

Testing the Interface Hypothesis: Acquisition of English Articles by Korean L2 Learners

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1. Introduction

Recent acquisition studies have maintained that interfaces are particularly vulnerable in language acquisition. The Interface Hypothesis (Sorace, 2006; Sorace & Serratrice, 2009; Sorace, 2011)[henceforth, IH] was proposed to account for some of the persistent non-target like patterns found in the adult L2 end-state grammar. The IH assumes that different interfaces pose different levels of difficulties in learning second language properties. It predicts that properties which involve sub-modules of language (internal interface) can be acquired relatively easier than those relating to cognitive domains (external interface), external to core computational system. Thus, it was argued that processing difficulties in external interface domains may trigger residual optionality at the end-state grammar of L2 learners.

The current study expands testing grounds of the IH by investigating L2 acquisition of generic use of English articles by highly proficient Korean speaking learners of English. Two main features of English article semantics are (in)definiteness and genericity. This study argues that (in)definite uses of English articles concern external interface as they represent a linguistic property at syntax and discourse interface. On the other hand, it is assumed that generic use of the English article is associated with the interface of semantics-syntax, thus internal interface. The current study hypothesizes that if the Korean learners of English show higher accuracy rates with generic use of English articles than (in)definite uses of English articles, it would provide strong evidence for the IH.

This paper is organised in the following way: Section 2 discusses how English (in)definite articles involve the syntax-discourse interface and English generic articles are associated with the semantics-syntax interface. Section 3 lays out the hypothesis of the study and presents the experimental design and participants. Section 4 reports the major findings from the experiment and presents possible explanations for the results. Finally, Section 5 concludes the current research.

2. Linguistic background

The current section discusses how English (in)definite use of articles involve ‘*external interface*’ and generic use of articles are related to ‘*internal interface*’.

2.1. (In)definite use of English articles as ‘*external Interface*’

English (in)definiteness is regarded as an external interface and it is assumed that internal interfaces involve sub-linguistic modules, whereas external interfaces concern cognitive domains that are external to the core computational system (Sorace & Serratrice, 2009). It is widely held that English article ‘a’ encodes indefiniteness, whereas ‘the’ encodes definiteness. Ionin et al. (2004) defines definiteness as follows: “If a Determiner Phrase (DP) is [+definite], then the speaker and the hearer presuppose the existence of a unique individual in the set denoted by the NP” (Ionin et al. 2004, page 5).

For example, if an NP appears in a sentence where the NP has been introduced to the hearer in previous discourse, the NPs are regarded to be ‘definite’, and reversely if certain entities have not been mentioned previously thus new to the hearer, it is ‘indefinite’. Definiteness is expressed by the article *the* and indefiniteness is marked by the article *a* in English as shown in the example (1) below.

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- (1) I saw a dog. I gave the dog some food.

In the first sentence, *dog* was first mentioned and there is no presupposition that a dog exists, thus the indefinite article ‘a’ was used. In contrast, in the second sentence, the hearer already knows the existence of a particular dog which has just been mentioned. Therefore, the definite article ‘the’ was used in the second sentence. The discussion on the use of articles regarding (in)definiteness shows that (in)definiteness of nouns decides employment of English articles. In other words, in deciding ‘a’ or ‘the’, discourse knowledge is involved which is external to sub-linguistic systems. Therefore, learners should refer their pragmatic / discourse knowledge to correctly use (in)definite articles.

2.2. *Generic use of English articles as ‘internal interface’*

According to Carlson & Pelletier (1995), there are two different types of genericity in languages; sentence level genericity (characterising generic sentences) and NP level genericity (generic NPs). Thus, following Carlson & Pelletier (1995), the two types of genericity are discussed separately.

2.2.1. *Characterising generics*

Let us first focus on the sentence-level generics (characterising generics). Firstly, Diesing’s ‘mapping hypothesis’ shows an interface relationship between semantic and syntactic structures in the interpretation of bare plurals (Diesing, 1992). Consider the following examples in (2) and (3) below.

- (2) a. Firemen are available.
 b. GENx[firemen(x)][available(x)]
 c. $\exists x[\text{firemen}(x) \wedge \text{available}(x)]$

(Jun, 2001:p.18)

As the logical representation shows, for the s-level predicate ‘available’, the bare plural subject can have both a generic and an existential interpretation. For the generic interpretation, (2-b) can mean that firemen are generally available. For the existential meaning, (2-c) could mean that there are typically some firemen available around here. On the other hand, bare plural subjects with i-level predicates can only have generic readings as in (3) below.

- (3) a. Firemen are altruistic.
 b. GENx[firemen(x)][altruistic(x)]

(Diesing, 1992:p.14)

Diesing (1992) proposes that the syntax of the sentences reflect the semantic asymmetry between s-level predicates and i-level predicates. Diesing (1992) argues for the following mapping hypothesis between syntactic and semantic representations.

- (4) a. Material from VP is mapped into the nuclear scope.
 b. Material from IP is mapped into the restrictive clause.

(Diesing, 1992:p.15)

Diesing (1992)’s mapping hypothesis shows a syntax-semantics relationship in the generic interpretation of bare plurals. Furthermore, one can argue that the choice of NP forms in characterising generic sentences do not involve discourse knowledge, thus representing a linguistic property at internal interface. For example, semantics of sentences decide acceptability of NPs in the subject position. In other words, if sentences provide characteristics of the subject nouns, any type of NPs is allowed. See the examples (5) below.

- (5) a. A dog is a faithful animal.
 b. The dog is a faithful animal.
 c. Dogs are faithful animals.

In (5) the underlined part of the sentences present characteristic features of the subject ‘dog’. Thus, ‘a dog’, ‘the dog’, and ‘dogs’ are all acceptable in characterising generic sentences. Thus, the choice of NP in characterising generic sentences does not involve discourse knowledge.

2.2.2. *Generic NPs*

Let us now consider generic NPs and investigate how generic NPs show syntax-semantics interface relationship. Firstly, unlike characterising generic sentences, genericity arises from NP themselves. It is generally believed that ‘bare plural’ NPs and ‘definite singular’ NPs are generic NPs. Consider the examples in (6) below.

- (6) a. A potato/ Potatoes / the potato contain(s) amino acids, vitamin C, protein, and thiamine.
 b. *A dodo/ Dodos / the dodo is/are extinct.

(Carlson & Pelletier, 1995:p.2)

As the examples in (6) show, ‘bare plural’ NPs and ‘the+singular’ NPs can occur not only in characterising sentences as in (6-a) but also with kind-requiring predicates as in (6-b) without receiving any restrictions from sentences. Thus, generic NPs appear to be independent from sentences. On the other hand, for ‘a+singular’ NP forms, they should occur in characterising generics but not with kind-requiring verbs as in (6-b) because ‘a+singular’ NP forms are not generic NPs.

In terms of the choice of generic NPs between ‘bare plurals’ and ‘definite singulars’, they do not involve any cognitive domains. In fact, it has been widely held that semantic interpretation between definite singular generics and bare plural generics is distinguishable (Chierchia, 1998; Dayal, 2004; Farkas & Swart, 2009). In terms of definite singular generic NPs, Carlson (1995) originally treats the definite singular NPs as referring to a special atom *k* and they are kind-referring and unique. On the other hand, with respect to bare plural generic NPs, they are assumed to be involved with the ‘sum’ of their instantiations across different worlds and situations. Thus, different semantic representations were suggested for ‘definite singular’ NPs and ‘bare plural’ NPs, respectively.

Furthermore, generic NPs can occur not only in subject position but also in object position. While the choice of subject NPs do not receive any restrictions for generic interpretation, generic interpretation of NPs in object position can be determined by the preceding verb types in English as exemplified in (7).

- (7) a. French settlers exterminated the dodo/?dodos.
 b. Cats hate dogs

In (7-a), the predicate is a kind-predicate and it requires kind-referring NPs as argument. However, while bare plural forms are proper generic NPs, it is not always accepted in object positions as shown in (7-a). However, with stative verbs, bare plural forms can be interpreted as generic NPs as in (7-b). One cannot claim that the phenomenon is caused by the semantics of nouns because *dodos* do not raise oddity in the subject position as in (8).

- (8) Dodos were exterminated by French settlers.

Therefore, this different interpretation on bare plurals can be accounted for by the syntactic position. According to Carlson & Pelletier (1995), bare plurals are indefinite as a default interpretation and definite readings of bare plurals rise only in some syntactic environments, thus representing a property at syntax-semantics interface.

3. Methodology

In order to test the ‘Interface Hypothesis’, a timed-acceptability judgment task was conducted which tested knowledge on the use of the articles ‘a’ and ‘the’ in both generic and (in)definite contexts.

3.1. *Hypothesis*

The hypothesis of the current research is as follows: If the Korean learners of English show higher accuracy rates with generic uses of English articles (internal interface) than with (in)definite uses of them (external interface), it would lend support to the *IH*.

3.2. Participants

A total number of 77 Korean speaking learners of L2 English participated in this study. Among them, 44 were recruited at a university in Korea (KK) and 33 were recruited at the University of Sheffield (KE). The proficiency between participants from Korea and those in England were matched and all were rated as advanced learners. The major difference between KK and KE is a length of exposure to naturalistic L2 input. 21 English native speakers participated in the study as controls (EC).

3.3. Materials

To examine knowledge of the use of English articles in both generic and (in)definite contexts, a timed acceptability judgment task was conducted. Each test item set comprises of a couple of sentences. The first sentences were considered to be always true and participants were required to judge whether the second sentences were acceptable or not, given the first sentences. Let us first consider example test sentences for English (in)definite article use. Infelicitous sentences are marked with # in example (9) and this is so under (in)definite readings.

- (9) Test sentences for (in)definite article uses
- Jane bought a bag last Christmas. # However, she didn't buy the hat.
 - Jane had a candy after dinner. The candy was too sweet for her.
 - Sam saw a hedgehog in the wood the other day. However, he didn't see a squirrel.
 - Sam's cat doesn't listen to him. # However, a cat listens to Sam's wife.

Overall 4 categories were tested in the (in)definite use of English articles : incorrect use of 'the' in an indefinite context (9-a), correct use of 'the' in a definite context (9-b), correct use of 'a' in an indefinite context (9-c), and incorrect use of 'a' in a definite context (9-d). Let us now consider example test sentences for English generic article uses. In the example test sentences in (10), 'bare plural', 'the+singular' and 'a+singular' NPs occur in one sentence but in the test, only one type of NP was given in one sentence. Infelicitous sentences are marked with # in example (10) and this is so under generic reading.

- (10) Test sentences for generic article uses
- Animals have different characters. Cats /the cat / a cat is/are very independent.
 - Insects are not a problem for camping in Scotland. Mosquitoes/ The mosquito/# a mosquito is/are widespread in Scotland.
 - Tom has never seen a dodo. French settlers exterminated the dodo/?dodos/ # a dodo.
 - Rachael enjoys eating fruit every morning. Especially, she loves oranges/ the orange /# an orange.

The example (10-a) is to test article use in 'characterising generic sentences'. Example in (10-b) tests 'generic NPs' in the subject position before kind-requiring verbs such as *extinct* or *widespread*. (10-c) display generic NPs in the object position after kind-requiring verbs such as *exterminate* or *invent*. (10-d) shows an example test sentences for generic NPs in the object position after stative verbs such as *like*.

3.4. Procedure

Test sentences were shown to the participants on a computer screen in order to prevent learners from going back to previous questions and revising their answers. For each sentence, around 7 seconds were given, the timing of which was calculated during the pilot test.

4. Results and discussion

4.1. Results

The results on the article use on (in)definite contexts are presented first. The following table summarises mean accuracy rates for the (in)definite article use. In Table 1, the numbers represent mean accuracy rates on each category. Arrows mark significant differences between subject groups and between categories.

Table 1: Responses on Definite and Indefinite NPs

In/definiteness	*‘the’ indefinite context		‘the’ in definite context		‘a’ in indefinite indefinite context		*‘a’ in definite context	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
KK(n=44)	50%	0.313	86%	0.186	77%	0.233	62%	0.266
KE(n=33)	53%	0.335	95%	0.083	70%	0.184	73%	0.275
EC(n=21)	98%	0.654	92%	0.184	89%	0.191	96%	0.102

From Table 1, it is obvious that both KK and KE display correct instances of article use (‘the’ in definite context and ‘a’ in indefinite context). However, it appeared that both KK and KE over-accepted the definite article ‘the’ in indefinite contexts, thus showing considerably lower accuracy rates than EC ($p=0.000$, $p=0.000$, respectively). In terms of ‘a’ in definite contexts, only KK seemed to have over-accepted ‘a’ in definite contexts ($p=0.000$). Now, let us compare the results for the articles ‘the’ and ‘a’ in both generic and (in)definite contexts. Table 2 below compares mean accuracy rates on article use in generic and (in)definite sentences. The ‘*’ in Table 2 marks significant differences from EC.

Table 2: Genericity vs. (In)definiteness by KK, KE, and EC

Average Accuracy Rates	‘the’		‘a’	
	In/definiteness	Genericity	In/definiteness	Genericity
KK	*68%	*63%	70%	*60%
KE	74%	68%	72%	*61%
EC	95%	89%	90%	85%

In order to calculate the numbers in Table 2, accuracy rates in all categories shown in examples (9) and (10) for (in)definite sentences and generic sentences were collapsed. Average accuracy rates were then calculated. As Table 2 indicates, while there were no statistical differences, it appeared that both KK and KE performed slightly better in (in)definite contexts than generic contexts. However, no statistical differences were found between article uses of (in)definiteness and genericity by both KK and KE. In other words, there was no significant difference in the results between internal interface ((in)definite uses of articles) and external interface (generic uses of articles). This goes against the predictions made by the Interface Hypothesis thus, the interface hypothesis cannot be supported by this study.

4.2. Discussion

Regarding the relative difficulties found with generic articles, I propose that such difficulties can be attributable to the subtle semantic constraints on the generic article use, which are determined by types of generic sentence such as characterising generics and kind-referring generics or accompanying predicate types (Carlson & Pelletier, 1995). For instance, the article ‘a’ can only be used in characterising generic sentences but not as the kind-referring generic NP. See the examples in(11) and (12) below.

(11) A female kangaroo carries its young in its pouch.

(12) *A kangaroo is far from extinct.

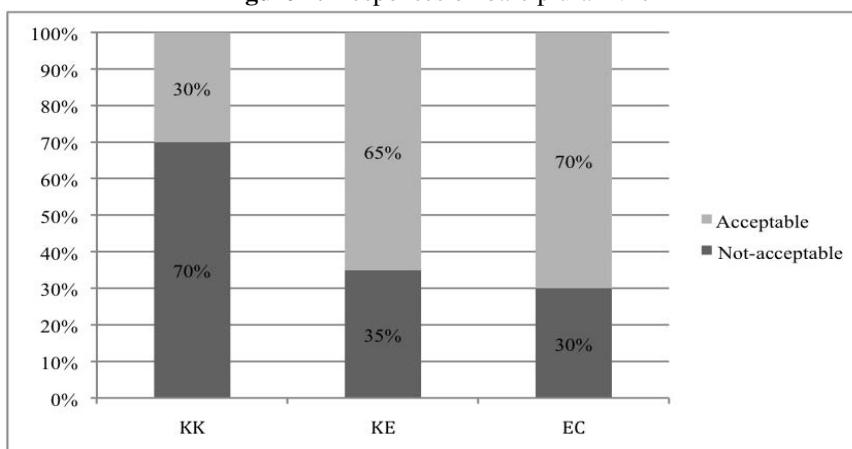
'A female kangaroo in (11) is legitimate because sentence (11) is a characterising generic sentence where genericity rises from sentences. However, 'a kangaroo' in (12) is inappropriate because 'a kangaroo' is not a kind-referring NP. Predicates such as *extinct*, as in (12) require kind-requiring NPs as their arguments. In sentences such as (12), learners showed difficulties and had low accuracy rates of 55% and 60% by KK and KE, respectively. Furthermore, Carlson and Pelletier (1995) suggest that article choice in generic sentences are restricted by syntactic position. For example, bare plural NPs are acceptable in subject position as in (13) but not acceptable after kind-requiring verbs such as *invent* or *exterminate* as in (14).

(13) Transistors were invented by Shockley.

(14) *Shockley invented transistors.

In this category, while learners performed native-like in sentences such as (13), they showed non target-like performances when generic NPs occurred in the object position as in (14). Consider Figure 1 for results on bare plurals in the object position after kind-requiring verbs such as in (14).

Figure 1: Responses on bare plural NPs



As the acceptance rates in Figure 1 show, while KE showed target-like responses, KK showed opposite patterns to EC by accepting 'bare plurals' as generics after kind-requiring verbs more often than EC. It was in these categories that learners had great difficulty. It is possible that the subtle semantic features seemed to have posed difficulties to adult second language learners. Then, let us consider the relative easiness of (in)definite uses of English articles. Learners performed equally well with (in)definite uses of English articles which involve external interface. It might be because (in)definite uses of English articles are more familiar than generic uses of English articles to Korean L2 learners. In fact, 21 English grammar books and English textbooks used in formal English classrooms for middle school and high school students were examined. Among 21 books, none of them cover generic uses of English articles, whereas 6 of them included an explanation on the (in)definite uses of English articles. Therefore, it is possible that the participants of the current research are familiar with (in)definite uses of English articles, but not generic uses.

The results can be interpreted such that properties at external interface such as *syntax-discourse* are not necessarily more problematic than those involving internal interface like *syntax-semantics*. The current results indicate that non target-like performance of highly advanced learners cannot be explained by predictions made on the distinction between internal vs. external interface within *Interface Hypothesis*. Rather, it suggests that subtle semantic features can account for the difficulties by L2 learners.

5. Conclusion

The results of the current study establish the following two findings that (i) the prediction based on the distinction between Internal interface and external interface with IH may not be sustainable regarding L2 acquisition of article uses. (ii) External interfaces are not entirely problematic in the L2 acquisition of articles.

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