

A Multivariate Analysis of L2 English Article Use by Article-less L1 Learners

Junko Tanaka
Kobe University

1. Introduction

Second language (L2) learners whose first language (L1) does not have articles have been shown to have great difficulty acquiring English article usage. According to previous research the difficulty arises at least in part from a tendency to confuse the concepts of specificity and definiteness when choosing between articles *a* and *the* (Ionin, Ko, & Wexler, 2004). To build on this body of research, the present study explores whether Japanese L1 learners show the same trend as reported in the Ionin, Ko, and Wexler's (2004) study and whether the learners sense that they are overusing articles.¹ To do so, the relationship among participants' proficiency, their accuracy of article use, and their degree of certainty about their article choice is examined.

Research on L2 English article usage is plentiful, such as Huebner (1983), Parrish (1987), Master (1987) and Thomas (1989), and several studies have explored article acquisition by L1 article-less language speakers, such as Japanese (e.g., Yamada & Matsuura, 1982; Goto-Butler, 2002; Snape, 2006; Akamatsu & T. Tanaka (2008), and others), Chinese (Lardiere, 2004), Korean and Russian (Ionin et al., 2004; Kim & Lakshmanan, 2009), and Serbian (Trenkic, 2007), among other language backgrounds. These studies have looked at the following features: definiteness, specificity, generics, and count versus non-count nouns.

The studies cited above are largely based on two different approaches: Some use a parameter setting framework, which assumes that parameter (re)setting is necessary for L2 acquisition and in cases where this (re)setting does not occur or is inadequate, a fluctuation between different parameter settings would be evident. The second approach is a developmental one, in which learners' article errors, or variation, is a byproduct of the L2 development process and not due to fluctuation in setting parameters.

In one of these previous studies, Ionin et al. (2004) presents an "Article Choice Parameter." They claim that languages which have two articles (such as English with *a* and *the*) may distinguish them based on definiteness, or the "definiteness setting" as they refer to it, or they may be distinguished based on specificity, referred to as the "specificity setting" (p. 12). Also, Ionin et al. postulated the Fluctuation Hypothesis (FH) which states that (a) L2 learners have full access to UG principles and parameter-settings; and (b) L2 learners fluctuate between different parameter-settings until the input leads them to set the parameter to the appropriate value (p. 16). In the present study, I attempt to partially replicate Ionin et al.'s framework to see whether L1 Japanese speakers show the similar patterns in article choice to Ionin et al.'s L1 Korean and Russian participants.

Standard English is a two-article language, and cross-linguistically there are two possible article choice patterns in such two-article languages: Article grouping by definiteness, like English, or article grouping by specificity, like Samoan (Ionin et al., 2004, p.12). These two types of article groupings are schematically shown in Tables 1 and 2 below.

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¹ The study this proceedings paper is based on is part of a matrix research project, one of whose aims is to examine the relationship between participants' accuracy of article use and their degree of certainty about their article choice.

Table 1
Article Grouping by Definiteness

	+ definite	- definite
+ specific		
- specific		

Note. Adapted from Ionin et al. 2004, p. 13.

Table 2
Article Grouping by Specificity

	+ definite	- definite
+ specific		
- specific		

Note. Adapted from Ionin et al. 2004, p. 13.

The two possible article settings are given schematically in Table 3 and a problematic issue for article-less L1 speakers is explained below.

Table 3
The Two Possible Article Groupings Together

	+ definite	- definite
+ specific	A	C
- specific	D	B

Note. Adapted from Ionin et al., 2004, p. 18, and modified by the author.

Whichever setting the L2 learners adopt, specific definites (cell A) will always be assigned *the* and nonspecific indefinites (cell B) will always be assigned *a*. As for cells C and D, however, they will be assigned different articles depending on the setting adopted. For example, cell C would be assigned *a* under the definiteness setting, but *the* under the specificity setting. Conversely, cell D would be assigned *the* under the definiteness setting, but *a* under the specificity setting. Thus, by looking at cells C and D, one can tell whether L2 learners have adopted the definiteness setting or the specificity setting and whether they are currently fluctuating between them.

Ionin et al.'s FH predicts that the learners would fluctuate between the correct semantic setting and a wrong semantic setting until they receive enough L2 input. I used L2 proficiency as a correlate of the amount of L2 input each learner has received. Previous research on L2 English article acquisition has found that L2 proficiency is related to L2 English article acquisition and has reported a relationship between L2 learners' preference in their article use, their L2 proficiency, and semantic types. For example, Ionin et al. (2004) reported developmental effects in their Russian L1 speakers' use of L2 English articles (pp. 31-32). On the other hand, Kim & Lakshmanan (2009) reported cases where an increase in L2 proficiency does not show a corresponding increase in accuracy with L2 English article use. L1 Korean learners with an intermediate level L2 English proficiency tended to adhere to the specificity setting, and "the specificity setting continues to persist at advanced levels of proficiency even after the emergence of the definiteness setting" (p. 87) thereby making more errors than their lower proficiency peers for the semantic context.

From the above, therefore, it is speculated that L2 English learners of article-less L1 backgrounds may not perform equally accurately across possible permutations of the two semantic features. It is also speculated that it is not necessarily the case that L2 English learners with article-less L1s become increasingly accurate in their article use across the four possible semantic permutations as a function of their L2 English proficiency. Further, if they fluctuate between the definiteness setting and the specificity setting, the fluctuation may be a reflection of their uncertainty about their article choices.

2. The present study

2.1. Research questions and predictions

Research questions of this study are as follows:

RQ1: Do L1 Japanese speakers overuse *the* more at [-definite, +specific] contexts than at [-definite, -specific] contexts?

RQ2: Do L1 Japanese speakers overuse *a* at [+definite, -specific] than at [+definite, +specific] contexts?

RQ3: Are L1 Japanese speakers at higher proficiency levels less accurate in their article use than lower proficiency learners when the polarities of semantic features do not match?

It is predicted that L1 Japanese speakers would have more difficulties in using articles correctly in contexts where the polarities of two semantic features, definiteness and specificity, do not match each other than when the two features do match each other. Therefore predictions for each research questions are as follows.

Hypothesis for RQ1: L1 Japanese speakers will overuse *the* more when what is denoted by the noun phrase is specific than not;

Hypothesis for RQ2: L1 Japanese speakers will overuse *a* when the noun phrase does not denote a specific entity;

Hypothesis for RQ3: L1 Japanese speakers of higher proficiency will make more errors when what is denoted by the noun phrase is specific.

2.2. Participants

Participants of this study were 149 speakers of L1 Japanese (Age $M=19.17$ ($SD=.74$)) comprised of 88 males and 61 females.² The participants were all undergraduate and graduate students in Japan. They had been studying English for more than six years but had little experience living in English speaking countries. Their average months of stay including traveling in L2 English speaking countries were 1.72 months. Their mean English proficiency on the TOEFL ITP was 472 (MIN = 310, MAX = 620). The participants' L1, Japanese, does not have articles like English (Shibatani, 1990). Therefore, no L1 transfer is expected in their choosing semantic values that are relevant for English.

Participants were divided into the following three groups for analyses based on their TOEFL ITP scores³: Group 1 for those whose TOEFL ITP scores were below 450 ($n = 48$); Group 2 for those whose TOEFL ITP scores were 450 and up but below 500 ($n = 48$); and Group 3 for those who scored 500 or more ($n = 53$).⁴ There was a significant difference among these three groups.

2.3. Methodology

Measures used in this study were (1) a participant background questionnaire, and (2) a web-based article test. The background questionnaire asked about their English learning history and their experience living in English speaking countries. After filling out the questionnaire they sat for a web-based article test comprised of 40 forced choice elicitation tasks. All of the 40 items were adopted from Ionin et al.'s (2004) study. Of their 40 items, this research utilized 32 items, eight items each for

² This study is part of a larger study that had more than 200 participants, but the complete results are not reported here as the data were not ready at the time of the conference presentation. The 149 reported in this paper are those who completed all of the items. Those who did not complete all items were not included in these 149 as they needed to be excluded listwise from the analyses.

³ Participants' English proficiency scores measured by tests other than TOEFL ITP (such as TOEIC and IELTS) have been converted or approximated to TOEFL ITP scores.

⁴ The result of the analysis presented at SLRF 2011 was based on an unbalanced research design. After the conference, the data were reanalyzed using 45 participants from each group. The reanalysis obtained results which are not so different from the results I report in these proceeding, but I have chosen not to report the reanalyzed results in the proceedings.

[-definite, -specific] (Type 1), [-definite, +specific] (Type 2), [+definite, -specific] (Type 3), and [+definite, +specific] (Type 4), excluding eight items for two simple contexts. Every noun phrase in the forced choice test was singular and countable.⁵

2.4. Procedures

After participants filled in a questionnaire, they sat in front of a PC or a Mac connected to a server and were told to go through the items. The test is a self-paced test and participants finished in a single session. There was one time when a participant sat for the test alone, but usually there were 10 to 40 participants together at once.

Each item comprised of sentences that provide contexts and a sentence with a slot where participants needed to fill in with *a*, *the*, or ‘—’ that represents no article from a pull down menu. Below the pull down menu, there was a sentence that asked them to rate their certainty about the answer they have just given by choosing an adjective ranging from “not certain,” “not very certain,” “neither not certain or certain,” “somewhat certain,” to “certain.” If they wanted, they could write a reason(s) why they have chosen a specific answer or any other comments about the question they had just seen. After participants clicked the button to send their answers to the server, their answers were saved on the server and retrieved as CSV files. The CSV files contained both accuracy and certainty data.

2.5. Analysis

Hypotheses 1 to 3 were tested by means of a mixed ANOVA with a multivariate approach using accuracy and certainty as two dependent variables with definiteness and specificity as within-subject variables and proficiency as a between-subject variable. This resulted in a 2 (definiteness) by 2 (specificity) by 3 (proficiency) design on two dependent variables (accuracy, and certainty).⁶ Alpha was set at .05 throughout the analyses.

3. Results

3.1. Descriptive statistics results on accuracy

Table 4 shows the mean score and standard deviation of accuracy for items for Type 1 through Type 4, and Table 5 shows the mean score and standard deviation of certainty for the four semantic types. Table 6 shows the percentages of answers based on definiteness and specificity by all participants.

As for accuracy, you can see that Types 2 and 3, where polarities of definiteness and specificity do not match each other, accuracy were lower than that for Types 1 and 4, where polarities of definiteness and specificity match one another. This holds irrespective of the three proficiency groups. Interestingly Mid proficiency learners showed lower accuracy than their low proficiency counterpart in [+definite, -specific] contexts (see the numbers in bold in Table 4).

On the other hand, as is shown in Table 5, there was not much difference in their certainty across the four semantic Types irrespective of proficiency. However, their mean certainty was the lowest for Type 3, which was [+definite, -specific] (see the numbers in bold in Table 5).

⁵ For each question refer to appendices in Ionin et al. (2004).

⁶ However, the results that pertain to certainty are not reported fully in this paper as the data need further analyses.

Table 4
Descriptive Statistic Results on Accuracy

Semantic Type	Type 1. -def, -spec	Type 2. -def, +spec	Type 3. +def, -spec	Type 4. +def, +spec
Proficiency	<i>M</i> (SD)	<i>M</i> (SD)	<i>M</i> (SD)	<i>M</i> (SD)
Low (<i>n</i> = 48)	73.18 (19.12)	61.98 (21.87)	63.02 (20.46)	74.74 (20.87)
Mid (<i>n</i> = 48)	82.55 (21.07)	69.01 (25.26)	59.90 (21.41)	75.78 (23.97)
High (<i>n</i> = 53)	89.86(15.71)	83.49 (19.73)	66.75 (25.23)	83.49 (16.94)
Total (<i>N</i> =149)	82.13 (19.78)	71.90 (23.96)	63.34 (22.59)	78.19 (20.91)

Note. The numbers are based on the percentage correct. The percentage incorrect would be 100 subtracted by the above statistic for each cell.

Table 5
Descriptive Statistic Results on Certainty

Semantic Type	Type 1. -def, -spec	Type 2. -def, +spec	Type 3. +def, -spec	Type 4. +def, +spec
Proficiency	<i>M</i> (SD)	<i>M</i> (SD)	<i>M</i> (SD)	<i>M</i> (SD)
Low (<i>n</i> = 48)	59.53 (18.10)	58.91 (18.10)	58.60 (18.59)	59.58 (17.20)
Mid (<i>n</i> = 48)	66.46 (16.90)	64.74 (16.09)	62.08(15.18)	65.31(14.75)
High (<i>n</i> = 53)	71.93(15.13)	69.62 (14.83)	63.92(17.09)	69.81 (16.46)
Total (<i>N</i> =149)	66.17 (17.36)	64.60 (16.83)	61.61(17.04)	65.07 (16.61)

Note. The numbers are based on a percentage of certainty with “certain” as 100.

Table 6
Answers Based on Definiteness versus Specificity: All Groups

	[+definite]		[-definite]	
	<i>the</i>	<i>a</i>	<i>the</i>	<i>a</i>
[+specific]	75.19	12.75	24.33	71.90
[-specific]	63.34	25.08	7.80	82.13

Note. *N*=149. The numbers are in percentages. Bolds represent correct answers.

Table 6 shows similar results with Ionin et al. (2004) in that L1 Japanese speakers had difficulties in using articles correctly and tended to overuse *a* instead of *the* in [+definite, -specific] contexts than with [+definite, +specific] contexts. Similarly, they had more difficulties with articles and overused *the* in [-definite, +specific] contexts as opposed to [-definite, -specific]. It is noteworthy that they overused *a* even with [+definite, +specific] (12.75%), which is supposed to be easy to determine which article to use.

3.2. Results of mixed ANOVA with a multivariate approach on ‘accuracy and certainty’

Using Pillai’s trace, there was a significant main effect of definiteness on combined dependent variables ‘accuracy and certainty’ with $V = .10$, $F(2, 145) = 8.39$, $p < .001$, $\eta^2_{\text{part}} = .10$. But a main effect of specificity was not found significant but near significant on ‘accuracy and certainty’ with $V = .03$,

$F(2, 145) = 2.52, p = .084$. A between-subject variable, proficiency, had a significant effect on ‘accuracy and certainty’ with $V = .16, F(4, 292) = 6.33, p < .001, \eta^2_{\text{part}} = .08$ when all of the four semantic types were collapsed into one.

There was a significant and large interaction of definiteness and specificity on ‘accuracy and certainty,’ $V = .31, F(2, 145) = 32.21, p < .001, \eta^2_{\text{part}} = .31$. There was a significant interaction between definiteness and proficiency on ‘accuracy and certainty,’ $V = .08, F(4, 292) = 3.09, p < .05, \eta^2_{\text{part}} = .04$. An interaction between specificity and proficiency on ‘accuracy and certainty’ was not significant, $V = .03, F(4, 292) = .95, p = .44$. Finally, an interaction of definiteness, specificity, and proficiency was not significant on ‘accuracy and certainty’ with $V = .05, F(4, 292) = 1.98, p = .10$.

These results of mixed ANOVA with a multivariate approach (MANOVA) show that L1 Japanese participants’ accuracy in the use of L2 English articles with certainty are strongly affected by definiteness. As expected, the L1 Japanese participants’ article use was affected greatly by definiteness and specificity combined. Definiteness and proficiency combined also affected the participants’ L2 English article use.

Specificity affects their accurate use of L2 English articles only slightly. Both ‘specificity and proficiency’ combined, and ‘definiteness, specificity, and proficiency’ combined did not significantly affect L1 Japanese speakers’ use of L2 English articles. This means that the L1 Japanese speakers in this study chose L2 English articles based more on definiteness and less on specificity.

The results of two separate follow-up ANOVAs, one on accuracy and the other on certainty, are given below in sections 3.3 and 3.4.⁷ A summary of results from MANOVA and the two ANOVAs is presented in Table 7.

3.3. Results of univariate mixed ANOVA on accuracy

What would these effects be like on a single dependent variable of accuracy? A separate univariate ANOVA on ‘accuracy’ showed a similar trend as the results of the multivariate test reported above. There was a significant main effect of definiteness on accuracy, $F(1, 146) = 13.78, p < .001, \eta^2_{\text{part}} = .09$. There was no significant, but near significant, main effect of specificity on accuracy, $F(1, 146) = 3.04, p = .083$. A main effect of proficiency on accuracy was significant, $F(2, 146) = 11.77, p < .001$, with $\eta^2_{\text{part}} = .14$.

There was a significant and large interaction effect between definiteness and specificity on accuracy, $F(1, 146) = 57.50, p < .001$, with $\eta^2_{\text{part}} = .28$. An interaction between definiteness and proficiency on accuracy was found significant, $F(2, 146) = 5.50, p < .01$, with $\eta^2_{\text{part}} = .07$. There was no significant effect of interaction between specificity and proficiency on accuracy, $F(2, 146) = 1.48, p = .23$. Finally there was no significant interaction of definiteness and specificity and proficiency on accuracy, $F(2, 146) = .41, p = .67$.

3.4. Results of univariate mixed ANOVA on certainty

Another separate univariate ANOVA on ‘certainty’ showed there was a main effect of definiteness on certainty, $F(1, 146) = 10.35, p < .01, \eta^2_{\text{part}} = .07$. A main effect of specificity had a near significant effect on certainty, $F(1, 146) = 3.51, p = .063, \eta^2_{\text{part}} = .02$. A main effect of proficiency on certainty was found significant, $F(2, 146) = 4.89, p < .01, \eta^2_{\text{part}} = .06$.

An interaction effect between definiteness and specificity on certainty was very significant, $F(1, 146) = 21.86, p < .001, \eta^2_{\text{part}} = .13$. A significant interaction effect between definiteness and proficiency was found, $F(2, 146) = 3.21, p < .05, \eta^2_{\text{part}} = .04$. There was no significant interaction effect between specificity and proficiency on certainty, $F(2, 146) = .97, p = .38$. Interestingly, a weak but significant interaction effect of definiteness and specificity and proficiency on certainty was found, $F(2, 146) = 3.32, p < .05, \eta^2_{\text{part}} = .04$.

⁷ The two dependent variables, accuracy and certainty, are deemed related in the data. Therefore, performing separate univariate F tests following a MANOVA are *not* the best solution as doing so will invite the danger of inflating Type I error. A further follow-up analysis is in order using either step-down analysis or discriminant function analysis.

Similar trends were found on certainty as a single dependent variable with multivariate results on ‘accuracy and certainty’ given in 3.2 and with univariate results on accuracy as a single dependent variable reported in 3.3, except that, on certainty, a significant interaction effect of definiteness and specificity and proficiency was found.

Table 7
Summary of results of MANOVA and univariate ANOVAs

Test Dependent Variable Statistic	MANOVA			univariate ANOVA			
	Accuracy and Certainty			Accuracy		Certainty	
	<i>V</i>	<i>F</i>	η^2_{part}	<i>F</i>	η^2_{part}	<i>F</i>	η^2_{part}
Between subjects							
Proficiency	.16	6.33***	.08	11.77***	.14	4.89**	.06
Within subjects							
Definiteness	.10	8.39***	.10	13.78***	.09	10.35**	.07
Definiteness x Proficiency	.08	3.09*	.04	5.50**	.07	3.21*	.04
Specificity	.03	2.52†	.03	3.04†	.02	3.51†	.02
Specificity x Proficiency	.03	.95	.01	1.48	.02	.97	.01
Definiteness x Specificity	.31	32.21***	.31	57.50***	.28	21.86***	.13
Def. x Spec. x Proficiency	.05	1.98	.03	.41	.01	3.32*	.04

Note. $N = 149$. *** $p < .001$. ** $p < .01$. * $p < .05$. † near significant.

3.5. Synthesis of findings

From the results based on a multivariate analysis and follow-up univariate analyses coupled with descriptive data, it was found that hypotheses 1 and 2 were tenable. These hypotheses stated that (1) L1 Japanese speakers will overuse *the* more when what is denoted by the noun phrase is specific than not, and that (2) L1 Japanese speakers will overuse *a* when the noun phrase does not denote a specific entity. However, hypothesis 3, which states that L1 Japanese speakers of higher proficiency will make more errors when what is denoted by the noun phrase is specific, was rejected.

Despite the fact that there was no significant effect of definiteness and specificity and proficiency on accuracy, a significant effect of the three variables was found on certainty.

4. Discussion

4.1. Answers to RQ1 and RQ2

From these results, it can be said that L1 Japanese speakers, like L1 Korean speakers in Ionin et al.’s study, tended to overuse *the* more when what is denoted by the noun phrase was specific. Therefore, the answer to RQ1 was confirmed. As for RQ2, L1 Japanese speakers were found to overuse *a* when the noun phrase did not denote a specific entity. RQ2 was also confirmed.

It can be concluded that their L2 English article choice seemed to be made based on mostly the value of definiteness but also affected by the value of specificity, confirming Ionin et al.’s (2004) results. The L1 Japanese learners in this study seem to have access to the definiteness setting, which is instantiated by their L2, English.

Then, how should one evaluate the inclination of L1 Japanese speakers to choose L2 English articles based on definiteness while their choice is being affected by specificity? Are L1 Japanese speakers fluctuating between the two values: definiteness or specificity? Or is ‘fluctuating’ a sign of their developmental processes?

I speculate that the L1 Japanese speakers are in the process of approximating their internal rules to those of an English definiteness setting in response to the linguistic data they are exposed to. I presume that L2 English learners of L1 Japanese background are not adhering to the two semantic settings (or a cluster of features) in an *either-or* fashion. Rather the L2 learners select the setting that seems to best match the current linguistic situation, and thus they look fluctuating. As they proceed through

developmental (or learning) processes, at some stages they go through a restructuring (c.f. Kellerman, 1985) while in which their accuracy drops and quite possibly so does their certainty about their answers. Such restructuring seems to have happened with Mid proficiency participants in the L1 Japanese speakers in this study (see Table 4).

4.2. *Answers to RQ3*

There was no combined effect of specificity and proficiency on ‘accuracy and certainty’ nor on accuracy as a single dependent variable. Therefore, there was no support for hypothesis 3 which states that L1 Japanese learners of higher L2 English proficiency will make more errors when what is denoted by a noun phrase is specific. What is interesting, however, is that a combined effect of definiteness and specificity and proficiency was found significant on certainty and nothing else. This means that they are less certain to varying degrees depending on the proficiency level when the polarities of definiteness and of specificity do not match each other, which in fact corresponds to the descriptive data (see Types 2 and 3 in Tables 4 and 5).

4.3. *Synthesis and caveats*

It was found that either definiteness or proficiency alone, and definiteness and proficiency combined, and definiteness and specificity combined, all had significant effects on ‘accuracy and certainty’ and on accuracy alone and on certainty alone. It was confirmed that L1 speakers of Japanese, which is an article-less language, had difficulty in choosing a correct article when the polarity of definiteness did not match that of specificity. Group-wise, this can be observed in the rather large standard deviations in [-definite, +specific] and [+definite, -specific] contexts.

Although the strength of the effect was not as large as that of the aforementioned variables, specificity was also found near significant on ‘accuracy and certainty’ and on accuracy alone and on certainty alone. This suggests that by observing certainty we may be able to capture when they are deliberating between article choices in their developmental stage and with what combination of semantic features L1 article-less language speakers are having problems and if they are going through a restructuring stage. To do so precisely calls for a detailed quantitative and qualitative analysis of the relationship between L2 English learners’ accuracy and learners’ certainty ratings and the semantic contexts, which, however, is beyond the scope of this paper.

Finally, I need to add some caveats in interpreting the results of this study. This study did not employ robust methods to correct irregularities in the data. It was difficult to obtain normal distributions and equal variances among the three groups, with data from 149 participants. On top of that, the design was unbalanced.⁸ I am hoping to perform a more rigorous study with a robust design in the near future.

5. Conclusion

This study shows a similar trend to Ionin et al.’s (2004) study with L1 Russian and L1 Korean speakers in that L1 Japanese speakers also mixed ‘specificity’ with ‘definiteness.’ It is not known, however, whether [-definite] causes them trouble to choose the correct article or [-specific] causes them such difficulty. A future study with much larger participants may be able to tease out this myth and give us an answer regarding which of the two was the catalyst by using a more sophisticated analysis such as a step-down analysis or discriminant function analysis together with a multivariate ANOVA. Also by doing correlational analyses on the data, I may be able to find a clearer tendency.

Note that all of the nouns used in this study (borrowed from Ionin et al.’s study) were singular countables. Consider the fact that L2 English learners need to observe, in choosing an article, not only the semantic contexts such as definiteness and specificity but also differences in count/uncount and in plural/bare-plural as they process language in the real world. As I have seen, dealing with just two

⁸ As is mentioned in footnote 4, reanalysis of the data excluding outliers from the three groups ($n = 45$ each) showed similar results to the results of this study, which would support the findings of this study.

variables, definiteness and specificity, was not easy for L2 English learners who have not had enough *authentic* L2 English input. So, arriving at accurate article use is really a tough job.

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