



One possible direction for the puzzle of morphological acquisition in advanced second-language learners of English: Insights from Chinese and Japanese speakers^{*}

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Kojima, Satsuki. 2025. One possible direction for the puzzle of morphological acquisition in advanced second-language learners of English: Insights from Chinese and Japanese speakers. *Linguistic Research* 42(Special Edition): 75-107. Previous studies on second language English acquisition have underscored the difficulty of mastering inflectional morphology, such as the third-person singular -s. Two main perspectives have emerged within generative grammar frameworks to elucidate this difficulty, namely, the missing surface inflection hypothesis and the failed functional feature hypothesis. However, there is still no reasonable explanation for the various phenomena in different languages. This study examined speech data from advanced Japanese and Chinese learners of English, replicating previous studies. The past tense in Japanese is inflected, unlike the present tense. In contrast, Chinese lacks inflection in both the past and present tenses. The objective of this study is to ascertain which of the aforementioned hypotheses provides a more robust explanation for the observed morphological variability. A series of clay animations featuring *Pingu* was used as a methodology for speech production instead of the classic competence questionnaires. The data were obtained from six Japanese and eight Chinese learners who participated in this study. The findings revealed a significant difference between the two groups in the narration task, but not in the other task. Overall, the Japanese learners produced more third-person singular -s and fewer morpheme errors than the Chinese learners. A notable finding in this study is the higher percentage of correct answers obtained by Chinese learners of English in comparison to previous research. This study significantly advances our understanding of how the absence of specific syntactic features in the L1 affects L2 acquisition. (Miyagi University)

Keywords feature, generative second language acquisition, inflection, first-language effect, advanced learners

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1. Introduction

Acquiring a second language (L2) or subsequent language perfectly is almost always challenging and seldom develops as smoothly as the first language (L1). Few individuals can acquire multiple languages quickly, proficiently, and without difficulty. Studies on L2 acquisition that utilize generative grammar have increasingly examined why certain language features or structures are easier or more difficult for L2 learners to master. Notably, the acquisition of inflectional morphology in English, such as the -s marking agreement between the subject and verb, poses explicit challenges for adult learners of English (Lardiere 2016), even though this morpheme appears frequently in learners' input and is typically taught in schools at an early stage.

Over the past two decades, numerous L2 acquisition studies grounded in generative grammar have explained the non-target-like use of inflectional morphology and have illuminated L2 learners' internal grammar. Consequently, various hypotheses have been proposed (Hawkins and Chan 1997; Prévost and White 2000; Hawkins 2001; Hawkins and Liszka 2003; Goad and White 2004; Lardiere 2008, 2009). However, a reasonable and theoretically sound explanation for this morphological discrepancy has yet to be identified. Previous research has shown that acquiring and applying tense features in spoken production is particularly challenging, especially for L1-Chinese learners of English (Lardiere 1998a, 1998b; Hawkins and Liszka 2003).

The novelty of the present study lies in six main contributions. First, unlike prior research that has typically examined either the third-person singular present tense -s or past tense marking separately, or these groups individually, this study investigates both inflectional morphemes within an experimental framework that compares advanced Japanese and Chinese learners of English. This approach allows for a more integrated understanding of how different L1 grammatical backgrounds (with Japanese possessing tense features and Chinese lacking them) affect L2 acquisition of English inflection. Second, the study incorporates not only analyses such as chi-square tests to replicate previous findings, but also applies General Linear Mixed Models (GLMMs) to more rigorously account for variability across participants and items.

Third, an alternative stimulus combination from previous studies is utilized, namely the clay animation series featuring *Pingu* and spontaneous speech, as opposed to the classic competence questionnaires. Fourth, while the performance of Japanese learners aligns with earlier studies, Chinese learners in our study demonstrated unexpectedly

higher accuracy in producing inflected forms compared to previous reports. The findings indicate a wide range of morpho-syntactic patterns involved in the production of English utterances by advanced Chinese learners of English. Fifth, the current study includes a slightly larger number of participants than prior comparable studies, enhancing the reliability of the findings and allowing for more robust statistical analysis. Finally, this study also aims to determine which of the major hypotheses proposed in the literature more accurately explain the underlying knowledge of advanced English learners regarding inflectional morphology.

Two influential theoretical accounts have been proposed to explain non-target-like use of inflectional morphology, namely, the missing surface inflection hypothesis (MSIH) (Prévost and White 2000) and the failed functional features hypothesis (FFFH) (Hawkins and Chan 1997). According to the MSIH, L2 learners possess the necessary functional features in their underlying grammar, but surface inflection may be variably expressed due to the pressures of communication or processing demands. In contrast, the FFFH argues that unspecified features may be entirely absent from the learners' interlanguage grammar if they are not underspecified in the learners' L1. As a result, morphological errors are seen not as performance-related but as indicative of representational deficits.

To test the predictions of these competing hypotheses, the present study employs an elicited production task that requires learners to produce morphologically inflected forms in syntactically controlled contexts. The reasoning is as follows: if errors stem primarily from surface realization issues (MSIH), then both groups (Chinese and Japanese learners) should exhibit similar patterns of variability. However, if differences in L1 feature availability affect L2 acquisition at the representational level (FFFH), then systematic differences between the two groups are expected, particularly because Japanese contains a tense feature, while Chinese does not.

In this respect, the task is well-suited to distinguish between performance-based and representational explanations, providing a theoretically grounded test of how L1 background influences morphological acquisition in L2 English.

Given the small sample size and the diversity in participant backgrounds, the present study should be viewed as a meaningful yet preliminary step toward understanding how L1 features may shape L2 morpho-syntactic development. Despite its exploratory nature, it aims to generate hypotheses and identify patterns that warrant further investigation in future research.

2. Theoretical background

2.1 Underlying morpho-syntactic representation

To understand the primary models and theories in recent works within the Minimalist Program for syntactic theory (Chomsky 1995, 2000), a simple underlying representation of the relevant syntactic properties is illustrated in Figure 1: *she likes vegetables*.

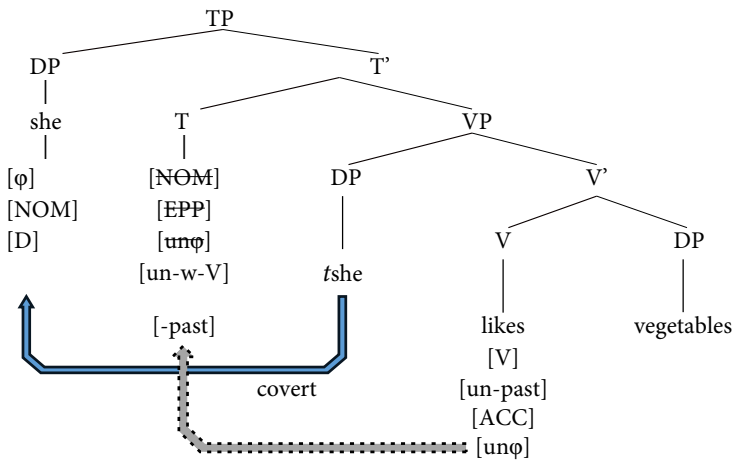


Figure 1 Morphosyntactic structure of “she likes vegetables.” EPP, extended projection principle; TP, tense phrase; T, tense; VP, verb phrase; NOM, nominative case; ACC, accusative case; ϕ , phi-feature (person, number, gender, and case features); DP, determiner phrase; D, determiner; un, uninterpretable; *t*, trace; un-w-V, uninterpretable weak verb.

This representation consists of heads, which are bundles of features that merge with other heads to produce phrases. Each head contains features relevant to either the expression’s semantic interpretation or its grammaticality. Features relevant to semantic interpretation, such as tense in verbs (V), are interpretable features. Conversely, features related to grammaticality are uninterpretable features, which are assigned value by interpretable features and are subsequently deleted. The tense head (T) includes various features (see Figure 1). The extended projection principle (EPP) feature in T forces the subject *she* to move from the specifier position of the verb phrase (VP) and merge with the tense phrase (TP). Given that the EPP is an

uninterpretable feature in the logical form (LF), it is checked by the D feature in the subject and deleted. Additionally, T assigns nominative case to the moved subject, and the nominative feature (NOM) in T is deleted through spec-head agreement.

Moreover, T agrees with the subject's ϕ (phi) feature (person and number in this case). While the ϕ feature of the subject DP is relevant to the semantic interpretation, the ϕ feature in T is relevant to its grammaticality. Thus, the ϕ feature of the DP is interpretable [ϕ], and that of T that agrees with the interpretable feature is uninterpretable [$\text{un}\phi$]. The [$\text{un}\phi$] feature in T is assigned the value by the interpretable [ϕ] feature in the TP spec position and then deleted. Furthermore, T has an uninterpretable weak V feature [un-w-V] and an interpretable [-past] feature. Since English verbs are weak, they move covertly after being spelled out and these features are successfully checked and deleted.

2.2 Previous studies on advanced learners of English

This section introduces studies on the acquisition of inflectional morphology, particularly those focused on online tasks undertaken by advanced English learners from various native languages. Research indicates that the morphological knowledge of advanced English learners is statistically comparable to that of native English speakers regarding offline tasks, including truth-value judgment, cloze, preference, or elicited production tasks (Lardiere 2016). However, previous studies suggest that this similarity does not extend to online tasks for Chinese learners of English (Lardiere 1998a, 1998b; Hawkins and Liszka 2003). Similar discrepancies between online and offline performance have also been observed in other syntactic domains. For instance, Park (2021) reported that Korean learners of English exhibited inconsistent eye-tracking patterns when processing articles in real time, despite making accurate judgments in offline tasks. Therefore, this study examines L2 learners' online responses, replicating Hawkins and Liszka (2003)'s study while uncovering new insights from them.

Hawkins and Liszka (2003) examined the past-tense marking of verbs (both regular and irregular) by advanced learners of English with different L1s, obtaining spontaneous production data from two Chinese speakers, five Japanese speakers, and five German speakers. Statistical analysis revealed that the Chinese participants behaved

significantly differently (inflection with regular verbs: $X^2 = 30.49$, $df = 2$, $p < .01$; with irregular verbs: $X^2 = 8.13$, $df = 2$, $p < .05$) from the Japanese and German participants, both of whom showed a high accuracy rate (more than 90%). By contrast, Chinese participants' accuracy rates were 62% for regular verbs and 84% for irregular verbs. In addition, studies show that advanced Japanese learners of English excel in online spontaneous speech tasks (Yoshimura and Nakayama 2009; Kojima 2019). For example, Yoshimura and Nakayama (2009) analyzed spontaneous speech data of two advanced Japanese learners of English and found high accuracy in tense marking (third-person singular *-s* and past-tense *-ed*). Kojima (2019) measured variability in English tense marking among 10 L1-Japanese advanced learners of English and found that advanced learners showed high accuracy in English inflectional morphology (*-s*: 93% and *-ed*: 89%). Two highly proficient Turkish learners of English in White (2003) similarly displayed high accuracy for third-person singular *-s* (78% - 82%) and past-tense inflection (76% - 85%).

L1-Chinese advanced learners of English have been observed to make errors in inflectional morphology, and behave differently from advanced English learners who speak other L1s (Lardiere 1998a, 1998b, 2007; Hawkins and Liszka 2003). For example, Lardiere (1998a, 1998b, 2007) observed that a Chinese learner of English did not accurately use inflectional morphology (about 34% for the past tense form and about 5% for third person *-s*) but performed quite well on the nominative case (100%) and overt subject assignments (about 98%), although Chinese permits null subjects. Notably, Chinese does not always require a subject. Similarly, Japanese and Turkish are not overt subject languages; yet, their speakers can effectively acquire overt subject and nominative case assignments in L2 English (Lardiere 1998a, 1998b; White 2003; Yoshimura and Nakayama 2009; Kojima 2019), indicating accurate specification of [$\pm$ finite] in their underlying syntactic representation. Additionally, the [$\pm$ finite] feature, which specifies the clause type, is accurately assigned to the TP specifier, and the subject is correctly marked with the nominative case (see Figure 1 for more detail).

Prior research has highlighted two key findings: 1) L2 learners of English can easily grasp overt subjects and subject-case assignments related to tense, even when similar overt forms are optional in their L1 (Lardiere 1998a, 1998b, 2007; Yoshimura and Nakayama 2009; Kojima 2019); however, 2) mastering inflectional morphology presents difficulties, particularly for advanced L1-Chinese learners of English (Lardiere 1998a, 1998b; Hawkins and Liszka 2003). Therefore, a key question arising from these

findings is whether some L1 elements have a significant influence on advanced second-language learners, while others have a minimal impact.

2.3 Configuration of the Japanese and Chinese languages

This section provides an overview of the structural differences between the Japanese and Chinese languages. Japanese has the past-tense marker *-ta* suffixed at the end of the stem of the verb, while present events are marked by *-ru*.

- | | | | | |
|-----|-------------------------------------|----------|-----------|----------------------|
| (1) | Hanako-wa | mainichi | ringo-o | tabe- <u>ru/ta</u> . |
| | Hanako-NOM | everyday | apple-ACC | eat-PRES/PAST |
| | “Hanako eats/ate apples every day.” | | | (Kojima 2019: 175) |

In contrast, Chinese traditionally lacks markers of tense (Li and Thompson 1981), with context or explicit time adverbs helping to indicate the event period. Example (2a) illustrates that the verb *kan* ‘see’ can be used for both present- and past-tense events. The time adverb *zuotian* ‘yesterday’ in (2b) indicates a past event.

- | | | | | | |
|-----|----|-----------------------------------|------------|------------|-------------------------------|
| (2) | a. | Zhangsan | <u>kan</u> | dianying. | |
| | | Zhangsan | see | movie | |
| | | “Zhangsan is seeing a movie.” | | | |
| | b. | Zhangsan | zuotian | <u>kan</u> | dianying. |
| | | Zhangsan | yesterday | see | movie |
| | | “Zhangsan saw a movie yesterday.” | | | (Hawkins and Liszka 2003: 34) |

Hence, the representation of Chinese learners of English may lack tense features ([±past], see Figure 1), but the tense feature exists in the Japanese representation.

The Chinese language lacks inflections, conjugations, or case markers, as illustrated in Example (3). Each pronoun can function as both nominative and accusative, while word order and prepositions typically indicate case marking (Li and Thompson 1981).

- | | | | |
|-----|----|---------------------|-----------------------------|
| (3) | wǒ | “I/me” | |
| | ni | “you (sg)” | |
| | ta | “he/she/it/him/her” | (Li and Thompson 1981: 134) |

However, in Japanese, a case particle immediately follows a noun phrase (McGloin et al. 2014), indicating a nominative (-ga), accusative (-o), dative (-ni), or genitive (-no), as in Example (4).

- | | | |
|-----|-------------------|------------------|
| (4) | watashi-ga/-o | “I/me” |
| | anata-ga/-o | “you” |
| | kare/kanojo-ga/-o | “he/she/him/her” |

These examples indicate that the case feature is absent in Chinese (Lin 2011) but present in Japanese. Here, if tense is specified for [+finite], we expect nominative case marking. Therefore, there is no [$\pm$ finite] feature in Chinese, in contrast to Japanese. Regarding the person feature, both languages use different words to express each person (such as first, second, and third person). Therefore, a person feature exists in both languages.

Unlike English, both Japanese and Chinese do not mark nouns to express a distinction between singular and plural forms. Instead, a singular noun can indicate either singular or plural meaning depending on the context. Thus, they lack the number feature. In both languages, plurality is expressed by adding a separate word, such as “some” or “many.” However, both Japanese and Chinese must indicate plurality with pronouns, as demonstrated in Examples (5) and (6), respectively. These markings are not used for nouns. The suffixes *-tachi* in Japanese and *-men* in Chinese function as plural markings of pronouns; in both languages, these suffixes apply only to people. Thus, it can be concluded that Japanese and Chinese have a type of numerical feature, although it does not directly correspond to the plural suffix *-s* in English.

- | | | | | |
|-----|-------------|----------|-------------------|--------|
| (5) | kare/kanojo | “he/she” | kare/kanojo-tachi | “they” |
| (6) | ta | “she/he” | ta-men | “they” |

To summarize, the clear differences between Japanese and Chinese are tense, case, and finite features, as shown in Table 1. The tense feature is interpretable, while the

other features are uninterpretable. Given the discrepancy in L1 features, it is reasonable to hypothesize that if L1 influences English acquisition, there may be noticeable disparities in behavior between Japanese and Chinese learners of English.

Table 1. Differences between Japanese and Chinese

	Japanese	Chinese
Tense feature (interpretable feature)	○	×
Case feature (uninterpretable feature)	○	×
±Finite (uninterpretable feature)	○	×
Person feature (interpretable feature)	○	○
Number feature (interpretable feature)	△	△

2.4 Missing surface inflection hypothesis and failed functional feature hypothesis

Since the 1990s, numerous studies have examined the incorrect use of inflectional morphology by English learners and their underlying knowledge of pertinent English grammatical properties (Hawkins and Chan 1997; Lardiere 1998a, 1998b; Hawkins and Liszka 2003; White 2003; Prévost 2008; Cho and Slabakova 2014). Previous L2 acquisition studies on the framework of generative grammar have proposed approximately two views¹ to account for a reasonable explanation. One refers to problems with the actual use of the language, while the other pertains to issues concerning the learner's knowledge of the language. The central question is whether L2 learners can acquire features that are absent in their native language. Since direct access to learners' internal knowledge of language is impossible, this remains a complex and intriguing challenge for many researchers.

The MSIH, first proposed by Prévost and White (2000), exemplifies the first issue, such as a performance problem (Lardiere 1998a, 1998b; White 2003; Prévost 2008).² This hypothesis posits that L2 learners possess the underlying grammar necessary for acquiring abstract properties, such as functional categories, features, feature-checking mechanisms, and feature strength, as shown in Figure 1. However, they face challenges

1 Although there are many other hypotheses, such as the fluctuation hypothesis, lexical learning/ lexical transfer hypothesis, and the feature assembly hypothesis, this study will primarily focus on the two hypotheses mentioned above. This is due to the fact that these two hypotheses are the most prominent.

2 The essential idea was first proposed by Haznedar and Schwartz (1997) as the missing inflection hypothesis.

in mapping these abstract features to surface morphology, especially under the pressure of communication or processing demands (Prévost and White 2000). According to this perspective, while the targeted formal features and syntactic properties of the L2 are learnable, learners encounter difficulties in mapping abstract syntactic features to exact morphology. In other words, mapping morphology to the phonological form (PF) presents challenges (Lardiere 2000; Yoshimura and Nakayama 2009); however, there is no difficulty at the abstract level.

This hypothesis is supported by empirical studies (Lardiere 1998a, 1998b; White 2003) that demonstrate L2 learners can successfully acquire abstract features such as pronominal case marking and subject raising, even when corresponding overt expressions do not exist in the L1. Additional support for this view comes from recent studies of Chinese-speaking learners of Korean, who demonstrated target-like knowledge of embedded *wh*-features—features not present in their L1—particularly when their proficiency was sufficiently high. This suggests that the acquisition of abstract syntactic features is indeed possible, even in the absence of corresponding L1 cues, reinforcing the MSIH perspective (Park et al. 2021).

However, this does not hold true for tense marking, which is believed to be a PF-level operation. To elucidate the mechanisms underlying the mapping problem, Prévost and White (2000) employed Distributed Morphology (DM) (Halle and Marantz 1993). In DM, lexical insertion involves competition among potential candidates. In this model, the features of a vocabulary item align with those of the terminal node in the syntax. When the characteristics of a lexical item do not match those of the hosting node, learners select a form from the potential candidates. Utilizing DM, Prévost and White (2000) posited that the L2 learner acquired terminal node features, but the challenge lies in the feature specification of the relevant lexical items. When the forms are underspecified, they are inserted into the node. However, if they are not underspecified, they cannot be inserted into the node. Once the fully specified forms are acquired, they replace the underspecified forms. Even if the fully specified forms are acquired, they may become temporarily inaccessible due to processing limitations or communicative pressure.

Another perspective is the representation-deficit perspective. Hawkins and Chan proposed the FFFH, which states that after the critical period, “unspecified features disappear, leaving only those features encoded in the lexical entries for particular lexical items [...]. The principles of [universal grammar] UG, however, remain fully available

and constrain grammar building” (1997: 216). Later, this hypothesis was revised by Tsimpli and Dimitrakopoulou (2007) and presented as the Interpretability Hypothesis, which suggests that the feature inventory not selected during the critical period disappears or becomes inaccessible in the L2. However, during language acquisition, all other aspects of UG, such as “the computational devices, their associated operation principles, interpretable syntactic features, and uninterpretable features already selected during the acquisition of primary grammar during the critical period” are available (Tsimpli and Dimitrakopoulou 2007: 270). They argued that uninterpretable features not instantiated in the L1 were absent from L2 learners’ underlying representations.

In summary, the MSIH argues that abstract properties, such as features, remain fully specified in L2 learners’ underlying grammar, while the FFFH contends that inventory features not selected during the critical period will disappear, while other aspects of UG selected in L1 are still available. Here, the MSIH must explain why processing or mapping problems occur only in specific L2 learners, such as Chinese learners of English (Lardiere 1998a, 1998b, 2007), despite their advanced level. Moreover, Chinese learners of English exhibit insufficient use of past-tense markings compared to other L1 speakers (Hawkins and Liszka 2003). Notably, because the lexicalist hypothesis is employed for morpho-syntactic features in the Minimalist Program (Chomsky 1995), the main verb and its affix are not considered combined through movement in the PF component, such as affix hopping or V-to-I raising.³ Therefore, comparing the explanation of the post-syntactic concern by the Government and Binding framework and the feature-focused Minimalist Program framework lacks consistency. To align with the framework, comparing ideas within the scope of the Minimalist Program is more appropriate. Conversely, the concept of FFFH might explain how inflectional morphemes can be successfully added at advanced levels in various languages, considering the influence of L1 features. However, it remains unclear why some L2 learners (Chinese/Japanese/Turkish) can produce grammar such as overt subjects correctly, even though such grammar is optional in their L1.

3 Under the lexicalist hypothesis, the morphological properties of lexical items are already determined when they are introduced into the syntactic structure and are not considered to change during derivation. Therefore, the selection of features related to morphological properties is finalized during their introduction into the syntactic structure (Chomsky 1995; Nakamura et al. 2001).

3. Research questions

The present study considers previous research showing that Chinese learners of English, in particular, continue to make inflectional errors even at the advanced level, whereas Turkish and Japanese native English learners do not. Based on this, we hypothesize that L1 influences the learning process and that, among L1, some second language learners may find it easier or more challenging to learn a second language, despite the absence of that grammatical feature in their L1. Specifically, by comparing the utterances of English inflectional morphemes from advanced Japanese and Chinese learners of English, this study reexamines whether any differences exist between the two groups due to a grammatical feature (tense, in this case) that is absent in the native language of the Chinese learners of English but present in that of the Japanese learners of English.

If abstract features not present in L2 learners' L1 affect L2 acquisition, some differences may be observed between the two groups in their use of inflectional morphemes of verbs involving tense features. Conversely, if all abstract features were available in L2 learners' syntactic representations, there would be no differences between the groups.

Accordingly, the following research questions were set:

1. Is there any difference between advanced Japanese and Chinese learners of English in an online task related to third-person singular -s and past tense marking?
2. Which of the competing hypotheses does this study support?

4. Methodology

4.1 Participants

This study involved advanced learners of English with different L1s (native speakers of Chinese and Japanese). Ten Chinese and six Japanese English learners participated in this study, and we compared how they produced inflectional morphology in a spontaneous spoken task. Each had a Test of English for International Communication

(TOEIC) score of more than 900 points or a Test of English as a Foreign Language Internet-Based Test (TOEFL IBT) score of more than 88 points.⁴ Two participants with TOEFL scores below 88 points were excluded; therefore, data from 14 participants were analyzed. All Japanese speakers were part-time workers or lecturers at the university level in Japan, while Chinese speakers included undergraduates, graduates, and postgraduates at universities in Japan and the United States. For clarity, it should be noted that all Japanese participants were from Japan. The Chinese participants were all from China, but currently reside in Japan or the United States.⁵ We focused exclusively on speaking performance for our study, overlooking any assessment of written task skills. The participants were asked the following questions:

- Q1: When did you start studying English?
- Q2: Which skill do you use the most every day?
- Q3: How many hours a day do you use English?
- Q4: For how many years have you been using English?

Detailed profiles of the participants are presented in Table 2.

Table 2. Participant information

Japanese	Score	Q1	Q2	Q3	Q4
J1	TOEIC 990	JH	R	1–3h	+20y
J2	TOEIC 965	JH	L	+3h	+20y
J3	TOEIC 940	JH	R	+3h	+20y
J4	TOEIC 980	JH	L	1–3h	+20y
J5	TOEIC 950	JH	R	1–3h	+20y
J6	TOEIC 945	EL	R	1–3h	+20y
Chinese	Score	Q1	Q2	Q3	Q4
C1	TOEIC 910	EL	R	1–3h	10–15y

4 Converting the scores of the two tests can be challenging, as conversion charts vary by source. To establish a common standard for advanced English learners, we sought advice from TOEIC and TOEFL textbook publishers and material writers at Aruku Publishing in Japan. As a result, we selected participants categorized as advanced for scoring in this study. It is reasonable to assume that the participants in this study were within the advanced range. However, administering the same language proficiency test to all participants would have been more helpful.

5 It suggests potential variability in their linguistic backgrounds. This geographic diversity may have resulted in differences in their language use. Future research could further examine how participants' multilingual environments, including the potential influence of a third language (L3), might affect second language performance.

C2	TOEFL 92	EL	R	30–1h	10–15y
C3	TOEFL 104	EL	L	30–1h	5–10y
C4	TOEFL 88	EL	L	30–1h	15–20y
C5	TOEFL 93	EL	R	1–3h	5–10y
C6	TOEFL 102	EL	S	1–3h	5–10y
C7	TOEFL 90	EL	L	1–3h	10–15y
C8	TOEFL 97	EL	R	-30m	5–10y

Note. JH in Q1 refers to junior high school, and EL refers to elementary school; R was reading, L was listening, and S was speaking in Q2; -30 in Q3 indicates less than 30 minutes, 30–1h: 30 minutes to one hour, 1–3h: one to three hours, +3h: more than three hours; 5–10y in Q4 refers to five to ten years, 10–15y refers to 10 to 15 years, and +20y refers to more than 20 years.

4.2 Tasks

The two tasks administered in this study constituted a reproduction experiment that expanded the research conditions of Hawkins and Liszka's (2003) study on past-tense marking. One task was a narration, while the other was a free conversation. To collect spontaneous oral data, Hawkins and Liszka (2003) used a short extract from a Charlie Chaplin film (*Modern Times*) and asked participants to narrate the story. In the current study, data were collected from the children's clay animation series *Pingu*. To obtain information regarding third-person singular -s, participants were asked to narrate while watching the movie. *Pingu* does not speak the actual language; instead, the show uses an invented penguin language called Penguinese, which comprises babbling, muttering, and language-like, yet uninterpretable sounds that can be easily understood by viewing the context. The central character, *Pingu*, is curious about everything and has various adventures; participants describe what *Pingu* does in the movie, which facilitated the collection of extended data on third-person singular -s (used to refer to *Pingu*). The narration task was conducted using the following procedure:

1. Participants received instructions from the researcher to ensure they understood the tasks and research.
2. They watched a sample video performed by the researcher who used the present tense (on purpose) to describe the situation.
3. They watched the target movie twice to understand the content.
4. Before starting the narration, they were asked to read a specific present-tense sentence shown by the researcher to induce the present tense at the

beginning.

5. Subsequently, the participants narrated the movie while watching it.
6. The participants did this for two *Pingu* movies.

After the narration task, following Hawkins and Liszka (2003), participants were asked to recount happy or exciting experiences to collect data on the past-tense marking of verbs through free conversation. Only thematic verbs were counted, excluding modals and *be*-verbs. All phonologically ambiguous verbs were omitted. The data were recorded and transcribed, and participants' errors were counted and analyzed statistically. Here are some examples of the mistakes made by the subjects:

- (7) a. *Pingu* find the fly flap and tries to fight with the bee. (Japanese participant A)
b. He take order from the customer now and customer leaves the store. (Japanese participant B)
- (8) a. The chef still think of something and goes through the whole restaurant to get, maybe, a meal for the lady. (Chinese participant A)
b. He rush to the old man. *Pingu* takes the food to the old man. (Chinese participant B)

The main verb in the third person singular subject was counted, and the number of verbs without the third person singular present *-s* was calculated. To find out how many verbs do not have a past tense inflection, all past tense *-ed* forms were tallied.

4.3 Ethical approval

Ethical approval was granted by Miyagi University. The ethics committee authorized the collection of data. Written informed consent was obtained from all participants during data collection. Interviews took place in a private space, and participants were assured that their details would be omitted from transcripts and that no personal information would be disclosed to ensure confidentiality. Finally, participants were informed that their involvement in the research was voluntary and that they could withdraw at any time without personal consequence.

5. Results

5.1 Narration task

The results for the frequencies of inflected and uninflected verbs in the present-tense context are presented in Table 3. Overall, Japanese learners of English produced more total third-person singular -s and fewer morpheme errors than Chinese learners of English.

Table 3. Frequency of inflected verbs in present-tense contexts: Narration task

Third-person singular -s	Total	Inflected	Uninflected	Inflected %
Japanese				
J1	139	135	4	97%
J2	106	98	8	92%
J3	102	92	10	90%
J4	78	68	10	87%
J5	58	54	4	93%
J6	70	67	3	96%
Total	553	514	39	93%
Chinese				
C1	68	65	3	96%
C2	60	43	17	72%
C3	60	32	28	53%
C4	66	50	16	76%
C5	54	38	16	70%
C6	67	57	10	85%
C7	65	61	4	94%
C8	90	63	27	70%
Total	530	409	121	77%

To maintain methodological comparability with previous studies (e.g., Lardiere 1998a and 1998b; Hawkins and Liszka 2003), a chi-square test was conducted to determine the statistical differences between Japanese and Chinese learners of English in producing third-person singular-s in the narration task. The relationship between these variables was significant ($X^2(1, N = 1083) = 53.5, p < .001$). To evaluate the strength of the association, Cramér's V was calculated and found to be 0.22. This indicates a weak association between Japanese and Chinese learners of English in producing third-person singular -s in the narration task. While the relationship is

statistically significant, the strength of the association is considered weak.

To conduct a more robust comparison that controls for potential confounding variables at the individual level, generalized linear mixed-effects model (GLMM) analyses were performed using IBM SPSS Statistics 30. The dependent variable was binary (inflected vs. uninflected), and L1 (Japanese vs. Chinese) was included as a fixed effect. A random intercept for each participant was included to account for repeated observations. In the narration task, the model with only L1 as a fixed effect revealed a statistically significant difference between groups ($F(1) = 8.126$, $p = .004$, odds ratio = 3.50), indicating that learners' L1 significantly predicted the accurate use of third-person singular-s. This result was identical to that of the chi-square test mentioned above. However, when additional variables, such as starting age, daily study time, preferred skill area, and years of English learning were included, the L1 effect was no longer statistically significant ($p = .675$, odds ratio = 1.69; see Appendix A and B for the full model output). None of the added predictors achieved statistical significance, indicating that the initial group difference may have been influenced by individual learner factors. These findings emphasize the need for using models that accommodate variability at the individual level, especially when sample sizes are small and potential covariates are present.

5.2 Free conversation task

Tables 4–6 present the results of inflected and uninflected verbs in present- and past-tense contexts (regular and irregular verbs).

Table 4. Frequency of inflected and uninflected verbs in present-tense contexts

Third-person singular -s	Total	Inflected	Uninflected	Inflected %
Japanese				
J1	6	5	1	83%
J2	13	13	0	100%
J3	9	8	1	88%
J4	23	21	2	91%
J5	4	3	1	75%
J6	12	12	0	100 %
Total	67	62	5	90%
Chinese				

C1	16	13	3	81%
C2	13	11	2	85%
C3	5	1	4	20%
C4	6	4	2	67%
C5	10	9	1	90%
C6	14	7	7	50%
C7	13	12	1	92%
C8	19	17	2	89%
Total	96	74	22	71%

Table 5. Frequency of inflected and uninflected verbs in past-tense contexts: Regular verbs

Past (regular)	Total	Inflected	Uninflected	Inflected %
Japanese				
J1	22	17	5	77%
J2	32	32	0	100%
J3	16	12	4	75%
J4	19	16	3	84%
J5	37	35	2	94%
J6	14	13	1	92%
Total	140	125	15	87%
Chinese				
C1	12	9	3	75%
C2	20	18	2	90%
C3	14	13	1	92%
C4	8	7	1	87%
C5	27	20	7	74%
C6	25	20	5	80%
C7	7	6	1	85%
C8	20	13	7	65%
Total	133	106	27	81%

Table 6. Frequency of inflected and uninflected verbs in past-tense contexts: Irregular verbs

Past	Total	Inflected	Uninflected	Inflected %
Japanese				
J1	31	31	0	100%
J2	31	30	1	97%
J3	12	11	1	97%
J4	23	22	1	96%
J5	19	17	2	89%
J6	18	17	1	94%
Total	134	128	6	96%
Chinese				

C1	13	13	0	100%
C2	22	16	6	73%
C3	10	9	1	90%
C4	16	14	2	87.5%
C5	28	28	0	100%
C6	21	11	10	52%
C7	15	12	3	80%
C8	39	33	6	84%
Total	164	136	28	83%

Regarding free conversation tasks conducted between each participant and the researcher, a chi-square test of independence showed a significant association between Japanese and Chinese learners of English for third-person singular *-s* (X^2 (1, $N = 163$) = 6.8, $p = .009$, *Cramer's V* = .20), regular past tense (X^2 (1, $N = 273$) = 4.815, $p = .028$, *Cramer's V* = .13), and irregular past tense (X^2 (1, $N = 329$) = 16.0, $p < .001$, *Cramer's V* = .19). These results suggest Chinese learners of English may produce more errors in inflectional morphology than Japanese learners. While *Cramer's V* revealed a weak strength of association, the results still indicate a significant connection between Japanese and Chinese English learners in both tasks.

However, to conduct a more robust comparison that controls for individual-level variation and potential confounding factors such as starting age and daily study habits, GLMMs were conducted for each morpheme type.

For third-person singular *-s*, the model including only L1 as a fixed effect did not reach statistical significance ($p = .06$, $F(1) = 3.588$, odds ratio = 3.7, coefficient = 1.3, $t = 1.8$), although it approached the conventional threshold. When additional covariates were added (e.g., starting age, years of study, skill preference, and daily study time), the effect of L1 became clearly non-significant ($p = .82$, odds ratio = 2.104).

For regular past tense, L1 alone did not show a significant effect ($p = .13$, odds ratio = 1.9), and the full model with covariates also failed to produce significant differences ($p = .30$, odds ratio = 11).

In the production of irregular past tense verbs during the free narration task, the chi-square test revealed a significant difference between Japanese and Chinese learners ($\chi^2(1, N = 329) = 16.0$, $p < .001$, *Cramer's V* = .19), suggesting that Chinese learners made more inflectional errors. However, the GLMM analysis, which accounted

for individual variation and potential covariates, did not show a significant effect of L1 ($p = .604$, odds ratio = 0.436). This indicates that once individual differences were controlled for, L1 alone did not significantly predict accuracy in irregular past-tense production.

Notably, the GLMM revealed that skill preference had a statistically significant effect. Learners who reported reading as their strongest skill were significantly more likely to produce irregular past-tense verbs correctly compared to those who identified speaking as their strength ($p = .001$, odds ratio = 34.2). A similar effect was observed for those who favored listening ($p = .001$, odds ratio = 24.9). These findings suggest that stronger receptive skills may be positively associated with more accurate use of complex verb forms, such as the irregular past tense, even when controlling for L1 and other variables (see Appendix C-H for the full model output).

6. Discussion

Previous research has shown that acquiring and using tense features in spoken production is difficult, especially for L1-Chinese learners of English (Lardiere 1998a, 1998b; Hawkins and Liszka 2003). This study builds on the findings of prior research by investigating the influence of L1 on the use of present and past tenses by L1-Chinese and L1-Japanese participants in spoken production tasks.

This study aimed to address two research questions. In response to the first question, while the chi-square tests replicated previous findings by detecting statistically significant group-level differences between Japanese and Chinese learners of English across all tasks, the GLMMs revealed a more refined perspective. Specifically, when GLMMs were applied using L1 as the sole fixed effect, a statistically significant difference was also found in the narration task ($F(1) = 8.126$, $p = .004$, odds ratio = 3.50). However, when additional covariates such as starting age, years of learning, preferred language skills, and daily English usage were included in the models, no significant differences related to L1 were observed, even in the narration task. These findings highlight the importance of using models that account for variability at the individual level, especially when sample sizes are limited and potential confounding variables exist. GLMMs facilitated more robust comparisons and suggested that the effects of L1 were perhaps overstated in earlier studies using only group-level statistics

like chi-square.

Moreover, this study found no significant L1 effects in the free conversation task regarding the third-person singular *-s* and past-tense marking, contrasting with previous studies that reported consistent L1-related difficulties in acquiring English inflectional morphology for Chinese learners. Importantly, the GLMM revealed that skill preference had a statistically significant effect, suggesting that stronger receptive skills may facilitate more accurate use of complex verb forms, such as the irregular past tense, independent of L1 background. This discrepancy suggests that the influence of L1 may be less uniform than previously believed, particularly among Chinese learners of English. Notably, while advanced Japanese learners performed consistently across tasks and replicated earlier findings, Chinese learners exhibited significantly higher accuracy in producing inflectional morphemes than previously reported. For example, the accuracy rate for the past tense of regular verbs was 81%, and for the third-person singular *-s*, it was 71% and 77%—a substantial increase compared to 62% for regular past tense in Hawkins and Liszka (2003) and just 5% for *-s* in Lardiere (1998a, 1998b). These improvements suggest considerable variation among Chinese learners that had not been captured in prior research.

Upon closer examination of individual learner data, this variation becomes even more evident. For instance, participant C1, who had a TOEIC score of 910 and over ten years of English usage, achieved accuracy scores comparable to Japanese participants across all tasks, including the narration task. Conversely, participant C6, despite living in the U.S. and having a TOEFL score of 102, showed lower accuracy in the free conversation task, particularly in the use of the third-person singular *-s*, with only 50% correctness. These results highlight that L1 effects among Chinese learners may vary between individuals, and that learner-specific factors—such as proficiency level, learning history, and communicative environment—may play a significant role.

Consequently, how can we explain this considerable variation only among Chinese participants? As stated in Table 1, the evident distinctions between Japanese and Chinese L1 features include tense, case, and finiteness. It is assumed that Chinese and Japanese participants would behave differently in acquiring inflectional morphology because the syntactic representation of Chinese lacks the tense feature. This absence aligns with our study's results, where Chinese learners demonstrated greater variability and occasional underperformance in producing past tense or

agreement markers. From another perspective, Japanese learners may benefit from positive transfer, since Japanese does encode tense morphologically. The ability to apply their L1's tense feature directly to English inflection could explain their higher consistency and accuracy. This positive transfer likely facilitates early acquisition of past tense forms, which may subsequently ease the transition to mastering present tense agreement, such as the third-person singular *-s*. This interpretation, if supported by further research, would signify a significant contribution to understanding cross-linguistic influence in second language morphology acquisition.

In conclusion, this study highlights the methodological strength of GLMMs in accounting for individual differences and controlling for confounding variables. While the chi-square results revealed significant group-level differences, only the narration task demonstrated a marginally significant L1 effect under the simplest GLMM, and no differences appeared when additional factors were controlled for. The results further suggest that although Japanese learners tend to follow consistent acquisition patterns, Chinese learners show greater individual variability, potentially stemming from the syntactic features of their L1. This variability underscores the need for more nuanced, learner-specific approaches in both research and pedagogy related to second language acquisition.

Regarding the second research question, the results of this study provide partial support for the FFFH, particularly in that statistically significant differences were found between the two groups only in the narration task, which may place greater demands on morphosyntactic encoding. However, no significant group differences emerged in the free conversation tasks or when additional learner-related factors were considered. Therefore, the findings indicate that while the FFFH offers some explanatory power, it alone does not sufficiently account for the observed phenomena.

The findings also offer partial support for the MSIH. The relatively high accuracy rates among Chinese participants (71–83%) suggest that the difficulty may not be categorical or rooted solely in representational failure, but instead reflect variability in surface realization. Furthermore, no statistical differences were found between the two groups of learners in the GLMM, except for the narration task. Chinese participant C1 produced inflectional morphemes at a rate comparable to Japanese participants. In this regard, although the lack of tense morphology in L1 may continue to pose challenges even for advanced learners, it does not entirely prevent the successful use of inflection.

These patterns suggest that features not present in a learner's L1 can indeed be difficult to acquire, but the nature of the difficulty may differ across individuals and contexts. Further investigation is also warranted into why, despite the absence of case marking and finite morphology in L1, Chinese learners have demonstrated high performance in tasks involving nominative case marking and overt subjects (Lardiere, 2007). To sum up, neither FFFH nor MSIH alone adequately accounts for the full range of observed linguistic behavior.

In other words, based on the present data and previous findings, L2 learners may face difficulties at both the level of underlying grammatical representation and in the post-syntactic realization of those representations. Furthermore, as previously discussed, the theoretical foundations of FFFH (representational difficulty) and MSIH (performance-related omission) rest on distinct assumptions, making direct comparisons problematic. Therefore, while this study set out to evaluate the relative plausibility of the two accounts, the results suggest that neither framework alone sufficiently explains the observed phenomena, highlighting the need for an integrated or alternative theoretical approach.

A tentative solution to the case and tense feature discrepancy is presented here. The possible difference between case and tense features lies in their interpretability. Arguably, case features are considered uninterpretable while tense features are interpretable. Based on this study and previous research, it can be assumed that uninterpretable case features are easier to acquire, whereas interpretable tense features are more difficult.⁶ Uninterpretable features must be checked and deleted during the derivation process, whereas interpretable features remain, as they are subject to interpretation in the LF and are not deleted. However, in the case of tense, the deletion of the uninterpretable [-past] feature in the V (see Figure 1) involves covert movement, where the main verb moves to spec T and is deleted. The necessity of deleting uninterpretable features drives movement in language, and this movement is essential for understanding why such linguistic phenomena exist. Accordingly, we speculate that the difference between covert and overt movements may cause the difficulty in L2 acquisition. According to Chomsky, "the more complex operation is sometimes

6 However, this solution contrasts with the predictions of the interpretability hypothesis (Tsimplici and Dimitrakopoulou 2007), which posits that interpretable features are accessible to L2 learners, while uninterpretable features are more challenging and less likely to be fully acquired, even though learners can theoretically include both to their linguistic inventory.

induced by economy considerations, namely, Procrastinate, which requires that some operations be covert, hence (typically) operations that embed” (1995: 254). Covert movement, being a more complex operation, may be more difficult for L2 learners to acquire than overt movement. Therefore, the distinction between covert and overt movement could offer a plausible explanation for the challenges in L2 acquisition.

The validity of this assumption indicates that L2 learners will struggle when faced with tasks that require adding or removing features associated with covert movement. Therefore, other covert movements in L2 learning, such as *wh*-movement in Japanese or exceptional case marking in English, are likely to be similarly challenging for L2 learners to acquire. Future research may investigate the comparative difficulty of learning covert movement in an L2 where it is overt in the L1 and vice versa, which would provide valuable insights.

7. Future scope of the study

The present study provides novel insights into the use of English inflectional morphology among Chinese and Japanese learners; however, its relatively small and imbalanced sample necessitates a cautious interpretation. These findings should be regarded as preliminary and serve as a basis for future hypothesis-driven investigations using larger and more demographically balanced samples.

To begin with, despite the small sample size ($N = 14$), the study revealed consistent and noteworthy patterns. In particular, the accuracy of inflectional morphemes among Chinese participants was notably higher than predicted based on prior research. This unexpected result suggests that further investigation with a larger sample could yield valuable insights and help clarify whether this pattern holds across a broader population.

Second, we acknowledge that the two participant groups differed in key demographic and educational factors—such as age, length and context of English exposure, and types of proficiency tests (TOEIC vs. TOEFL iBT)—which may have introduced potential confounding variables. This heterogeneity, while reflective of real-world L2 learner diversity, raises a significant interpretive challenge: it is difficult to determine to what extent the observed patterns can be attributed to L1-based influences versus other uncontrolled variables such as proficiency level or learning

environment. This tension complicates the interpretation of group differences and highlights the need for caution when drawing conclusions about the role of L1 alone. Rather than dismissing these differences as mere limitations, we argue that they underscore the importance of designing future studies with more controlled participant characteristics to isolate the effects of L1 more precisely.

Moreover, although the GLMM analyses showed that L1 group differences became statistically non-significant once covariates such as skill preference and learning history were included, this result may reflect limited statistical power rather than a true absence of L1 effects. A larger sample size would help clarify whether L1 remains a significant factor when individual differences are taken into account.

Finally, while our discussion tentatively proposed the role of covert movement in explaining some of the observed difficulties, it lacked a thorough examination of the underlying mechanisms contributing to the relative ease or difficulty of acquiring specific morpho-syntactic features. Nonetheless, the findings may be interpreted—albeit tentatively—as consistent with the possibility that such mechanisms are involved. Future research with task designs specifically targeting this theoretical distinction would be necessary to confirm or refine this interpretation.

8. Conclusion

This study examined whether features that are absent from learners' L1 affect the acquisition of English inflectional morphology, even at advanced proficiency levels. Two oral production tasks were administered to Chinese and Japanese learners of English to examine the use of third-person singular *-s* and past-tense inflections. While chi-square tests showed significant differences between the two L1 groups across all tasks, GLMM analysis revealed statistically significant differences only in the narration task when comparing L1 without covariates. This finding underscores the importance of using statistical models like GLMM, which accommodate individual variability and nested data structures, particularly in studies with small sample sizes and potentially confounding learner characteristics.

Furthermore, the additional GLMM analysis including covariates such as starting age, preferred skill, length of English study, and time spent using English, did not identify any significant predictors of accuracy beyond L1 for all the tasks. These

findings suggest that while L1 remains a relevant factor, its influence interacts with individual learner characteristics. In particular, the variability observed among Chinese learners indicates that inflectional morpheme acquisition is not uniformly affected by L1, but likely mediated by experience, exposure, and perhaps motivation.

According to the results of the current study, the Japanese participants' performance mirrored findings from previous research, demonstrating consistently high accuracy in inflectional morphology. However, the Chinese participants exhibited significantly better performance than previously reported. This result suggests that some Chinese learners may achieve native-like accuracy despite the absence of tense features in their L1. Nevertheless, other Chinese learners still exhibited difficulty with certain inflectional morphemes in spontaneous contexts, such as the third-person singular *-s*.

The overall improvement in Chinese learners' accuracy relative to past studies may be explained by the absence of tense features in Chinese, which require L2 learners to newly acquire and restructure grammatical representations. In contrast, Japanese learners may benefit from positive transfer, as Japanese contains tense features, facilitating the acquisition of English past tense forms. This finding supports previous claims about the role of feature availability and reassembly in L2 acquisition, and underscores how syntactic feature mappings between L1 and L2 shape developmental trajectories.

In summary, this study presents preliminary but significant evidence that L1 background influences the acquisition of English inflectional morphology among advanced learners, particularly when tense features are absent in the L1. The results also indicate that even within the same L1 group, individual variation can be considerable, especially among Chinese learners. Given the limitations of our study, future research should examine which features pose the greatest challenges for advanced learners across different languages and investigate the learning difficulties involved in covert movement with a larger sample size. Overall, the results of this study enhance our understanding of how L1 features influence L2 morphological development.

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Appendix A

Fixed Effects from the Generalized Linear Mixed Model (Narration task: present tense)

Predictor	Estimate (B)	Std. Error	t value	p value	Odds Ratio (Exp(B))	95% CI for OR (Lower–Upper)
Intercept	1.340	0.2805	4.778	< .001	3.820	2.203 – 6.624
L1: Japanese	1.263	0.4431	2.851	.004	3.537	1.482 – 8.438
L1: Chinese	Reference	–	–	–	–	–

Appendix B

Fixed Effects from the Generalized Linear Mixed Model (Narration task: with other variables)

Predictor	Estimate (B)	Std. Error	t value	p value	Odds Ratio (Exp(B))	95% CI for OR (Lower–Upper)
Intercept	2.708	1.4196	1.908	.057	14.998	0.925 – 243.08
L1 (Japanese = 1)	.528	1.2569	.420	.675	1.695	0.144 – 19.968
Started Age: JH	-.450	.9321	-.483	.629	0.637	0.102– 3.969
Skill: Reading	-.511	.8793	-.582	.561	.600	0.107 – 3.366
Skill: Listening	-.578	.8985	-.644	.520	.561	0.096 – 3.270
Skill: Speaking	Reference	–	–	–	–	–
Daily Study: 1–3 h	.382	.8417	.454	.650	1.465	0.281 – 7.640
Daily Study: 3+ h	.118	1.0597	.111	.911	1.125	0.141 – 9.001
Daily Study: 30–1 min	-.990	.8586	-1.15	.249	.372	0.069 – 2.003
Daily Study: <30 min	Reference	–	–	–	–	–
Years Learned: 10–15 y	.080	.8780	.091	.928	1.083	0.193 – 6.064
Years Learned: 5–10 y	-1.349	.8498	-1.58	.113	.259	0.049– 1.375
Years Learned: 15–20 y	Reference	–	–	–	–	–

Appendix C

Fixed Effects from the Generalized Linear Mixed Model (Conversation task: present tense)

Predictor	Estimate (B)	Std. Error	t value	p value	Odds Ratio (Exp(B))	95% CI for OR (Lower–Upper)
Intercept	1.164	0.3799	3.064	< .003	3.203	1.513 – 6.783
L1: Japanese	1.318	0.6960	1.894	.060	3.737	0.945 – 14.775
L1: Chinese	Reference	–	–	–	–	–

Appendix D

Fixed Effects from the Generalized Linear Mixed Model (Conversation task: present tense with other variables)

Predictor	Estimate (B)	Std. Error	t value	p value	Odds Ratio (Exp(B))	95% CI for OR (Lower–Upper)
Intercept	1.922	2.7670	.695	.488	6.835	.029 – 1617.
L1 (Japanese = 1)	7.652	34.5521	.221	.825	2104.985	4.764E-27 – 93005464 874 1690000 000000000000000.
Started Age: JH	-7.876	34.5119	-.228	.820	0.000	9.305E-34 – 15497042 86454070000 00000000.00012.056
Skill: Reading	1.066	1.5675	.680	.498	2.904	.131 – 64.237
Skill: Listening	1.322	1.6156	.819	.414	3.753	.154- 91.31
Skill: Speaking	Reference	–	–	–	–	–
Daily Study: 1–3 h	-1.074	1.6523	-.650	.517	.342	0.013 – 8.936
Daily Study: 3+ h	.163	2.2018	.074	.941	1.178	0.015 – 91.235
Daily Study: 30–1 min	-2.551	1.7060	-1.49	.137	.078	0.003 – 2.268
Daily Study: <30 min	Reference	–	–	–	–	–
Years Learned: 10–15 y	.367	1.7384	.211	.833	1.444	0.047 – 44.76
Years Learned: 5–10 y	-.848	1.7385	-.488	.626	.428	0.014 – 13.285
Years Learned: 15–20 y	Reference	–	–	–	–	–

Appendix E

Fixed Effects from the Generalized Linear Mixed Model (Conversation task: regular past tense)

Predictor	Estimate (B)	Std. Error	t value	p value	Odds Ratio (Exp(B))	95% CI for OR (Lower–Upper)
Intercept	1.410	.2941	4.793	<.001	4.095	2.295 – 7.307
L1: Japanese	.687	.4578	1.502	.134	1.989	0.807 – 4.897
L1: Chinese	Reference	–	–	–	–	–

Appendix F

Fixed Effects from the Generalized Linear Mixed Model (Conversation task: regular past tense with other variables)

Predictor	Estimate (B)	Std. Error	t value	p value	Odds Ratio (Exp(B))	95% CI for OR (Lower–Upper)
Intercept	.243	2.6564	.091	.927	1.275	0.007 – 238.3
L1 (Chinese = 1)	2.434	2.3691	1.027	.305	11.402	0.107 – 1210.3
Started Age: JH	-.954	1.5441	-.618	.537	.385	0.018 – 8.057
Skill: Reading	-.440	1.4038	-.313	.754	.644	0.041 – 10.223
Skill: Listening	.427	1.5092	.283	.778	1.532	0.078 – 29.922
Skill: Speaking	Reference	–	–	–	–	–
Daily Study: 1–3 h	.328	1.3930	.235	.814	1.388	0.089 – 21.556
Daily Study: 3+ h	.800	1.7741	.451	.652	2.225	0.068 – 73.195
Daily Study: 30–1 min	1.276	1.5652	.815	.416	3.582	0.164 – 78.103
Daily Study: <30 min	Reference	–	–	–	–	–
Years Learned: 10–15 y	.980	1.8089	.542	.589	2.663	0.076 – 93.822
Years Learned: 5–10 y	.816	1.8492	.441	.660	2.261	0.059 – 865.214
Years Learned: 15–20 y	Reference	–	–	–	–	–

Appendix G

Fixed Effects from the Generalized Linear Mixed Model (Conversation task: irregular past tense)

Predictor	Estimate (B)	Std. Error	t value	p value	Odds Ratio (Exp(B))	95% CI for OR (Lower–Upper)
Intercept	1.748	.3872	4.515	<.001	5.744	2.681 – 12.309
L1: Japanese	1.284	.6714	1.912	.057	3.610	0.963 – 13.530
L1: Chinese	Reference	–	–	–	–	–

Appendix H

Fixed Effects from the Generalized Linear Mixed Model (Conversation task: irregular past tense with other variables)

Predictor	Estimate (B)	Std. Error	t value	p value	Odds Ratio (Exp(B))	95% CI for OR (Lower–Upper)
Intercept	-1.949	1.8251	-1.068	.287	0.142	0.004 – 5.174
L1 (Chinese = 1)	-.829	1.5972	-.519	.604	0.436	0.019 – 10.117
Started Age: JH	.296	1.1145	.266	.791	1.344	0.150 – 12.056
Skill: Reading	3.532	1.0680	3.307	.001	3.532	4.178 – 279.840
Skill: Listening	3.215	.9802	3.280	.001	3.215	3.617 – 171.378
Skill: Speaking	Reference	–	–	–	–	–
Daily Study: 1–3 h	1.923	1.0709	1.796	.074	6.840	0.831 – 56.288
Daily Study: 3+ h	1.977	1.4525	1.361	.175	7.222	0.414 – 125.954

Daily Study: 30–1 min	0.675	0.9704	0.695	.488	1.963	0.291 – 13.257
Daily Study: <30 min	Reference	–	–	–	–	–
Years Learned: 10–15 y	-1.266	1.0276	-1.232	.219	0.282	0.037 – 2.130
Years Learned: 5–10 y	0.121	1.1559	0.105	.917	1.129	0.116 – 10.981
Years Learned: 15–20 y	Reference	–	–	–	–	–

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