

# Asymmetry between Person and Number Features in L2 Subject-Verb Agreement

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## 1. Introduction

Certain bound morphemes are extremely difficult to acquire in the L2 acquisition of English. Third-person singular *-s* (3ps) is one of them. Below, we explain why, arguing that L2 learners are less sensitive to number features than person features in violations of subject-verb agreement and that this reflects properties of formal features supplied by Universal Grammar.

Morphology is where difficulty lies in SLA (cf. Slabakova 2016) but this does not mean that a given morpheme is equally difficult in all morpho-syntactic contexts (Wakabayashi 1997, 2013, Wakabayashi & Yamazaki 2006, Wakabayashi, Hokari, Akimoto, & Kimura 2018, Hawkins & Casillas 2008). Among several factors related to morpho-syntactic contexts relevant for 3ps *-s*, the difference between [person] and [number] features in sentential subjects appears to be crucial to learner (in)sensitivity to violations of subject-verb agreement. Wakabayashi (1997) carried out an experiment with reading time measurement, and found intermediate Japanese-speaking learners of English to be sensitive to the overuse of *-s* with a second person subject (e.g., *\*You speaks English*) but not with a plural subject (e.g., *\*Sam and Tom/\*The students speaks English*). Wakabayashi, Bannai, Fukuda and Asaoka (2007) gathered physiological data with ERP measurement which revealed that intermediate level Japanese-speaking learners of English exhibit a P600 when they read sentences containing a verb marked with *-s* following a first person subject (e.g., *\*I speaks English*) but not after a plural subject (See Wakabayashi 2013, Wakabayashi, Hokari, Akimoto, & Kimura 2018, and Jiang 2018 for a summary). These studies suggest that L2 learners are sensitive to the violation of subject-verb agreement in terms of [person] but not of [number].

However, the results in those previous studies might be attributed to another difference among stimulus items: Sentential subjects in materials used to test

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sensitivity to [person] violations were all pronouns (i.e., *I* and *you*) while those for [number] violations in the third person were all full noun phrases (e.g., *Sam and Tom, the students*). Therefore, the difference in sensitivity between [person] and [number] violations might be influenced by differences in the processing of pronoun subjects as opposed to full DP subjects. In this study we rectify this inconsistency by carefully controlling for the type of subject in test items containing subject-verb agreement violations.

The paper is structured as follows. In section 2, the theoretical background will be presented. Then, we set up our research question in section 3 and describe the experiment in section 4. Experimental results appear in section 5, followed by a discussion and conclusion presented in section 6.

## 2. Theoretical background

We adopt the framework of the Minimalist Program (Chomsky 1995) and Distributed Morphology (Halle & Marantz 1993), where first language acquisition of morpho-syntax is understood as the selection of formal features from an exhaustive list supplied by Universal Grammar, and the assembly of the selected features into lexical items in Lexicon. Second language acquisition is basically the same: (re)selection of formal features and (re)assembly of selected features into relevant lexical items, while some influences of (non-)selection and assembly in first language acquisition (L1 grammar) remain in the L2 learner grammar (Wakabayashi 1997, Lardiere 2008, 2009), with some formal features and lexical items not selected during L1 acquisition possibly unavailable to L2 grammars (Hawkins & Hattori 2006, Hawkins & Casillas 2008).<sup>1</sup>

In cases where 3ps *-s*, [number: singular], [person: 3rd], [*u*Number], [*u*Person] and the corresponding derivation are involved,<sup>2</sup> the steps in (1) take place in adult native-speaker grammar. Here, extending Wakabayashi (1997) and Suda and Wakabayashi (2007), we assume that feature assembly and Numeration take place each time in the derivation of a syntactic structure.<sup>3</sup>

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<sup>1</sup> Besides, L1 rules in Morphology, such as Vocabulary Insertion for morphological marking of CAUSE, may influence learner sensitivity to the syntactic properties of lexical items (cf. e.g., Montrul 2001), but we do not discuss this issue here; nor do we discuss whether full transfer takes place (cf. Schwartz & Sprouse 1994, 1996).

<sup>2</sup> We do not address the L2 acquisition or use of formal features not relevant to our discussion here, including [tense: present/past]. Although a tense feature may cause problems in SLA (cf. e.g., Hawkins & Liszka 2003), it should not lead to differences among the types of sentences used in the experiment presented here.

<sup>3</sup> The derived structure should be relevant to spell out as a phase (Chomsky 2001), but we keep our discussion to the sentence level in order to avoid unnecessary technical discussion. Besides, we do not posit the functional category Num(ber) in this paper (Ritter 1991) as subjects in our materials include only pronouns; hence, the inclusion of this category only makes the discussion unnecessarily complex.

- (1) (i) In Lexicon: Feature selection and assembly: [person: 3rd] and [number: singular] are assembled with D;<sup>4</sup> and [*u*Person] and [*u*Number] with T.
- (ii) In Narrow Syntax: Agree between interpretable and uninterpretable features, and valuing of unvalued/uninterpretable features: [*u*Person] and [*u*Number] are valued as [person: 3rd] and [number: singular], respectively.
- (iii) In Morphology: Feature bundle ([person: 3rd] [number: singular]) lowering, unless there exists a syntactic reason to disallow this lowering (e.g., Neg intervenes between T and *v*).
- (iv) In Morphology: Vocabulary Insertion: Vocabulary Insertion Rules are applied, and the feature bundle is spelled out as *-s*.
- (v) In Phonology: Mapping on phonemes: 3ps *-s* is realized as /s/, /z/ or /ɪz/

Let us consider where the L2 learner grammar differs from native-speaker grammar. First, extending the general ‘modulated’ view of language acquisition (Crain & Thornton 1998), we assume that each step is acquired independently though they are related with one another. An L2 learner grammar may differ from the native-speaker at more than one step.

Putting step (i) aside for the moment, Ionin and Wexler (2002) suggest that L2 learners have no problems with step (ii) but they do with step (iii). Likewise, Wakabayashi (2019) proposes that a principle of economy, DENS (Do Everything in Narrow Syntax), operates in the derivation through Lexicon to Phonology, which explains why step (iii), but not step (ii), is problematic. As for step (iv), Vocabulary Insertion Rules must be learned in SLA, which Prévost and White (2000) contend poses a problem for L2 learners. With regard to step (v), the Prosodic Transfer Hypothesis (Goad, White, & Steele 2003; Goad & White 2004, 2006) suggests that the ratios of target-like suppliance of inflectional morphology reflect the prosodic structures licensing the allophones; however, Yamazaki (2015) has shown that such an effect is not observed with respect to *-s* as the ratios of plural *-s* suppliance are the same regardless of its position in syllabic and other prosodic structures. In short, step (ii) is not likely to be problematic to L2 learners, while step (iii) is; and difficulties in steps (iv) and (v) remain unclear.

Let us now discuss the prediction for step (i). The Feature Reassembly Hypothesis (Lardiere 2008, 2009) proposes that some features must be assembled to more than one category in L2 grammar, and this should be difficult for L2 learners because the surface complexity in L2 input may prevent them from discovering which category the feature should be assembled to. Therefore, step (i) is difficult when the L2 input fails to compel learners to posit a rule for it. Another widely discussed hypothesis, the Interpretability Hypothesis (Hawkins & Casillas 2008, Hawkins & Liszka 2003, Tsimpli & Dimitrakopoulou 2007),

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<sup>4</sup> This will be revised just below.

suggests that uninterpretable features are not acquirable in L2 acquisition if they have not been already acquired (i.e., selected) in L1 acquisition.<sup>5</sup>

We agree with these proposals in that step (i) is problematic for L2 learners. However, the difficulty is not due only to Primary Linguistic Data in L2 acquisition or the property [uninterpretable]. We maintain that some features are difficult but not others based on UG: Only optional features pose difficulty; other features, namely intrinsic features, do not. Among the features to be assembled for target-like use of 3ps -s, [person] is intrinsic to D but [number] is not (Chomsky 1995); hence, the learner has no difficulty with the acquisition of [person] but does with [number].

The ‘intrinsic’ nature of [person] is demonstrated by the fact that all noun phrases are 3rd person except when they refer to the speaker or the hearer in a discourse: In any language, noun phrases whose reference includes the speaker are 1st person; those whose reference includes the hearer(s) are 2nd person; and noun phrases that refer to neither the speaker nor hearer(s) are 3rd person. This association of [person] features to noun phrases (or D and/or N) is universal. Therefore, whenever D and N are taken into Numeration, they have a person feature. This entails that D always has a [person] feature, even in L2 grammar, regardless of whether it is used for subject-verb agreement or not.

On the other hand, while the [number] feature is associated with D in English, it is not in all languages, including Chinese. Hence, numbers for the two noun phrases must be specified in (2a) but not in (2b).

- (2) a. [[singular] A student] ate [[singular] an apple].  
 b. Xuéshēng chīle píngguǒ  
 student ate apple  
 “A student / students ate an apple / apples.”

In short, the assembly of [number] to D or N is obligatory in English but not in all languages. Therefore, learners of English must select the [number] feature from the inventory of formal features and assemble it with D and N in derivation. In contrast, [number] is not selected in the acquisition of Chinese, and it is not assembled with D (or N) in derivation.<sup>6</sup> Therefore, for learners of L2 English whose L1 is Chinese, the assembly of the [number] feature to D must be learned.

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<sup>5</sup> We will later suggest that certain uninterpretable person features, including [*u*Person], may be acquirable in L2 acquisition even if they have not been selected in first language acquisition. In this sense, we do not agree with the Interpretability Hypothesis.

<sup>6</sup> It is possible to express the plurality of a referent by using quantifiers or some other means, but it is optional.

### 3. Shibuya and Wakabayashi (2008) and the research question

The present study investigates whether learners show an asymmetry between [person] and [number] features in English subject-verb agreement. As mentioned in the previous section, L2 learners may have problems assembling a number feature to a subject noun phrase, which may account for their lack of sensitivity to subject-verb agreement. Shibuya and Wakabayashi (2008) found that Japanese learners of English are not sensitive to the overuse of 3ps *-s* when the [number: plural] feature of a subject noun phrase is marked only with the plural marker *-s* on the head noun (e.g., *\*The students speaks English*), but they are sensitive to it when plurality is marked with a demonstrative and quantifier (e.g., *\*These two students speaks English*) or syntactically (e.g., *\*Sam and Tom speaks English*). They propose that these learners' insensitivity to the violation of subject-verb agreement is due to a gap in their L2 grammar, which lacks the obligatory assembly of a number feature to a subject noun phrase, though the number feature may be available for optional use in subject-verb agreement when it is saliently marked with determiners, quantifiers or syntactically. This suggests that L2 learners' insensitivity to the number feature might arise from the lack of phonetic saliency of English plural *-s* (cf. Goldshneider & DeKeyser 2001). However, the various types of noun phrases in Shibuya and Wakabayashi (2008) differ also in meaning. The semantics of plurality on noun phrases containing a definite article and noun is arguably lighter than on other types. To tease apart phonetic saliency and semantics, we need to control for the semantic heaviness of noun phrases.

Our research question is, as mentioned in the introduction, whether L2 learners show an asymmetry between [person] and [number] even if the number feature is clearly and saliently marked in subject noun phrases and the semantic properties and categorial features of the subjects are carefully controlled. We address this by presenting test items with pronoun subjects. In the next section (4.2), we show how such improved materials will overcome the problems encountered in earlier work.

## 4. The experiment

### 4.1. Participants

Twenty Taiwanese learners of English (TLEs), who are native speakers of Chinese, participated in the experiment. They were first-year college students at a national university in Taiwan, whose general proficiencies in English were from low-intermediate to advanced according to scores on the Oxford Quick Placement Test (score range: 32-57,  $M = 43.6$ ,  $SD = 6.63$ ). Some TLEs speak Taiwanese, but neither Chinese nor Taiwanese has subject-verb agreement or (obligatory) number marking and hence no influence is expected with respect to subject-verb agreement. Twenty-seven native speakers of English (NSEs) also participated in the experiment. All participants were paid for their participation.

## 4.2. Materials and hypotheses

Materials included four sentence types, as in (3). Ungrammatical sentences of Types 1 and 2 included forms with a 3ps *-s* on the verb with [person: 1st] [number: singular] and [person: 2nd] subject pronouns, respectively. Type 3 contained an omission error where 3ps *-s* was missing with a [person: 3rd] [number: singular] pronoun subject (*he/she*). Type 4 included a [person: 3rd][number: plural] pronoun subject (*they*), and the 3ps *-s* was attached to the verb as another kind of oversuppliance.

- (3) a. Type 1: 1st person singular subject  
I know that I like/\*likes tennis most of all.
- b. Type 2: 2nd person subject  
I realize that you hate/\*hates exams but you will have to take one.
- c. Type 3: 3rd person singular subject  
I'm sure that she \*know/knowns me better than anyone else.
- d. Type 4: 3rd person plural subject  
I think that they need/\*needs a better attitude towards their studies.

Since [person] is intrinsic to noun phrases, including pronouns, even though the participants' L1 does not have subject-verb agreement, we hypothesize that they will be sensitive to the overuse of 3ps *-s* in Types 1 and 2 (more on overuse in Type 4 just below) (Hypothesis 1). With regard to omission errors, previous studies (Wakabayashi 1997, Ionin & Wexler 2002, among others) report that L2 learners are insensitive to such omissions; hence, we hypothesize that these L2 learners will be insensitive to the ungrammaticality in sentences of Type 3 (Hypothesis 2). Type 4 sentences are crucial in this experiment, where the third person plural pronoun *they* is used. The phonetic difference between *they* and *he/she* is salient, at least more salient than plural *-s*, and it is very unlikely that learners confuse *they* and *he/she* based on sounds. The semantic properties of these pronouns were comparable: The test sentences were embedded in contexts (see below) where the antecedents for these pronouns were all human. Hence, if L2 learners are not sensitive to the overuse of 3ps *-s* in Type 4 ungrammatical sentences, it is due to their insensitivity to the [number] feature of the subject *they*. Based on our description in section 3, we hypothesize that TLEs will be insensitive to the violation of subject-verb agreement in this type (Hypothesis 3).

Each type included four grammatical and four ungrammatical sentences. Two lists of materials were produced, and grammaticality was balanced between the two lists. Thirty-two distractors were added to both lists. Each participant completed the experiment with one list.

## 4.3. Procedure

The experiment was carried out on a computer with a response pad attached, measuring reading time (RT) by word in a non-cumulative self-paced moving

window reading task presented with SuperLab 5. Before starting the experiment, instructions were given by a native speaker of Chinese to TLEs and by a native speaker or near native speaker of English to NSEs in each participant's mother tongue. During each trial participants first saw a complete sentence as context, then read the self-paced test sentence, and then answered a comprehension question with multiple-choice responses. After thirteen practice trials, participants were asked whether they understood the procedure, and all answered positively. The experiment was carried out in a silent room on campus of the university where participants studied.

#### 4.4. Results

Critical regions for calculating effects of ungrammaticality are the verbs where 3ps -s was marked, as illustrated in Figure 1. In order to capture spill-over effects, we calculated reading times for the first and second words following critical regions as well.

Data screening was carried out as follows: RTs for sentences whose comprehension question was answered incorrectly were excluded from analysis (incorrect answers:  $n = 86/1280$ , 6.7%). RTs longer than  $M + 2.5$  SD, or shorter than  $M - 2.5$ SD (or 100ms) were considered outliers ( $n = 85/2560$ , 3.3%). Long duration outliers were replaced by  $M + 2.5$  SD, and short ones were excluded.

NSE and TLE RTs are given in Figures 1 and 2, respectively. Statistical analyses were carried out with Linear Mixed Effect Models for both groups, where grammaticality, sentence type, and their interaction were treated as fixed effects and participants and tokens as random effects. Significant ( $p < .05$ ) and marginally significant ( $p = .0553$  for NSEs and  $p = .0783$  for TLEs) differences were observed at the places framed with a solid line and dotted line, respectively. Delays were observed as expected among NSEs in all sentence types except Type 1.<sup>7</sup> TLE data support our hypotheses in that they indicate sensitivity to the violation of subject-verb agreement in Types 1 and 2 but not to omission errors in Type 3 or [number] agreement errors in Type 4.

**Table 1. Regions of reading times**

Region number	-1	0	1	2
Example (Type 1 (3a))	<i>I</i>	<i>like/likes</i>	<i>tennis</i>	<i>most</i>

<sup>7</sup> The lack of ungrammaticality effect in the data for Type 1 sentences might be due to the fact that the pronoun *I* is so short that the task may not be sufficiently sensitive to detect a delay. Alternatively, because these items were all embedded in a sentence with a first person singular pronoun as the matrix subject, there may be some contamination on RT for the embedded first-person sentential subject.

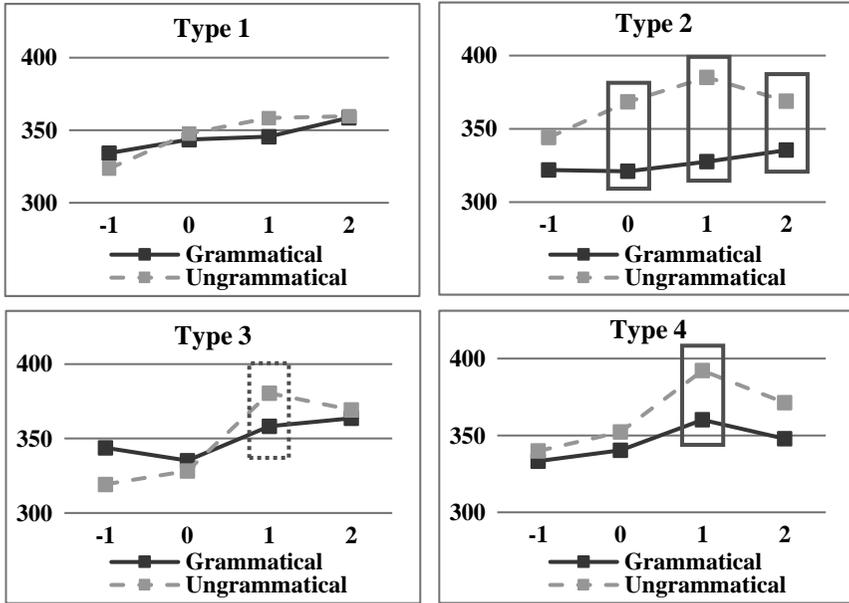


Figure 1. NSEs' mean RTs

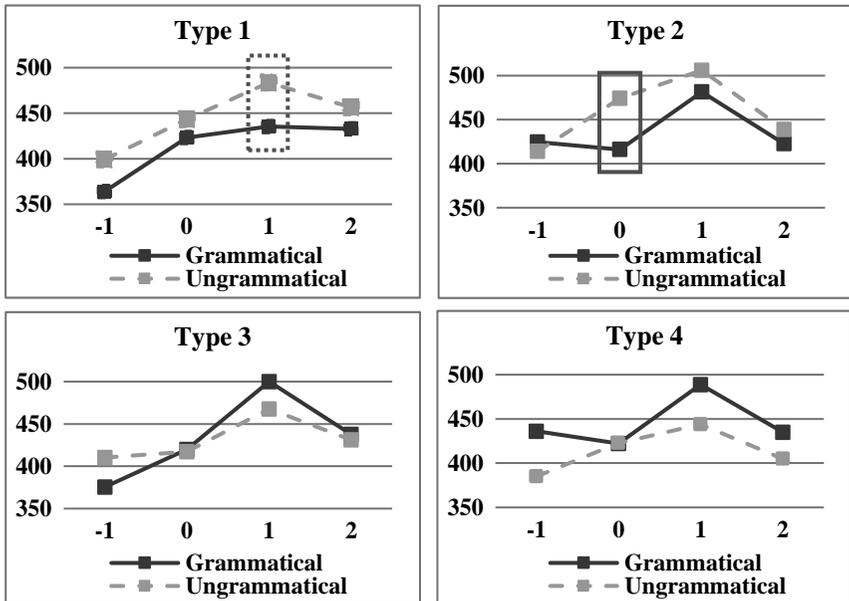


Figure 2. TLEs' mean RTs

Crucially, TLEs were not sensitive to the violation of subject-verb agreement in Type 4 sentences, with subject *they* and a verb affixed with *-s*.

## 5. Discussion and Conclusion

The data presented here contribute to our understanding of learner grammar in at least three ways. First, learners were not sensitive to omission errors. This has been observed among learners with various L1s in previous studies as well (cf. Jiang 2018). Our account would be that feature lowering in Morphology is difficult for L2 learners and the bare form of a lexical verb may appear as default, following and Ionin and Wexler (2002) and Wakabayashi (2019).<sup>8</sup>

Second, learners were sensitive to the overuse of 3ps *-s* when subjects were *I* or *you*. Their sensitivity to the violation in [person] agreement between the subject D and the verb suggests that their grammar has a means for representing “subject-verb agreement,” and they thus do not overlook such overuse. Assuming that functional items used in L2 grammar must be selected from the list given by Universal Grammar (see section 2), T is the strongest candidate, but we leave open to further research the question of how precisely “agreement” might be represented.<sup>9</sup>

Third and most importantly, TLEs were not sensitive to the overuse of 3ps *-s* even when the subject was *they*. We posit that the uninterpretable [number] feature was not assembled with T because of a failure in feature assembly and that [number: plural] is assembled to D but is not used for subject-verb agreement. Note that the test materials included a comprehension question for each item and that we analyzed RT data only for items for which the comprehension question was correctly answered. Therefore, it is plausible that the TLEs understood the meaning of *they* correctly but nevertheless did not use [number: plural] for agreement.

To conclude, this study has demonstrated that TLEs are sensitive to the overuse of 3ps *-s* with lexical verbs when the sentential subject is *I* or *you* but not when the subject is *they*. This confirms that [number] is problematic for these learners but [person] is not. We speculate that this may well be due to the difference between the intrinsic and optional nature of these features but recognize that further research is needed to explain why such an asymmetry is observed.

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<sup>8</sup> More precisely, the elsewhere condition in Distributed Morphology will explain why the bare form is allowed. See Wakabayashi (2019).

<sup>9</sup> Some sort of uninterpretable phi-feature is possibly involved, which may be similar to those that operate for subject-verb agreement in honorific expressions in Japanese (See Wakabayashi 1997 and also Harada 1976).

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