follows:

Model 0 = glmer (Response ~ (1 | Participant) + (1 | Item), family = "binomial")

The formula indicates that the observation (i.e., Response) is explained by the two predictor variables (i.e., Participant and Item), and "family = binomial" means that the dependent variable, Response, is binomial. Throughout the analysis, 221 mixed-effect models were created. Model descriptions are listed in Appendix 6.

Next, Model 1 was created, which contained only the two fixed effects: Approach and Test. This model was the base model for the analysis because learning approaches and article tests would account for the research question of Experiment 2. Using this model as a base, other fixed effects and random effects were added in subsequent models. The formula for Model 1 was as follows:

Model 1 = glm (Response ~ Approach + Test, family = "binomial")

All subsequent models were built based on Model 1. A series of Model 2 were fixed effects models, containing Abstractness, Countability, and Learnedness, besides Approach and Test. Lower case letters were added arbitrarily to the model numbers. Models with different letters contained different combinations of fixed effects. All models except Model 0 and

Model 1 were distinguished by numbers and arbitrary letters, according to the fixed effects which were contained in the models. For example, Model 2a contained three fixed effects, Approach, Test and Abstractness, while Model 2f contained four fixed effects, Approach, Test, Countability and Learnedness. The formulas for Model 2a and Model 2f were as follows:

Model 2a = glm (Response ~ Approach + Test + Abstractness, family = "binomial")

Model 2f = glm (Response ~ Approach + Test + Countability + Learnedness,

        family = "binomial")

Eight combinations of fixed effects were prepared, including the base model which contained two fixed effects for Approach and Test.

A series of Model 3 were random intercepts models. Both the random intercepts by the participants and the items were added to each combination of fixed effects. Arbitrary letters were added to the model numbers in order to distinguish patterns of the fixed effects contained in the models. For example, models with the letter "d" contained four fixed effects for Approach, Test, Abstractness and Countability. The formula for Model 3d was as follows:

Model 3d = glmer (Response ~ Approach + Test + Abstractness + Countability

        + (1 | Participant) + (1 | Item), family = "binomial")

Models from 4 to 9 were random effects models. The random effects models contained random slopes for the fixed effects, as well as fixed effects and the two random intercepts. There were five steps to create the random effects structure; (1) selecting fixed effects, (2) adding the two random intercepts for Participant and Item, (3) adding random slopes concerning either or both of the two fixed effects for Approach and Test, (4) correlating the random slopes with the random intercepts for Participant and Item, and (5) estimating models

by iterating from Step 1 to Step 4. For example, Model 8b, which contained Approach, Test, and Countability as the fixed effects, correlated random slopes for Test with both intercepts by Participant and Item. The model estimated Response with three fixed effects and random slopes for Test by Participant and Item.

Model 8b = glmer (Response ~ Approach + Test + Countability + (1 + Test | Participant) + (1 + Test | Item), family = "binomial")

Models from 10 to 16 were interaction models. Interaction models included all five fixed effects and their interactions. There were 26 combinations of interaction. The random effects contained in each model varied depending on the model numbers. A series of Model 11, for example, contained the random intercept by Item and the random slope for Test by Participants as well as all the five fixed effects. Upper case letters were added arbitrarily to the model numbers. Different letters indicated different interaction patterns of variables. For example, models with the letter "E" contained the interaction between Test and Abstractness. The formula of Model 11E was described as below:

Model 11E = glmer (Response ~Approach + Countability + Learnedness + Test*Abstractness) + (1 | Item) + (1+Test | Participant), family = "binomial")

Model 11 estimated Response with all the five fixed effects, the interaction between Test and Abstractness, the random intercept by Item, and the random slope for Test by Participant.

As the basis for model selection in the analysis, Akaike's Information Criterion (AIC) was employed. AIC is a numeric value which ranks multiple competing models, and this criterion is increasingly being used as one of the model selection methods in statistical analyses. Each model is considered as a possible prediction of a phenomenon being observed. By comparing the AIC values of competing models, one can estimate which of them explains

the phenomenon most appropriately. The model with the lowest AIC value represents the best predictive model. The AIC values of all the mixed-effect models are given in Appendix 6.

After constructing multiple models and comparing them, the most plausible model was found. Model 15Q showed the lowest AIC value (19059.2). In order to make sure of the statistical significance of Model 15Q, the model was compared with Model 15S which showed the second lowest AIC value (19067.7), using the ANOVA function in R. Table 4.1 represents AIC values and model descriptions of Model 15Q and Model 15S. Table 4.2 shows the results of comparison between the two models, demonstrating that the AIC value of Model 15Q is significantly lower than that of Model 15S. The formulas of the Model 15Q and Model 15S are as follows:

Model 15Q = glmer (Response ~ Approach + Test + Abstractness + Countability
+ Learnedness + Test*Countability*Abstractness + (1 + Test | Participant)
+ (1 + Test | Item)

Model 15S = glmer (Response ~ Approach + Test + Abstractness + Countability
+ Learnedness + Test*Countability*Learnedness + (1 + Test | Participant)
+ (1 + Test | Item)

Table 4.1 *Summary of Model 15Q and Model 15S*

	Model description		
Model	**Fixed effects**	**Random effects**	**AIC**
Model 15Q	Approach + Learnedness + Test × Abstractness × Countability	by-participant intercept + by-participant slope for test + by-item intercept + by-item slope for test	19059.2
Model 15S	Approach + Abstractness + Test × Countability × Learnedness	by-participant intercept + by-participant slope for test + by-item intercept + by-item slope for test	19067.7

Table 4.2 *Results of Comparison between Model 15Q and Model 15S*

Model	npar	AIC	logLik	deviance	Chisq	Df	Pr (< Chisq)
Model 15Q	26	19059.2	-9503.6	19007	8.4654	0	< 2.2e-16
Model 15S	26	19067.7	-9607.9	19016			

4.3 Results

The collected data in Experiment 2 were analyzed using a GLMM. Mixed-effect models can handle not only fixed-effects variables, but also random variance across and within the participants and the items. After creating all possible mixed-effect models and estimating them, the most predictive model (i.e., the model with the lowest AIC value) was found. In this section, only the results of the most predictive mixed-effect model (Model 15Q) are reported.

The descriptive statistics of the participants' response accuracy of each variable in the article tests are given in Table 4.3. All the means are expressed in terms of the percentage of correct answers. The results of the most predictive mixed effects model (Model 15Q) are represented in Table 4.4.

Table 4.3. *Descriptive Statistics of Response Accuracy (%) of Each Variable in the Article Tests*

Variable		MEAN(%)	SD
Approach	Cognitive Linguistics	74.8	0.43
	Conventional	76.2	0.43
Test	Pretest	66.2	0.47
	Immediate posttest	80.7	0.39
	Delayed posttest	79.4	0.40
Abstractness	Abstract nouns	74.0	0.44
	Concrete nouns	76.9	0.42
Countability	Countable items	73.3	0.44
	Uncountable items	77.6	0.42
Learnedness	Learned items	76.7	0.42
	Novel items	74.0	0.44

Table 4.4. *Results of the Best Predictive Mixed Effect Model (Model 15Q): Fixed Effects and Random Effects Estimates*

Fixed effects	Estimate	SE	z	Pr(<|z|)
Intercept	0.59	0.15	4.05	5.19e-05
Approach	-0.00	0.07	-0.01	0.99
Learnedness	0.15	0.17	0.90	0.37
Pre – Immediate posttest	0.52	0.14	3.81	0.00
Pre – Delayed posttest	0.80	0.12	6.45	1.15e-10
Countability	-0.32	0.08	-0.42	0.68
Abstractness	-0.13	0.16	-0.84	0.40
Pre – Immediate posttest×Countability	0.67	0.12	5.50	3.81e-08
Pre – Delayed posttest×Countability	-0.04	0.19	-0.37	0.71
Countability×Abstractness	0.58	0.11	5.26	1.47e-07
Pre – Immediate×Countability×Abstractness	-0.74	0.18	-4.16	3.20e-05
Pre – Delayed×Countability×Abstractness	-0.42	0.17	-2.45	0.01

Random effects		Variance	SD	Correlation	
Item	Intercept	0.29	0.53		
	Pre – Immediate posttest	0.30	0.55	0.28	
	Pre – Delayed posttest	0.19	0.44	0.34	1.00
Participant	Intercept	0.02	0.13		
	Pre – Immediate posttest	0.11	0.32	0.32	
	Pre – Delayed posttest	0.08	0.29	0.47	0.97

Note. SE and SD stand for standard errors and standard deviations, respectively.

Post-hoc analyses were conducted in order to obtain more detailed results. There was no significant main effect of Approach (*estimate* = -0.00, *SE* = 0.07, *z* = -0.01, *p* = 0.99); the CL approach group and the conventional approach group were not statistically different in response accuracy in the article tests (see Table 4.4). Table 4.5 shows estimated marginal means (EMMEANs) and standard errors of response accuracy in each learning approach. EMMEANs give mean responses of each factor in which the effects of any other variables in the model are adjusted. With the adjustment for the effects of other variables, EMMEANs are capable of exhibiting more accurate results for each factor than descriptive statistics. In Table 4.5, the exact same EMMEANs are reported for both the CL and the conventional approach (pretest: *EMMEAN* = 0.73 and 0.73, *SE* =0.08 and 0.08; immediate posttest: *EMMEAN* = 1.70

and 1.70, *SE* = 0.13 and 0.14; delayed posttest: *EMMEAN* = 1.55 and 1.55, *SE* = 0.13 and 0.13 for the CL approach and the conventional approach, respectively), revealing no significant differences in learning effects between learning approaches.

Table 4.5. *Results of the Best Predictive Mixed Effect Model (Model 15Q): The Estimated Marginal Means (EMMEANs) and Standard Errors (SE) of Response Accuracy in Each Learning Approach*

Approach	Test	EMMEAN	SE
Cognitive linguistics	Pretest	0.73	0.08
	Immediate posttest	1.70	0.13
	Delayed posttest	1.55	0.13
Conventional	Pretest	0.73	0.08
	Immediate posttest	1.70	0.14
	Delayed posttest	1.55	0.13

By contrast, the main effect of Test was significant; response accuracy in the two posttests was significantly higher than that in the pretest (pretest - immediate posttest: *estimate* = 0.52, *SE* = 0.14, *z* = 3.81, *p* < .001; pretest - delayed posttest: *estimate* = 0.80, *SE* = 0.12, *z* = 6.45, *p* < .001) (see Table 4.4). Table 4.6 exhibits the contrasts between tests in each learning approach, reflecting the fact that both learning approaches achieved higher response accuracy in the two posttests than the pretest (*p* < .001). There were no statistically significant differences in response accuracy between the two posttests in both learning approaches (*p* = 0.27).

Table 4.6. *Results of the Best Predictive Mixed Effect Model (Model 15Q): Contrasts Between Tests in Each Learning Approach*

Approach	Contrast	Estimate	SE	z. ratio	p. value
Cognitive linguistics	Pre - Immediate	-0.97	0.10	-9.97	< .001
	Pre - Delayed	-0.82	0.08	-9.87	< .001
	Immediate - Delayed	0.15	0.06	2.57	0.27
Conventional	Pre - Immediate	-0.97	0.10	-9.97	< .001
	Pre - Delayed	0.82	0.08	-9.82	< .001
	Immediate - Delayed	0.15	0.06	2.57	0.27

As Table 4.4 shows, the two-way interaction between Test and Countability was statistically significant. Specifically, the difference in countability between the pretest and the immediate posttest was statistically significant (*estimate* = 0.67, *SE* = 0.12, z = 5.50, p < .001), while such a significant difference was not found between the pretest and the delayed posttest (*estimate* = -0.04. *SE* = 0.19, z = -0.37, p = 0.71). Table 4.7 shows the EMMEANs and standard errors of response accuracy of countable and uncountable use in each test. The contrasts between countable and uncountable use in each test are represented in Table 4.8. In the pretest and the immediate posttest, there were significant differences in response accuracy between countable and uncountable use; the accuracy of uncountable use was significantly higher than that of countable use (pretest: *estimate* = -0.26, *SE* = 0.06, z = -4.68, p < .001; immediate posttest: *estimate* = -0.56, *SE* = 0.07, z = -8.05, p < .001). There was, however, no statistically significant difference in response accuracy between countable and uncountable use in the delayed posttest (*estimate* = -0.00, *SE* = 0.07, z = -0.07, p = 0.94).

Table 4.7. *Results of the Best Predictive Mixed Effect Model (Model 15Q): The Estimated Marginal Means (EMMEANs) and Standard Errors (SE) of Response Accuracy of Countable and Uncountable Use in Each Test*

Test	Countability	EMMEAN	SE
Pretest	Countable	0.60	0.08
	Uncountable	0.86	0.08
Immediate posttest	Countable	1.42	0.13
	Uncountable	1.98	0.14
Delayed posttest	Countable	1.55	0.13
	Uncountable	1.55	0.13

Table 4.8. *Results of the Best Predictive Mixed Effect Model (Model 15Q): Contrasts Between Countable and Uncountable Use in Each Test*

Contrast: Countable - Uncountable			
Test	estimate	SE	z. ratio	p. value
---	---	---	---	---
Pretest	-0.26	0.06	-4.68	< .001
Immediate posttest	-0.56	0.07	-8.05	< .001
Delayed posttest	-0.00	0.07	-0.07	0.942

Table 4.9 also exhibits the results of interaction between Test and Countability, representing the contrasts between tests in each countability type. With respect to items for countable use, the response accuracy in the immediate and the delayed posttests was significantly higher than that of the pretest (immediate posttest: *estimate* = -0.82, *SE* = 0.10, *z* = -7.85, *p* < .001; delayed posttest: *estimate* = -0.95, *SE* = 0.09, *z* = -10.18, *p* < .001). There was no statistically significant difference in response accuracy between the immediate and the delayed posttests (*estimate* = -0.13, *SE* = 0.07, *z* = -1.78, *p* = 0.177). Regarding items for uncountable use, the response accuracy in the two posttests was significantly higher than that in the pretest (immediate posttest: *estimate* = -1.12, *SE* = 0.11, *z* = -10.24, *p* < .001; delayed posttest: *estimate* = -0.69, *SE* = 0.09, *z* = -7.37, *p* < .001). Unlike items for countable use, there was also a significant difference between the immediate and the delayed posttests, indicating that the response accuracy of uncountable items in the delayed posttest was significantly lower than that in the immediate posttest (*estimate* = 0.42, *SE* = 0.08, *z* = 5.47, *p* < .001).

Table 4.9. *Results of the Best Predictive Mixed Effect Model (Model 15Q): Contrasts between Tests in Each Countability Type*

Countability	Contrast	estimate	SE	z. ratio	p. value
Countable	Pre - Immediate	-0.82	0.10	-7.85	< .001
	Pre - Delayed	-0.95	0.09	-10.18	< .001
	Immediate - Delayed	-0.13	0.07	-1.78	0.177
Uncountable	Pre - Immediate	-1.12	0.11	-10.24	< .001
	Pre - Delayed	-0.69	0.09	-7.37	< .001
	Immediate - Delayed	0.42	0.08	5.47	< .001

The interaction between Countability and Abstractness was statistically significant (*estimate* = 0.58, *SE* = 0.11, *z* = 5.26, *p* < .001) (see Table 4.4). Table 4.10 shows the EMMEANs and standard errors of response accuracy of abstract and concrete nouns in each countability type. The contrasts between countable and uncountable use in abstract and

concrete nouns are represented in Table 4.11, reflecting that the accuracy of uncountable use was significantly higher than that of countable use in both abstract and concrete nouns (abstract nouns: *estimate* = -0.18, *SE* = 0.05, *z* = -3.48, *p* = .0005; concrete nouns: *estimate* = -0.37, *SE* = 0.05, *z* = 6.93, *p* < .0001). Although there were significant differences between countable and uncountable use both in abstract and concrete nouns, the contrast in concrete nouns between countable and uncountable use was larger than that in abstract nouns. A post-hoc analysis showed no significant differences in countability between abstract and concrete nouns (countable use: *estimate* = -0.17, *SE* = 0.19, *z* = -0.89, *p* = 0.37; uncountable use: *estimate* = -0.37, *SE* = 0.19, *z* = -1.92, *p* = 0.06).

Table 4.10. *Results of the Best Predictive Mixed Effect Model (Model 15Q): The Estimated Marginal Means (EMMEANs) and Standard Errors (SE) of Response Accuracy of Abstract and Concrete Nouns in Each Countability Type*

Abstractness	Countability	EMMEAN	SE
Abstract	Countable	1.10	0.14
	Uncountable	1.28	0.14
Concrete	Countable	1.27	0.14
	Uncountable	1.65	0.14

Table 4.11. *Results of the Best Predictive Mixed Effect Model (Model 15Q): Contrasts Between Countable and Uncountable use in Abstract and Concrete Nouns*

	Contrast: Countable - Uncountable		
Abstractness	estimate	SE	z. ratio	p. value
Abstract	-0.18	0.05	-3.48	.0005
Concrete	-0.37	0.05	-6.93	< .0001

Table 4.4 also shows that the three-way interaction among Test, Countability, and Abstractness was statistically significant (immediate posttest × countability × abstractness: *estimate* = -0.74, *SE* = 0.18, *z* = -4.16, *p* <.001; delayed posttest × countability × abstractness: *estimate* = -0.42, *SE* = 0.17, *z* = -2.45, *p* = 0.01). Table 4.12 shows the EMMEANs and

standard errors of response accuracy of countable and uncountable use of abstract and concrete nouns in each test. The results of interaction between Test, Countability and Abstractness are given in Table 4.13, showing the contrasts between countable and uncountable use of abstract and concrete nouns in each test. With respect to abstract nouns, there was a significant difference between countable and uncountable use only in the immediate posttest. The accuracy of uncountable use was significantly higher than that of countable use in the immediate posttest (*estimate* = -0.63, *SE* = 0.09, *z* = -6.76, *p* < .0010), but there were no significant differences between countable use and uncountable use in the pretest and the delayed posttest (pretest: *estimate* = 0.03, *SE* = 0.08, *z* = 0.42, *p* =1.000; delayed posttest: *estimate* = 0.08, *SE* = 0.09, *z* = 0.84, *p* = 0.9996). For concrete nouns, the accuracy of uncountable use was significantly higher than that of countable use in the pretest and the immediate posttest (pretest: *estimate* = -0.55, *SE* = 0.08, *z* = -6.86, *p* < .001; immediate posttest: *estimate* = -0.48, *SE* = 0.10, *z* = -4.73, *p* = .0001). There was, however, no significant difference in the delayed posttest (*estimate* = -0.09, *SE* = 0.10, *z* = -0.89, *p* = 0.9992).

Table 4.12. *Results of the Best Predictive Mixed Effect Model (Model 15Q): The Estimated Marginal Means (EMMEANs) and Standard Errors (SE) of Response Accuracy of Countable and Uncountable use of Abstract and Concrete Nouns in Each Test*

Test	Countability	EMMEAN	SE
Abstract Nouns			
Pretest	Countable	0.66	0.11
	Uncountable	0.63	0.11
Immediate posttest	Countable	1.19	0.18
	Uncountable	1.82	0.18
Delayed posttest	Countable	1.46	0.17
	Uncountable	1.38	0.17
Concrete Nouns			
Pretest	Countable	0.53	0.11
	Uncountable	1.08	0.12
Immediate posttest	Countable	1.65	0.18
	Uncountable	2.13	0.19
Delayed posttest	Countable	1.64	0.17
	Uncountable	1.72	0.17

Table 4.13. *Results of the Best Predictive Mixed Effect Model (Model 15Q): Contrasts between Countable and Uncountable use of Abstract and Concrete Nouns in Each Test*

Contrast: Countable - Uncountable				
Test	**estimate**	**SE**	**z. ratio**	**p. value**
Abstract Nouns				
Pretest	0.03	0.08	0.42	1.000
Immediate posttest	-0.63	0.09	-6.76	< .001
Delayed posttest	0.08	0.09	0.84	0.9996
Concrete Nouns				
Pretest	-0.55	0.08	-6.86	< .001
Immediate posttest	-0.48	0.10	-4.73	.0001
Delayed posttest	-0.09	0.10	-0.89	0.9992

4.4 Discussion

4.4.1 Overview

Experiment 2 examined whether the CL learning approach helped Japanese EFL learners understand noun countability and use English articles appropriately in comparison with the conventional learning approach. The results showed that the CL approach and the conventional approach groups were not statistically different in their English article usage accuracy. In Experiment 2, some variables which seemed to affect the participants' response accuracy for English article usage (i.e., countability, abstractness and learnedness of nouns) were also prepared. The results showed that the following interactions between the variables were statistically significant: the two-way interaction between Test and Countability, the two-way interaction between Countability and Abstractness, and the there-way interaction among Test, Countability, and Abstractness. These significant interactions suggest that accuracy of English article use varied according to the countability of nouns. In the subsequent sections of this chapter, (1) the relative effectiveness of the CL approach and (2) the learning effects in terms of noun countability are discussed.

4.4.2 The Relative Effectiveness of the CL Approach

Experiment 2 focused on the effects of the CL approach on Japanese EFL learners' understanding of noun countability and their appropriate usage of English articles. The results, however, found no difference in the learning effectiveness for facilitating the learners' accuracy of article use between the CL approach and the conventional approach, although both the CL and the conventional approaches equally promoted Japanese EFL learners' understanding of the English article system. In light of the effects of explicit learning of the English article system, therefore, regardless of difference in learning approach, the training for understanding noun countability and English article usage improved the participants' accuracy of article use. This finding is consistent with some previous studies on acquisition of L2 English articles suggesting that systematic instructions help L2 learners understand English article usage. Master (1994), for example, demonstrated the effectiveness of explicit instruction of the English article system. In his study, he taught the major principles of the English article system (e.g., the distinction between countable and uncountable, singular and plural, definite and indefinite, and specific and generic) over nine weeks and found that a total of six hours of instruction had a significant effect in increasing scores on the article test. Master asserts that systematic instruction of the English article system improves ESL learners' usage of English articles. It is noteworthy that the findings of Experiment 2 of this study supported Master's claim. Specifically, the results showed that the Japanese EFL learners improved their English article usage through explicit learning regardless of difference in learning approach: both the CL approach and the conventional approach contributed to the participants' improvement in English article usage. This study highlighted the overall effects of explicit learning on ESL learners' understanding of the English article system and their appropriate English article usage.

Nonetheless, it is noteworthy that a majority of previous studies investigating the effectiveness of cognitive linguistic instructions claimed the superiority of the CL approach in L2 learning (see Boers, 2013). As a study of the acquisition of complex grammatical items,

Tyler et al. (2010) demonstrated that cognitive linguistic insights were effective for learning subtle differences between modal verbs, which are difficult for L2 learners due to modals' divergent senses. In the study by Tyler and her colleagues, L2 learners studied modal verbs (e.g., can, will, may, must, could, would, should) in either a CL approach or a traditional approach based on a speech act perspective. The traditional approach simply explained the relationship between modals and their functions in speech (e.g., may/can refer to granting permission; would/could/will/can refer to asking for assistance). The CL approach, in contrast, highlighted the relationship between human cognition (i.e., reasoning and logical prediction) and our spatial-physical-social experiences, on the basis of a key principle of CL that human experiences with the external world shape the human internal world (i.e., cognition), and that our cognition is reflected in language. In other words, the CL approach explains how the force dynamics in the real world are related to root and epistemic meanings of each modal. The results indicated that the CL approach deepened the L2 learners' knowledge of modal verbs and facilitated their appropriate usage of modals in comparison with the traditional approach.

Cho (2010) also reported a similar finding, claiming the effectiveness of cognitive linguistic treatment in learning complex grammatical items. She examined Japanese learners' acquisition of English prepositions, using cognitive linguistic perspectives which explain the relationship between spatial topology and functions of *in*, *on*, and *at*. She found that the Japanese learners in the CL approach group performed more accurately on a fill-in-the-blank task than those in the comparison group.

Although cognitive linguistic instruction appears to be promising in these previous experimental studies, the results of the present study showed no difference in learning effectiveness for Japanese EFL learners' appropriate English article usage between the CL approach and the conventional approach. This result contradicts the findings from previous studies favoring the CL approach. There are several possible reasons for the CL approach not demonstrating any superiority.

One reason concerns the participants' potential prior knowledge of English articles.

Experiment 2 explored whether the cognitive linguistic insights could provide Japanese EFL learners with a new observation on the English article system and facilitate their appropriate use of English articles. In other words, the participants in the CL approach group were expected to restructure their knowledge of the English article system from a new perspective of CL. All the participants in the present study were, however, university students who studied English as their major and had knowledge of English nouns and articles to a certain extent before participating in the experiment. It is possible that their existing knowledge reduced the effectiveness of the CL approach. Many previous studies supporting the effectiveness of the CL approach examined learning of novel L2 items, especially L2 vocabulary. Verspoor and Lowie (2003), for example, investigated the acquisition of multiple meanings of previously unknown polysemous words, using the cognitive linguistic notion of "core meaning." They hypothesized that providing a core meaning of an unfamiliar polysemous word in context helped L2 learners precisely guess nonliteral, figurative senses of the word. The results showed that the learners who were given core meanings of polysemous words were better at guessing and retaining figurative senses of polysemous words than those who simply memorized each meaning of polysemous words. Boers (2001) also reported similar findings favoring the CL approach for teaching figurative idioms containing unfamiliar lexical components to L2 learners. As these previous studies demonstrated, application of the CL approach might be able to offer some advantage to learners when they acquire novel L2 items such as polysemous words and idioms. Some studies, however, discussed the relationship between learning effectiveness and learners' prior knowledge of target items. Akamatsu (2018) investigated the extent to which Japanese EFL learners acquired knowledge of the English article system, comparing the CL approach and the conventional approach. The results did not show the CL approach to be superior: both learning approaches contributed equally to the participants' appropriate usage of English articles. He suggested that when L2 learners have a certain understanding of to-be-learned items, fewer chances for learning effects emerge, compared with the case where they have no prior knowledge of to-be-learned

items. The participants in Experiment 2, therefore, might have only received some of the advantages of cognitive linguistic instruction, because they had already acquired a certain degree of knowledge of the English article system when they encountered the cognitive linguistics insights.

Another possible reason is the nature of cognitive linguistic insights. CL aims to represent the way in which people conceive the world on the basis of individual experiences. A majority of cognitive linguistic insights, therefore, originate in linguistic knowledge that L1 speakers implicitly acquire. In other words, CL shows how language and thought work together in the mind of L1 speakers. According to Boers (2013), even highly advanced L2 learners' performance is expected to be based on different knowledge from that of native speakers, because L2 learners learn target languages more analytically through their L1. Advocates for the CL approach claim that cognitive linguistic insights provide L2 learners with more systematic and more profound descriptions of a target language based on L1 speakers' knowledge. It may be difficult, however, for learners to acquire L1 speakers' representations of the language. In the case of L1 acquisition, speakers are exposed to the language time and again. Linguistic knowledge of L1 speakers is stored in their minds gradually and systematically over time alongside other various knowledge. With regard to L2 learning, by contrast, learners usually learn each grammatical item separately and intensively. In short, L1 knowledge is acquired through completely different processes from L2 learning. Although the CL approach could offer linguistic representations of L1 speakers and reduce the gap in knowledge between L1 speakers and L2 learners, internalization of L1 speakers' knowledge might take time, in the same way that L1 speakers develop their linguistic knowledge gradually in their childhood. Especially, the target grammatical item in Experiment 2, the usage of English articles, is one of the most complicated grammatical items to acquire for Japanese EFL learners whose L1 has no article system. Some SLA researchers suggest that it takes time to comprehend the English article system fully. Larsen-Freeman and Long (1991), for instance, argued that the accurate use of English articles improves only

slowly despite the fact that articles are the most frequently used items that the learners are exposed to. Snape and Yusa (2013) also reported that explicit instruction over three weeks may not have provided the participants with adequate intervention to make ESL learners understand thoroughly the English article system. When learners try to comprehend complex aspects of an L2 grammar, such as noun countability in English article use, they need more time in order to fully acquire the grammar. It is possible that Japanese EFL learners require a longer period of time for internalizing cognitive linguistic insights, especially in the case of learning such a complicated grammatical item as English articles.

Furthermore, the ambiguity of the cognitive linguistic concepts used in this experiment could be one reason for the CL approach having no relative effectiveness. Most previous studies supporting the CL approach employed relatively transparent concepts from CL. One of the concepts used in cognitive linguistic instructions is conceptual metaphors for learning L2 vocabulary; many previous studies attempted to make idioms and phrasal verbs easier to learn by providing L2 learners with conceptual metaphors. For example, Yasuda (2010) examined whether conceptual metaphors of adverbial particles (e.g., COMPLETION IS UP, OFF IS STOPPING/CANCELLING) helped Japanese EFL learners acquire English phrasal verbs. The results showed that the learners receiving conceptual metaphors (i.e., the CL approach) achieved significantly better performance than those learning in a traditional way (i.e., memorizing each phrasal verb with its Japanese translation). On the other hand, the cognitive linguistic insights used in Experiment 2 of the present study were the concepts of individuation and boundedness, which provide criteria for judging the countability of nouns. These concepts are ambiguous and abstract, compared with conceptual metaphors, because the distinction between countable and uncountable nouns depends largely on a person's perception and it is hard to provide concrete explanations about concepts underlying such a flexible rule as the English article system. The ambiguity of grammatical rules would increase complexity and learners' cognitive burden in language learning. Although the cognitive linguistic accounts for noun countability (i.e., individuation and boundedness) seem to be able

to explain noun countability fully, they are ambiguous and, therefore, may have been difficult for the Japanese EFL learners to understand. Yasuda herself pointed out that adverbial particles have polysemous meanings and that some meanings are more prototypical and easier to understand. She also mentioned that because some meanings of adverbial particles are more figurative and abstract, and thus require more metaphoric guessing, future research should investigate whether the results of her study are applicable to different metaphors for the same adverbial particles. The transparency of cognitive linguistic accounts may be a crucial factor which affects the effectiveness of the CL approach. When cognitive linguistic instructions are based on ambiguous and abstract concepts, it may be hard for L2 learners to grasp the concepts precisely, even if the concepts appear to show natural and plausible representations of a linguistic feature.

4.4.3 The Learning Effects in Terms of the Countability of English Nouns

Experiment 2 set several variables that are considered to affect English article usage: countability, abstractness, and learnedness of the target English nouns. The results showed some significant interactions between these variables: the two-way interaction between Test and Countability, the two-way interaction between Countability and Abstractness, and the three-way interaction between Test, Countability, and Abstractness. The results suggest that accuracy of English article use was affected by the countability of English nouns.

The results showed that the two-way interaction between Test and Countability was statistically significant (see Table 4.4). This suggests that the learning effects of the training for appropriate English article usage varied according to the countability of the target nouns in the immediate posttest. Such a significant difference, however, was not found in the delayed posttest. Figure 4.1 depicts the two-way interaction between Test and Countability, exhibiting the EMMEANs (i.e., the means of response accuracy) of each countability type in the article tests.

Figure 4.1. *The Two-Way Interaction Between Test and Countability*: *The EMMEANs of Each Countability Type in the Article Tests*
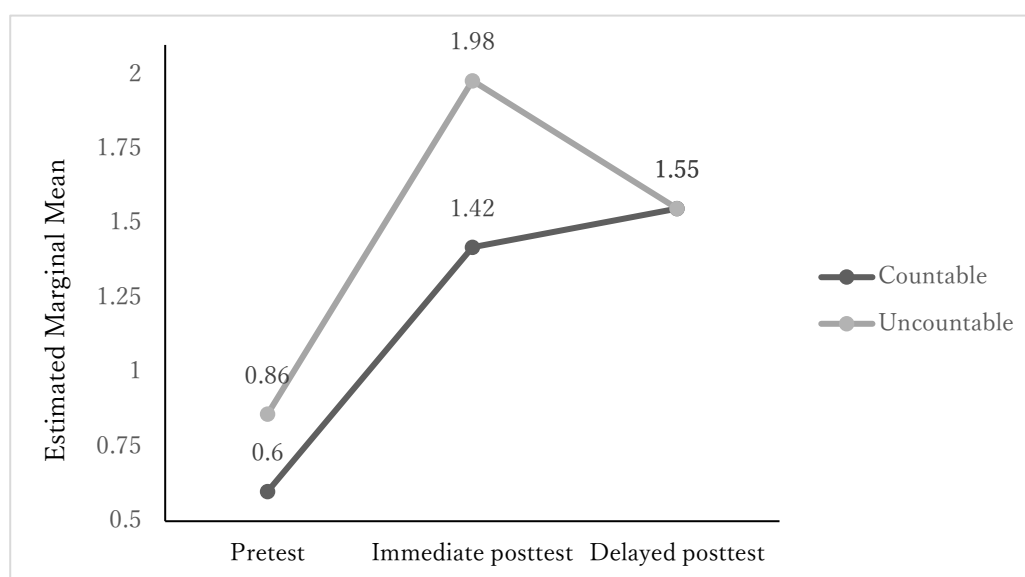
For both countable and uncountable use, the participants' response accuracy in the immediate posttest and the delayed posttest was significantly higher than that of the pretest. This indicates that the explicit learning of the English article system facilitated appropriate English article usage by the Japanese EFL learners. Regarding the target items in uncountable use, however, there was also a significant difference between the immediate and the delayed posttests (see Table 4.9); the response accuracy of uncountable use decreased in the delayed posttest. This result suggests that the target items in uncountable use showed a great learning effect immediately after the training, but the learning effect did not last until the delayed posttest. For the items in countable use, by contrast, the learning effect was retained four weeks after the training, although the increase rate of response accuracy in the immediate posttest was more gradual than the items in the mass context. Furthermore, there was no significant difference in response accuracy between countable and uncountable use in the delayed posttest, while the difference existed in the pretest and the immediate posttest (see Table 4.8). These results indicate that the accuracy of uncountable use was significantly higher than that for countable use in the pretest and the immediate posttest, but such a

difference disappeared in the delayed posttest. This suggests that the longitudinal learning effects shown in the delayed posttest was more significant in countable items than in uncountable items.

The findings are supported by some previous studies on the acquisition of the count-mass distinction of English nouns (Inagaki & Barner, 2009; Snape, 2008). Snape (2008) investigated whether Japanese EFL learners could judge grammaticality of count and mass nouns preceded by different quantifiers. In his study, the count-mass grammaticality judgement task was designed with four conditions: count singular (e.g., *much car, *many sweet), count plural (e.g., some shirts, *much roses), mass (e.g., much paper, *many money), and mass plural (e.g., *some butters, *many evidences). The learners were required to judge which condition was possible. The results showed that the learners had greater difficulty with mass nouns than with count nouns; they accepted pluralized mass nouns with count quantifiers (e.g., *some butters) and judged mass nouns with mass quantifiers (e.g., much paper) as ungrammatical. The results indicate that Japanese EFL learners may have difficulty dealing with the uncountable use of English nouns. Therefore, it may be suggested that due to the difficulty, the participants in Experiment 2 could not maintain the learning effect for uncountable items.

As for a reason for Japanese EFL learners' difficulty with English nouns in uncountable use, it is plausible that Japanese EFL learners are not able to relate the uncountable use of nouns with mass syntax. They may treat mass nouns as countable nouns due to the influence of their L1, because Japanese nouns only appear in mass syntax and can be easily counted by using classifiers. For example, when counting liquid, Japanese speakers use a Japanese classifier "杯 [-hai]", which is translated as *glass* or *cup* in English (e.g., *a glass of wine*, *two cups of tea*). Although Japanese speakers actually count this classifier when counting wine or tea, they are effectively unconscious of this, because Japanese nouns always occur with classifiers. Thus, Japanese speakers may think that all Japanese nouns can be counted, even though they actually do not count nouns, but classifiers. Due to this habit in their L1, Japanese

EFL learners might treat the English nouns *wine* or *tea* as countable nouns. In other words, they might think that *wine* or *tea* can be counted by number in the same way as *dog* (e.g., *a dog*, *two dogs*), despite the fact that they actually count English classifiers (e.g., *glass* or *cup*) when counting uncountable nouns. It is possible that Japanese EFL learners count English nouns without considering the syntactic difference between count and mass, and they do not distinguish clearly whether they count classifiers from whether they count nouns themselves. According to Inagaki (2014), the L1 influence might be a cause for Japanese EFL learners' struggle with acquisition of the count-mass distinction of English nouns. He claims that although English native speakers distinguish the countability of English nouns by syntax (i.e., grammatical cues such as the plural morpheme "-s"), Japanese EFL learners tend to determine the countability by semantics (i.e., whether the referent of a noun is individuated). While Japanese speakers habitually count entities without considering the distinction of count-mass syntax, it may in fact lead to their difficulty with uncountable use in English nouns.

Furthermore, Japanese EFL learners' sensitivity to individuation could be a reason for the retention of learning effect for countable use. Inagaki and Barner (2009) claim that Japanese speakers are sensitive to individuation despite there being no count-mass distinction in the Japanese language, or more specifically, the lack of overt count syntax. In their experiment, native speakers of Japanese and English performed a quantity judgement task; they were asked which of the two people in pictures had more target items (e.g., *mustard* for a substance-mass noun, *shoes* for a count noun) in number or in volume. Words referring to the target items included nouns that can be used in either mass or count syntax in English (e.g., *string*). The quantity judgement task was conducted using their L1 (i.e., English for English native speakers, Japanese for Japanese native speakers). The results showed that the English quantity judgement was based on number when a noun was used in count syntax, but on volume when in mass syntax, while approximately half of the Japanese quantity judgement was based on number. The results revealed not only number preference by Japanese speakers but also their ability to individuate objects and substances (i.e., judgement or specification as

countable) regardless of the absence of count syntax in their L1. Japanese speakers' sensitivity to individuation may be a reason for their retention of learning effect for countable use in Experiment 2.

Furthermore, some studies claim that learning English may cause a shift in ESL learners' cognitive preferences regarding individuation. Athanasopoulos and Kasai (2008), for instance, examined Japanese and English monolinguals and Japanese-English bilinguals, conducting a task which asked them to match novel objects based on either shape (i.e., conceptualization as individuals) or color (i.e., conceptualization as unindividuated substance). The Japanese-English bilinguals were at intermediate and advanced levels. The results showed that English monolinguals had a significant preference for shape compared to Japanese monolinguals. Interestingly, the bilinguals behaved more like English monolinguals as their L2 English proficiency developed. The authors concluded that constant attention to linguistic rules regarding individuation might result in Japanese speakers' preference toward conceptualizations as individuals. It is possible that continuous English learning may improve sensitivity to individuation.

The results of the most predictive mixed-effect model (Model 15Q) showed that the two-way interaction between Countability and Abstractness was significant; the accuracy of uncountable items was significantly higher than that of countable items in both abstract and concrete nouns (see Table 4.11). Figure 4.2 depicts the two-way interaction between Countability and Abstractness. According to Table 4.11, the difference between countable and uncountable use in concrete nouns was more significant than that in abstract nouns, although a post-hoc analysis showed no difference in each countability type between abstract and concrete nouns. This appears to suggest that the Japanese EFL learners judged the countability of English nouns more correctly when the target items were concrete nouns in uncountable use. This finding, however, contradicts those of previous research (Kobayashi, 2008; Takahashi, 2013): Japanese EFL learners tend to regard concrete and abstract nouns as count and mass nouns, respectively. According to Takahashi (2013), Japanese EFL learners tend to

make countability judgements based on a mental list of countable and uncountable nouns dependent on what Allan (1980) called *countability preference*. The list reflecting countability preference includes the notion that concrete nouns are regarded as countable nouns and abstract nouns as uncountable nouns. Takahashi claims that Japanese EFL learners' intuitive notion regarding English noun countability is memorized as a fixed rule. If Japanese EFL learners believe that concrete nouns are countable, they are likely to have difficulty dealing with uncountable concrete nouns.

Figure 4.2. *The Two-Way Interaction Between Countability and Abstractness*: *The EMMEANs of Abstract and Concrete Nouns in Each Countability Type.*
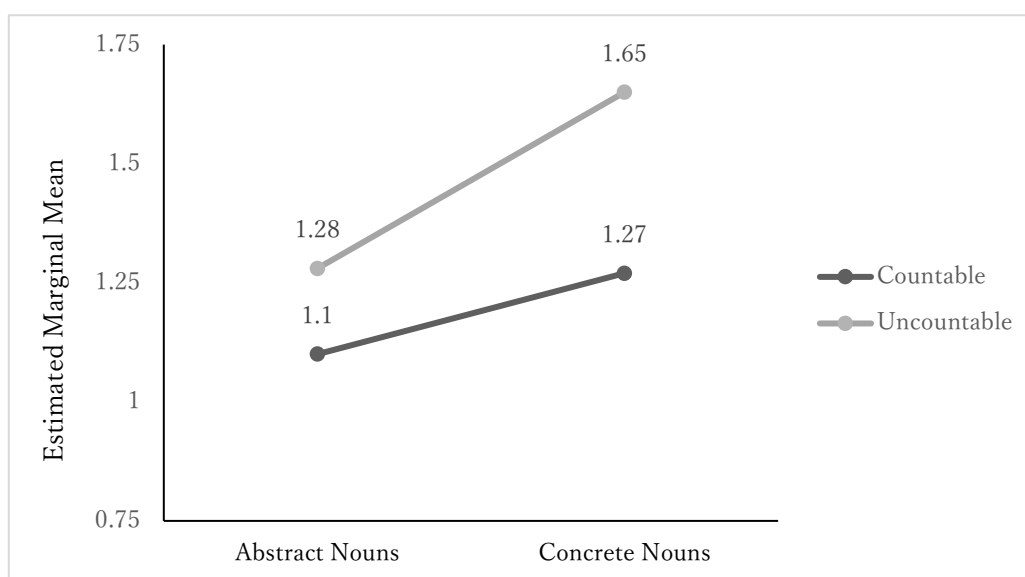
Moreover, the finding on the interaction between Countability and Abstractness seems to be inconsistent with the results of the interaction between Countability and Test, which showed a greater learning effect for countable items. In order to interpret the discrepant finding in more detail, the results of the three-way interaction between Test, Countability, and Abstractness are discussed below.

Figure 4.3 illustrates the EMMEANs of concrete nouns in each countability type in the article tests. For concrete nouns, the response accuracy of uncountable use was significantly

higher than that of countable use both in the pretest and the immediate posttest (see Table 4.13). The difference, however, disappeared in the delayed posttest because the accuracy of uncountable use dropped drastically. The results indicate that in concrete nouns, there was the same extent of learning effect for both countable and uncountable items in the immediate posttest, but only the learning effect for countable items remained until the delayed posttest. The longitudinal learning effects, therefore, were more significant in countable items than uncountable items. These findings are not surprising given that previous studies (Kobayashi, 2008; Takahashi, 2013) argue that Japanese EFL learners tend to regard concrete nouns as countable, and thus concrete nouns in countable use would be more familiar and easier to understand for them. The retention of learning effect for countable concrete nouns was reasonable.

Figure 4.3. *The Three-Way Interaction Between Test, Countability, and Abstractness*: *The EMMEANs of Concrete Nouns in Each Countability Type in the Article Tests.*
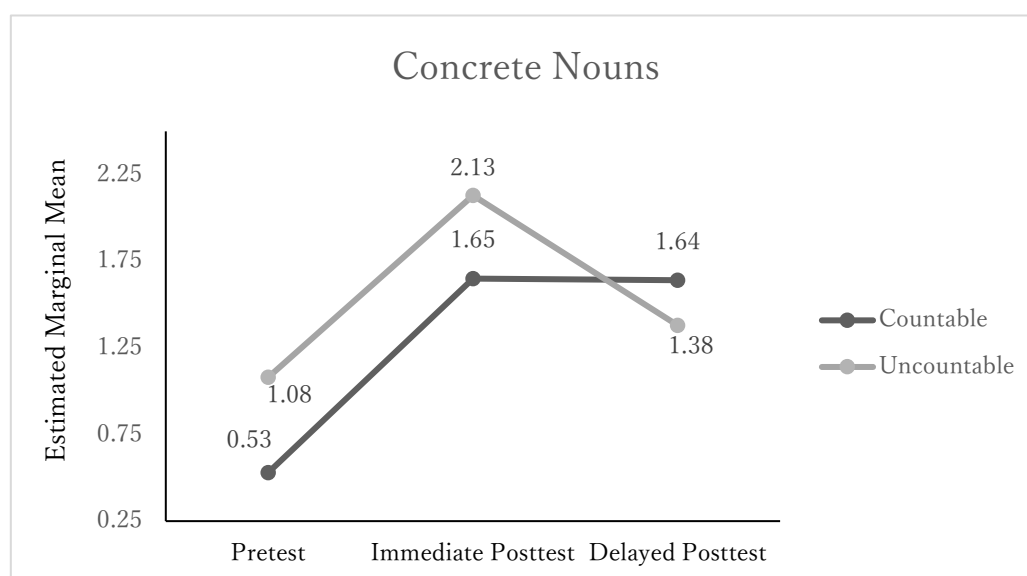
In contrast, uncountable concrete nouns appear to be difficult for Japanese EFL learners to judge accurately, because the combination of concrete nouns and uncountable use contradicts their intuitive notion on countability (i.e., countability preference). In addition to

their unfamiliarity with the uncountable use of concrete nouns, Japanese EFL learners have difficulty specifying the uncountable use of nouns (Snape, 2008). These are some of the reasons for the drastic fall in response accuracy of uncountable use. Although the learning effect for uncountable items was observed temporarily in the immediate posttest, the learners might have obtained only superficial and, in the worst case, inappropriate understandings of the uncountable use of English nouns. It is suggested that Japanese EFL learners are better at judging the countability of concrete nouns which are represented with the countability type (i.e., countable use) that is preferable for them, whereas they show some difficulty with the less preferable countability type (i.e., uncountable use).

However, the results on the two-way interaction between Countability and Abstractness indicated the different finding: the Japanese EFL learners judged uncountable concrete nouns more accurately than countable concrete nouns. The reason for the discrepant finding is as follows. Regarding concrete nouns, the accuracy of uncountable use was significantly higher than that of countable use not only in the immediate posttest but also the pretest (see Table 4.13). The high accuracy of uncountable items before the training (i.e., in the pretest) must be the reason that the participants made more accurate judgements on uncountable concrete nouns. This finding from the results on the interaction between Countability and Abstractness is, therefore, dismissed. The significant three-way interaction revealed that, regarding concrete nouns, the learning effects remained only for countable items in the delayed posttest and the learning effects of the training were eventually more significant in countable use. The results indicate that Japanese EFL learners can judge countable concrete nouns more accurately than uncountable concrete nouns.

With respect to abstract nouns, the results showed that the accuracy of uncountable use was significantly higher than that of countable use only in the immediate posttest (see Table 4.13). Figure 4.4 depicts the EMMEANs of abstract nouns in each countability type in the article tests. For uncountable use, the response accuracy was tremendously high in the immediate posttest, indicating the rapid effects of the training for English article usage. The

high accuracy of uncountable use, however, decreased in the delayed posttest. For countable use, on the other hand, the increase rate of response accuracy was not as robust as that of uncountable use in the immediate posttest, but the accuracy continued to increase slightly after the training. Both the fall in accuracy of uncountable use and the continuous increase of accuracy of countable use resulted in no difference in response accuracy between countable use and uncountable use in the delayed posttest. At the point of the pretest, there was also no difference in response accuracy between uncountable and countable items. Thus, the learning effect for uncountable use was eventually the same as those for countable use four weeks after the training, although the learning effect for uncountable use was significantly higher than that for countable use immediately after the training.

Figure 4.4. *The Three-Way Interaction Between Test, Countability, and Abstractness*: *The EMMEANs of Abstract Nouns in Each Countability Type in the Article Tests*
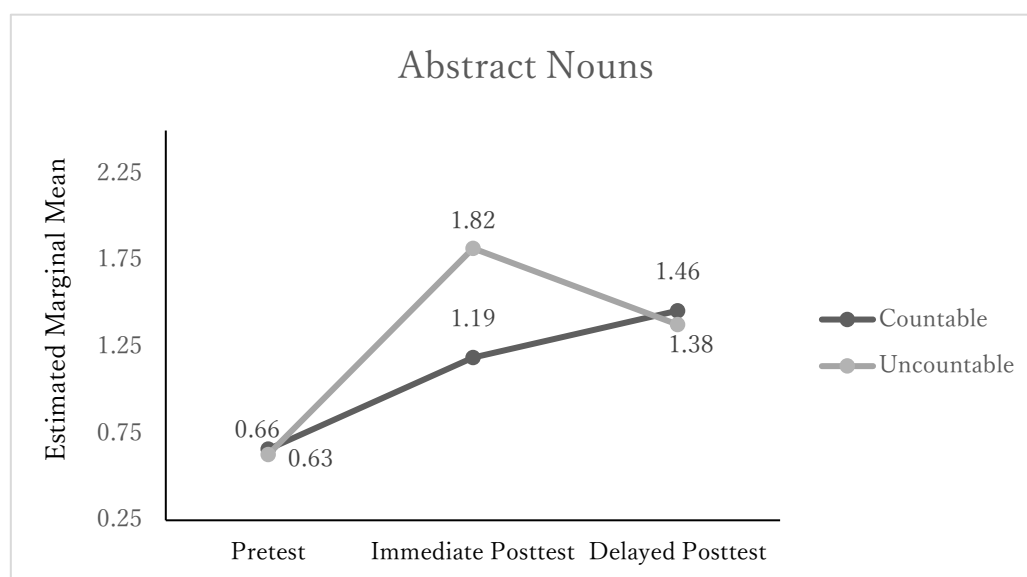

Unlike the case of concrete nouns, these findings of the learning effects for both countable and uncountable abstract nouns were not expected, because countable abstract nouns are incompatible with each other for Japanese EFL learners. If they believed that abstract nouns were qual to uncountable nouns (see Takahashi, 2013), abstract nouns in

countable use would be more difficult for Japanese EFL learners to understand. Why was the longitudinal learning effect for countable use the same as that for uncountable use?

As many linguists suggest, English noun countability is determined by boundedness (i.e., whether the referent of a noun is discrete or individuated). Some SLA researchers claim that while Japanese EFL learners have difficulty judging the countability of abstract nouns, they can make relatively accurate judgements on the countability of concrete nouns because concrete objects are likely to have clear boundaries. For example, Hiki (1990) examined Japanese learners' understandings of English noun countability using an editing task in which Japanese college students were asked to check the forms of noun phrases and correct them if necessary. Hiki found that the learners had difficulty using correct articles for abstract nouns. More specifically, when nouns were abstract, the learners had difficulty deciding whether the indefinite article was appropriate or not (e.g., *a pleasure*). Butler (2002) also found similar results and pointed out that Japanese learners' difficulty with countability judgement on abstract nouns resulted from the fact that abstract nouns refer to "indivisible entities" (p. 471). These findings from previous studies suggest that Japanese EFL learners may fail to relate the concept of boundedness to abstract nouns, because the referents are not physically bounded or individuated. It could be, therefore, that their difficulty with the application of boundedness to abstract nouns contributed to the slight improvement in accuracy of abstract nouns in countable use, compared to uncountable use, in the immediate posttest in Experiment 2 of this study. The compatible combination of abstract nouns and countable use might be a reason for the limited learning effects immediately after the training. The participants, however, showed a gradual increase in accuracy of countable use after the training, and the learning effects remained for four weeks after the training. These results appear to suggest that Japanese EFL learners can individuate (i.e., count) abstract entities as well as concrete objects, despite their countability preference for uncountable use for abstract nouns. This finding is consistent with the suggestion from previous studies (Athanasopoulos & Kasai, 2008; Inagaki, 2014; Inagaki & Barner, 2009) that Japanese EFL learners whose L1 has only mass syntax are relatively sensitive to individuation or boundedness, which are

essential concepts for counting nouns. Due to this sensitivity, the participants may have been able to apply the concept of individuation relatively easily even to abstract nouns.

As for uncountable abstract nouns, it seems to be easier for Japanese EFL learners to judge the countability type because the combination of abstract nouns and uncountable use is consistent with their countability preference (Takahashi, 2013). Previous research demonstrated the strong correspondence between abstract nouns and uncountable use. Yoon (1993), for instance, examined the perception of noun countability by Japanese speakers of English. Yoon suggested that when they intuitively judged an English noun as a mass noun, they did not change their judgement, even though the noun appeared in the count context and required the indefinite article. In other words, the connection between abstract entities and mass syntax (i.e., uncountable use) is fairly fixed in Japanese EFL learners' minds. Similarly, the results of Experiment 2 appeared to show that the participants were likely to associate abstract nouns with uncountable use. The correspondence between abstract nouns and uncountable use may have positively affected their countability judgements and contributed to the high response accuracy of uncountable abstract nouns in the immediate posttest. This high accuracy, however, decreased drastically in the delayed posttest. The fall in accuracy of uncountable use was also observed in the case of concrete nouns.

In sum, the learning effect for uncountable use decreased in four weeks after the training not only for concrete nouns, but also for abstract nouns. These results are consistent with those of Snape's (2008) study: Japanese EFL learners have trouble specifying nouns in uncountable use. In Experiment 2, although the temporal learning effect for uncountable items was observed immediately after the training, the participants' countability judgements might have been based on inadequate knowledge which simply signified their countability preference. In the worst case, they may have understood the uncountable use of English nouns incorrectly. Even though they preferred uncountable use for abstract nouns to countable use, it may still have been difficult for them to specify the uncountable use of nouns. This suggests that Japanese EFL learners' difficulty with uncountable use affected them more strongly in

countability judgement than their countability preference.

4.5 Conclusion

Experiment 2 investigated whether Japanese EFL learners understood the English article system more appropriately with the use of the CL approach compared to the conventional approach. The results showed that the CL approach and the conventional approach groups were not statistically different in their accuracy of English article usage. Both approaches equally improved Japanese EFL learners' understanding of the English article system. The results support previous studies claiming that explicit learning of the English article system improves Japanese EFL learners' English article usage (e.g., Master, 1994). On the other hand, the results are inconsistent with findings from previous empirical studies on the effectiveness of cognitive linguistic instruction. A majority of them claim that cognitive linguistic insights are more effective in L2 learning (e.g., Boers, 2013) than explanations in traditional approaches. There are some possible reasons for the lack of superiority of the CL approach in this study. First, the participants might have taken limited advantage of cognitive linguistic insights due to their prior knowledge of English articles. Most previous studies which demonstrated the effectiveness of the CL approach focused on novel linguistic items for learners, such as vocabulary and idioms (e.g., Boers, 2011; Verspoor & Lowie, 2003). By contrast, in Experiment 2 of this study, English articles were already familiar grammatical items for the participants. L2 learners might receive some of the advantages of the CL approach if they have prior knowledge of target items. Second, it may take a long time to fully understand cognitive linguistic insights. Fundamentally, CL describes linguistic representations that L1 speakers implicitly acquire. As L1s are acquired gradually throughout childhood, it might take L2 learners a lot of time to internalize cognitive linguistic insights. Furthermore, the cognitive linguistic insights used in this study (i.e., boundedness and individuation) may be difficult to understand precisely, because they are ambiguous and

abstract notions. Common cognitive linguistic insights such as conceptual metaphors can provide L2 learners with concrete and transparent descriptions of a target language. Boundedness and individuation are, however, fairly abstract and ambiguous concepts because English article usage depends largely on a person's perception. The ambiguity of the cognitive linguistic insights may have affected the effectiveness of the CL approach.

Experiment 2 also examined several variables that are believed to affect English article usage: countability, abstractness, and learnedness of the target English nouns. The results showed some significant interactions between these variables, suggesting that accuracy of English article usage was affected by the countability of English nouns. In light of the longitudinal learning effects, the overall results showed that while the accuracy of countable use remained unchanged, the accuracy of uncountable use decreased four weeks after the training for English article usage. These results are consistent with some findings from previous studies. Inagaki and Barner (2009), for example, claim that Japanese speakers are sensitive to individuation despite the lack of overt count syntax in the Japanese language. Athanasopoulos and Kasai (2008) also insist that continuous English learning may result in Japanese speakers' preference toward conceptualizations as individuals. The Japanese EFL learners' sensitivity to individuation may be a reason for their retention of learning effect for countable use in this study. With respect to uncountable use, Experiment 2 showed that the learning effect for uncountable use was not retained. As a possible reason for these results, it may be that Japanese EFL learners have difficulty specifying the uncountable use of English nouns (Snape, 2008). In Experiment 2, the participants had difficulty with uncountable use even when they judged abstract nouns, despite the correspondence to their countability preference. Due to their difficulty with uncountable use, they could not retain the learning effect for uncountable items.

Importantly, the results of Experiment 2 showed that the participants achieved better performance on English articles through explicit learning from the cognitive linguistic insights, although the CL approach was not superior compared to the conventional approach.

This finding suggests that both the conventional learning approach and the CL approach are useful for learning appropriate usage of English articles. While the conventional approach complements the participants' existing knowledge of English articles, the CL approach can give them new insights into English article usage. However, due to their novelty, internalization of cognitive linguistic insights may take learners more time, especially in the case where cognitive linguistic concepts are ambiguous and difficult to understand. In Experiment 2 of this study, ambiguous and abstract notions (i.e., boundedness and individuation) were adopted as the instruction for the count-mass distinction of English nouns. It is therefore possible that the CL approach was still enhancing the participants' understandings of the English article system at the point of the delayed posttest. They might have improved their ability of English article usage if they had continued learning with the use of the CL approach. Learning over a longer period of time may help Japanese EFL learners internalize cognitive linguistic insights and ease their difficulty with the uncountable use of English nouns. The present study suggests the good potential of the CL approach for learning the English article system. Future research must explore the longitudinal effects of the CL approach.

Chapter 5

GENERAL DISCUSSION

5.1 Overview

This thesis focused on Japanese EFL learners' noun-countability judgement and English article usage. In order to investigate these issues, two experiments were conducted. Experiment 1 examined how Japanese EFL learners understand and judge the countability of English nouns and their Japanese translations. Experiment 2 examined whether Japanese EFL learners improve their understandings of English noun countability and article usage through explicit learning using the CL approach.

The following discussion will first focus on individual differences of nouns in appropriate countability judgement. The results of the two experiments revealed that Japanese EFL learners' response to noun countability varied depending on the features of nouns. Experiment 1 showed that there was a positive correlation in countability judgement between English nouns and their Japanese translations, even when different translations were applied to distinctive countability types. It is, however, noteworthy that the participants judged more than half of the Japanese translations in such a way that different translations for count and mass meanings corresponded to each countability type. In Experiment 2, while the participants failed to judge the countability of some nouns, they were able to accurately estimate that of other nouns. This suggests that Japanese EFL learners may be able to judge the countability of some particular nouns relatively easily. Detailed observations on individual differences between items will be provided here.

The second part of the discussion will focus on explicitness and implicitness of L2 learning. Experiment 2 demonstrated that explicit learning of the English article system prompted Japanese EFL learners' appropriate usage of English articles. However, the learning

effect for the uncountable use of nouns (i.e., the use of the zero article) was more limited than that for countable use (i.e., the use of the indefinite article). It is possible that explicit learning is not sufficient to facilitate Japanese learners' complete understanding of the English article system. Did the explicitness of the instruction result in the limited effects for some aspects of English article usage? More specifically, if learners had received implicit instruction on English article usage, could they have resolved their difficulty with uncountable use? In terms of the explicitness and implicitness of L2 learning, the intervention effects on learners' understanding of the English article system will be discussed.

Furthermore, some educational implications from the present findings and limitations of this study are also mentioned. At the end of the discussion, recommendations for possible future research on the acquisition of the English article system are presented.

5.2 Individual Differences of Nouns in Appropriate Countability Judgement

Experiment 1 investigated the relationship in countability judgement between English nouns and their Japanese translations. The results revealed the cross-linguistic relationship in noun-countability judgement between the two languages: Japanese EFL learners' countability judgements of English nouns positively correlated with that of Japanese translations. The results can be interpreted from the point of view of multi-competence. According to Cook (2016), language learners hold both knowledge of an L1 and an L2 in their minds, and the integrated knowledge (i.e., multi-competence) affects bilinguals' cognition in both languages. In fact, some previous studies demonstrated that L2 systems affect learners' L1 systems such as lexicon and conceptual representations (e.g., Athanasopoulos et al., 2011; Pavlenko & Malt, 2011). Thus, the results of Experiment 1 suggest that Japanese EFL learners possibly use their knowledge of the countability of English nouns in judging the countability of their L1 counterparts, because noun countability is not a salient grammatical feature in the Japanese language.

Experiment 1 also aimed to explore the potential usefulness of Japanese translations in noun-countability judgement. In order to examine this issue, two different conditions of the target nouns were set out: English nouns with the same Japanese translations for both count and mass meanings, and those with different Japanese translations. In the latter case, both languages correspond to each other in light of noun countability, such as 火事 [*kaji*] for the count meaning of *fire* and 火 [*hi*] for the mass meaning. It was therefore predicted that this one-to-one correspondence would help Japanese EFL learners appropriately judge English noun countability, because they could rely on Japanese translations in judging whether an English noun is count or mass. The results, however, found a positive correlation between the two languages, even in the case where different Japanese translations were provided for each count and mass meaning. In short, the statistical result did not confirm the prediction, indicating that the participants may not have referred to the different meanings of the Japanese translations in determining the countability type.

Some Japanese translations appear to be disadvantageous for distinguishing noun countability. For example, both count and mass Japanese translations of *chicken* were judged as countable (the count meaning, にわとり [*niwatori*]: $M = 6.8$, $SD = 0.5$; the mass meaning, 鶏肉 [*keiniku*]: $M = 4.9$, $SD = 1.9$), despite the different meanings that specify distinctive countability types. The same result was obtained in the cases of *noise* and *work* (see Appendix 1.2). Japanese translations of such English nouns seem to favor either of the two countability types. These Japanese translations are unlikely to be suitable as a foothold for understanding the difference between countable and uncountable.

Although the statistical result did not demonstrate the potential usefulness of Japanese translations in judging the countability of English nouns, it is important that the countability of 54 out of 100 Japanese translations was correctly judged. More specifically, the participants' countability judgements of those 54 Japanese translations agreed with the countability type that the Japanese translations specify. This result suggests that those Japanese translations could be useful for distinguishing the countability of English nouns. For example, the

participants judged the countability of each count and mass Japanese translation of *iron* in such a way as to correspond to the countability type that the Japanese translations intend (the count meaning, アイロン [*airon*]: $M = 6.1$, $SD = 1.3$; the mass meaning, 鉄 [*tetsu*]: $M = 3.3$, $SD = 1.9$). The same applies to nouns such as *beauty* and *fire* (see Appendix 1.2). Because the Japanese translations of these nouns were consistent with the learners' sense or understanding of the count-mass distinction, they may have helped Japanese EFL learners understand English noun countability more appropriately.

In Experiment 2, the focus of the investigation was whether the CL approach is superior to the conventional approach in helping Japanese EFL learners understand noun countability and use English articles more appropriately. The results showed that explicit learning improved Japanese EFL learners' performance on English article usage regardless of which learning approach was used. Although the learners' overall usage of English articles improved, their appropriateness of article usage differed among nouns.

Figure 5.1 and Figure 5.2 show countable and uncountable target items respectively, in order of accuracy. The figures reveal that the participants were able to appropriately deal with some English nouns in both countable and uncountable contexts. Their article usage for *iron* and *fire*, for instance, was accurate in both countable and uncountable contexts. In Experiment 1, the two nouns had different Japanese translations for distinctive countability types, and the participants' countability judgement of the translations corresponded to the expected countability type. Since such nouns signify completely different referents depending on their countability, the participants were able to distinguish countable and uncountable referents of the nouns correctly.

The figures also show that some English nouns were used accurately in only one of the two countability types: while some target items showed high accuracy in one countability type, they were inaccurate in the other. *Language* and *metal*, for example, showed low accuracy in the countable context, but they were used accurately in the uncountable context. *Room*, by contrast, was used with high accuracy in the countable context, while it was fairly inaccurate

in the uncountable context. The results indicate that Japanese EFL learners may have difficulty dealing with particular countabilities of some English nouns.

One possible reason for these results relates to the quality of input that the participants have received throughout their English learning experience. Specifically, past input of such nouns as *language*, *metal*, and *room* was biased toward either of the two countability types, and thus the familiar countability type may have been dominant in the participants' countability judgements. In the conventional approach that Japanese EFL learners encounter at junior high and high school, *language*, *metal*, and *room* are treated as abstract, material, and common nouns respectively, according to the classification of nouns. Consequently, Japanese EFL learners usually see *language* and *metal* in the uncountable context, while *room* generally appears in the countable context. In short, these nouns had appeared exclusively in either of the countability types. It is therefore possible that when some particular nouns are used with an unfamiliar type of countability, Japanese EFL learners may fail to appropriately judge that countability. As Gally (2010) pointed out, many textbooks and vocabulary books for Japanese EFL learners do not mention the countability of nouns, and thus the learners must have only learned the preferred countability type of each noun. The classification of English nouns taught by the conventional approach may be misleading in that it cannot adequately explain the nature of noun countability in English: most nouns can be countable and uncountable.

Another reason for the difficulty with particular usage of countability may be an incorrect understanding of each countable and uncountable meaning of some nouns. In the case of *language*, for example, while the uncountable meaning refers to "the general concept of a communication system with sounds and words," the countable meaning denotes "a particular communication system used by people in a particular country or area" such as English or Japanese. Similarly, the countable meaning of *metal* refers to "a specific kind of metal." In short, the difference between the countable and uncountable meanings of some nouns is merely that between a specific kind of an entity and the entity in general. Because the

difference is subtle, it may be hard for learners to realize. It is possible that the participants incorrectly supposed that the count meanings of *language* and *metal* were "a word" and "a piece of metal" respectively.

In the case of *room*, on the other hand, the countable and uncountable meanings are fairly dissimilar. The countable meaning of *room* refers to "an enclosed area inside a building," and the uncountable meaning "available space." Since these two meanings differ from each other, one may find it difficult to become aware of the relationship in meaning between one countability type and the other. The uncountable meaning of *room*, therefore, might not have been understood appropriately unlike the count meaning which is extremely frequent and primary. When a single noun denotes completely different referents depending on distinctive countability, it may be difficult to correctly associate the different meanings of each countability type.

In addition, there are some nouns that showed low accuracy in both countability types. The countability of *lamb* and *chicken* was inaccurately judged in both countable and uncountable contexts. The countable and uncountable referents of these nouns are animate creatures and their meat, respectively. Despite the clear difference in referents, the participants misjudged their countability types. There is the possibility that the participants simply did not distinguish the count and mass meanings of these nouns; they might not have paid attention to the difference or even noticed it. It is true that if *lamb* and *chicken* are used in the wrong countability type, discourse contexts can prevent misunderstandings from occurring. In a conversation about pets or favorite animals, for example, if a learner says, "*I like cat*," the listener will perfectly understand that the learner is referring to living animals without even wondering if the referent is the meat taken from the animal. Because such a mistake hardly ever causes serious misunderstandings, learners might be less conscious of the relationship between each countability type and the distinctive meanings of the noun. For Japanese EFL learners, the difference between the countable and uncountable meanings of some nouns might be less noticeable than those of other nouns.

Figure. 5.1. *Countable Target Items in Order of Accuracy*
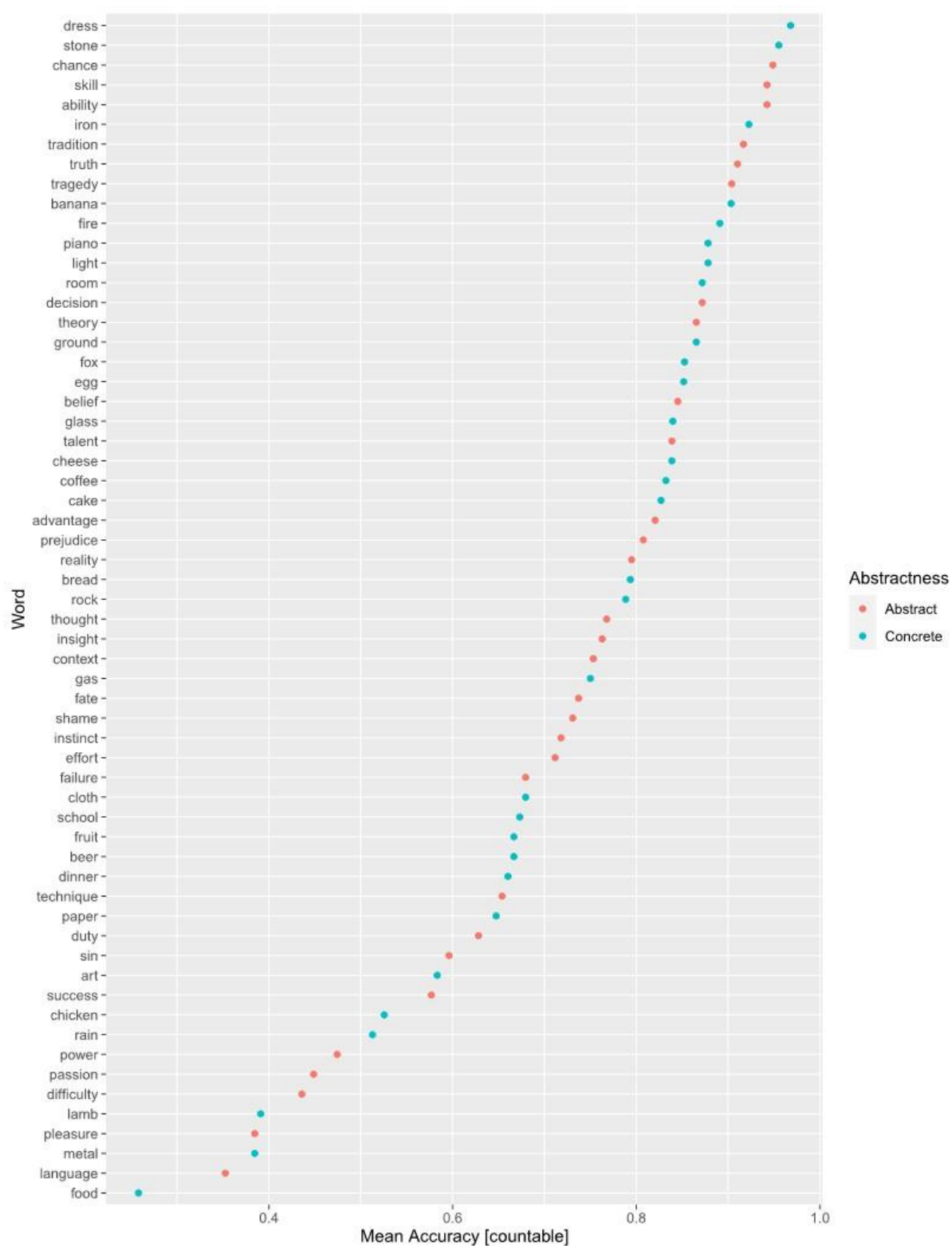
Figure 5.2. *Uncountable Target Items in Order of Accuracy*
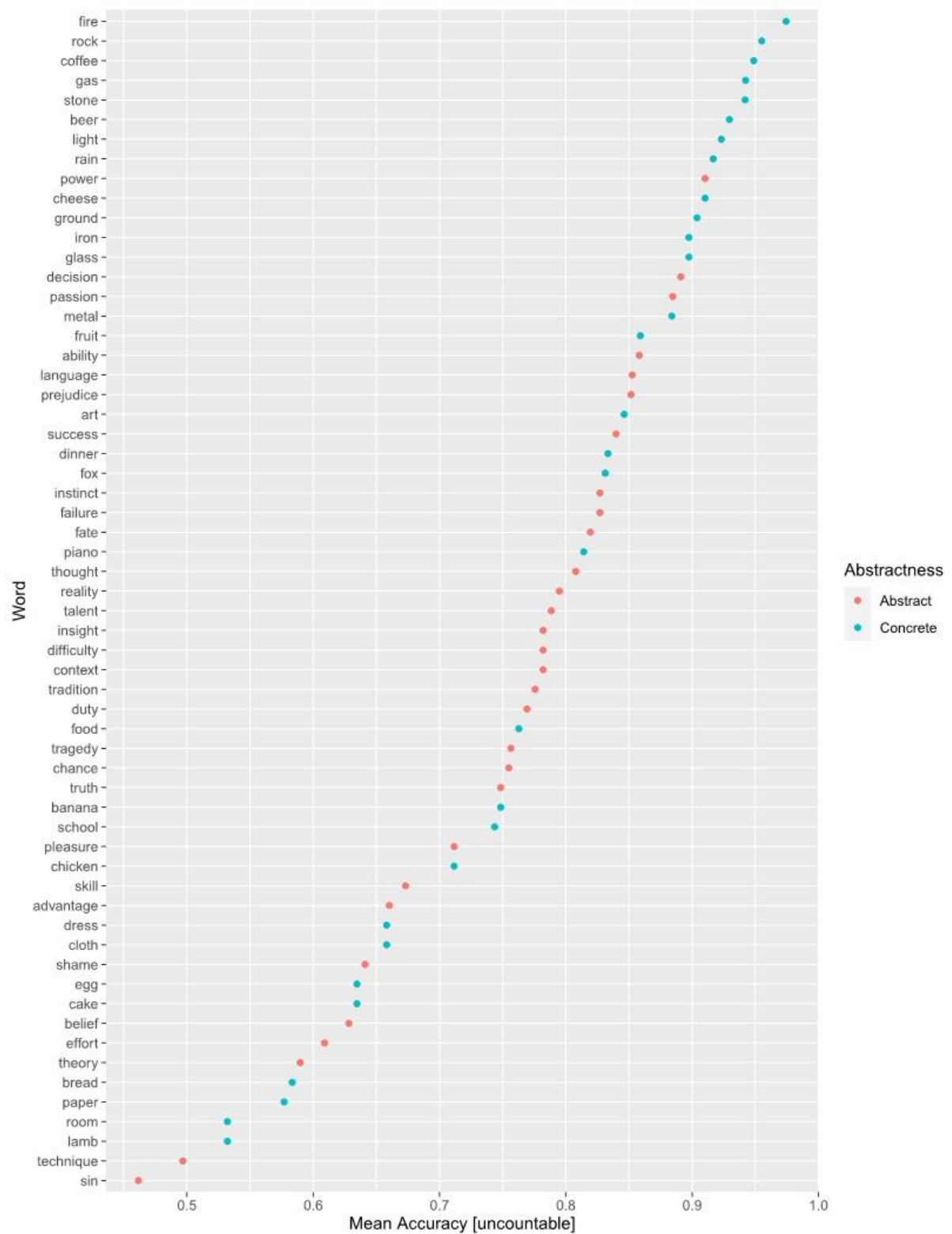
Detailed analysis of the results of the two experiments revealed that Japanese EFL learners' response to countability and their accuracy of article usage differed among nouns. While the countability of some English nouns was easily judged in context, the countability type of other nouns was hard to determine. Importantly, the results of Experiment 2 showed that the participants had difficulty with the uncountable use of nouns, even when the nouns belonged to abstract nouns. This contradicts the claim in previous research findings that Japanese EFL learners tend to regard abstract nouns as uncountable (e.g., Takahashi, 2013). Furthermore, it is highly likely that the participants were taught in English class at junior high and high school that *paper* and *bread* are material mass nouns. The uncountable use of these nouns, however, was fairly inaccurate (see Figure 5.2). The results showing Japanese EFL learners' struggle with the uncountable items suggest that they may fail to grasp the notion of "uncountable" itself. In the Japanese language, any noun can be counted if accompanied by a classifier so that Japanese speakers may be unfamiliar with the notion of uncountability. As Snape and Yusa (2013) revealed the influence of L1s on L2 grammar, some fixed notions affected by L1s may lead to difficulty with particular usages of English articles.

5.3 Implicit and Explicit Learning

Many SLA researchers have insisted that such complex and abstract linguistic rules as those possessed by English articles strongly resist explicit instruction or learning (Butler, 2002; Dulay et al., 1982; VanPatten, 2011). Experiment 2 of the present study examined whether explicit learning using the CL approach could improve Japanese EFL learners' understandings of English noun countability and article usage. The results showed that in both the CL approach and the conventional approach, the explicit learning of the English article system improved Japanese EFL learners' usage of English articles. In short, the overall results demonstrated the effectiveness of explicit learning in studying the English article system. The

learning effects, however, differed between countable and uncountable contexts. More specifically, the learning effect for the uncountable use of nouns (i.e., the use of the zero article) was more limited than that for countable use (i.e., the use of the indefinite article). This result suggests that explicit learning, regardless of learning approach, may not have helped the participants fully understand the English article system. A question arises here: could implicit learning be a solution for the difficulty learners face with uncountable use?

The notions of implicit and explicit learning originate in cognitive psychology. Cognitive psychologists have tried to define implicit and explicit knowledge and explain how implicit learning takes place. The implicit-explicit distinction is also affirmed in the field of language learning and teaching, and much research has been conducted on the two learning mechanisms. According to Reber (1976), the pioneer researcher of implicit learning, the essence of implicit learning is a lack of consciousness of the structure being learned. Although there is a difficulty in defining consciousness or awareness, implicit learning can be generally defined as learning without awareness of what is being learned. Explicit learning, by contrast, necessarily involves a conscious process or intentionality. Hulstijn (2002) claimed that "it is a conscious, deliberative process of concept formation and concept linking" (p. 206).

Reber (1976) and Krashen (1982, 1994) have strongly insisted that implicit learning is advantageous for complex structures. DeKeyser (2008), however, points out that empirical studies comparing implicit and explicit learning have failed to demonstrate any significant learning of abstract rules without awareness.

DeKeyser (1995), for example, compared implicit and explicit learning conditions in an experiment using an artificial language with morphological rule. He examined two hypotheses in cognitive psychology and psycholinguistics: that explicit-deductive learning would be more effective than implicit-inductive learning for simple categorical rules, and that implicit-inductive learning would be more effective than explicit-deductive learning for fuzzy prototypical rules. In his experiment, simple categorical rules involved straightforward morphological form-function mappings, and fuzzy prototypical rules involved linking certain

stems to certain allomorphs. Participants in the implicit group were exposed to numerous sentences paired with color pictures. Those in the explicit condition received direct explanations of rules along with picture-sentence pairs. Fill-in-the-blank tests were administered to measure the participants' understanding of the grammatical rules. The results showed that the explicit learning group significantly outperformed the implicit learning group in the categorical rules. The participants in the implicit group, however, learned fuzzy prototypical rules slightly better than those in the explicit group, but they did not learn any abstract rules even after exposure to thousands of examples of simple rules. Although this study demonstrated that explicit learning helps learners use at least simple grammatical rules, it remains questionable whether implicit learning of abstract rules is effective.

R. Ellis (2009) noted that while the terms *implicit learning* and *explicit learning* can refer to learners' perspectives, the terms *implicit instruction* and *explicit instruction* are only defined from perspectives external to L2 learners, such as SLA researchers. He used the term *instruction* as an attempt to intervene in interlanguage development. According to R. Ellis, implicit instruction encourages L2 learners to infer grammatical rules without awareness. They are provided with abundant examples of a specific rule, so that they can internalize the underlying rule without explicitly focusing on it. Explicit instruction, on the other hand, allows L2 learners to become aware of a grammatical rule by providing them with explicit metalinguistic explanations of the rule.

Norris and Ortega (2000) analyzed previous experimental studies on the effects of implicit and explicit instruction, comparing average effect sizes of the two types of instruction. They reported that the effect size of 29 implicit treatments was medium ($d = 0.54$) and that of 69 explicit treatments was large ($d = 1.13$), using Cohen's (1988) criteria. The overall finding from their meta-analysis was that explicit instruction was more effective than implicit instruction.

Experiment 2 of the present study adopted explicit learning and instruction on noun countability and the English article system. Although the overall results showed that explicit

learning improved Japanese EFL learners' usage of English articles, the learning effect for the uncountable use of nouns (i.e., the use of the zero article) was more limited than that for countable use (i.e., the use of the indefinite article). More specifically, in light of the longitudinal learning effects, while the accuracy of countable use remained relatively constant, that of uncountable use decreased four weeks after the training for English article usage. However, the suggestion that implicit learning could be a solution for learners' difficulty with uncountable use does not seem realistic. As introduced above, experimental studies on implicit and explicit learning revealed some advantages of the explicit condition in language learning. In particular, the effectiveness of implicit learning for abstract rules is open to question (e.g., DeKeyser, 2008). Because the English article system involves abstract and complex rules, it may be hard for learners to grasp the rules without any explicit instruction. In the case that L2 rules are unlikely to be easily learned implicitly due to their abstract or complex features, explicit instruction would be needed in order to make learners notice them. Thus, even if implicit learning or instruction had been used in Experiment 2 of the present study, it would not have solved the difficulty the participants had with the uncountable use of nouns.

It should be taken into account, however, that the treatments in previous research on the effects of implicit and explicit learning were of relatively short duration. Furthermore, the learning effects were measured by the kinds of tests that were likely to favor explicit learning (e.g., grammaticality judgement tests). Therefore, it could be argued that the methods used in these experiments were biased toward explicit learning (DeKeyser, 2008; R. Ellis, 2009). Treatments over a longer duration or other ways of measuring learners' linguistic performance may provide evidence favoring implicit learning.

In summary, the present study demonstrated that Japanese EFL learners generally developed their ability to use English articles through explicit and successive learning, regardless of the type of learning approach. There are, however, a few points worth noting. First, the results showed that the accuracy of Japanese EFL learners' noun-countability

judgement varied among the target items. While the countability of some nouns was correctly judged in both countable and uncountable contexts, that of other nouns was incorrectly judged in either of the two countability types, or both. It is suggested that the individual features of English nouns affect appropriate countability judgement and article usage by Japanese EFL learners. Furthermore, Experiment 2 revealed that the effectiveness of explicit learning differed depending on countability type. The learning effect for the uncountable use of nouns was not as constant as that for countable use. Thus, in this study, full understandings of noun countability and English article usage were not enabled by explicit learning and instruction. Considering the findings of previous studies, however, the explicit condition still appears to be more effective than the implicit condition especially in learning such a complex grammar as the English article system.

5.4 Educational Implications

Previous studies investigated Japanese EFL learners' understanding of English noun countability (e.g., Gally, 2010; Yoon, 1993). These studies pointed out that Japanese EFL learners judge English noun countability intuitively, and fail to change their judgements even when nouns occur in the opposite countability context. The problem is that Japanese EFL learners seem to believe that the count or mass status of an English noun is fixed. Thus, English education needs to make them aware of the flexible nature of English noun countability.

As mentioned in Chapter 2, one possible reason for Japanese learners' difficulty with English article usage relates to the conventional learning approach that has been adopted in English education in Japan for a long time. Because the conventional approach simply focuses on the relationship between the classification of English nouns and article choice, it does not fully describe the concept of countability. The present study adopted the CL approach as an alternative approach to learning the English article system, which explains that countability

judgement involves a speaker's perception of the boundary state of a referent. It was predicted that the CL approach would be more effective than the conventional approach because the CL approach provides detailed explanations of how to judge the countability of a noun. Contrary to this hypothesis, however, the results showed that both approaches facilitated Japanese EFL learners' understanding of the English article system equally. Although the CL approach demonstrated no superiority, it is noteworthy that the cognitive linguistic insights improved the participants' English article usage. This finding indicates that the CL approach could in fact be an effective method for learning the English article system.

Noun countability seems to be a difficult concept for Japanese EFL learners to understand. Gally (2010) reported that the grammatical distinction between countable and uncountable nouns is particularly troublesome for Japanese EFL learners. The primary reason could relate to the linguistic characteristic of their first language: there is no distinction between countable and uncountable nouns in the Japanese language. In order to appropriately use English articles, Japanese EFL learners first need to understand what noun countability is. In that sense, the CL approach appears to be useful. Because CL focuses not only on language but also on human cognition, cognitive linguistic insights may help L2 learners understand some L2 features that do not exist in their L1s. That is, with cognitive linguistic insights such as boundedness and individuation, noun countability may become more comprehensible to L2 learners. In fact, some research (e.g., Middleton et al., 2004; Wisniewski et al., 2003) has shown that the use of count and mass syntax is related to a conceptual distinction in a speaker's mind. If the count-mass distinction is conceptually based, L2 learners would be able to understand the concept of countability itself, even if their L1s do not have the syntactic distinction of count and mass. From the perspective of human cognition, therefore, the CL approach may have a greater advantage in promoting understanding of noun countability than the conventional approach.

In short, although this study showed no statistically significant differences between the CL approach and the conventional approach, it demonstrated the effectiveness of the CL

approach in learning English noun countability. A few other studies also reported similar results (e.g., Akamatsu, 2018; Cho & Kawase, 2011; Kishimoto, 2007). It may be worth using the CL approach as a novel orientation toward learning noun countability and English article usage.

The present study also indicates the importance of successive and systematic learning of noun countability and English article usage. English education in Japan tends not to dedicate time to exercises on countability judgement and article usage. Japanese EFL learners only receive one-shot instruction on English articles. Some researchers (e.g., Master, 1995, 1997; Yamada & Matsuura, 1982) pointed out that such a trend may cause learners' lack of attention to English articles. In addition, the conventional approach adopted in Japan, which focuses on English noun classifications, does not provide adequate explanations of the English article system. Gally (2010) stated that "a relative disregard for noun countability in English education in Japan results in excessively delayed acquisition of this grammatical feature by students who have gone through the standard education system" (p. 99). In fact, Japanese EFL learners' understanding of noun countability and their English article usage are full of stereotypes and misconceptions (Takahashi, 2013).

The English article system is so complicated that it cannot be fully understood with one-shot learning. It consists of multiple referential properties: it contains not only noun countability but also other multiple aspects, such as definiteness, specificity and genericity. It is essential to understand that English article usage is a whole system which pertains to multiple heterogeneous properties. Only after understanding all of these properties of English nouns can learners determine which article is the most felicitous one for a context. In order to learn various contextual situations where nouns occur, learners should be provided with abundant experiences with English nouns and articles. Thus, successive and systematic learning is required for ESL learners to grasp how the whole English article system works.

In light of systematic learning of English article usage, the CL approach may be beneficial. Because CL is based on linguistic representations that L1 speakers implicitly

acquire, cognitive linguistic insights can offer detailed descriptions on the target language. The perspectives from CL would help ESL learners understand how the English article system works in L1 speakers' minds. Importantly, cognitive linguistic insights might be internalized slowly, especially in the case of ambiguous and abstract notions relating to complex grammatical features, just as L1s are developed gradually throughout childhood. Although the present study did not show the CL approach to be superior, the effects of the CL approach could be more significant with a longer duration of learning. Considering the importance of systematic and successive learning in the acquisition of the English article system, the CL approach seems promising.

Furthermore, the results of Experiment 1 suggested that some Japanese translations may be useful for judging English noun countability. The results showed that the participants successfully distinguished the countable and uncountable referents of almost half of the target Japanese nouns. These Japanese translations, therefore, may help Japanese EFL learners determine the appropriate countability type of English nouns according to referents or contexts. If Japanese EFL learners could refer to Japanese translations in determining the countability of English nouns, they would be able to use the count-mass syntax of English nouns more correctly. As discussed in the early section of this chapter, some Japanese translations are apparently unsuitable for distinguishing the countability type of English nouns. For instance, both count and mass Japanese translations of *work* (作品 [*sakuhin*] for the count meaning; 仕事 [*shigoto*] for the mass meaning) were judged as countable. Similarly, the count and mass Japanese translations of *noise* (物音 [*monooto*] for the count meaning; 騒音 [*souon*] for the mass meaning) were judged as uncountable. These Japanese translations favoring either of the two countability types would be unsuited to distinguish the countability type in English. For practical English teaching in a classroom, English teachers should carefully select target Japanese translations.

5.5 The Limitations of the Present Study

The first possible limitation of this study may be the reliability of the Japanese translations used in Experiment 1. All the Japanese translations were selected in reference to two English-Japanese dictionaries. It is possible, however, that the dictionaries fail to provide appropriate Japanese translations for distinguishing the countability type. Specifically, the Japanese translations from the dictionaries may not reflect the count and mass meanings of each English noun accurately. As stated in the preceding section, the participants failed to distinguish the countability type of count and mass Japanese translations of some English nouns (e.g., *work*, *noise*). This result may have stemmed from inappropriate Japanese translations. If accurate Japanese translations had been provided, the participants may have been able to successfully judge their countability types. It is possible that some Japanese translations may not be reliable in representing the count-mass distinction of English nouns.

The second possible limitation relates to the measurements used in the article tests in Experiment 2. In the article tests, the participants were asked to choose the appropriate article from two choices: the indefinite article or the zero article. However, it can sometimes be difficult to determine which of the two articles is the definitively correct answer. According to the cognitive linguistic perspective (Langacker, 2008; Talmy, 2002) and the cognitive individuation hypothesis (Wisniewski et al., 2003), the decision as to which article to use is made on the basis of a speakers' conceptualization. Thus, it is highly likely that interpretations of noun phrases where articles are used vary among speakers. Substantial efforts, such as the use of authentic materials and proofreading by native speakers of English, were made to create appropriate and reliable test sentences. It is, however, still possible that some particular contexts of noun phrases allowed the participants to make alternative interpretations.

The third possible limitation is the length of learning. In Experiment 2, the participants

underwent six sets of article training. Each training set contained explicit instruction on the English article system and 30 practice questions. The participants encountered 180 practice questions over the whole training and conducted one training set repeatedly until they marked a perfect score. It took them a week or two to complete all the six sets of training. Although the participants received intensive intervention for English article usage, the learning period was relatively short. Such a short duration of learning, therefore, may not have been enough to lead the participants to a full understanding of the English article system. Snape and Yusa (2013) claimed that instruction on article choice is so complex that it cannot be adequately taught in a short period of time. Larsen-Freeman and Long (1991) also insisted that the accurate use of English articles slowly improves over time. Thus, Japanese EFL learners may need a longer period of time for learning in order to gain a profound knowledge of such complex linguistic aspects as noun countability judgement in English article choice.

Lastly, both experiments of the present study did not conduct follow-up interviews with the participants. It would be worth asking them directly about their countability judgements and article choice because it may illuminate potential causes of their errors in article usage. With the interviews, more conclusive and detailed findings might have been obtained.

5.6 Future Research Directions

Recently, cognitive linguistic insights have attracted increasing attention in the field of SLA. Although many empirical studies have reported the effectiveness of the CL approach in L2 learning, there is little, if any, research which investigates the effects of the CL approach on the acquisition of English article usage. Previous studies on the CL approach have focused mainly on vocabulary learning, such as polysemous words and phrasal verbs. Furthermore, a majority of studies on L2 English article usage have targeted definiteness, specificity, or genericity using traditional frameworks such as generative or universal grammar. There are only a few studies examining the effectiveness of cognitive linguistic insights in learning

noun countability (e.g., Akamatsu, 2018; Cho & Kawase, 2011; Kishimoto, 2007). Thus, further research on the CL approach should pay more attention to the acquisition of the English article system, especially noun countability.

The present study only adopted explicit learning and instruction for the English article system. Although much of the previous literature on implicit and explicit learning favors the explicit condition, the effect of implicit learning on the acquisition of the English article system is still an open question. It would be worth exploring whether or the extent to which implicit learning works in learning noun countability and English article usage.

The EFL participants in this study were Japanese undergraduates in a university's department of English. They had relatively homogenous English learning environments and English proficiency. It would be interesting to investigate noun-countability judgement and English article usage of Japanese learners with various English learning environments or different levels of English proficiency. Furthermore, as a number of studies have demonstrated (e.g., Hawkins & Liszka, 2003; Hawkins & Franceschina, 2004; Inagaki, 2014; Ionin, 2013, Ionin et al., 2004; Snape & Yusa, 2013), learners' L1 backgrounds affect their L2 English article usage. Future research needs to target learners of other L1s which lack article systems or those with fairly different article systems. The effects of learners' L1s on article acquisition should be more thoroughly examined.

As another suggestion for future research on English article usage, it would also be worth examining learner-internal processes when learners engage in learning the English article system. The complexity and the abstractness of the English article system are two of the reasons for learners' misunderstandings on article usage. Observations of learners' cognitive processes may be helpful to ascertain how learners understand the English article system and what misconceptions they have. As a way of measuring learner-internal processes, follow-up interviews with participants would be effective. Analysis of follow-up interviews allows SLA researchers to access learners' cognitive processes during their engagement with language.

In conclusion, the present study explored the potential usefulness of Japanese translations and the CL approach in learning a complex English grammatical item, the article system. The results indicate a certain possibility of Japanese translations and the CL approach as effective ways of understanding English noun countability and article usage. In particular, Experiment 2 demonstrated that explicit learning using the CL approach developed Japanese EFL learners' article usage. The results of this study, however, still left room for argument on the effectiveness of Japanese translations and superiority of the CL approach. It would be worth exploring the clear advantages of Japanese translations and the CL approach in the acquisition of the English article system.

REFERENCES

Akamatsu, N. (2018). Does cognitive linguistic insights help Japanese learners understand the English article system? *SELT (Studies in English Language Teaching)*, *41*, 1–20. https://doi.org/10.18989/selt.41.0_1

Allan, K. (1980). Nouns and countability. *Language, 56*(3), 541–567. http://dx.doi.org/10.2307/414449

Ando, S. (2005). *Gendai eibumpou kougi* [Lectures on modern English grammar]. Kaitakusha.

Athanasopoulos, P., Damjanovic, L., Krajciova, A., & Sasaki, M. (2011). Representation of colour concepts in bilingual cognition: The case of Japanese blues. *Bilingualism: Language and Cognition*, *14*(1), 9–17. http://dx.doi.org/10.1017/S1366728909990046

Athanasopoulos, P., & Kasai, C. (2008). Language and thought in bilinguals: The case of grammatical number and nonverbal classification preferences. *Applied Psycholinguistics*, *29*, 105–123. http://dx.doi.org/10.1017/S0142716408080053

Barner, D., Inagaki, S., & Li, P. (2009). Language, thought, and real nouns. *Cognition*, *111*, 329–344. http://dx.doi.org/10.1016/j.cognition.2009.02.008

Bates, D., Machler, M., Bolker, B., & Walker, S. (2014). Fitting linear mixed-effects models using lme4. *Journal of Statistical Software*, *67*, 1–48.

Bitchener, J., & Knoch, U. (2010). Raising the linguistic accuracy level of advanced L2 writers with written corrective feedback. *Journal of Second Language Writing*, *19*, 207–217. http://dx.doi.org/10.1016/j.jslw.2010.10.002

Bloom, P. (1990). *Semantic structure and language development*. [Unpublished doctoral dissertation], Massachusetts Institute of Technology.

Boers, F. (2000). Metaphor awareness and vocabulary retention. *Applied Linguistics*, *21*, 553–571. http://dx.doi.org/10.1093/applin/21.4.553

Boers, F. (2001). Remembering figurative idioms by hypothesising about their origin. *Prospect*, *16*, 35–43.

Boers, F. (2013). Cognitive linguistic approaches to teaching vocabulary: Assessment and integration. *Language Teaching*, *46*, 208–224. http://dx.doi.org/10.1017/S0261444811000450

Bolinger, D. (1977). *Meaning and form*. Longman.

Brysbaert, M., Warriner, A. B., & Kuperman, V. (2014). Concreteness ratings for 40 thousand generally known English word lemmas. *Behavior research methods*, *46*(3), 904–911. http://dx.doi.org/10.3758/s13428-013-0403-5

Butler, Y. (2002). Second language learners' theories on the use of English articles: An analysis of the metalinguistic knowledge used by Japanese students in acquiring the English article system. *Studies in Second Language Acquisition*, *24*, 451–480. http://dx.doi.org/10.1017/S0272263102003042

Cho, K. (2010). Fostering the acquisition of English prepositions by Japanese learners with networks and prototypes. In S. de Knop, F. Boers, & T. De Rycker (Eds.), *Fostering language teaching efficiency through cognitive linguistics* (pp. 259–276). Mouton de Gruyter. https://doi.org/10.1515/9783110245837.257

Cho, K., & Kawase, Y. (2011). Effects of a cognitive linguistic approach to teaching countable and uncountable English nouns to Japanese learners of English. *ARELE (Annual Review of English Language Education in Japan)*, *22*, 201–215. https://doi.org/10.20581/arele.22.0_201

Chomsky, N. (1965). *Aspects of the theory of syntax*. MIT Press.

Cook, V. (2016). Premises of multi-competence. In V. Cook & L. Wei (Eds.), *The Cambridge handbook of linguistic multi-competence* (pp. 1–25). Cambridge University Press.

Crompton, P. (2011). Article errors in the English writing of advanced L1 Arabic learners: The role of transfer. *Asian EFL Journal*, *50*(1), 4–35.

Cruse, A. (2000). *Meaning in language. An introduction to semantics and pragmatics*. Oxford University Press.

Cunnings, I. (2012). An overview of mixed-effects statistical models for second language researchers. *Second Language Research*, *28*(3), 369–382. https://doi.org/10.1177/0267658312443651

DeKeyser, R. (2005). What makes learning second-language grammar difficult? A review of issues. *Language Learning*, *55*, 1–25. https://doi.org/10.1111/j.0023-8333.2005.00294.x

DeKeyser, R. (2008). Implicit and explicit learning. In C. Doughty & M. Long (Eds.), *The handbook of second language acquisition* (pp. 313–348). Blackwell.

Dulay, H., Burt, M., & Krashen, S. (1982). *Language two*. Oxford University Press.

Ellis, R. (2009). Implicit and Explicit Learning, knowledge and Instruction. In R. Ellis, S. Loewen, C. Elder, R. Erlam, J. Philp, J & H. Reinders (Eds.), *Implicit and explicit knowledge in second language learning, testing and teaching* (pp. 3–25). Multilingual Matters. https://doi.org/10.21832/9781847691767-003

Evans, V. & Green, M. (2006). *Cognitive linguistics. An introduction*. Lawrence Erlbaum Associates.

Fauconnier, G. (1994). *Mental spaces: Aspects of meaning construction in natural language*. Cambridge University Press.

Gally, T. (2010). Noun countability and English-language pedagogy in Japan: A re-exploration. *Komaba Journal of English Education*, *1*, 85–103.

García Mayo, M. (2008). The acquisition of four nongeneric uses of the article the by Spanish EFL learners. *System*, *36*, 550–565. https://doi.org/10.1016/j.system.2008.08.001

Geeraerts, D. (2006). *Cognitive linguistics: Basic readings*. Mouton de Gruyter.

Greenberg, J. (1963). Some universals of grammar with particular reference to the order of meaningful elements. In J. Greenberg (Ed.), *Universals of language* (pp. 73–113). MIT Press.

Hawkins, R., & Franceschina, F. (2004). Explaining the acquisition and non-acquisition of determiner-noun gender concord in French and Spanish. In P. Prevost & J. Paradis (Eds.), *The acquisition of French in different contexts* (pp. 175–205). John Benjamins.

Hawkins, R., & Liszka, S. (2003). Locating the source of defective past tense marking in advanced L2 English speakers. In R. Van Hout, A. Hulk, F. Kuiken & R. Towell (Eds.), *The lexicon-syntax interface in second language acquisition* (pp. 21–44). John Benjamins.

Hiki, M, (1990). The judgement of noun countability by Japanese college students: Where is the difficulty? *JACET Bulletin, 21*, 19–38,

Hulstijn, J. (2002). Towards a unified account of the representation, processing and acquisition of second language knowledge. *Second Language Research*, 18, 193–223. https://doi.org/10.1191/0267658302sr207oa

Ibrahim, E. H. E., Sarudin, I., & Muhamad, A. J. (2016). The Relationship between Vocabulary Size and Reading Comprehension of ESL Learners. *English Language Teaching*, *9*(2), 116–123.

Inagaki, S. (2014). Syntax–semantics mappings as a source of difficulty in Japanese speakers' acquisition of the mass–count distinction in English. *Bilingualism: Language and Cognition*, *17*, 464–477. https://doi.org/10.1017/S1366728913000540

Inagaki, S., & Barner, D. (2009). Countability in absence of count syntax: Evidence from Japanese quantity judgments. In M. Hirakawa, S. Inagaki, Y. Hirakawa, H. Sirai, S. Arita, H. Morikawa, M. Nakayama & J. Tsubakita (Eds.), *Studies in Language Sciences* (8) (pp. 111–125). Kurosio. https://doi.org/10.31234/osf.io/ntw5p

Ionin, T. (2006). This is definitely specific: specificity and definiteness in article systems. *Natural Language Semantics*, *14*, 175–234.

Ionin, T. (2013). Morphosyntax. In J. Herschensohn & M. Young-Scholten (Eds.), *The Cambridge handbook of second language acquisition.* (pp. 505–528). Cambridge University Press. https://doi.org/10.1017/CBO9781139051729.030

Ionin, T., Ko, H., & Wexler, K. (2004). Article semantics in L2 acquisition: The role of specificity. *Language acquisition*, *12*(1), 3–69. https://doi.org/10.1207/s15327817la1201_2

Ionin, T., & Montrul, S. (2010). The role of L1 transfer in the interpretation of articles with definite plurals in L2 English. *Language learning*, *60*(4), 877–925. https://doi.org/10.1111/j.1467-9922.2010.00577.x

Ionin, T., Zubizarreta, M. L., & Maldonado, S. B. (2008). Sources of linguistic knowledge in the second language acquisition of English articles. *Lingua*, *118*(4), 554–576. https://doi.org/10.1016/j.lingua.2006.11.012

Iwasaki, N., Vinson, D., & Vigliocco, G. (2010). Does the grammatical count/mass distinction affect semantic representations? Evidence from experiments in English and Japanese. *Language and Cognitive Processes*, *25*(2), 189–223. https://doi.org/10.1080/01690960902978517

Kishimoto, E. (2007). A suggestion for teaching countability and articles of English nouns at junior high school in Japan: how to teach from the viewpoint of cognitive grammar. *Proceedings of seventh annual meeting of the Japanese Cognitive Linguistics Association*, *7*, 536–551.

Kobayashi, T. (2008). Usage of countable and uncountable nouns by Japanese learners of English: Two studies using the ICLE error-tagged Japanese sub-corpus. *Gakuen*, *816*, 73–82.

Konishi, T., & Minamide, K. (2001). *Genius English-Japanese dictionary*. Taishukan.

Krashen, S. (1982). *Principles and practice in second language acquisition*. Prentice-Hall.

Krashen, S. (1999). Seeking a role for grammar: a review of some recent studies. *Foreign Language Annals*, *32*, 245–257. https://doi.org/10.1111/j.1944-9720.1999.tb02395.x

Kreidler, C. W. (1998). *Introducing English semantics*. Routledge.

Krifka, M., Pelletier, F., Carlson, G., ter Meulen, A., Link, G., & Chierchia, G. (1995). Genericity: An introduction. In G. Carlson & F. Pelletier (Eds.), *The generic book* (pp. 1–124). University of Chicago Press.

Langacker, R. (2008). *Cognitive grammar: A basic introduction*. Oxford University Press.

Larsen-Freeman, D., & Long, M. (1991). *An introduction to second language acquisition research*. Longman.

Littlemore, J. (2009). *Applying cognitive linguistics to second language learning and teaching*. Palgrave Macmillan.

Littlemore, J., & Juchem-Grundmann, C. (2010). Introduction to the interplay between cognitive linguistics and second language learning and teaching. *AILA Review*, *23*, 1–6. https://doi.org/10.1075/aila.23.01lit

Liu, Y., & Lu, X. (2020). Chinese EFL learners' misconceptions of noun countability and article use. *System*, *90*, 1–12. https://doi.org/10.1016/j.system.2020.102222

Long, M., & Robinson, P. (1998). Focus on form: Theory, research, and practice. In C. Doughty & J. Williams (Eds.) *Focus on form in classroom second language acquisition* (pp. 15–41). Cambridge University Press.

Lyons, C. (1999). *Definiteness*. Cambridge University Press.

Master, P. (1987). *A cross-linguistic interlanguage analysis of the acquisition of the English article system*. [Unpublished doctoral dissertation], University of California.

Master, P. (1990). Teaching the English Articles as a Binary System. *TESOL Quarterly*, *24*, 461–478. https://doi.org/10.2307/3587230

Master, P. (1993, April 15). *A contrastive study of determiner usage in EST research articles*. Paper presented at the TESOL convention, Atlanta, Georgia.

Master, P. (1994). The effect of systematic instruction on learning the English article system. In T. Odlin (Ed.), *Perspectives on pedagogical grammar* (pp. 229–252). Cambridge University Press.

Master. P. (1995) Consciousness raising and article pedagogy. In D. Belcher & G. Braine (Eds.), *Academic writing in a second language* (pp. 183–204). Ablex Publishing.

Master, P. (1997). The English article system: acquisition, function, and pedagogy. *System*, *25*(2), 215–232. https://doi.org/10.1016/S0346-251X(97)00010-9

Master, P. (2002) Information structure and English article pedagogy. *System, 30*(3), 331−348. https://doi.org/10.1016/S0346-251X(02)00018-0

Matsuda, T. (1999). *Kenkyusha's English-Japanese dictionary for the general reader*. Kenkyusha.

Middleton, E., Wisniewski, E., Trindel, K., & Imai, M. (2004). Separating the chaff from the oats: Evidence for conceptual distinction between count noun and mass nouns aggregates. *Journal of Memory and Language*, *50*, 371–394. https://doi.org/10.1016/j.jml.2004.02.005

Nation, P., & Beglar, D. (2007). A vocabulary size test. *The Language Teacher*, *31*, 9–13.

Ohori, T. (2002). *Ninchi gengogaku.* [Cognitive linguistics]. Tokyo Daigaku Shuppankai.

Oxford Quick Placement Test. (2001). *Quick placement test*. Oxford University Press.

Park, K. (1996). The article acquisition in English as a foreign language. *English Teaching*, *51*(3), 37–49.

Pavlenko, A., & Malt, B. C. (2011). Kitchen Russian: Cross-linguistic differences and first-language object naming by Russian-English bilinguals. *Bilingualism: Language and Cognition*, *14*(1), 19–45. https://doi.org/10.1017/S136672891000026X

Pica, T. (1983). The article in American English: What the textbooks don't tell us. In N. Wolfson & E. Judd (Eds.), *Sociolinguistics and language acquisition* (pp. 222–233). Newbury House.

Quine, W. V. O. (1960). *Word and object.* MIT Press.

Reber, A. (1976). Implicit learning of synthetic languages: the role of instructional set. *Journal of Experimental Psychology: Human Learning and Memory*, *2*, 88–94. https://doi.org/10.1037/0278-7393.2.1.88

Robinson, P., & Ellis, N. (Eds.). (2008). *Handbook of cognitive linguistics and second language acquisition*. Routledge.

Sapir, E. (1921). *Language: An introduction to the study of speech*. Harcourt, Brace and Company.

Sinclair, J. M. (1991). *Corpus, concordance, collocation*. Oxford University Press.

Skinner, B. F. (1957). *Verbal Behavior*. Appleton-Century-Crofts.

Snape, N. (2008). Resetting the nominal mapping parameter in L2 English: Definite article use and the count-mass distinction. *Bilingualism: Language and Cognition*, *11*(1), 63–79. https://doi.org/10.1017/S1366728907003215

Snape, N., & Yusa, N. (2013). Explicit article instruction in definiteness, specificity, genericity and perception. In M. Whong, K.-H. Gil & H. Marsden (Eds.), *Universal grammar and the second language classroom* (pp. 161–183). Springer.

Snape, N., Umeda, M., Wiltshier, J., & Yusa, N. (2016) Teaching the complexities of English article use and choice for generics to L2 learners. In D. Stringer, J. Garrett, B. Halloran, & S. Mossman (Eds.), *Proceedings of the 13th Generative Approaches to Second Language Acquisition Conference* (GASLA 2015) (pp. 208–222). Cascadilla Proceedings Project.

Sugiyama, T. (1998). Eibumpou shoukai [A comprehensive English grammar]. Gakushu
Kenkyu Sha.

Takahashi, T. (2013). Japanese Learners' Criteria to Judge English Nouns' Countability.
International Journal of Curriculum Development and Practice, *15*, 1–10.
https://doi.org/10.18993/jcrdaen.15.1_1

Talmy, L. (2000). *Toward a cognitive semantics: Concept structuring systems* (Vol. 1). MIT
Press.

Thomas, M. (1989). The acquisition of English articles by first- and second-language learners.
Applied Psycholinguistics, *10*, 335–355. https://doi.org/10.1017/S0142716400008663

Tyler, A. (2012). *Cognitive linguistics and second language learning: Theoretical basics and
experimental evidence*. Routledge.

Tyler, A., Mueller, C., & Ho, V. (2010). Applying cognitive linguistics to instructed L2
learning: The English modals. *AILA Review*, *23*, 30–49.
https://doi.org/10.1075/aila.23.03tyl

Ungerer, F. & Schmid, H. J. (1996). *An introduction to cognitive linguistics*. Longman.

Umeda, M., Snape, N., Yusa, N., & Wiltshier, J. (2017) The long-term effect of explicit
instruction on learners' knowledge of English articles. *Language Teaching Research*,
23(2), 179−199. https://doi.org/10.1177/1362168817739648

VanPatten, B. (2011). Stubborn syntax: How it resists explicit teaching and learning. In C.
Sanz & R. Leow (Eds.), *Implicit and explicit language learning: Conditions, processes,
and knowledge in SLA and bilingualism* (pp. 9–21). Georgetown University Press.

Verspoor, M., & Lowie, W. (2003). Making sense of polysemous words. *Language Learning*,
53, 547–586. https://doi.org/10.1111/1467-9922.00234

Whorf, B (1956). Science and Linguistics. In J. Carroll (Ed.), *Language, thought and reality:
Selected writings of Benjamin Lee Whorf* (pp. 207–219). MIT Press.

Wierzbicka, A. (1985). Oats and wheat: The fallacy of arbitrariness. In J. Haiman (Ed.),
Iconicity in syntax (pp. 311–342). Benjamins.

Wierzbicka, A. (1988). *The semantics of grammar*. Benjamins.

Wisniewski, E. J., Lamb, C. A., & Middleton, E. L. (2003). On the conceptual basis for the count and mass noun distinction. *Language and Cognitive Processes*, *18*(5/6), 583−624. https://doi.org/10.1080/01690960344000044

Yamada, J., & Matsuura, N. (1982). The use of the English article among Japanese students. *RELC Journal*, *13*, 50−63. https://doi.org/10.1177/003368828201300104

Yasuda, S. (2010). Learning phrasal verbs through conceptual metaphors: A case of Japanese EFL learners. *TESOL Quarterly*, *44*(2), 250–273. https://doi.org/10.5054/tq.2010.219945

Yoon, K. (1993). Challenging prototype descriptions: Perception of noun countability and indefinite vs. zero article use. *IRAL*, *31*, 269–289. https://doi.org/10.1515/iral.1993.31.4.269

Zareva, A., Schwanenflugel, P., & Nikolova, Y. (2005). Relationship between lexical competence and language proficiency: Variable sensitivity. *Studies in Second Language Acquisition*, *27*, 567–595. https://doi.org/10.1017/S0272263105050254

APPENDIX 1

Appendix 1.1: Stimulus English Nouns and Their Japanese Counterparts
Which Are the Same in Mass and Count Contexts

English Nouns	Japanese Translations
banana (6.6; 0.7)	バナナ (6.6; 1.0)
beer (3.4; 2.0)	ビール (5.2; 1.8)
book (6.7; 0.5)	本 (6.6; 0.9)
bread (4.2; 2.2)	パン (6.4; 0.9)
cake (5.6; 1.9)	ケーキ (6.5; 0.8)
car (6.8; 0.4)	車 (6.8; 0.4)
chalk (5.4; 1.5)	チョーク (6.5; 0.6)
cheese (4.1; 1.9)	チーズ (5.9; 1.4)
coffee (3.0; 2.1)	コーヒー (5.1; 2.0)
comedy (4.1; 2.0)	喜劇 (4.6; 1.8)
crime (4.9; 1.9)	犯罪 (5.2; 1.8)
custom (4.6; 1.9)	習慣 (3.4; 1.9)
disease (4.3; 2.2)	病気 (3.8; 2.1)
egg (6.4; 1.0)	卵 (6.7; 0.5)
environment (3.1; 2.0)	環境 (2.5; 1.7)
food (4.8; 2.0)	食物 (4.3; 2.0)
fruit (5.9; 1.4)	果物 (5.9; 1.6)
gas (2.3; 1.8)	気体 (1.6; 1.0)
hair (2.6; 1.5)	毛 (5.1; 2.0)
harvest (3.2; 1.7)	収穫 (3.5; 2.0)
heaven (1.9; 1.4)	天国 (1.9; 1.7)
history (3.6; 2.2)	歴史 (2.7; 1.7)
juice (2.4; 1.5)	ジュース (4.7; 1.9)
language (5.8; 1.3)	言語 (6.0; 1.4)
marriage (3.9; 2.1)	結婚 (4.6; 2.1)
metal (3.2; 1.7)	金属 (3.8; 1.8)
motion (3.7; 1.9)	動作 (3.4; 2.0)
movement (4.6; 1.9)	動向 (2.8; 1.6)
night (4.5; 2.1)	夜 (4.6; 2.0)
opera (4.0; 1.8)	歌劇 (4.5; 1.9)
orange (6.6; 0.7)	オレンジ (6.6; 0.9)
orchestra (4.5; 1.9)	オーケストラ (5.5; 1.7)
peace (2,2; 1.6)	平和 (1.9; 1.3)
pen (6.8; 0.5)	ペン (6.8; 0.4)
piano (6.0; 1.4)	ピアノ (6.7; 0.6)

English Nouns	Japanese Translations
pizza (4.5; 2.0)	ピザ (6.5; 0.6)
rain (2.2; 1.7)	雨 (2.5; 1.7)
religion (4.7; 2.0)	宗教 (5.2; 1.7)
rest (3.5; 1.7)	休息・休憩 (3.9; 1.9)
revolution (4.4; 1.9)	革命 (4.2; 2.0)
rice (2.6; 1.3)	米 (4.6; 1.9)
rock (4.7; 1.8)	岩 (5.7; 1.5)
rope (5.2; 1.6)	ロープ (6.1; 1.3)
salt (2.2; 1.3)	塩 (3.3; 2.2)
sand (2.5; 1.5)	砂 (3.0; 1.9)
silence (2.1; 1.5)	静寂 (1.8; 1.2)
sin (3.5; 1.9)	罪悪 (2.0; 1.4)
sleep (2.5; 1.4)	睡眠 (2.3; 1.5)
snow (2.1; 1.2)	雪 (2.4; 1.4)
song (6.4; 0.9)	歌 (6.0; 1.3)
stone (5.5; 1.6)	石 (6.3; 1.2)
sugar (2.1; 1.2)	砂糖 (3.0; 2.1)
time (3.3; 1.9)	時間 (3.9; 2.2)
tragedy (3.5; 1.7)	悲劇 (4.0; 2.0)
TV (5.2; 2.1)	テレビ (6.5; 0.7)
war (5.0; 1.8)	戦争 (5.2; 1.8)
water (1.6; 0.8)	水 (3.2; 2.2)
wine (2.7; 1.7)	ワイン (4.3; 2.1)
winter (2.8; 1.8)	冬 (3.3; 2.1)

Note. The first numbers in the parentheses stand for the mean values of noun countability judgement; the second numbers stand for standard deviations.

Appendix 1.2: Stimulus English Nouns and Their Japanese Counterparts Which Are Different in Mass and Count Contexts

English Nouns	Japanese Translations Count Meanings	Japanese Translations Mass Meanings
action (4.7; 2.0)	行い (4.2; 2.2)	行動 (3.5; 2.2)
advertisement (4.7; 1.8)	広告 (5.5; 1.4)	広報 (2.9; 1.7)
air (1.5; 0.7)	雰囲気 (1.4; 0.7)	空気 (1.2; 0.4)
argument (4.7; 1.7)	口論 (3.3; 1.9)	議論 (4.2; 1.9)
art (4.2; 2.0)	技術・わざ (4.3; 1.9)	芸術 (2.7; 1.8)
assignment (5.5; 1.6)	仕事・宿題 (5.5; 1.6)	割当て (4.0; 1.9)
basketball (4.0; 2.5)	バスケットボールのボール (6.9; 0.3)	バスケットボール（スポーツ）(2.1; 1.5)
beauty (2.3; 1.5)	美人 (5.9; 1.7)	美 (1.8; 1.3)
business (3.9; 1.7)	仕事・事業 (4.9; 1.9)	商売 (3.3; 2.1)
chicken (4.8; 1.9)	にわとり (6.8; 0.5)	鶏肉 (4.9; 1.9)
church (6.0; 1.3)	教会 (6.4; 1.1)	礼拝 (3.0; 1.9)
class (6.5; 0.7)	学級 (6.0; 1.6)	授業 (6.1; 1.3)
cloth (5.3; 1.6)	ぞうきん (6.6; 0.6)	布 (5.7; 1.6)
color (5.4; 1.6)	色 (5.4; 1.6)	顔色 (1.7; 1.1)
copper (4.2; 1.7)	銅貨 (6.1; 1.4)	銅 (3.8; 2.1)
country (6.4; 0.9)	国 (6.5; 1.1)	田舎 (2.5; 1.6)
crocodile (6.4; 0.9)	ワニ (6.7; 0.5)	ワニ皮 (4.4; 2.0)
democracy (2.3; 1.5)	民主国家 (4.9; 2.0)	民主主義 (2.0; 1.2)
dinner (3.3; 1.8)	晩餐会 (4.7; 2.0)	夕食 (4.1; 2.1)
dress (5.9; 1.3)	ワンピース (6.4; 1.1)	服装 (2.6; 1.8)
fact (5.3; 1.9)	事実 (3.9; 2.2)	現実 (2.1; 1.7)
failure (4.7; 1.8)	失敗作 (5.5; 1,8)	失敗 (5.0; 1.8)
fire (2.5; 1.7)	火事 (4.8; 1.9)	火 (2.1; 1.6)
fox (6.3; 1.1)	きつね (6.7; 1.0)	きつねの毛皮 (4.3; 2.1)
glass (5.7; 1.6)	グラス (6.4; 1.0)	ガラス (4.6; 2.1)
grammar (2.8; 1.9)	文法書 (6.5; 0.7)	文法 (3.7; 2.1)
ground (3.6; 1.8)	運動場 (5.6; 1.6)	地面 (2.1; 1.6)
iron (3.5; 2.0)	アイロン (6.1; 1.3)	鉄 (3.3; 1.9)
lamb (4.4; 2.0)	子羊 (6.5; 0.8)	ラム肉 (5.0; 1.8)
land (4.5; 1.9)	国土 (3.3; 2.0)	陸地 (3.0; 1.9)
life (4.6; 2.1)	生涯 (2.2; 1.6)	生命 (4.3; 2.2)
light (4.5; 2.1)	照明 (4.9; 2.1)	光 (2.9; 1.9)
necessity (3.2; 1.9)	必需品 (5.0; 1.8)	必要性 (2.3; 1.5)
nickel (3.1; 1.5)	５セント硬貨 (6.6; 0.8)	ニッケル (3.3; 1.6)
noise (2.8; 1.6)	物音 (2.8; 1.9)	騒音 (2.3; 1.5)
paper (4.5; 2.2)	新聞 (6.2; 0.9)	紙 (6.3; 0.8)
pleasure (2.9; 1.8)	娯楽 (3.8; 1.9)	喜び (2.8; 1.8)

English Nouns	Japanese Translations Count Meanings	Japanese Translations Mass Meanings
power (3.2; 1.8)	強国 (5.6; 1.7)	権力 (2.8; 1.9)
room (5.8; 1.5)	部屋 (6.5; 0.8)	余地 (2.3; 1.6)
school (6.1; 1.3)	校舎 (6.3; 0.7)	学業 (2.4; 1.5)
shadow (3.7; 2.0)	影 (3.7; 2.1)	暗がり (2.0; 1.4)
silver (2.8; 1.4)	銀メダル (6.6; 0.5)	銀 (3.6; 1.9)
society (3.9; 2.0)	共同体 (4.5; 2.0)	世間 (1.8; 1.1)
space (4.1; 2.0)	間隔 (3.3; 2.0)	宇宙 (2.2; 1.7)
speech (5.0; 1.8)	スピーチ (5.0; 1.9)	言語能力 (2.2; 1.6)
straw (5.1; 1.6)	ストロー (6.6; 0.8)	わら (4.8; 1.9)
success (3.8; 1.8)	成功者 (5.6; 1.8)	成功 (4.3; 2.3)
trouble (5.0; 1.9)	悩み (4.6; 2.1)	厄介 (2.3; 1.6)
word (6.5; 0.8)	単語 (6.2; 1.4)	知らせ (5.1; 1.9)
work (5.0; 1.6)	作品 (6.2; 1.4)	仕事 (5.4; 1.5)

Note. The first numbers in the parentheses stand for the mean values of noun countability judgement; the second numbers stand for standard deviations.

English Nouns	Japanese Translations
advice (3.8; 2.2)	助言 (4.3; 2.0)
audience (3.0; 1.9)	聴衆 (4.7; 2.1)
board (5.3; 1.6)	理事会 (4.8; 1.8)
cabinet (5.0; 1.5)	内閣 (3.7; 2.0)
cattle (5.5; 1.7)	家畜 (5.0; 2.2)
clothing (4.3; 1.9)	衣類 (5.0; 1.9)
committee (5.0; 1.7)	委員会 (5.2; 1.7)
cutlery (3.9; 1.5)	食器 (5.9; 1.6)
deer (5.7; 2.0)	鹿 (6.8; 0.5)
family (5.3; 1.6)	家族 (5.4; 1.7)
fish (3.7; 2.4)	魚 (6.4; 1.1)
footwear (5.3; 1.4)	履物 (6.2; 1.3)
furniture (2.7; 1.9)	家具 (5.7; 1.7)
information (2.6; 2.0)	情報 (4.0; 2.1)
jewelry (5.2; 1.6)	宝石類 (5.1; 1.8)
jury (4.1; 1.9)	陪審 (3.7; 2.0)
luggage (4.9; 2.2)	手荷物 (6.3; 1,0)
money (2.9; 1.8)	お金 (5.2; 2.0)
police (3.9; 2.2)	警察 (5.0; 2.0)
public (2.3; 1.4)	公衆 (2.5; 1.7)
sheep (4.3; 2.4)	羊 (6.7; 0.6)
team (6.2; 1.1)	チーム (6.3; 1.1)
underwear (5.4; 1.6)	下着 (6.3; 1.1)

Note. The first numbers in the parentheses stand for the mean values of noun countability judgement; the second numbers stand for standard deviations.

APPENDIX 2

Appendix 2.1: Target English Nouns and Their Abstractness Ratings from the Study by Brysbaert et al. (2014)

Words Used Only in the Article Tests		Words Used Both in the Tests and Training	
Abstract Nouns	**Ratings**	**Abstract Nouns**	**Ratings**
chance	1.64	advantage	2.00
decision	2.19	belief	1.19
duty	2.19	choice	1.90
effort	2.33	context	2.17
failure	2.08	difficulty	1.90
fate	1.53	insight	1.72
instinct	2.00	passion	2.30
language	2.35	pleasure	2.04
power	2.04	prejudice	2.22
reality	1.72	success	2.21
shame	2.24	talent	2.19
sin	1.85	technique	2.40
skill	2.17	theory	1.47
thought	1.97	tragedy	2.07
tradition	1.69	truth	1.96
Concrete Nouns	**Ratings**	**Concrete Nouns**	**Ratings**
beer	4.88	art	4.17
cake	4.81	banana	5.00
chicken	4.80	bread	4.92
cloth	4.90	cheese	4.70
coffee	4.81	dinner	4.50
dress	4.93	egg	4.97
food	4.80	fire	4.68
glass	4.82	fox	4.97
metal	4.87	fruit	4.81
paper	4.93	gas	4.29
piano	4.90	ground	4.77
rain	4.97	iron	4.59
room	4.79	lamb	4.97
school	4.79	light	4.21
stone	4.72	rock	4.91

Note: Brysbaert et al. (2014) used a 5-point scale in order to rate the abstractness of English words. According to the scale, abstract words have lower ratings while concrete words have higher ratings. In the present study, English nouns which were rated under 2.5 points were chosen as abstract nouns and those above 4.0 points were chosen as concrete nouns.

Appendix 2.2: Dummy Items and Their Abstractness Ratings from the Study by Brysbaert et al. (2014)

Abstract Nouns	Ratings	Concrete Nouns	Ratings
choice	1.90	church	4.90
democracy	1.78	color	4.08
destiny	1.67	crocodile	4.83
difference	2.15	hair	4.97
exception	1.85	land	4.57
hope	1.25	night	4.52
mystery	2.33	rope	4.93
necessity	2.08	sleep	4.44
priority	1.76	straw	4.77
trouble	2.25	TV	4.83

APPENDIX 3

Appendix 3.1: Sentences for Target Items in the Article Test

Target Words	Test Sentences
ability	I have an ability to analyze information and to ask the right questions.
	Some companies hire women based on their looks rather than ability.
advantage	I definitely had an advantage as a volleyball player. I was much taller than others.
	I don't like him because he hurt others in pursuit of advantage.
art	I try to improve myself in an art called flower arrangement.
	I enjoy art and go to exhibitions when time allows.
banana	She grabbed a banana off the fruit bowl in the middle of the table.
	This German grape often picks up flavors like banana.
beer	I grabbed a beer from the fridge.
	Beer has four basic ingredients, water, barley, hops and yeast.
belief	She is beautiful beyond belief.
	This is a belief called monotheism.
bread	My mom and I bake bread together every day.
	Fruitcake is a bread that usually contains nuts and pieces of candied fruit.
cake	I baked a cake for my brother's birthday.
	Around the corner, there is a little cafe serving cake and tea.
chance	Give me a chance!
	You must leave nothing to chance.
cheese	I like cheese very much.
	Taleggio is a cheese I'd never heard of.
chicken	I' d like chicken for dinner.
	A chicken can produce twelve to fifteen eggs each month.
cloth	He pulled out a cloth and polished his shoes.
	The store sells cloth by the yard.
coffee	I'm addicted to coffee.
	A cortado is a coffee served with just a splash of milk.
context	Teachers must try to create a context where students learn voluntarily.
	Most people can deduce what is meant by context.
decision	The company announced a decision to limit imports of foreign cars.
	This is a time of decision.
difficulty	As a child develops, activities with toys increase in difficulty.
	When you read classical literature, old languages will be a difficulty.

Note: Two sentences were created for each target item by manipulating its countability type: one for countable use and another for uncountable use.

Target Words	Test Sentences
dinner	My father sometimes cooks dinner.
	A dinner has been held to celebrate the opening of the new hotel.
dress	He is careless about dress.
	She bought a dress for 2,000 dollars in Paris.
duty	He believes that duty should come before anything else.
	Military service is a duty in our country.
effort	This book is a good effort in terms of content.
	The goal of motivation is to increase effort.
egg	Crack an egg into the bowl and beat it.
	They use egg in their breads.
failure	His latest novel was a failure.
	I'm not afraid of failure.
fate	Do you believe in fate?
	He is facing a terrible fate.
fire	In 1991 there was a fire in Oakland.
	It is absolutely incredibly dangerous to play with fire.
food	I have never left food on my plate.
	If you are having a reaction to a food, you should suspect an allergy.
fox	This fur is fox.
	He got into the forest with the gun and shot a fox.
fruit	He grows a fruit that smells like flowers.
	Honey is used to preserve fruit.
gas	How much have you spent on gas this month?
	Methane is a greenhouse gas.
glass	Be careful with that vase; it is made of glass.
	I filled a glass with water.
ground	The parachute is designed to open when it is 200 meter above ground.
	The school has a beautiful ground and spacious classrooms.
insight	The newspaper certainly gives an insight into what President Trump is thinking.
	Marketing without insight is like marketing blind.
instinct	Animals possess an instinct to protect themselves against their enemies.
	Instinct helps me make decisions.
iron	The investigation found that the soil contains iron.
	My roommate said, "Do you need an iron? I'll leave it for you."
lamb	I had lamb last night.
	A lamb is not a fast animal.
language	Language is the life of people who use it.
	You will find employment opportunities here to teach a language other than English.

Target Words	Test Sentences
light	Excuse me, I'm looking for <u>a light</u> that hangs from the ceiling.
	Time travel is the only kind of travel faster than <u>light</u>.
metal	Early men used <u>metal</u> for weapons.
	This bottle is made from <u>a metal</u> called Gallium.
paper	Could you wrap the box in <u>paper</u>?
	I read <u>a paper</u> in the coffee shop every morning.
passion	Italy is known for <u>passion</u>.
	She develops <u>a passion</u> for golf.
piano	She began lessons in <u>piano</u> at age 6.
	For a year, I begged my parents to buy me <u>a piano</u>.
pleasure	A pet is an animal kept for <u>pleasure</u>.
	It was <u>a pleasure</u> to meet you.
power	This country used to be <u>a military power</u>.
	Solar panels can't generate <u>power</u> in total darkness.
prejudice	There is <u>a prejudice</u>, which is true, that Germans like functional wear.
	I want my students to explore ways of eliminating <u>prejudice</u> in daily life.
rain	<u>Rain</u> falls constantly in this area.
	There was <u>a heavy rain</u> last night.
reality	Terrorism is <u>a reality</u> that we're going to have to deal with for a long time.
	You will see that <u>reality</u> is not so obliging.
rock	He tried to push <u>a rock</u> down the hill.
	My house walls are made of <u>rock</u>.
room	There is <u>room</u> in the car.
	Bright colors make <u>a room</u> look bigger.
school	The building next to the park is <u>a school</u>.
	She went back to <u>school</u> for a second degree in education.
shame	I nearly died of <u>shame</u>.
	I took the photos with my iPhone, and it was <u>a shame</u> I hadn't got a really good camera with me.
sin	My grandfather said having nuclear weapons is <u>a sin</u>.
	Many people see <u>sin</u> as simply breaking God's list of rules.
skill	Confidence is <u>a skill</u> that can be acquired with proper training.
	To be honest, I'm astonished by the difference in <u>skill</u> between us.
stone	Many English houses are made of <u>stone</u>.
	When I was walking my dog in the park, a stranger threw <u>a stone</u> at him.
success	He was <u>a success</u> as an actor.
	Education is the key to <u>success</u> in life.
talent	The singer is <u>a real talent</u>. There's no question about it!
	Investing in <u>talent</u> is a good way to use your money.
technique	My mother uses <u>a simple technique</u> in cooking.
	He is a football player who has good <u>technique</u>.

Target Words	Test Sentences
theory	The plan is excellent in <u>theory</u>.
	Let me share with you <u>a theory</u> I have about feminism.
thought	Human beings are provided with <u>thought</u>.
	OK, here's <u>a thought</u> for some of you who are against this plan.
tradition	There is <u>a tradition</u> in my family that visitors should be given roses.
	They are still bound by <u>tradition</u>.
tragedy	It is <u>a tragedy</u> for this country that the prince died young.
	This is a story about a family filled with <u>tragedy</u>.
truth	The search for <u>truth</u> is the university's central mission.
	There's <u>a truth</u> that we all know and pretend like we don't.

Appendix 3.2: *Sentences for Dummy Items in the Article Test*

Target Words	Test Sentences
choice	If we had <u>a choice,</u> we wouldn't have married.
	It is not something resulting from <u>a choice</u> you make.
church	I attend <u>church</u> every Sunday.
	They used to go to <u>church</u> with their family.
color	The good news brought <u>color</u> to her cheek.
	When I showed up at the party, he changed <u>color</u>.
crocodile	His leg was bitten by <u>a crocodile</u>.
	There was a story about a couple who tried to steal <u>a crocodile</u> from a zoo.
democracy	He tried to bring <u>democracy</u> to his country.
	This chapter examines the debates over regional models of <u>democracy</u>.
destiny	Nobody can quarrel with <u>destiny</u>.
	This is a battle in which <u>destiny</u> is decided.
difference	It made <u>a difference</u> within a couple of days.
	It's <u>a difference</u> of a few dollars.
exception	I hope you can make <u>an exception</u> for this particular case.
	I usually get up early, but Sunday is <u>an exception</u>.
hair	She used to have <u>long hair</u>.
	Why is coconut oil good for <u>hair</u>?
hope	After my wife died, I completely lost <u>hope</u>.
	Until that time, I fly the flag as a symbol of <u>hope</u>.
land	I think Morocco is <u>a land</u> of great beauty and kindness.
	This country is <u>a land</u> of freedom.
mystery	I asked him to write <u>a mystery</u> next time.
	It is <u>a mystery</u> to many people that he was the only survivor in the accident.
necessity	<u>Necessity</u> is the mother of invention.
	Out of <u>necessity</u>, student athletes learn to manage busy schedules.
night	I want to take <u>a night</u> off.
	This hostel costs around $25 <u>a night</u>.
priority	Shaving was not <u>a priority</u>. Not first thing in the morning.
	You should explain to your children that schoolwork is <u>a priority</u>.
rope	The rock on this railroad was moved by <u>rope</u>.
	They bound my arms with rope.
sleep	His mother was constantly working. She clearly needed <u>sleep</u>.
	<u>Sleep</u> is basic to health.
straw	I put <u>a straw</u> in it and then I drank it.
	She sucked the lemonade through <u>a straw</u>.
trouble	Here are 5 tips to avoid <u>trouble</u> in business.
	My son is always making <u>trouble</u>.
TV	My father bought <u>a TV</u> for me on Christmas Eve.
	My house has <u>a TV</u> in every room.

Note: Dummy items took either the indefinite article or the zero article.

APPENDIX 4

Appendix 4.1: Learning Material for the CL Approach Group

冠詞の学習
英語の「冠詞」を正しく使うためには、「冠詞」の後ろにくる「名詞」を正しく理解する必要があります。この学習では、「名詞」を正しく捉えるための、「個体性」と「境界の明確性」という考え方を学びます。

個体性
「個体性」とは、「個としての認識が可能かどうか」、つまり、名詞の指示対象が「1つ1つ単体として認識できるか」という考え方です。対象物が1つの個体として認識できる場合は「数えられるもの」、反対に、個としての認識が難しい対象物は「数えられないもの」と判断されます。
この基準によって、「数えられるのか、それとも、数えられないのか」という名詞の可算・不可算性が決められます。では、どのような基準で対象物の「個体性」を判断するのでしょうか？

境界の明確性
対象物の個体性は、「対象物の境界が明確であるかどうか」という「境界の明確性」に基づいて判断されます。対象物の境界が明確であれば、1つの個体としての認識ができやすくなりますが、逆に、境界がはっきりしない場合は、個としての認識が難しくなります。

冠詞の種類
英語の冠詞には3種類の使い方があります。a または an を「不定冠詞」、the を「定冠詞」、そして、冠詞をつけない場合を「無冠詞」と呼びます。この学習では、「個体性」と「境界の明確性」に関係する、「不定冠詞」と「無冠詞」の使い方について学びます。

不定冠詞と無冠詞
対象物の境界が明確で、1つの個体として認識できる場合、名詞は単数形を用い、単数を表わす冠詞である不定冠詞（a もしくは an）がつきます。
反対に、対象物の境界線がはっきりせず、個としての認識が難しい場合は、名詞は原形（単数形と同じ）を使い、無冠詞となります。
また、境界が明確な対象物が複数個ある場合、名詞は複数形を使い、この場合も冠詞は無冠詞を用います。

境界の明確性と冠詞

写真を参考に、以下の例を見ていきましょう。

(A) There are apples on the table.

１つ１つ、個体として、リンゴが複数個あることが分かります。また、個々のリンゴの境界線もはっきりしています。この場合、apples（複数形）が用いられます。不定冠詞は単数を表す冠詞ですので、必要ありません。

(B) There is an apple in my hand.

この場合も(A)と同様、リンゴの境界線が明確で、リンゴが１つ（単数個）あるのが分かります。したがって、単数を表わす不定冠詞 (an) がつきます。

(C) There is apple in the pie.

パイの中にリンゴが入っているのですが、リンゴが丸ごと入っているのではなく、スライスされたり、すりつぶされたリンゴが入っています。この場合、リンゴは個体としての原形をとどめていないので、(A)や(B)の場合のリンゴとは異なり、リンゴを個として認識するための境界が明確ではありません。
このような場合、原形 (apple) を用い、無冠詞で表します。

(D) We fell in love on our first date.

感情や思考は、その輪郭や大きさを認識することができません。この場合、love（愛）は実体がないので、個体性を形成するための境界線が明確ではありません。したがって、無冠詞となり、名詞は原形を用います。

(E) You should put plastic into the recycle box.

例えば、plastic bottle（ペットボトル）は、１つ１つ個体として認識することができます。しかし、この文では、plastic（プラスチック）という素材に焦点が当たっています。このように、対象物の素材や材料に注目する場合、その境界線は、ペットボトルのように明確ではありません。したがって、無冠詞と名詞の原形を用います。

(F) We just bought new cutlery.
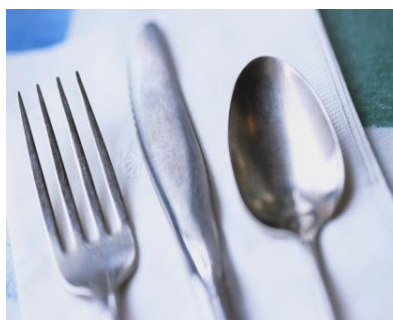
ナイフ、フォーク、スプーンはそれぞれ個としての認識が可能であり、数えることができます。しかし、「cutlery（食器）」はそれらをまとめた総称としての言葉であり、そこには境界線がありません。したがって、無冠詞の原形で使います。

Appendix 4.2: Learning Material for the Conventional Approach Group

冠詞の学習

英語の「冠詞」を正しく使うためには、「冠詞」の後ろにくる「名詞」を正しく理解する必要があります。この学習では、まず「名詞の種類」について学習し、その後「冠詞」とその使い方について学びます。

名詞の種類

英語名詞は、「可算名詞」と「不可算名詞」に分けられます。ここでは、可算名詞と不可算名詞の特徴をそれぞれ見ていきます。

可算名詞

一定の形を持った、数えられるものを表す名詞を可算名詞と呼びます。大部分の普通名詞がこれにあたります。可算名詞には以下のような特徴があります。

  ① 単数（１つのものを表す）と複数（２つ以上のものを表す）の区別がある。

  ② 単数には不定冠詞（a または an）がつく。

  ③ 複数の場合は複数形で表し、多くの場合、名詞の語尾に-s がつく。

  ④ 数詞（one, two, three…）をつけることができる。

  ⑤ 複数の場合は、不定の数を表す語（many, a few など）をつけることができる。

不可算名詞

個別に数えることができないものを表す名詞を不可算名詞と呼びます。不可算名詞には以下のような種類があります。

  ① 物質名詞：一定の形や区切りのない物資を表す名詞。

  ② 抽象名詞：具体的な形を持たない抽象的な概念を表す名詞。性質や状態、感情などがあたります。

  ③ 集合名詞：同種類のものが複数集まった集合体を表す名詞。

また、これら不可算名詞には、以下のような共通した特徴があります。

  ① 原則的に複数形は存在しない。

  ② 不定冠詞（a または an）はつかない。

  ③ 数詞（one, two, three…）を直接つけることはできない。

  ④ 量を表す語（much, little など）をつけることができる。

冠詞の種類

英語の冠詞には 3 種類の使い方があります。a または an を「不定冠詞」、the を「定冠詞」、そして、冠詞をつけない場合を「無冠詞」と呼びます。この学習では、特に、「不定冠詞」と「無冠詞」の使い方について学びます。

不定冠詞

不定冠詞をつけることによって、その名詞がある 1 つの不特定な対象であることを示します。原則として、可算名詞の単数形につけます。

無冠詞

不定冠詞と同じく、不特定な対象を示す名詞に対して用います。原則として、不可算名詞と可算名詞の複数形に対して使用されます。

可算名詞と冠詞

写真を参考に、以下の例を見ていきましょう。

(A) There is an apple in my hand.

通常、apple は普通名詞です。リンゴは 1 つ（単数個）ですので、名詞は単数形を用い、単数を表わす不定冠詞 (an) がつきます。

(B) There are apples on the table.

リンゴが複数個ありますので、apples（複数形）が用いられます。複数形を用いる場合、不定冠詞は必要ありません。

<u>不可算名詞と冠詞</u>

(C) There is apple in the pie.

パイの中にリンゴが入っているのですが、リンゴが丸ごと入っているのではなく、スライスされたり、すりつぶされたリンゴが入っています。この場合、(A)や(B)のリンゴとは違い、一定の形を持ちません。よって、ここでの apple は物質名詞として扱われ、無冠詞で表します。

(E) You should put plastic into the recycle box.

Plastic bottle（ペットボトル）の場合は普通名詞ですので、可算名詞として扱われます。しかし、この文では、plastic（プラスチック）という素材に焦点が当たっています。このように、対象物の素材や材料に注目する場合、物質名詞と捉えますので、無冠詞となります。

(D) We fell in love on our first date.

感情や思考は、具体的な形を持たない抽象名詞です。
この場合の love（愛）も実体がありませんので、不可算名詞として扱います。したがって、無冠詞で表します。

(F) We just bought new cutlery.

ナイフ、フォーク、スプーンは普通名詞であり、数えることができます。しかし、「cutlery（食器）」はそれらをまとめた総称を表す言葉であり、集合名詞として扱われます。したがって、無冠詞を使います。

APPENDIX 5

Appendix 5.1: Sample Practice Exercises

Target Words	Practice Sentences
ability	(Ability) is the origin of any career or professional success.
	In physics, it is necessary to develop (an ability) to analyze problems, to reason logically.
dinner	Tyler and his dad often had (dinner) together on Wednesday nights.
	He greeted guests before attending (a dinner) welcoming them.
egg	I spilled (egg) on the floor.
	Some idiots threw (an egg) at my car during the night.
fire	The house is lighted and warmed by (fire), not electricity.
	The street was closed at 5:30 a.m. because of (a fire) on a Greyhound bus.
fruit	She eats (fruit) every morning.
	Spanish lime is (a fruit) that grows in tropical regions.
gas	Many people cook with (gas) in my country.
	Ethylene is (a natural gas) given off by some fruits and vegetables.
iron	(Iron) rusts easily.
	Smooth this dress with (an iron).
lamb	Our special meal is (lamb) paired with potatoes.
	She has saved (a lamb) from slaughter.
light	Every morning (light) comes from the window.
	It's dark here. I'm going to get (a light) and try to see.
pleasure	The look on his face is not one of (pleasure).
	Plane travel used to be (a pleasure) that he couldn't afford
success	Most people think that the secret to (success) is experience.
	With or without him, the film must have been (a success).
talent	This team won because of (talent).
	We have seen a lot of great actors, but (a talent) like Redmayne is rare.
theory	Students may come to have a deeper understanding of the crucial distinction between (theory) and evidence.
	We have (a theory) that the three cases were caused by the same person.

Note: Each word and its article appeared in a single blank in a question. The participants chose the appropriate answer from two choices: the word with the indefinite article or one with the zero article.

Appendix 5.2: Sample Feedback for the CL Approach Group

Words	Countability Type	Sample Feedback
egg	uncountable	ここでは、「spilled(こぼした)」という動詞から、egg は「液状の卵」であることが想像できます。この場合、egg の境界線は明確ではなく、「卵」1個としての認識が困難ですので、不定冠詞（an）はつけません。
	countable	通常、「卵」は明確な境界線を持ち、1個、2個のように数えられます。個としての認識が可能であるため、不定冠詞（an）をつけます。
gas	uncountable	gas は総称的に「気体・ガス」を意味する場合、その境界線は不明瞭です。個としての認識ができないため、不定冠詞（a）はつけません。
	countable	様々な種類のガスを区別する場合、それぞれのガスを個別に扱うことができます。ここでは、エチレンというある1つのガスについて言及していますので、その境界線は明確で、個としての認識が可能です。よって、一種類のガスという意味を表す、不定冠詞（a）が必要です。
iron	uncountable	iron は「鉄」という素材を意味する場合、その境界線は不明瞭で、個としての認識はできません。したがって、不定冠詞（an）は必要ありません。
	countable	iron は「アイロン」を意味する場合、1台、2台のように数えることができ、明確な境界線を持っています。個としての認識が可能ですので、ここでは不定冠詞（an）が必要です。
pleasure	uncountable	pleasure が「喜び・楽しみ」という漠然とした概念を示す場合、その境界線は明確ではなく、個としての認識ができません。よって不定冠詞（a）は必要ありません。
	countable	この文では、「plane travel」というあるひとつの「娯楽」を指すため、漠然とした概念とは区別された1つの事柄として捉えることができます。よって、pleasure の境界線は明確になり、不定冠詞（a）がつきます。
success	uncountable	ここでの success は「成功」という漠然とした概念を表しています。境界線が不明瞭で、個としての認識ができないため、不定冠詞（a）は付けません。
	countable	この文では、「the film」というあるひとつの対象について言及しており、ここでの success は「成功作」という意味になります。概念的な「成功」とは異なった、明確な境界線を持つ1つの個体として認識することができますので、不定冠詞（a）がつきます。

Appendix 5.3: Sample Feedback for the Conventional Approach Group

Words	Countability Type	Sample Feedback
egg	uncountable	ここでは、「spilled(こぼした)」という動詞から、egg は「液状の卵」であることが想像できます。液体は数えることができない物質名詞として扱われるので、不定冠詞（an）はつけません。
	countable	通常、「卵」は1個、2個のように数えることができる普通名詞ですので、不定冠詞（an）が必要です。
gas	uncountable	gas は総称的に「気体・ガス」という量的（＝数えられない）ものとして捉える場合、物質名詞として扱います。したがって、不定冠詞（a）は必要ありません。
	countable	様々な種類のガスを区別する場合、それぞれのガスを普通名詞として数えることが可能です。ここでは、エチレンというある1つのガスについて言及していますので、不定冠詞（a）を付けて、一種類のガスという意味を表します。
iron	uncountable	iron は「鉄」という素材を意味する場合、数えることができない物質名詞です。したがって、不定冠詞（an）は必要ありません。
	countable	iron は「アイロン」を意味する場合、1台、2台のように数えることができ、普通名詞として使用できます。したがって、ここでは不定冠詞（an）をつけます。
pleasure	uncountable	pleasure が「喜び・楽しみ」という漠然とした概念を示す場合、抽象名詞として扱います。数えることができないので、不定冠詞（a）は必要ありません。
	countable	この文では、「plane travel」という、あるひとつの「娯楽」を指しているので、漠然とした概念とは区別された事柄として捉えることができます。よって、ここでのpleasure は普通名詞として使用され、不定冠詞（a）がつきます。
success	uncountable	ここでの success は「成功」という漠然とした概念を表しています。抽象名詞として扱われますので、不定冠詞（a）は付けません。
	countable	この文では、「the film」というあるひとつの対象について言及しており、ここでの success は「成功作」という意味になります。よって、数えることができる普通名詞として使用され、不定冠詞（a）がつきます。

APPENDIX 6

Appendix 6.1: Descriptions of Mixed Effects Models and their AIC Values

Model	Model Descriptions Fixed Effects	Random Effects	AIC
0		(1|Paritipant) + (1|Item)	19730.5
1	Approach + Test		20427.0
2a	Approach + Test + Abstractness		20420.0
2b	Approach + Test + Countability		20381.0
2c	Approach + Test + Learnedness		20408.0
2d	Approach + Test + Abstractness + Countability		20374.0
2e	Approach + Test + Abstractness + Learnedness		20400.0
2f	Approach + Test + Countability + Learnedness		20362.0
2g	Approach + Test + Abstractness + Countability + Learnedness		20354.0
3	Approach + Test	(1|Participant) + (1|Item)	19283.6
3a	Approach + Test + Abstractness	(1|Participant) + (1|Item)	19232.5
3b	Approach + Test + Countability	(1|Participant) + (1|Item)	19283.5
3c	Approach + Test + Learnedness	(1|Participant) + (1|Item)	19233.5
3d	Approach + Test + Abstractness + Countability	(1|Participant) + (1|Item)	19284.4
3e	Approach + Test + Abstractness + Learnedness	(1|Participant) + (1|Item)	19233.4
3f	Approach + Test + Countability + Learnedness	(1|Participant) + (1|Item)	19234.4
3g	Approach + Test + Abstractness + Countability + Learnedness	(1|Participant) + (1|Item)	19282.6
4	Approach + Test	(1 + Test|Participant)+ (1|Item)	19253.4
4a	Approach + Test + Abstractness	(1 + Test|Participant)+(1|Item)	19254.5
4b	Approach + Test + Countability	(1 + Test|Participant)+ (1|Item)	19203.2
4c	Approach + Test + Learnedness	(1 + Test|Participant)+ (1|Item)	19254.3

Note. Approach: a variable with two levels (the CL and the conventional approach); Test: a variable with three levels (the pretest, the immediate posttest, and the delayed posttest); Abstractness: a binary variable (abstract or concrete nouns); Countability: a binary variable (countable or uncountable use of English nouns); Learnedness: a binary variable (items that were learned in advance or those that appeared only in the article tests); Participant: unexplained variance among subjects; Item: unexplained variance among target items.

	Model Descriptions		
Model	**Fixed Effects**	**Random Effects**	**AIC**
4d	Approach + Test + Abstractness + Countability	(1 + Test|Participant) + (1|Item)	19204.2
4e	Approach + Test + Abstractness + Learnedness	(1 + Test|Participant)+ (1|Item)	19255.3
4f	Approach + Test + Countability + Learnedness	(1 + Test|Participant) + (1|Item)	19204.1
4g	Approach + Test + Abstractness + Countability + Learnedness	(1 + Test|Participant) + (1|Item)	19205.0
5	Approach + Test	(1|Participant) + (1 + Approach|Item)	19286.4
5a	Approach + Test + Abstractness	(1|Participant) + (1 + Approach|Item)	19287.5
5b	Approach + Test + Countability	(1|Participant) + (1 + Approach|Item)	19236.3
5c	Approach + Test + Learnedness	(1|Participant) + (1 + Approach|Item)	19287.4
5d	Approach + Test + Abstractness + Countability	(1|Participant) + (1 + Approach|Item)	19237.4
5e	Approach + Test + Abstractness + Learnedness	(1|Participant) + (1 + Approach|Item)	19288.4
5f	Approach + Test + Countability + Learnedness	(1|Participant) + (1 + Approach|Item)	19237.3
5g	Approach + Test + Abstractness + Countability + Learnedness	(1|Participant) + (1 + Approach|Item)	19238.3
6	Approach + Test	(1|Participant) + (1 + Test|Item)	19196.1
6a	Approach + Test + Abstractness	(1|Participant) + (1 + Test|Item)	19197.4
6b	Approach + Test + Countability	(1|Participant) + (1 + Test|Item)	19145.8
6c	Approach + Test + Learnedness	(1|Participant) + (1 + Test|Item)	19197.4
6d	Approach + Test + Abstractness + Countability	(1|Participant) + (1 + Test|Item)	19174.0
6e	Approach + Test + Abstractness + Learnedness	(1|Participant) + (1 + Test|Item)	19198.8
6f	Approach + Test + Countability + Learnedness	(1|Participant) + (1 + Test|Item)	19147.0
6g	Approach + Test + Abstractness + Countability + Learnedness	(1|Participant) + (1 + Test|Item)	19148.4
7	Approach + Test	(1|Participant)+ (1+ Approach + Test|Item)	19205.4
7a	Approach + Test + Abstractness	(1|Participant)+ (1+ Approach + Test|Item)	19153.7
7b	Approach + Test + Countability	(1|Participant)+ (1+ Approach + Test|Item)	19205.3
7c	Approach + Test + Learnedness	(1|Participant)+ (1+ Approach + Test|Item)	19155.0

Model	Fixed Effects	Random Effects	AIC
	Model Descriptions		
7d	Approach + Test + Abstractness + Countability	(1|Participant) + (1 + Approach + Test|Item)	19206.7
7e	Approach + Test + Abstractness + Learnedness	(1|Participant) + (1 + Approach + Test|Item)	19154.9
7f	Approach + Test + Countability + Learnedness	(1|Participant) + (1 + Approach + Test|Item)	19156.4
7g	Approach + Test + Abstractness + Countability + Learnedness	(1|Participant) + (1 + Approach + Test|Item)	19204.1
8	Approach + Test	(1 + Test|Participant) + (1 + Test|Item)	19161.5
8a	Approach + Test + Abstractness	(1 + Test|Participant) + (1 + Test|Item)	19162.8
8b	Approach + Test + Countability	(1 + Test|Participant) + (1 + Test|Item)	19111.0
8c	Approach + Test + Learnedness	(1 + Test|Participant) + (1 + Test|Item)	19162.6
8d	Approach + Test + Abstractness + Countability	(1 + Test|Participant) + (1 + Test|Item)	19112.3
8e	Approach + Test + Abstractness + Learnedness	(1 + Test|Participant) + (1 + Test|Item)	19164.1
8f	Approach + Test + Countability + Learnedness	(1 + Test|Participant) + (1 + Test|Item)	19112.0
8g	Approach + Test + Abstractness + Countability + Learnedness	(1 + Test|Participant) + (1 + Test|Item)	19113.5
9	Approach + Test	(1 + Test|Participant) + (1 + Approach|Item)	19257.3
9a	Approach + Test + Abstractness	(1 + Test|Participant) + (1 + Approach|Item)	19258.4
9b	Approach + Test + Countability	(1 + Test|Participant) + (1 + Approach|Item)	19207.1
9c	Approach + Test + Learnedness	(1 + Test|Participant) + (1 + Approach|Item)	19258.3
9d	Approach + Test + Abstractness + Countability	(1 + Test|Participant) + (1 + Approach|Item)	19208.2
9e	Approach + Test + Abstractness + Learnedness	(1 + Test|Participant) + (1 + Approach|Item)	19259.3
9f	Approach + Test + Countability + Learnedness	(1 + Test|Participant) + (1 + Approach|Item)	19208.1
9g	Approach + Test + Abstractness + Countability + Learnedness	(1 + Test|Participant) + (1 + Approach|Item)	19209.0

Appendix 6.2: Descriptions of Interaction Models and their AIC Values

Model	Model Descriptions Interactions	Random Effects	AIC
10A	Approach*Test	(1|Participant) + (1|Item)	19229.8
10B	Approach*Abstractness	(1|Participant) + (1|Item)	19234.9
10C	Approach*Countability	(1|Participant) + (1|Item)	19235.4
10D	Approach*Learnedness	(1|Participant) + (1|Item)	19283.9
10E	Test*Abstractness	(1|Participant) + (1|Item)	19233.7
10F	Test*Countability	(1|Participant) + (1|Item)	19204.4
10G	Test*Learnedness	(1|Participant) + (1|Item)	19190.6
10H	Abstractness*Countability	(1|Participant) + (1|Item)	19223.9
10I	Abstractness*Learnedness	(1|Participant) + (1|Item)	19234.0
10J	Countability*Learnedness	(1|Participant) + (1|Item)	19233.0
10K	Approach*Test*Abstractness	(1|Participant) + (1|Item)	19235.2
10L	Approach*Test*Countability	(1|Participant) + (1|Item)	19204.2
10M	Approach*Test*Learnedness	(1|Participant) + (1|Item)	19189.3
10N	Approach*Abstractness*Countability	(1|Participant) + (1|Item)	19227.3
10O	Approach*Abstractness*Learnedness	(1|Participant) + (1|Item)	19237.3
10P	Approach*Countability*Learnedness	(1|Participant) + (1|Item)	19233.2
10Q	Test*Countability*Abstractness	(1|Participant) + (1|Item)	19179.0
10R	Test*Learnedness*Abstractness	(1|Participant) + (1|Item)	19186.3
10S	Test*Learnedness*Countability	(1|Participant) + (1|Item)	19157.2
10T	Abstractness*Learnedness*Countability	(1|Participant) + (1|Item)	19226.3
10U	Approach*Test*Abstractness*Countability	(1|Participant) + (1|Item)	19185.3
10V	Approach*Test*Abstractness*Learnedness	(1|Participant) + (1|Item)	19194.2
10W	Approach*Test*Countability*Learnedness	(1|Participant) + (1|Item)	19160.9
10X	Approach*Abstractness*Countability *Learnedness	(1|Participant) + (1|Item)	19228.7
10Y	Test*Abstractness*Countability* Learnedness	(1|Participant) + (1|Item)	19131.2
11A	Approach*Test	(1|Participant) + (1|Item)	19204.2
11B	Approach*Abstractness	(1|Participant) + (1|Item)	19205.6
11C	Approach*Countability	(1|Participant) + (1|Item)	19206.1
11D	Approach*Learnedness	(1|Participant) + (1|Item)	19204.6
11E	Test*Abstractness	(1+Test|Participant) + (1|Item)	19204.3
11F	Test*Countability	(1+Test|Participant) + (1|Item)	19174.7
11G	Test*Learnedness	(1+Test|Participant) + (1|Item)	19160.8
11H	Abstractness*Countability	(1+Test|Participant) + (1|Item)	19194.5
11I	Abstractness*Learnedness	(1+Test|Participant) + (1|Item)	19204.7

Note: Interaction models necessarily contain all the five fixed effects.

	Model Descriptions		
Model	Interactions	Random Effects	AIC
11J	Countability*Learnedness	(1+Test|Participant) + (1|Item)	19203.7
11K	Approach*Test*Abstractness	(1+Test|Participant) + (1|Item)	19209.4
11L	Approach*Test*Countability	(1+Test|Participant) + (1|Item)	19178.2
11M	Approach*Test*Learnedness	(1+Test|Participant) + (1|Item)	19163.2
11N	Approach*Abstractness*Countability	(1+Test|Participant) + (1|Item)	19198.0
11O	Approach*Abstractness*Learnedness	(1+Test|Participant) + (1|Item)	19208.0
11P	Approach*Countability*Learnedness	(1+Test|Participant) + (1|Item)	19203.9
11Q	Test*Countability*Abstractness	(1+Test|Participant) + (1|Item)	19149.4
11R	Test*Learnedness*Abstractness	(1+Test|Participant) + (1|Item)	19156.2
11S	Test*Learnedness*Countability	(1+Test|Participant) + (1|Item)	19126.9
11T	Abstractness*Learnedness*Countability	(1+Test|Participant) + (1|Item)	19196.9
11X	Approach*Abstractness*Countability *Learnedness	(1+Test|Participant) + (1|Item)	19199.4
12A	Approach*Test	(1|Participant) + (1 + Approach|Item)	19233.8
12B	Approach*Abstractness	(1|Participant) + (1 + Approach|Item)	19238.9
12C	Approach*Countability	(1|Participant) + (1 + Approach|Item)	19239.4
12D	Approach*Learnedness	(1|Participant) + (1 + Approach|Item)	19237.9
12E	Test*Abstractness	(1|Participant) + (1 + Approach|Item)	19237.7
12F	Test*Countability	(1|Participant) + (1 + Approach|Item)	19208.4
12G	Test*Learnedness	(1|Participant) + (1 + Approach|Item)	19194.6
12H	Abstractness*Countability	(1|Participant) + (1 + Approach|Item)	19227.9
12I	Abstractness*Learnedness	(1|Participant) + (1 + Approach|Item)	19238.0
12J	Countability*Learnedness	(1|Participant) + (1 + Approach|Item)	19237.0
12K	Approach*Test*Abstractness	(1|Participant) + (1 + Approach|Item)	19239.1
12L	Approach*Test*Countability	(1|Participant) + (1 + Approach|Item)	19208.2
12M	Approach*Test*Learnedness	(1|Participant) + (1 + Approach|Item)	19193.3
12N	Approach*Abstractness*Countability	(1|Participant) + (1 + Approach|Item)	19231.2
12O	Approach*Abstractness*Learnedness	(1|Participant) + (1 + Approach|Item)	19241.2
12P	Approach*Countability*Learnedness	(1|Participant) + (1 + Approach|Item)	19237.2
12Q	Test*Countability*Abstractness	(1|Participant) + (1 + Approach|Item)	19183.0
12R	Test*Learnedness*Abstractness	(1|Participant) + (1 + Approach|Item)	19190.3
12S	Test*Learnedness*Countability	(1|Pariticipant) + (1 + Approach|Item)	19161.2
12T	Abstractness*Learnedness*Countability	(1|Participant) + (1 + Approach|Item)	19230.2
12U	Approach*Test*Abstractness *Countability	(1|Participant) + (1 + Approach|Item)	19271.1
12V	Approach*Test*Abstractness *Learnedness	(1|Participant) + (1 + Approach|Item)	19198.2

	Model Descriptions		
Model	Interactions	Random Effects	AIC
12W	Approach*Test*Countability *Learnedness	(1|Participant) + (1 + Approach|Item)	19164.9
12X	Approach*Abstractness*Countability *Learnedness	(1|Participant) + (1 + Approach|Item)	19232.6
12Y	Test*Abstractness*Countability* Learnedness	(1|Participant) + (1 + Approach|Item)	19135.1
13A	Approach*Test	(1|Participant) + (1 + Test|Item)	19144.1
13B	Approach*Abstractness	(1|Participant) + (1 + Test|Item)	19149.5
13C	Approach*Countability	(1|Participant) + (1 + Test|Item)	19150.0
13D	Approach*Learnedness	(1|Participant) + (1 + Test|Item)	19148.5
13E	Test*Abstractness	(1|Participant) + (1 + Test|Item)	19149.6
13F	Test*Countability	(1|Participant) + (1 + Test|Item)	19117.7
13G	Test*Learnedness	(1|Participant) + (1 + Test|Item)	19137.5
13H	Abstractness*Countability	(1|Participant) + (1 + Test|Item)	19138.3
13I	Abstractness*Learnedness	(1|Participant) + (1 + Test|Item)	19149.3
13J	Countability*Learnedness	(1|Participant) + (1 + Test|Item)	19147.9
13K	Approach*Test*Abstractness	(1|Participant) + (1 + Test|Item)	19150.7
13L	Approach*Test*Countability	(1|Participant) + (1 + Test|Item)	19117.2
13M	Approach*Test*Learnedness	(1|Pariticipant) + (1 + Test|Item)	19150.7
13N	Approach*Abstractness*Countability	(1|Pariticipant) + (1 + Test|Item)	19141.6
13O	Approach*Abstractness*Learnedness	(1|Participant) + (1 + Test|Item)	19152.8
13P	Approach*Countability*Learnedness	(1|Participant) + (1 + Test|Item)	19148.1
13Q	Test*Countability*Abstractness	(1|Participant) + (1 + Test|Item)	19094.5
13R	Test*Learnedness*Abstractness	(1|Participant) + (1 + Test|Item)	19141.4
13S	Test*Learnedness*Countability	(1|Participant) + (1 + Test|Item)	19103.1
13T	Abstractness*Learnedness*Countability	(1|Participant) + (1 + Test|Item)	19141.7
13X	Approach*Abstractness*Countability *Learnedness	(1|Participant) + (1 + Test|Item)	19144.2
14A	Approach*Test	(1|Participant) + (1 + Approach + Test |Item)	19152.1
14B	Approach*Abstractness	(1|Participant) + (1 + Approach + Test |Item)	19157.4
14C	Approach*Countability	(1|Paritipant) + (1 + Approach + Test |Item)	19158.0
14D	Approach*Learnedness	(1|Participant) + (1 + Approach + Test |Item)	19156.5
14E	Test*Abstractness	(1|Participant) + (1 + Approach + Test |Item)	19157.5

Model	Model Descriptions Interactions	Random Effects	AIC
14F	Test*Countability	(1|Participant) + (1 + Approach + Test |Item)	19125.7
14G	Test*Learnedness	(1|Participant) + (1 + Approach + Test |Item)	19145.5
14H	Abstractness*Countability	(1|Participant) + (1 + Approach + Test |Item)	19146.3
14I	Abstractness*Learnedness	(1|Participant) + (1 + Approach + Test |Item)	19157.3
14J	Countability*Learnedness	(1|Participant) + (1 + Approach + Test |Item)	19155.9
14K	Approach*Test*Abstractness	(1|Participant) + (1 + Approach + Test |Item)	19158.7
14L	Approach*Test*Countability	(1|Participant) + (1 + Approach + Test |Item)	19125.2
14M	Approach*Test*Learnedness	(1|Participant) + (1 + Approach + Test |Item)	19143.8
14N	Approach*Abstractness*Countability	(1|Participant) + (1 + Approach + Test |Item)	19149.6
14O	Approach*Abstractness*Learnedness	(1|Participant) + (1 + Approach + Test |Item)	19160.7
14P	Approach*Countability*Learnedness	(1|Participant) + (1 + Approach + Test |Item)	19156.1
14Q	Test*Countability*Abstractness	(1|Participant) + (1 + Approach + Test |Item)	19102.5
14R	Test*Learnedness*Abstractness	(1|Participant) + (1 + Approach + Test |Item)	19149.3
14S	Test*Learnedness*Countability	(1|Participant) + (1 + Approach + Test |Item)	19111.1
14T	Abstractness*Learnedness*Countability	(1|Participant) + (1 + Approach + Test |Item)	19149.6
14X	Approach*Abstractness*Countability *Learnedness	(1|Participant) + (1 + Approach + Test |Item)	19152.1
15A	Approach*Test	(1+Test|Participant) + (1+Test |Item)	19113.2
15B	Approach*Abstractness	(1+Test|Participant) + (1+Test |Item)	19114.6
15C	Approach*Countability	(1+Test|Partcipant) + (1+Test |Item)	19115.1
15D	Approach*Learnedness	(1+Test|Participant) + (1+Test |Item)	19113.8
15E	Test*Abstractness	(1+Test|Participant) + (1+Test |Item)	19114.6
15F	Test*Countability	(1+Test|Participant) + (1+Test |Item)	19082.3
15G	Test*Learnedness	(1+Test|Participant) + (1+Test |Item)	19102.8
15H	Abstractness*Countability	(1+Test|Participant) + (1+Test |Item)	19103.4

Model	Interactions	Random Effects	AIC
	Model Descriptions		
15I	Abstractness*Learnedness	(1+Test|Participant) + (1+Test |Item)	19114.5
15J	Countability*Learnedness	(1+Test|Participant) + (1+Test |Item)	19113.0
15K	Approach*Test*Abstractness	(1+Test|Participant) + (1+Test |Item)	19119.7
15L	Approach*Test*Countability	(1+Test|Participant) + (1+Test |Item)	19085.7
15M	Approach*Test*Learnedness	(1+Test|Participant) + (1+Test |Item)	19105.2
15N	Approach*Abstractness*Countability	(1+Test|Participant) + (1+Test |Item)	19106.8
15O	Approach*Abstractness*Learnedness	(1+Test|Participant) + (1+Test |Item)	19118.1
15P	Approach*Countability*Learnedness	(1+Test|Participant) + (1+Test |Item)	19113.3
15Q	Test*Countability*Abstractness	(1+Test|Participant) + (1+Test |Item)	19059.2
15R	Test*Learnedness*Abstractness	(1+Test|Participant) + (1+Test |Item)	19106.6
15S	Test*Learnedness*Countability	(1+Test|Participant) + (1+Test |Item)	19067.7
15T	Abstractness*Learnedness *Countability	(1+Test|Participant) + (1+Test |Item)	19106.8
15X	Approach*Abstractness*Countability *Learnedness	(1+Test|Participant) + (1+Test |Item)	19109.4
16A	Approach*Test	(1+Test|Participant) + (1+Approach|Item)	19208.2
16B	Approach*Abstractness	(1+Test|Participant) + (1+Approach|Item)	19209.6
16C	Approach*Countability	(1+Test|Participant) + (1+Approach|Item)	19210.1
16D	Approach*Learnedness	(1+Test|Participant) + (1+Approach|Item)	19208.6
16E	Test*Abstractness	(1+Test|Participant) + (1+Approach|Item)	19208.3
16F	Test*Countability	(1+Test|Participant) + (1+Approach|Item)	19178.7
16G	Test*Learnedness	(1+Test|Participant) + (1+Approach|Item)	19164.8
16H	Abstractness*Countability	(1+Test|Participant) + (1+Approach|Item)	19198.5
16I	Abstractness*Learnedness	(1+Test|Participant) + (1+Approach|Item)	19208.7
16J	Countability*Learnedness	(1+Test|Participant) + (1+Approach|Item)	19207.7
16K	Approach*Test*Abstractness	(1+Test|Participant) + (1+Approach|Item)	19213.4
16L	Approach*Test*Countability	(1+Test|Participant) + (1+Approach|Item)	19182.2
16M	Approach*Test*Learnedness	(1+Test|Participant) + (1+Approach|Item)	19167.2
16N	Approach*Abstractness*Countability	(1+Test|Participant) + (1+Approach|Item)	19201.9
16O	Approach*Abstractness*Learnedness	(1+Test|Participant) + (1+Approach|Item)	19212.0
16P	Approach*Countability*Learnedness	(1+Test|Participant) + (1+Approach|Item)	19207.9
16Q	Test*Countability*Abstractness	(1+Test|Participant) + (1+Approach|Item)	19153.4
16R	Test*Learnedness*Abstractness	(1+Test|Participant) + (1+Approach|Item)	19160.2
16S	Test*Learnedness*Countability	(1+Test|Participant) + (1+Approach|Item)	19130.9
16T	Abstractness*Learnedness *Countability	(1+Test|Participant) + (1+Approach|Item)	19200.9
16X	Approach*Abstractness*Countability *Learnedness	(1+Test|Participant) + (1+Approach|Item)	19203.4