

# The Role of Genericity in Online Grammar Processing by Japanese Adult L2 Learners and Japanese Child L2 Learners of English

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## 1. Introduction

Adult L2 learners' acceptability judgements or choices for English articles have been the focus of a number of studies (Ionin, Ko & Wexler, 2004; Ionin, Montrul, Kim, & Philippov, 2011; Snape, García Mayo, & Gürel, 2009, 2013; Snape 2013, among others). The current study includes a group of adult L2 learners and a group of child L2 learners. A contrast in our study, besides the age difference between the two groups, is between the adults, who are all EFL learners, and the children, who all lived outside of Japan for a few years or more, and have returned to Japan, referred to as 'returnees'. The focus of our study is on the role of genericity in online grammar processing in English. Specifically, the aim of the study is to examine whether L2 learners can distinguish between generics at the NP-level and generics at the sentence-level in an online reaction time experiment. In this section we outline the differences between NP-level generics and sentence-level generics, according to Krifka, Pelletier, Carlson, ter Meulen, Link, and Chierchia's (1995) account of generics. Section 2 provides details of previous L2 studies that have focused on article interpretations. Section 3 provides details of the current study. Section 4 discusses the findings in comparison with previous results from other studies and concludes the paper.

Examples (1) and (2) are not identical according to Krifka et al. (1995): Definite singulars and bare plurals are NP-level generics as they can refer to natural kinds as in examples (1a, b) with a predicate like *be extinct* while definite plurals cannot (see 1c). A natural kind represents a single abstract individual such as an animal or plant species by name or by a definite singular / bare plural description. Indefinite singulars and bare plurals are sentence-level generics as they are compatible with characterizing sentences: they are used to make a general statement, as in examples (2a, b), but indefinite singulars cannot refer to a whole species (see 2c).

(1)

- a. The dinosaur is extinct.
- b. Dinosaurs are extinct.
- c. #The dinosaurs are extinct.

(2)

- a. A potato contains vitamin C, amino acids, protein and thiamine.
- b. Potatoes contain vitamin C, amino acids, protein and thiamine.
- c. #A dinosaur is extinct.

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The definite singular NP has a unique status within the range of definite article functions (i.e., anaphoric, cataphoric, associative)<sup>1</sup> as it is able to refer to an entire species or group, unlike the indefinite article. Dayal (2004) suggests that the definite singular generic carries a [+kind formation] feature and in a similar vein, Vergnaud and Zubizarreta (1992) claim that the definite singular generic is marked with a [+species] feature.

In contrast, Japanese refers to something or someone as generic by using the topic marker *wa*, as in the following examples in (3) and (4), since Japanese is an article-less language (Kuroda, 1992).

(3) NP-level generics

- a. #Sono kyoryu-wa zetsumetsushi-ta.  
that dinosaur-TOP die out-PAST TENSE  
'The dinosaur died out'.
- b. #Aru kyoryu-wa zetsumetsushi-ta.  
a certain type of dinosaur-TOP die out-PAST TENSE  
'A certain type of dinosaur died out'.
- c. Kyoryu-wa zetsumetsushi-ta.  
dinosaur(s)-TOP die out-PAST TENSE  
'The dinosaur died out. / Dinosaurs died out'.

(4) Sentence-level generics

- a. #Sono jyagaimo-wa bitamin C to amino-san-o fukunde i-ru.  
that potato-TOP vitamin C and amino acids-ACC contain-ASP-NON-PAST  
'The potato contains vitamin C and amino acids'.
- b. #Aru jyagaimo-wa bitamin C to amino-san-o fukunde i-ru.  
a certain type of potato-TOP vitamin C and amino acids-ACC contain-ASP-NON-PAST  
'A certain type of potato contains vitamin C and amino acids'.
- c. Jyagaimo-wa bitamin C to amino-san-o fukunde i-ru.  
potato(s)-TOP vitamin C and amino acids-ACC contain-ASP-NON-PAST  
'The potato contains vitamin C and amino acids'. / 'Potatoes contain vitamin C and amino acids'.

Japanese does not contrast NP-level genericity with sentence-level genericity the same way as English does because there are no articles to encode the differences. Furthermore, there is no number distinction between singular generics and plural generics in Japanese.

## 2. Previous L2 Studies of Article Interpretations

Ionin et al. (2011) administered an offline acceptability judgement task to adult Russian and Korean L2 learners of English. The types of contexts used in the task are provided in examples (5) – (8) below. The participants were instructed to read each short context and then rate each possible continuation from a-e. In (5), the most acceptable continuation is a. because one particular shirt, the red one, is being referred to as it has the unique property of being plastic. Thus, sentence (5a) should be rated 4 (completely acceptable) and all the other sentences (5b-e) should receive a rating of 1 (completely unacceptable). If the participants were unsure of the acceptability of a certain sentence they could choose 2 (less acceptable) or 3 (nearly acceptable).

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<sup>1</sup> See Hawkins (1978) for a detailed description of the types of definite singulars in English and their functions.

## (5) Control condition: Anaphoric singular

Takako loves shopping. Yesterday she bought three T-shirts: One is red and two are yellow. However, they are different from regular T-shirts. For example ....

- |                                       |   |   |   |   |
|---------------------------------------|---|---|---|---|
| a. <b>the red T-shirt is plastic.</b> | 1 | 2 | 3 | 4 |
| b. the red T-shirts are plastic.      | 1 | 2 | 3 | 4 |
| c. red T-shirts are plastic.          | 1 | 2 | 3 | 4 |
| d. a red T-shirt is plastic.          | 1 | 2 | 3 | 4 |
| e. red T-shirt is plastic             | 1 | 2 | 3 | 4 |

Example (6) is similar to (5) with the only difference of ‘number’. In (6), the definite plural in (6a) is the only sentence that is a completely acceptable continuation as the two grey suits have the unique property of being tailor made.

## (6) Control condition: Anaphoric plural

Yahiro has three suits: one black suit and two grey suits. He takes great care of his grey suits because they are unusual. You see ....

- |   |   |   |   |   |
|---|---|---|---|---|
| a. <b>the grey suits are tailor made.</b> | 1 | 2 | 3 | 4 |
| b. the grey suit is tailor made.          | 1 | 2 | 3 | 4 |
| c. grey suits are tailor made.            | 1 | 2 | 3 | 4 |
| d. a grey suit is tailor made.            | 1 | 2 | 3 | 4 |
| e. grey suit is tailor made.              | 1 | 2 | 3 | 4 |

The example in (7) is of a definite singular generic and a bare plural generic. As illustrated in examples (1) and (2) above, there is not one but two possible acceptable continuations as the definite singular (7a) and bare plural (7b) are both completely acceptable continuations. (7c) and (7d) should receive lower ratings as they do not have a kind interpretation. (7e) is completely unacceptable and ungrammatical as there is no article.

## (7) Test condition: NP-level generic

I have been studying biology today and I found out that many species are no longer alive. For example, I found out ....

- |                                    |   |   |   |   |
|------------------------------------|---|---|---|---|
| a. <b>the dinosaur is extinct.</b> | 1 | 2 | 3 | 4 |
| b. <b>dinosaurs are extinct.</b>   | 1 | 2 | 3 | 4 |
| c. a dinosaur is extinct.          | 1 | 2 | 3 | 4 |
| d. the dinosaurs are extinct.      | 1 | 2 | 3 | 4 |
| e. dinosaur is extinct.            | 1 | 2 | 3 | 4 |

Example (8) is an indefinite singular generic and a bare plural generic. (8a) and (8b) are both completely acceptable continuations and are expected to be rated as 4. (8c-e) are not acceptable continuations as they fail to provide a general description of colourful toys. Rather, the definite singular and definite plural in (8c-d) have a partitive reading where the colourful toy(s) is part of a set of toys with one or more of them being colourful.

## (8) Test condition: Sentence-level generic

My 3 year old daughter’s birthday is coming soon. I don’t know what to buy her for a present.

However, my wife read in a recent survey of young children, .....

- a. **a colourful toy is popular with young kids.**
- b. **colourful toys are popular with young kids.**
- c. the colourful toy is popular with young kids.
- d. the colourful toys are popular with young kids.
- e. colourful toy is popular with young kids.

1	2	3	4
1	2	3	4
1	2	3	4
1	2	3	4
1	2	3	4

Ionin et al. (2011) found that learners had difficulty accepting the definite singular (for NP-level generics) to refer to natural kinds, but were better at accepting the indefinite singular for sentence-level generics. Snape (2013) replicated Ionin et al.'s (2011) study with adult Japanese and adult Spanish L2 learners of English by using an acceptability judgement task. The task was similar to the one designed by Ionin et al. (2011), but included more NP-level and sentence-level test categories. A web-based version of the task was created as well as a paper-based version, as the task was administered in Spain and the U.S using a web survey website. The findings show clearly that for the Spanish speakers, the mean rating for the definite singular was higher (2.66 out of 4) than the indefinite singular (1.52 out of 4) for NP-level generics. However, for the Japanese speakers, the mean rating for the definite singular was lower (2.04 out of 4) and equal to the ratings for the indefinite singular (2.16 out of 4) and the bare singular (2.02 out of 4). These results are consistent with the findings in the Ionin et al. (2011) study as the Russian and Korean speakers perform much like the Japanese speakers in their rating of the definite singular. The definite singular is not rated highly by L1 groups from article-less languages since the definite singular generic is far more complex semantically as L2 learners must acquire a new feature, a [+kind formation] feature.

### 2.1. Second Language Processing of Article Semantics

Kim and Lakshmanan (2008) examined the online processing of articles by 18 Korean L2 learners of English (intermediate and advanced proficiency), using a self-paced reading task. They designed a number of short contexts where the definite singular was acceptable (and the indefinite singular was unacceptable) and vice versa. The participants were instructed to look at two lines presented on the computer screen. They were told that the two lines represented sentences spoken by one person who was having a conversation with a friend he had not seen for a while. Upon each press of the space bar, a new word appeared. When the participants had finished reading the final word of the second sentence (represented by the second line) a question appeared on a new screen asking the participants whether the second sentence in the pair made sense in combination with the first sentence. The focus was on whether or not the Korean speakers would fluctuate between two semantic features, definiteness and specificity (based on Ionin, et al., 2004). NP-level generics and sentence-level generics were not included in the online task. Their findings show that the intermediate L2 learners read the second sentence faster in the [+specific *the*] condition than in the [+specific *a*] condition. This means that the learners likely associate the definite singular with [+specific], not [+definite], and the indefinite singular with [-specific], not [-definite] whereas the advanced L2 learners and the native controls correctly associate *the* with [+definite] and *a* with [-definite].

## 3. Our Study

Our study is based, in part, on a previous study conducted by Kim and Lakshmanan (2008) who investigated online reading times of articles in  $\pm$ definite and  $\pm$ specific contexts. The current study extends this line of research into the L2 acquisition of genericity to investigate the role of genericity in online grammar processing since it is possible that in an offline task learners are able to use explicit knowledge about articles. Our main research questions are:

In real time processing, are adult L2 learners and child L2 learners able to associate:

- 1.) the definite singular and bare plural with NP-level generics?
- 2.) the indefinite singular and bare plural with sentence-level generics?

The participants recruited for this study include 26 Japanese adult L2 learners of English, 14 Japanese child returnees (L2 English) and 18 native speaker controls. All of the L2 participants were tested in Japan. The native English participants were tested at the University of Calgary. The Japanese speakers' proficiency levels are based on recent Test of English for International Communication (TOEIC) scores. The average score for the 26 adult Japanese participants was 802 out of a total of 990. This placed all the adult Japanese speakers at an advanced level of proficiency. Table 1 provides details of age at testing and age of first exposure to English according to language background questionnaires completed by all the participants. The self-paced reading task took around 25 minutes for both groups of learners to complete and about 20 minutes for the native English speakers.

Table 1. *Details of the participants in the study*

	Adult Japanese speakers (n=26)		Child returnees (n=14)		Native English speakers (n=18)	
	mean	range	mean	range	mean	range
age at testing (years)	20	19-21	13	9-18	22	18-34
age of first exposure to English (years)	11	7-13	6	3-12	n/a	-

### 3.1. *Self-paced, Online Reading Task*

The self-paced moving window condition was created using the software package Superlab 4.5 for Apple Macintosh computers. Each participant was seated in front of a Macbook Pro equipped with a response pad since we are able to gain more accurate reading times than if we were to simply use the keyboard. He/she was asked to read a short context presented on the screen. A picture accompanied each context in order to assist the participants in their understanding of the upcoming stimulus sentence. The stimulus sentence was a continuation of the previous context. Once the participant had read the short context they were instructed to push any button on the response pad so that the continuation sentence would appear word-by-word using the moving window procedure (Just, Carpenter, & Woolley, 1982). The short context remained on the screen throughout each trial. With every push of a button a new word appeared and the previous word disappeared. Once participants had reached the end of the stimulus sentence, they were asked to push either the 'Yes' button meaning that the stimulus sentence is an acceptable continuation of the short context or the 'No' button indicating that the stimulus sentence is an unacceptable continuation of the sentence. Superlab recorded the word-level reading times between each button press (i.e., the time spent reading each word) in milliseconds. The participants were instructed to read the short contexts and stimulus sentences as naturally as possible. The instructions for the task were available in English and Japanese.

After completing practice items, each participant was asked if they understood the instructions. There were forty test items in total. Twenty test items were acceptable continuations of the short contexts and the other twenty were unacceptable continuations. The twenty acceptable continuations were divided so that ten items were NP-level continuations and ten items were sentence-level continuations: five items were singular and five items were bare plural. This division of items was also done for the unacceptable continuations. All stimulus sentences were randomized throughout the task and two versions of the task were created to prevent order effects. The continuation sentences were designed to focus on generics in subject position. None of the continuation sentences had generics in object position. There were four anaphoric singular and four anaphoric plural contexts as distracter items (control conditions) and six bare NPs. They appeared in the task as short contexts just as the NP-level and sentence-level generics did and participants had to decide whether the stimulus sentence was an acceptable or unacceptable continuation of the context. Examples of singular contexts are provided in (9-11). An example of an anaphoric singular short context is given in (9a).

## (9) Acceptable anaphoric singular condition



a.) Atsuko found a great sandwich shop which sells lots of international sandwiches. She wants three sandwiches for lunch. One is ham and two are tuna and mayonnaise. But they are made a little differently. For instance ....

b.) the ham sandwich is made with smoked ham from Spain.

(9b) is an acceptable stimulus sentence as it has a partitive reading, referring to the unique sandwich made with smoked ham from Spain. The same type of condition was set up for the anaphoric plural (see (6) above). The next example in (10) is of an acceptable NP-level generic.

## (10) Acceptable NP-level generic



a.) I have been studying biology today and I found out that many species are no longer alive. For example, I found out ....

b.) the dinosaur is extinct

In the case of example (10), it is an acceptable continuation of the short context as *the dinosaur* refers to the species of dinosaurs as a whole. In (11), the short context is set up so that it is acceptable as a sentence-level generic interpretation.

## (11) Acceptable sentence-level generic



a.) It's really hot today. I must take care of my head while I'm outside. My brother thinks ....

b.) a baseball cap is good protection

Baseball caps are not well-defined kinds so the indefinite singular in (11) should be judged as being acceptable.

### 3.2. Results

The results in Tables 2-4 show the total number of correct judgements for the acceptable sentences by each participant group for the control conditions and the test conditions.

Table 2. *Percentages of correct judgements for the control conditions (anaphoric singulars and plurals)*

	definite singular (anaphoric)	definite plural (anaphoric)
Native Controls	94%	100%
Adult L2ers	81%	85%
Child returnees	79%	64%

Table 3. *Percentages of correct judgements for the test conditions (singular generics)*

	definite singular (NP-level generic)	indefinite singular (sentence-level generic)
Native Controls	73%	90%
Adult L2ers	42%	76%
Child returnees	54%	69%

Table 4. *Percentages of correct judgements for the test conditions (plural generics)*

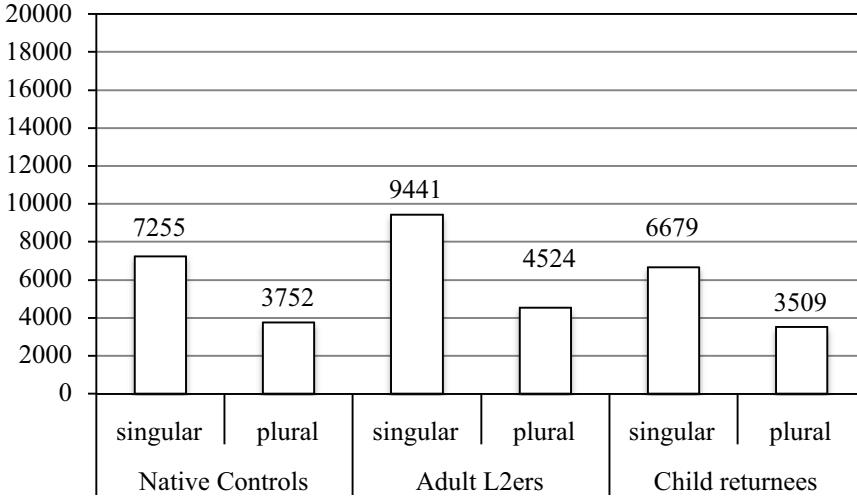
	bare plural (NP-level generic)	bare plural (sentence-level generic)
Native Controls	98%	92%
Adult L2ers	70%	78%
Child returnees	61%	68%

In order to examine the total mean reading times for the control and test conditions, we calculated the residual reading times (RRT).<sup>2</sup> This is a way to correct for sentence length, word length, and individual differences between participants' reading speeds. For example, a sentence with five words is read faster than one with ten; a sentence with ten long words is read faster than one with ten short words; etc. Since we used a self-paced design, naturally some people read and progress through the sentences faster than others. By calculating the RRT, we can eliminate this bias.

Instead of counting each letter of each word in the stimulus sentences, we counted the number of syllables in each word. We grouped the words with one syllable, two syllables etc. and calculated the mean reading time for each syllable grouping. Next, we organised all the stimulus sentences into the two control conditions and the two test conditions and calculated the mean for each condition. We then subtracted the syllable mean from the total mean in each condition to give us our RRTs. Furthermore, we excluded extreme values and outliers from each group's average reading time (Marinis, 2010) when a reading time was over two standard deviations away from the mean. The results in Figure 1 show the total mean reading times (in milliseconds) of the stimulus sentences in the control conditions (anaphoric singular and anaphoric plural) and Figures 2-3 show the total mean reading times (in milliseconds) of the stimulus sentences in the two test conditions (NP-level generics and sentence-level generics).

<sup>2</sup> We are grateful to Theo Marinis and Holger Hopp for their helpful advice with regard to dealing with group and individual reading time data.

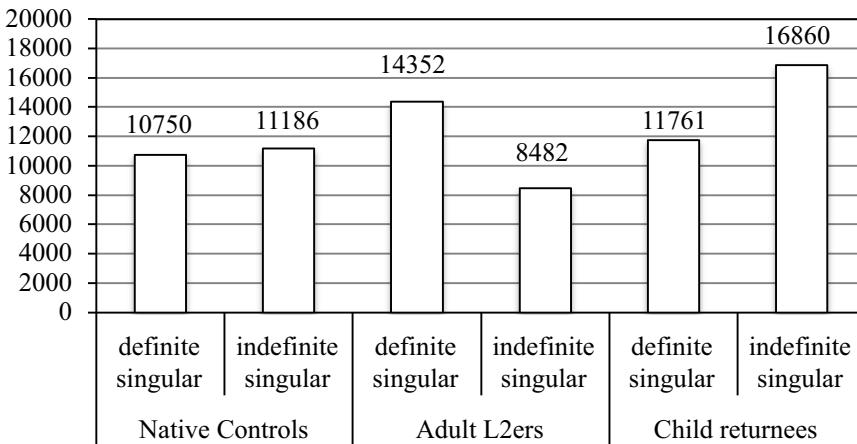
Figure 1.



Total mean reading times (in milliseconds) of the stimulus sentence for correct anaphoric singulars and anaphoric plurals

Overall, the control condition results show that the two L2 learner groups perform similarly to the native control group. The results in Table 2 and Figure 1 support the claim that the L2 learners have a basic understanding of the English article system. Figure 2 illustrates the results of the two singular generic test conditions, NP-level generics (*the*) and sentence-level generics (*a*).

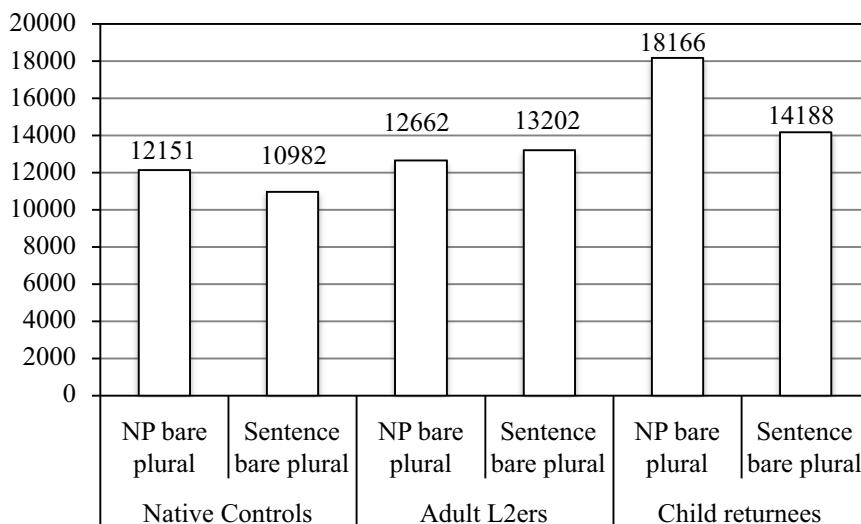
Figure 2.



Total mean reading times (in milliseconds) of the stimulus sentence for correct singular NP-level and sentence-level generics

Paired samples t-tests reveal that the native controls' reading times for NP-level generics (the definite singular) and sentence-level generics (the indefinite singular) are not significantly different ( $t=-.360, p>0.05$ ). Paired samples t-tests performed on the child returnees' reading times show that there is no significant difference between the two types of generics ( $t=-1.684, p>0.05$ ) and for the adult L2 learners, a significant difference was found ( $t=2.718, p=0.012$ ). Figure 3 shows the results of the two bare plural generic test conditions, NP-level generics and sentence-level generics.

Figure 3.



Total mean reading times (in milliseconds) of the stimulus sentence for correct plural NP-level and sentence-level generics

The results from paired samples t-tests reveal that there is no significant difference between the reading times for NP bare plurals and sentence-level bare plurals for the native control group ( $t=0.842$ ,  $p>0.05$ ). Paired samples t-tests show the same result for the L2 learner groups: no significant difference between the two bare plural conditions for the adult L2 learners ( $t=0.342$ ,  $p>0.05$ ) or for the child returnees ( $t=1.242$ ,  $p>0.05$ ). However, the child returnees, in comparison with the adult L2 learners and native controls, gave fewer correct responses to the bare plural NP-level generics (see Table 4 above) and the bare plural NP-level generics required longer reading times. This is an unexpected result and may indicate that the bare plural NP-level generic and the definite singular generic are equally difficult to acquire.

#### 4. Discussion and Conclusion

Most previous studies have used offline tasks to assess L2 learners understanding of article interpretations. We examined the online processing of NP-level generics and sentence-level generics (the two test conditions) and compared the results with those of the anaphoric control conditions. We found that all the L2 learners were faster at reading the anaphoric short contexts and more accurate in their correct responses to the stimulus sentences. Conversely, the adult L2 learners took significantly longer in reading short contexts in the NP-level generic condition compared with reading contexts in the sentence-level generic condition; there were no significant differences for the child returnees and the native controls. Additionally, the adult L2 learners were less likely to provide a correct response to acceptable sentence continuations for NP-level generics (42%) compared with the child returnees (54%) and the native controls (73%)<sup>3</sup>. No differences were observed between the NP-level bare plural

<sup>3</sup> Ideally, the native controls should have supplied more correct responses to the acceptable sentence continuations in the NP-level singular generics condition. An item analysis revealed that one item in particular, (i.) below, caused more native controls to select the incorrect response by rejecting it as an appropriate continuation of the short context:

(i.) My Japanese friend is living in Akita. He used to live in New York, so moving from a big city to the countryside was a big shock. He said he really misses Western style food and drinks. He was surprised when I told him .....

the coca-cola bottle is sold widespread throughout Japan.

This is the only item in the task that does not refer to a species of animals. It is possible that for some native controls it is harder to get a generic interpretation from *the coca-cola bottle*.

and the sentence-level bare plural conditions for each group. Our findings are consistent with the offline studies' findings (Ionin et al., 2011; Snape et al., 2009, 2013; Snape, 2013) as adult L2 learners, at advanced levels of proficiency, continue to have difficulty with accepting the definite singular for NP-level generics. The child returnees, however, have longer reading times for the definite singular in the NP-level generic condition than the indefinite singular in the sentence-level generic condition. The same applies to the bare plural conditions; reading times for the bare plural NP-level generics were longer than for the bare plural sentence-level generics. The fact that the child returnees are worse at acceptability judgements for the definite singular and the bare plural at NP-level demonstrates how difficult complex article semantics can be for L2 learners whose L1s lack a formal article system. The definite singular NP-level generic is more complex than the anaphoric singular because there is an additional feature (the +species feature or +kind formation feature) for L2 learners to map onto the definite singular generic. This is consistent with the claim that features that are available in the L1 need to be reorganized and mapped onto the appropriate L2 morphology (see Lardiere, 2009). In addition, the definite singular generic is not highly frequent in the input as corpus studies (e.g., Biber et al., 1999) show. The question remains whether the definite singular generic can be acquired. But, the bare plural NP-level generic was not predicted to cause the child returnees or adult L2 learners any difficulties since no article appears to mark genericity on the NP. Future studies need to investigate the acquisition of NP-level genericity by child (simultaneous) bilinguals to find out whether they can correctly identify the definite singular and bare plural as acceptable continuations in NP-level generic conditions.

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