Original Research

SAGE Open
October-December 2024: 1–12

DOI: 10.1177/21582440241308329
journals.sagepub.com/home/sgo
Sage

The Crosslinguistic Influence of L1 Morphological Awareness on L3 Lexical Inferencing: An Exploratory Study of L1 Japanese-L2 English-L3 Chinese Learners

Sihui (Echo) Ke[1], Xuehong (Stella) He[2], and Guihua Zhao[3]

Abstract

It is generally agreed that first language (L1) morphological awareness, the ability to reflect upon, analyze and manipulate morphemes and morphological structure of words, can transfer and facilitate second language (L2) reading subskill acquisition. However, the facilitative role of L1 morphological awareness is unclear in the literature investigating third language (L3) reading. This study explored if and how L1 morphological awareness and L2 reading subcomponent skills contribute jointly to L3 lexical inferencing in syllabic L1 Japanese-alphabetic L2 English-morphosyllabic L3 Chinese university learners. Sixty-seven students were recruited from novice-level, first-year Chinese classes from a Japanese university. Only 56 students completed 7 computerized or paper-and-pencil tasks, including L1 Japanese morphological awareness, L2 English morphological awareness, L2 English vocabulary knowledge, L2 English lexical inferencing, L3 Chinese morphological awareness, L3 Chinese vocabulary knowledge, and L3 Chinese lexical inferencing. They also completed a self-reported proficiency questionnaire survey. Correlational and regression analyses were conducted. The results suggested that there was only a significant association between L1 Japanese morphological awareness and L3 Chinese lexical inferencing, and there were no significant correlations between L2 English reading subcomponent skills and L3 Chinese lexical inferencing. Discussion is provided regarding the crosslinguistic influence of L1 morphological awareness in L3 reading development and the implications for L3 reading instruction.

Plain language summary

First language morphological awareness matters in third language word meaning inferencing

Morphological awareness refers to the ability to reflect upon, analyze and manipulate morphemes and morphological structure of words. It is a significant predictor in monolingual and bilingual reading development. However, it is unclear how morphological awareness developed in one's first language (L1) facilitates reading subskills acquisition in second and third languages (L2 and L3). This research examined the facilitative role of morphological awareness in L3 lexical inferencing (i.e., the ability to guess unknown word meanings during reading) with 56 L1 Japanese-L2 English-L3 Chinese university learners. They completed a set of tests including morphological awareness tasks in three different languages (i.e., Japanese, English, Chinese), English vocabulary knowledge, English lexical inferencing, Chinese vocabulary knowledge and Chinese lexical inferencing, and also filled out a self-reported proficiency questionnaire survey. The findings of the study indicated that L3 Chinese vocabulary knowledge alone is insufficient for successful L3 Chinese

[1]The Hong Kong Polytechnic University, Kowloon, Hong Kong, China
[2]Swansea University, Wales, UK
[3]Nagoya University of Commerce and Business, Aichi, Japan

Corresponding Author:
Sihui (Echo) Ke, Department of Chinese and Bilingual Studies, The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong, China.
Emails: echoecho.ke@gmail.com; sihui.ke@polyu.edu.hk

lexical inferencing, and L1 Japanese morphological awareness is a unique and additional predictor of L3 Chinese lexical inferencing. Also, the findings of this research suggested that L2 English morphological awareness or L2 English lexical inferencing is not significantly correlated with L3 Chinese lexical inferencing. Therefore, it is recommended that instructors and learners raise their awareness of the facilitative role of L1 Japanese metalinguistic resources and utilize these resources to develop L3 Chinese reading.

Keywords
morphological awareness, lexical inferencing, reading, multilingualism, transfer

Introduction

Successful reading comprehension, either in one's first language (L1) or an additional language, demands both effortless access to the meaning of familiar words and the ability to infer the meaning of unfamiliar words through word form analysis. The latter is also known as "lexical inferencing" (Haastrup, 1991). Previous research has found that lexical inferencing depends on a learner's morphological awareness (e.g., Park, 2004; D. Zhang et al., 2016), which pertains to a learner's ability to reflect upon, analyze, and manipulate the morphemes and word-internal morphological structure (Carlisle, 1995, 2000; Kuo & Anderson, 2008). It is well-established in the literature that morphological awareness in a learner's L1 can transfer and facilitate reading component skill development in a second language (L2), even between two typologically distinct languages and writing systems (see the transfer facilitation model by Koda, 2005, 2008, and the interactive framework of the cross-language transfer in bilingual reading development by Chung et al., 2019). However, there is a noticeable lack of research exploring the transfer effects of morphological awareness on third language (L3) reading. Additionally, the current literature yields conflicting results. Some researchers found that only L1 morphological awareness influences L3 morphological awareness and related outcomes such as vocabulary knowledge and reading comprehension, with no extra contribution from L2 morphological awareness (e.g., Cho & Tong, 2014), whereas others noted that both L1 and L2 linguistic resources contribute to L3 morphological awareness (e.g., Teng & Fang, 2024). These discrepancies highlight the need for more research in this field, whose findings will broaden our understanding of the crosslinguistic influence stemming from L1 morphological awareness on reading in an additional language. Pedagogically speaking, the findings will inform instruction aimed at capitalizing on multilingual learners' prior literacy resources in L3 reading development.

The present study set out to explore the facilitative role of L1 morphological awareness in L3 lexical inferencing. First language (L1), second language (L2), and third language (L3) in this study are defined based on the sequence or chronological order of acquiring a language (after Hammarberg, 2014). Data were collected with syllabic L1 Japanese-alphabetic L2 English-morphosyllabic L3 Chinese university learners. Japanese writing utilizes two syllabary Kana (Hiragana and Katakana) and morpheme-based Kanji. Because Hiragana is considered to be unique to Japanese orthography and instrumental in the establishment of the current conversion of using multiple writing systems in Japanese texts (Koda, 2017; Taylor & Taylor, 2014), this research focused on syllabary Hiragana in L1 Japanese reading. Specifically, it aimed to investigate (1) whether L1 Japanese morphological awareness was associated with L3 Chinese lexical inferencing; (2) whether there is any additional contribution from L2 English reading subcomponent skills to L3 Chinese lexical inferencing; and (3) whether L1 Japanese morphological awareness and L2 English reading subcomponents were jointly associated with L3 Chinese lexical inferencing.

Transfer Facilitation Model and Its Latest Development

Koda's Transfer Facilitation Model is "the most elaborate theory of transfer to date" (Chung et al., 2019, p. 158). Koda (2008) defined transfer as "automatic activation of well-established first language competencies triggered by second language input" (p. 78). This model suggests that in the process of acquiring reading skills in an L2, it is the subskills that are transferred, not a set of L1 linguistic rules or a comprehensive construct such as L1 reading ability or proficiency. Facilitation is the bootstrapping consequence of applying available L1 reading subskills to L2 reading tasks (Genesee et al., 2006; Riches & Genesee, 2006). This model is supported by substantial empirical evidence of L2 reading across different languages and writing systems (cf. a research timeline by Reddy and Koda, 2008 and a meta-analysis by Ke et al., 2023).

At the theoretical level, researchers have suggested modifications to the Transfer Facilitation Model (for instance, Chung et al., 2019; Hipfner-Boucher & Chen, 2016). Hipfner-Boucher and Chen (2016) distinguished between two types of transfer effects in L2 reading: one is the construct-level transfer, where L1 morphological awareness is transferred to the corresponding skill (that is, morphological awareness) in L2; the other is the cross-over effect, where L1 morphological awareness influences other reading-related outcomes such as word reading, vocabulary, lexical inferencing, and reading comprehension. Chung et al. (2019) introduced an interactive framework for cross-language transfer in the development of bilingual reading. They provided a comprehensive review of the cognitive and linguistic factors that affect cross-language transfer, including the relatively language-general or language-specific nature of the construct, the distance between L1 and L2, proficiency in L1 and L2, and language complexity, all of which were also addressed in Koda's transfer facilitation model. A unique aspect of their framework is the proposal that cross-language transfer is influenced by sociolinguistic and socio-cultural factors such as age of acquisition, immigration experience, educational settings, and the degree of exposure to L1 and L2. Chung et al. (2019) also emphasized the importance of acknowledging that current research has not sufficiently addressed transfer when more than two languages are involved.

The Transfer Facilitation Effect of Morphological Awareness in Japanese-Chinese Bilingual Learners

Previous studies of Japanese-Chinese bilingual learners have observed the influence of L1 morphological awareness (e.g., Bassetti, 2007; H. Zhang et al., 2024), which could be attributed to the similarity between the Chinese and Japanese orthographies. Chinese orthography is morphosyllabic, with the basic grapheme unit (character) encoding a morpheme that also corresponds to a syllable (DeFrancis, 1989). Standard Japanese texts are written using morphosyllabic-based Kanji for writing nouns and verbal/adjectival/adverbial roots, syllabic-based Hiragana for conveying grammatical information, and syllabic-based Katakana for transcribing foreign loan words and onomatopoeias) (Koda, 2017). In L1 Chinese and Japanese reading development, morphological awareness plays an important role early on (e.g., Chen & Pasquarella, 2017; Muroya et al., 2017).

In the context of L2 Chinese reading, Bassetti (2007) noted that L1 Japanese learners of Chinese demonstrated a higher level of word awareness, enabling them to segment longer words in Chinese, similar to native Chinese speakers. In contrast, L1 English learners of Chinese, whose alphabetic orthography background is more distant from the morphosyllabic Chinese, tended to segment shorter words. A recent study by H. Zhang et al. (2024) examined the relative contributions of L2 Japanese morphological awareness and cognate awareness to L2 Japanese lexical inferencing among Chinese-speaking university students learning Japanese. They discovered that morphological awareness contributed uniquely to L2 Japanese lexical inferencing beyond the influence of cognate awareness. H. Zhang et al. (2024) incorporated three measures of morphological awareness in their study: word segmentation, morpheme analysis, and homophone awareness. They concluded that both morpheme analysis and homophone awareness were crucial for successful L2 Japanese lexical inferencing.

The Transfer Facilitation Effect of Morphological Awareness in English-Speaking Learners of Chinese

English orthography is deemed as morphophonemic because it maps the oral language at the phoneme level, and morphemic boundaries in English coincide with phonemic boundaries (as in "cats" and "beds," "heal and "health") (Frost, 2012). It is thus not surprising that numerous studies have identified the links between morphological awareness and English reading outcomes such as word decoding and reading comprehension (for more thorough reviews, see Kirby & Bowers, 2017, who view morphology as a binding agent of phonology, orthography and meanings of words, as well as the Morphological Pathways Framework proposed by Levesque et al., 2021). More important, morphological awareness developed in L1 English can transfer and facilitate reading subskill development in L2 morphosyllabic Chinese, in spite of the L1 to L2 distance between English and Chinese (e.g., Ke & Koda, 2017, 2021)

Ke & Koda (2017, 2021) investigated to what extent L1 English morphological awareness transfers and facilitates L2 Chinese word-reading and lexical inferencing in L1 English-L2 Chinese university learners, and whether the transfer facilitation effects are altered by L2 Chinese linguistic knowledge. Their findings indicated that, when L2 word-reading was treated as the reading outcome, L1 English morphological awareness was significantly related to L2 Chinese morphological awareness, which subsequently affected L2 Chinese word-reading; and there was no additional effect from L2 Chinese linguistic knowledge. However, when L2 Chinese lexical inferencing was treated as the reading outcome, L2 Chinese morphological awareness contributed to L2 Chinese lexical inferencing via the mediation of L2 Chinese linguistic knowledge. In other words, the reading outcomes targeted in previous research may also affect how and to

what extent transferred morphological awareness facilitates reading acquisition in an additional language. Notably, in L2 reading, word decoding was the most studied outcome; vocabulary knowledge and reading comprehension received far less attention; and very few L2 reading research examined lexical inferencing as a reading-related outcome (see a meta-analysis by Ke et al., 2023).

The Transfer Facilitation Mechanism of Morphological Awareness in L3 Reading

As previously noted, despite the abundance of L2 reading studies in the literature, there is a significant dearth of research examining the role of morphological awareness in facilitating L3 reading subskill acquisition. Furthermore, the limited available evidence presents conflicting findings (e.g., Cho & Tong, 2014; Teng & Fang, 2024). Cho and Tong (2014) examined the relationship between morphological awareness and reading subskill acquisition in L1 Korean ninth graders who studied L2 English for 7 years and L3 Chinese for 1 year in Korea. Cho and Tong observed that L1 Korean morphological awareness contributed to L3 Chinese reading comprehension beyond L3 Chinese vocabulary knowledge and L3 Chinese morphological awareness, but there was no significant contribution from L2 English morphological awareness. They argued that the lack of transfer facilitation effect from L2 English morphological awareness to L3 Chinese reading comprehension might be caused by the different writing systems in English and Chinese (i.e., alphabet vs. morphosyllabary) (see the script dependent hypothesis, Geva & Siegel, 2000), and that the trilinguals' L2 English proficiency was too low for transfer to occur from an L2 to an L3. The literature has proposed that L3 learners must reach a certain degree of L2 competence so that their L2 experiences can impact their L3 acquisition (e.g., Hammarberg, 2001). Lasagabaster (1998) even argued that L3 learners need to reach language proficiency thresholds in all three languages so that resources are cross-linguistically shareable.

While Cho and Tong (2014) did not identify any L2 influence beyond L1 on L3 Chinese reading outcomes, including morphological awareness, vocabulary knowledge and reading comprehension, Teng and Fang (2024) observed that the activation of a learner's multilingual repertoire via translanguage pedagogy could influence morphological awareness in L3 Chinese. Teng and Fang (2024) conducted a mixed-methods interventional study. The study involved 62 Japanese-speaking students in a Chinese learning program at a Chinese university over 8 weeks. These students were divided into two groups: an experimental group that received translanguaging instruction that helped students use their L1 Japanese-L2 English-L3 Chinese skills for Chinese morphology learning and a control group that learned through a monolingual approach in Chinese. The results showed that the experimental group had higher morphology learning scores and responded positively to the use of translanguaging pedagogy.

In summary, while there is a wealth of empirical evidence supporting the transfer and facilitation of L1 morphological awareness to L2 morphological awareness and reading subskills, there is a significant gap in research examining the transfer facilitation effects of morphological awareness in L3 reading. Moreover, the existing literature presents contradictory findings. Some researchers, such as Cho and Tong (2014), found that only L1 morphological awareness impacts L3 morphological awareness and related outcomes, like vocabulary knowledge and reading comprehension, with no additional contribution from L2 morphological awareness. Conversely, others, like Teng and Fang (2024), observed that L1 and L2 linguistic resources both benefited the development of L3 morphological awareness. These conflicting findings underscore the need for further research in this area. Such research will enhance our understanding of the crosslinguistic influence of morphological awareness in L1 on reading in an additional language.

The Present Study

The main objective of the research is to explore the transfer facilitation mechanism of morphological awareness in L3 reading via an exploratory study with syllabic L1 Japanese-alphabetic L2 English-morphosyllabic L3 Chinese learners. Our study focused on lexical inferencing as the key outcome in L3 reading for two significant reasons. Firstly, proficient reading comprehension is heavily reliant on successful lexical inferencing. Secondly, despite its pivotal role in predicting reading comprehension, lexical inferencing has been the least explored among various reading outcomes in the existing literature on bilingual/multilingual reading. This study was guided by three research questions (RQs):

RQ1. Is L1 Japanese morphological awareness directly related to L3 Chinese lexical inferencing?
RQ2. Are L2 English reading subcomponents (i.e., L2 English morphological awareness, L2 English vocabulary knowledge, and L2 English lexical inferencing) directly related to L3 Chinese lexical inferencing?
RQ3: Are L1 Japanese morphological awareness and L2 English reading subcomponents jointly related to L3 Chinese lexical inferencing?

Table 1. Descriptive Statistics for L1 Japanese, L2 English, and L3 Chinese Variables ($N = 56$).

Task	*k*	MSP	Cron-bach's alpha	Mean	Mean (%)	95% CI	*SD*
Japanese morphological awareness (JMA)	24	24	0.70	15.45	64.38	14.76, 16.43	3.40
English morphological awareness (EMA)	32	32	0.59	13.10	40.94	12.49, 14.63	3.79
Chinese morphological awareness (EMA)	24	24	0.53	11.15	46.46	10.74, 12.15	2.55
English vocabulary (EVOC)	40	40	0.87	20.65	51.63	18.26, 22.78	7.76
Chinese vocabulary (CVOC)	60	60	0.89	15.26	25.43	13.65, 18.31	8.42
English lexical inferencing (ELI)	16	16	0.57	5.43	33.94	4.97, 6.14	2.09
Chinese lexical inferencing (CLI)	32	32	0.55	15.35	47.97	14.27, 15.92	3.05
Chinese lexical inferencing-cognate (CCLI)	16	16	NA	10.05	62.81	9.81, 10.33	1.87
Chinese lexical inferencing-noncognate (NCCLI)	16	16	NA	5.25	32.81	4.76, 5.81	1.89

Note. MSP = maximum score possible; NA = not applicable.

Method

Study Design

In line with previous studies on the connection between morphological awareness and L2 lexical inferencing (e.g., Park, 2004; D. Zhang et al., 2016), we carried out an observational study using a cross-sectional design. Participants, during their first semester of learning Chinese at a Japanese university, completed seven tasks either on a computer or using paper and pencil. These tasks were spread over 6 weeks during their Chinese class time. The course instructor, who is also the third author, assisted in data collection. After obtaining approval from the institutional research ethics review board, we obtained written consent from the participants through the use of consent forms. They were informed that their decision to participate or not would not impact their course grades. Further details about the participants are provided below.

Participants

Sixty-seven students from three first-year novice-level Chinese classes were recruited from a Japanese university. They were taught by the same instructor. Their mean age was 20.30 years old ($SD = 1.05$). Female: male ratio was 1:1.58. By the time of data collection, they had learned English as a foreign language for an average of 5.07 years ($SD = 2.72$). None of the students reported any study-abroad experience exceeding 1 month in English- or Chinese-speaking countries. The participants completed a 40-item L2 English vocabulary knowledge test adapted from Matsuo (2017), with further details provided in the subsequent section. The average accuracy rate was 46.46%. Additionally, they were asked to self-assess their English reading proficiency using a 6-point Likert scale (1, poor; 2, below average; 3, average; 4, good; 5, very good; 6, near native). The average rating was 2.56 ($SD = 0.94$), indicating that the participants perceived their English proficiency level as average or below average. Only 56 participants completed all seven tasks; thus, their data were reported in this study.

Task Battery

L1 Japanese, L2 English, and L3 Chinese Morphological Awareness. Morphological awareness in all three languages were measured via a computerized and timed morpheme counting task designed after Bernstein et al. (2020) (see a similar design in Koda & Miller, 2018), but administered with the instructions presented in Japanese, and items presented in the three different languages respectively. For example, in the L2 English morphological awareness task, participants were first provided with instructions that (1) explained a morpheme as the smallest meaningful unit in a language and (2) provided examples of one-, two-, three-, and four-morpheme words in English (e.g., phone = phone; training = train- + -ing; retraining = re- + train + -ing; babysitters = baby- + sit + -er + -s). There were four practice trials. In each trial, participants saw a fixation cross in the middle of the screen for 200 ms, followed by the target word. They were asked to judge the number of morpheme(s) in the target word and type their answers below the target words. They were given 6 s to respond after the appearance of the target word for each trial, and there was a countdown clock on the top of the screen reminding them of the time limit. After the practice trials, the participants proceeded with the experimental task. All tasks were administered via the online platform Gorilla (see https://gorilla.sc/). The same procedures were applied to L1 Japanese and L2 Chinese morphological awareness tasks, except that the total item numbers varied among the three languages. Each correct response was counted as one point. The maximum scores possible and the reliability information of all tasks are reported in Table 1 of the Results section.

It should be noted that the target learner population of the present study is university adult L3 learners, for

whom a receptive word segmentation task might tap into language-general and shareable morphological awareness (e.g., Hayashi & Murphy, 2011), and a timed task might be more suitable (e.g., the timed morpheme counting task used by Koda & Miller, 2018) because it helps avoid ceiling effects commonly observed in paper-and-pencil tasks used for child learners (see also Ke et al., 2021).

L2 English Vocabulary Knowledge. This paper-and-pencil vocabulary task was adopted from Matsuo (2017), who developed the tool for Japanese-speaking learners of English for reading comprehension development. In this task, participants were presented with a target vocabulary word in a sentence and asked to choose the best meaning/synonym in English from the four choices. For example, for the target vocabulary word "time," each participant would see the vocabulary and a sample sentence "Time: They have a lot of time." They were then asked to choose the meaning from "A. money, B. food, C. hours, and D. friends." The correct answer is "C. hours." There were 40 items in this task. One point was assigned for each correct response.

L2 English Lexical Inferencing. This paper-and-pencil task was adapted from Koda and Miller (2018). They administered the task with Japanese university learners of English in their study whose background was similar to our target learner population. In this task, the participants were asked to guess the meanings of 16 English pseudowords embedded in eight short passages. For each word, participants were asked to choose the best meaning from among the four choices: one incorporating contextual but not morphological information, one incorporating morphological but not contextual information, one incorporating both morphological and contextual information, and one which incorporated neither. Each correct choice was rewarded with one point.

L3 Chinese Vocabulary Knowledge. This was a paper-and-pencil task adopted from Liu (2013), which included 60 single- and two-character Chinese words. The task reliability in Liu's study of L2 Chinese learners was very high (Cronbach's alpha = .94). The participants in this research were asked to self-report if they knew the meaning of the words and indicate yes/no. Any "yes" response was counted as one point. Vocabulary self-report in a checklist format has been adopted by previous research assessing Chinese L1 or L2 vocabulary knowledge (e.g., Qi et al., 2024).

L3 Chinese Lexical Inferencing. This paper-and-pencil task was constructed after Ke & Koda (2017). The participants were asked to guess the meaning of an unfamiliar Chinese multi-character word underlined in a short sentence or phrase. The unfamiliar words could be categorized as 16 cognate words and 16 noncognate words based on the similarities or differences between Chinese and Japanese words (e.g., 多民族 was a cognate word item because it is written in the same form in Chinese characters and Japanese Kanji, both meaning "multi-ethnic"; 覆盖面 was a noncognate word item because it means "coverage" in Chinese, but the equivalent word in Japanese was written in Katakana カバレッジ). The rationale to include cognate and noncognate words was to control for the potential confounding effect of L1 Japanese learners' knowledge of Kanji. There were 32 items in this task. Each correct response was rewarded with one point.

Data Collection and Analysis Procedures

Data collection was conducted during Chinese class time with help from the course instructor and spaced out over six weeks within the same semester. Each student had a MacBook Air to complete the computerized morphological awareness tasks in class.

To answer the research questions, statistical analyses involved paired-sample *T*-test (to examine whether there was a significant difference between inferring cognate word meanings and inferring noncognate word meanings in L3 Chinese lexical inferencing) and correlational analyses (to explore the interrelationships among the various L1, L2, and L3 variables), followed by regression analyses with L3 Chinese lexical inferencing as the criterion variable, L1 Japanese morphological awareness and the three L2 English reading subcomponent skills (i.e., L2 English morphological awareness, L2 English vocabulary knowledge, and L2 English lexical inferencing) as predictors, and L3 Chinese morphological awareness and vocabulary knowledge as control variables. All statistical analyses were carried out via SPSS Version 28.0.

The assumptions for paired-sample *T*-test were checked and met via two steps: The first step checked the distribution of mean differences using a normal Q-Q plot. Minimal deviations between the dots and the line suggested a normal distribution. The second step examined the 95% confidence interval for the mean difference, which was reported to be between 4.06 and 5.29, thus did not include zero. We also tested three assumptions using SPSS for the regression models shown in Tables 3 and 4 below: (1) The normality of residuals was confirmed by a normal P-P plot, where the residuals' normal distribution closely aligned with the plot's diagonal line. (2) Homoscedasticity was confirmed as the residuals were evenly distributed across the scatterplot of predicted values against residuals. (3) The absence of multicollinearity was confirmed as all correlation coefficients

Table 2. Bivariate Correlations Among L1 Japanese, L2 English, and L3 Chinese Variables ($N = 56$).

	JMA	EMA	CMA	EVOC	CVOC	ELI	CLI	CCLI	NCCLI
JMA	–								
EMA	0.23*	–							
CMA	0.07	0.13	–						
EVOC	0.15	0.18	0.08	–					
CVOC	0.09	0.08	0.001	0.31**	–				
ELI	0.05	0.11	0.04	0.37**	0.10	–			
CLI	0.28*	0.18	0.07	0.20	0.34**	−0.17	–		
CCLI	0.15	0.09	0.02	−0.03	0.15	−0.15	0.81**	–	
NCCLI	0.30**	0.18	0.10	0.35**	0.39***	−0.16	0.81**	0.31**	–

Notes. JMA = Japanese morphological awareness; EMA = English morphological awareness; CMA = Chinese morphological awareness; EVOC = English vocabulary knowledge; CVOC = Chinese vocabulary knowledge; ELI = English lexical inferencing; CLI = Chinese lexical inferencing (total); CCLI = Chinese lexical inferencing of cognate words; NCCLI = Chinese lexical inferencing of noncognate words.
* = $p < .05$; ** = $p < .01$; *** = $p < .001$.

of the focal variables were below 0.80 (as reported in Table 3 below). Variance Inflation Factor values were all below 2.0. Detailed SPSS output can be accessed at OSF once the manuscript is accepted for publication.

Results

Descriptive Statistics and Preliminary Analysis Results

Descriptive statistical results are illustrated in Table 1 below. For the L3 Chinese lexical inferencing task, the subscore means of 95% CIs and SDs for the two types of unknown words (i.e., orthographic cognate and noncognate words) are also reported.

As mentioned previously, the first step was to explore whether there was any difference in the participants' responses to cognate versus noncognate words in the L3 Chinese lexical inferencing task. Paired-sample T-test analysis results suggested that there was a significant difference: mean difference in cognate versus noncognate word inferencing = 4.80, $t = 17.35$, $df = 63$, $p < .001$; Cohen's d estimate = 2.17, 95% CI [1.72, 2.62]. Subsequently, correlational analysis was conducted, and the results are presented in Table 2.

Five major patterns emerged: (1) L1 Japanese morphological awareness correlated with L2 English morphological awareness ($r = .23$, $p = .031$) and L3 Chinese lexical inferencing of noncognate words significantly ($r = .30$, $p = .008$). (2) L2 English vocabulary knowledge correlated with L2 English lexical inferencing ($r = .37$, $p = .002$), L3 Chinese vocabulary knowledge ($r = .31$, $p = .010$), and L3 Chinese lexical inferencing of noncognate words significantly ($r = .35$, $p = .004$). (3) L3 Chinese vocabulary knowledge correlated with L3 Chinese lexical inferencing of noncognate words significantly ($r = .39$, $p < .001$). (4) Neither L2 English nor L3 Chinese morphological awareness correlated significantly with L2 English lexical inferencing (*respective ps* = .195, .376) or L3 Chinese lexical inferencing (*respective ps* = .078, .282). And (5), L3 Chinese lexical inferencing of noncognate words correlated significantly with L3 Chinese lexical inferencing (total) ($r = .81$, $p < .001$) and L3 Chinese lexical inferencing of cognate words only ($r = .31$, $p = .007$).

Given the results of the paired sample T-test and correlational analysis, L3 Chinese lexical inferencing of noncognate words was treated as the criterion variable and labeled as "L3 Chinese lexical inferencing" in the following regression analyses. The possible explanation for the lack of significant predictors of L3 Chinese lexical inferencing of cognate words is provided in the *Discussion* section.

Association Between L1 Japanese Morphological Awareness and L3 Chinese Lexical Inferencing

As mentioned above, among L1 Japanese morphological awareness, L3 Chinese morphological awareness, and L3 Chinese vocabulary knowledge, only L1 Japanese morphological awareness and L3 Chinese vocabulary knowledge correlated significantly with L3 Chinese lexical inferencing. Thus, L3 Chinese morphological awareness was not included in the regression models. As shown in Table 3 below, L1 Japanese morphological awareness was entered first in Model 1, followed by L3 Chinese vocabulary knowledge; in Model 2, the entry order was reversed. Since there was no significant correlation between L1 Japanese morphological awareness and L3 Chinese vocabulary knowledge ($r = .09$, $p = .256$), no interactional effect was explored.

The results in Table 3 indicate that when L1 Japanese morphological awareness was first entered into the regression model, there was a significant effect ($p = .025$), and that when L3 Chinese vocabulary knowledge was entered in Step 2, there was an additional significant effect ($p = .003$). When the entry order was

Table 3. Regression Analysis with L3 Chinese Lexical Inferencing (of Noncognate Words) as the Criterion Variable and L1 Japanese Morphological Awareness (JMA) and L3 Chinese Vocabulary Knowledge (CVOC) as the Predictors ($N = 56$).

Model no.	R	R^2	ΔR^2	B	SE	β	t	Sig.
Model 1								
Step 1	.29	.08	.08*					
JMA				0.16	0.07	.29	2.30	.025
Step 2	.47	.22	.14**					
JMA				0.14	0.06	.26	2.20	.032
CVOC				0.08	0.03	.37	3.14	.003
Model 2								
Step 1	.39	.15	.15**					
CVOC				0.09	0.03	.39	3.24	.002
Step 2	.47	.22	.07*					
CVOC				0.08	0.03	.37	3.14	.003
JMA				0.14	0.06	.26	2.20	.032

* = $p < .05$; ** = $p < .01$.

Table 4. Regression Analysis with L3 Chinese Lexical Inferencing (of Noncognate Words) as the Criterion Variable and L2 English Vocabulary Knowledge (EVOC) and L3 Chinese Vocabulary Knowledge (CVOC) as the Predictors ($N = 56$).

Model no.	R	R^2	ΔR^2	B	SE	β	t	Sig.
Model 3								
Step 1	.35	.12	.12**					
EVOC				0.09	0.03	.35	2.72	.009
Step 2	.46	.21	.09**					
EVOC				0.06	0.03	.25	1.94	.058
CVOC				0.07	0.03	.31	2.43	.019
Model 4								
Step 1	.39	.15	.15**					
CVOC				0.09	0.03	.39	3.11	.003
Step 2	.46	.21	.06**					
CVOC				0.07	0.03	.31	2.43	.019
EVOC				0.06	0.03	.25	1.94	.058

Note. ** = $p < .01$.

reversed in Model 2, both L3 Chinese vocabulary knowledge and L1 Japanese morphological awareness were found to be significant predictors of L3 Chinese lexical inferencing (respective $p = .002, .032$).

To answer RQ1, L1 Japanese morphological awareness was significantly related to L3 Chinese lexical inferencing, uniquely explaining about 7% of the variance over and above L3 Chinese vocabulary knowledge.

Associations Between L2 English Reading Subcomponents and L3 Chinese Lexical Inferencing

To reiterate, among L2 English morphological awareness, L2 English vocabulary knowledge, and L2 English lexical inferencing, only L2 English vocabulary knowledge was found to be significantly correlated with L3 Chinese lexical inferencing. To explore any unique association between L2 English vocabulary knowledge and L3 Chinese lexical inferencing, regression analysis was conducted with L3 Chinese lexical inferencing as the criterion variable, as well as L2 English vocabulary knowledge and L3 Chinese vocabulary knowledge as the predictors. Since L2 English vocabulary knowledge and L3 Chinese vocabulary knowledge significantly correlated with each other, any interactional effect was first explored, and the result was not significant ($p = .188$). Subsequently, L2 English vocabulary knowledge was first entered in Model 1, followed by L3 Chinese vocabulary knowledge. The entry order was reversed in Model 2 (as shown in Table 4).

The results in Table 4 suggest the following: (1) When L2 English vocabulary knowledge was entered into the regression model alone, it was found to be significantly related to L3 Chinese lexical inferencing ($p = .009$) and explained about 12% of the variance in L3 Chinese lexical inferencing. Yet, when L3 Chinese vocabulary knowledge was entered into the model, the effect of L2 English

vocabulary knowledge was no longer significant ($p = .058$). (2) When the entry order was reversed in Model 2, the results were the same.

As mentioned earlier, no interactional effect was detected between L2 English vocabulary knowledge and L3 Chinese vocabulary knowledge. In other words, any effect of L2 English vocabulary knowledge on L3 Chinese lexical inferencing was not moderated by L3 Chinese vocabulary. To explore whether there was any effect of L2 English vocabulary knowledge on L3 Chinese lexical inferencing mediated by L3 Chinese vocabulary knowledge, a regression-based path model was examined via a bootstrap method (samples = 5000) used in an SPSS add-on tool (i.e., PROCESS V4.0, Hayes, 2018). L3 Chinese lexical inferencing of noncognate words was entered as the criterial variable, L2 English vocabulary knowledge as the independent variable, and L3 Chinese vocabulary knowledge as the mediator (see a similar approach used by Ke & Koda, 2019 with 50 participants). No significant mediation effect was found (estimate = 0.0238, BootSE = 0.0141, BootLLCI = −.0001, BootULCI = .0548).

To answer RQ2, none of the L2 English reading subcomponents (i.e., L2 English morphological awareness, L2 English vocabulary knowledge, and L2 English lexical inferencing) were significantly related to L3 Chinese lexical inferencing directly, when the effect of L3 Chinese vocabulary knowledge was accounted for.

Associations Among L1 Japanese Morphological Awareness, L2 English Reading Subcomponents, and L3 Chinese Lexical Inferencing

To recapitulate, earlier analysis results indicated that when the effect of L3 Chinese vocabulary knowledge was considered, L1 Japanese morphological awareness was significantly related to L3 Chinese lexical inferencing, yet none of the L2 English reading subcomponents were significantly related to L3 Chinese lexical inferencing. L2 English vocabulary knowledge seemed to have a marginal yet nonsignificant effect on L3 Chinese lexical inferencing ($p = .058$). A remaining question is whether L2 English vocabulary knowledge is indirectly related to L3 Chinese lexical inferencing via L1 Japanese morphological awareness, as previous Japanese-English bilingual reading research has found. Such research has observed that L2 reading subskills can transfer to L1 reading (e.g., Hayashi & Murphy, 2013). However, there was no significant correlation between L1 Japanese morphological awareness and L2 English vocabulary knowledge ($r = .15$, $p = .120$). Therefore, no further regression analysis was conducted to examine whether L2 English vocabulary knowledge was indirectly related to L3 Chinese lexical inferencing via L1 Japanese morphological awareness.

To answer RQ3, L1 Japanese morphological awareness and L2 English reading subcomponents were not jointly related to L3 Chinese lexical inferencing. Likewise, there was no indirect association between L2 English vocabulary knowledge and L3 Chinese lexical inferencing via L1 Japanese morphological awareness.

Discussion

To recapitulate, the present study explored the transfer mechanism of morphological awareness in L3 reading with adult learners of three distinct writing systems (i.e., syllabic L1 Japanese, alphabetic L2 English, and morphosyllabic L3 Chinese). The study found that (1) L1 Japanese morphological awareness was significantly and directly associated with L3 Chinese lexical inferencing, beyond L3 Chinese vocabulary knowledge, (2) none of the L2 English reading subcomponent skills (i.e., L2 English morphological awareness, L2 English vocabulary knowledge, and L2 English lexical inferencing) were found to be directly related to L3 Chinese lexical inferencing when the effect of L3 Chinese vocabulary knowledge was controlled for, and (3) there was no joint contribution from L1 Japanese morphological awareness and L2 English reading subcomponents to L3 Chinese lexical inferencing. The findings support the transfer facilitation model's prediction about the consistent impact of L1 reading experience on subsequent reading development in an additional language (Koda, 2005, 2008).

Additionally, the finding of the contribution of L1 Japanese morphological awareness to L3 Chinese lexical inferencing over and above L3 Chinese vocabulary knowledge has expanded Koda's (2005, 2008) transfer facilitation model because this model was initially developed based on bilingual/L2 reading in two languages and did not include predictions about the role of L1 morphological awareness in L3 reading development. One possible explanation for multilingual learners' reading ability development could be language aptitude (e.g., Sparks, 2022; Wen et al., 2022). Language aptitude is often defined as specific and superior cognitive abilities or potentials that people demonstrate when learning an additional language as opposed to their peers (Carroll, 1990; Doughty, 2019). Sparks (2022) held that the development of reading leads to more developed metalinguistic awareness, which further enhances L1 reading skills. Both L1 reading and metalinguistic awareness contribute to a stronger language aptitude in an additional language, leading to better bilingual/multilingual achievement.

Questions may exist regarding why there was no significant effect of L2 English reading subcomponent skills on L3 Chinese lexical inferencing, and as a result, there was no joint contribution of L1 and L2 reading subskills to L3 Chinese lexical inferencing. This finding

corroborated that of Cho and Tong (2014), who found no influence of L2 reading experience on L3 reading in L1 Korean-L2 English-L3 Chinese readers, yet differed from that of Teng and Tang (2024) who observed additive contributions of L1 and L2 use for L3 Chinese morphology learning. There are two potential explanations for this discrepancy: Firstly, in this study, the participants were learning Chinese and English as foreign languages in Japan. Their proficiency in L2 English and L3 Chinese may not have been sufficiently advanced to support L3 Chinese lexical inferencing (see also Hammarberg, 2001; Lasagabaster, 1998). Secondly, the study design differed between our research and that of Teng and Tang (2024). Our study was observational and cross-sectional, while theirs was a mixed-methods study with an intervention component. However, it is worth noting that in their intervention, they encouraged the use of first language (L1) Japanese and L2 English for L3 Chinese morphology learning, but did not explicitly promote the use of L1 Japanese morphological awareness and L2 English morphological awareness.

Another puzzling finding was that no significant predictors were identified for L3 Chinese lexical inferencing of cognate words. It is likely that the participants adopted an all-or-nothing approach toward L3 Chinese lexical inferencing of cognate words, thus, no clear pattern was observed. It is also possible that cognate awareness between Japanese and Chinese could contribute to L3 lexical inferencing beyond morphological awareness and other reading subcomponents (e.g., D'Angelo et al., 2017; H. Zhang et al., 2024); however, no cognate awareness was measured in this research.

It should be acknowledged that the reliability of L2 English morphological awareness and L3 Chinese morphological awareness tasks was lower than that of L1 Japanese morphological awareness task, which might lead to the nonsignificant effects of L2 English morphological awareness and L3 Chinese morphological awareness on L3 Chinese. The low reliability of L2 and L3 morphological awareness might be due to the participants' undeveloped L2 and L3 proficiency levels in this research (see Plonsky & Derrick, 2016). The relatively low L2 and L3 proficiency levels could also explain the lack of transfer facilitation effects of L2 and L3 morphological awareness on L3 Chinese lexical inferencing, as prior L2 reading studies found that morphological awareness was better utilized by more skilled L2 learners than less skilled L2 learners (e.g., Chen, 2018; Koda & Miller, 2018).

Conclusions, Limitations, and Implications

To conclude, this research examined the crosslinguistic of morphological awareness in L3 lexical inferencing with adult L1 Japanese-L2 English-L3 Chinese learners. Only a significant correlation was found between L1 Japanese morphological awareness and L3 Chinese lexical inferencing. There was no additional effect of L2 English reading subcomponent skills on L3 Chinese lexical inferencing. The present study is among the first to confirm that, for Japanese-English-Chinese multilingual learners, morphological awareness is a shareable metalinguistic resource in L3 reading, not constrained by L3 linguistic knowledge (measured as vocabulary knowledge in this study). In a broader context, this research contributes to the ongoing discussion about whether, besides L1 morphological awareness, L2 morphological awareness provides any further contribution to the acquisition of L3 reading subskills among multilingual learners. Our findings suggest that there is no additional contribution from L2 morphological awareness, a conclusion that aligns with the findings of Cho and Tong (2014).

Several limitations of this study should be addressed in future research. Firstly, the sample size ($N = 56$) is relatively small, indicating a need for larger and more linguistically diverse samples. Secondly, we used only one type of task (i.e., timed morpheme counting) to measure morphological awareness in Japanese, English, and Chinese for adult learners in this study. More future research, however, is needed to further investigate the transfer mechanism of morphological awareness in L3 reading by including multiple measures of morphological awareness, targeting different reading outcomes (e.g., word decoding and passage reading comprehension in addition to lexical inferencing), and including more covariates such as cognate awareness and Kanji knowledge. Lastly, this study employed a cross-sectional design and analyzed data based on correlation and regression. As a result, the observed association between L1 Japanese morphological awareness and L3 Chinese lexical inferencing is correlational, not causal. To investigate causality (i.e., whether L1 Japanese morphological awareness causes changes in L3 Chinese lexical inferencing), future research should consider experimental interventional studies to capture the causal effect of L1 morphological awareness on L3 reading, or longitudinal studies to track the influence of L1 morphological awareness on L3 reading over time.

The findings of the study indicated that L3 Chinese vocabulary knowledge alone is insufficient for successful L3 Chinese lexical inferencing and a direct link exists between L1 Japanese morphological awareness and L3 Chinese lexical inferencing. Therefore, it is important for instructors to raise learners' awareness of applying L1 Japanese metalinguistic resources to L3 Chinese reading. For instance, Littlewood and Shufang (2022) suggested that while teachers should avoid excessive use of L1, they should also leverage its potential as a learning aid. Also, the findings of this research suggested that L2 English morphological awareness or L2 English lexical

inferencing is not significantly associated with L3 Chinese lexical inferencing. Future research may consider recruiting participants with higher L2 (and L3) proficiency, so as to explore whether prior L2 reading experience may or may not be beneficial to L3 reading development.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This research has been supported by The Hong Kong Polytechnic University CBS Departmental General Research Fund.

ORCID iDs

Sihui (Echo) Ke https://orcid.org/0000-0003-2665-0637
Xuehong (Stella) He https://orcid.org/0000-0002-6419-0187
Guihua Zhao https://orcid.org/0000-0003-4947-4023

Data Availability Statement

The dataset is available at: osf.io/95zx3.

References

Bassetti, B. (2007). Bilingualism, biliteracy and metalinguistic awareness: Word awareness in English and Japanese users of Chinese as a second language. *Birkbeck Studies in Applied Linguistics*. *1*, 1–21.

Bernstein, S. E., Flipse, J. L., Jin, Y., & Odegard, T. N. (2020). Word and sentence level tests of morphological awareness in reading. *Reading and Writing*, *33*(6), 1591–1616. https://doi.org/10.1007/s11145-020-10024-6

Carlisle, J. F. (1995). Morphological awareness and early reading achievement. In L. B. Feldman (Ed.), *Morphological aspects of language processing* (pp. 189–209). Lawrence Erlbaum.

Carlisle, J. F. (2000). Awareness of the structure and meaning of morphologically complex words: Impact on reading. *Reading and Writing*, *12*, 169–190. https://doi.org/10.1023/A:1008131926604

Carroll, J. B. (1990). Cognitive abilities in foreign language aptitude: Then and now. In T. S. Parry, & C. W. Stansfield (Eds.), *Language aptitude reconsidered* (pp. 11–29). Prentice-Hall.

Chen, T. (2018). The contribution of morphological awareness to lexical inferencing in L2 Chinese: Comparing more-skilled and less-skilled learners. *Foreign Language Annals*, *51*(4), 816–830. https://doi.org/10.1111/flan.12365

Chen, X., & Pasquarella, A. (2017). Learning to read Chinese. In L. Verhoeven, & C. Perfetti (Eds.), *Learning to read across languages and writing systems* (pp.1–30). Cambridge University Press.

Cho, E., & Tong, F. (2014). Morphology-based cross language transfer from Korean to literacy acquisition in English and Chinese. *Asian Journal of Humanities and Social Sciences (AJHSS)*, *2*(1), 21–36.

Chung, S. C., Chen, X., & Geva, E. (2019). Deconstructing and reconstructing cross-language transfer in bilingual reading development: An interactive framework. *Journal of Neurolinguistics*, *50*, 149–161. https://doi.org/10.1016/j.jneuroling.2018.01.003

D'Angelo, N., Hipfner-Boucher, K., & Chen, X. (2017). Predicting growth in English and French vocabulary: The facilitating effects of morphological and cognate awareness. Developmental Psychology, *53*(7), 1242–1255. https://doi.org/10.1037/dev0000326

DeFrancis, J. (1989). *Visible speech: The diverse oneness of writing systems*. University of Hawaii Press.

Doughty, C. J. (2019). Cognitive language aptitude. *Language Learning*, *68*, 101–126. https://doi.org/10.1111/lang.12322

Frost, R. (2012). Towards a universal model of reading. *Behavioral and Brain Sciences*, *35*(5), 263–279. https://doi.org/10.1017/S0140525X11001841

Genesee, F., Geva, E., Dressler, C., & Kamil, M. (2006). Synthesis: Cross-linguistic relationships in working memory, phonological processes, and oral language. In D. August, & T. Shanahan (Eds.), *Developing literacy in second-language learners: Report of the National Literacy Panel on language-minority children and youth* (pp. 153–174). Lawrence Erlbaum.

Geva, E., & Siegel, L. S. (2000). Orthographic and cognitive factors in the concurrent development of basic reading skills in two languages. *Reading and Writing*, *12*(1), 1–30. https://doi.org/10.1023/A:1008017710115

Haastrup, K. (1991). *Lexical inferencing procedures, or, talking about words: Receptive procedures in foreign language learning with special reference to English*. Gunter Narr Verlag.

Hammarberg, B. (2001). Roles of L1 and L2 in L3 production and acquisition. In J. Cenoz, B. Hufeisen, & U. Jessner (Eds.), *Cross-linguistic influence in third language acquisition* (pp. 21–24). Multilingual Matters Ltd.

Hammarberg, B. (2014). Problems in defining the concepts of L1, L2 and L3. In A. Otwinowska, & G. De Angelis (Eds.), *Teaching and learning in multilingual contexts: Sociolinguistic and educational perspectives* (pp. 3–18). Multilingual Matters. https://doi.org/10.21832/9781783091263-003

Hayashi, Y., & Murphy, V. (2011). An investigation of morphological awareness in Japanese learners of English. *Language Learning Journal*, *39*(1), 105–120. https://doi.org/10.1080/09571731003663614

Hayashi, Y., & Murphy, V. A. (2013). On the nature of morphological awareness in Japanese–English bilingual children: A cross-linguistic perspective. *Bilingualism: Language and Cognition*, *16*(1), 49–67. https://doi.org/10.1017/S1366728912000181

Hayes, A. F. (2018). Partial, conditional, and moderated mediation: Quantification, inference, and interpretation.

Communication Monographs, *85*(1), 4–40. https://doi.org/10.1080/03637751.2017.1352100

Hipfner-Boucher, K., & Chen, X. (2016). Cross-language transfer of metalinguistic and cognitive skills in second language learning. In X. Chen, V. Dronjic, & R. Helms-Park (Eds.), *Reading in a second language: Cognitive and psycholinguistic issues* (pp. 99–132). Routledge/Taylor & Francis Group.

Ke, S. & Koda, K. (2017). Contributions of morphological awareness to adult L2 Chinese word meaning inferencing. *The Modern Language Journal*, *101*(4), 742–755. https://doi.org/10.1111/modl.12428

Ke, S. & Koda, K. (2019). Is vocabulary knowledge sufficient for word meaning inference? An investigation of the role of morphological awareness in adult L2 learners of Chinese. *Applied Linguistics*, *40*(3), 456–477. https://doi.org/10.1093/applin/amx040

Ke, S. & Koda, K. (2021). Transfer facilitation effects of morphological awareness on multicharacter word reading in Chinese as a second language. *Applied Psycholinguistics*, *42*(5), 1263–1286. https://doi.org/10.1017/S01427164210 0031X

Ke, S., Zhang, D. & Koda, K. (2023). *Metalinguistic awareness in second language reading development*. Cambridge University Press. Doi: 10.1017/9781108979801

Kirby, J. R., & Bowers, P. N. (2017). Morphological instruction and literacy: Binding phonological, orthographic, and semantic features of words. In K. Cain, D. L. Compton, & R. K. Parrila (Eds.), *Theories of reading development* (pp. 437–462). John Benjamins Publishing Company. https://doi.org/10.1075/swll.15.24kir

Koda, K. (2005). *Insights into second language reading: A cross-linguistic approach*. Cambridge University Press.

Koda, K. (2008). Impacts of prior literacy experience on second-language learning to read. In K. Koda, & A. M. Zehler (Eds.), *Learning to read across languages: Cross-linguistic relationships in first- and second-language literacy development* (pp. 68–96). Routledge.

Koda, K. (2017). Learning to read Japanese. In L. Verhoeven, & C. Perfetti (Eds.), *Learning to read across languages and writing systems* (pp.31–56). Cambridge University Press.

Koda, K., & Miller, R. T. (2018). Cross-linguistic interaction in L2 word meaning inference in English as a foreign language. In H. K. Pae (Ed.), *Writing systems, reading processes, and cross-linguistic influences: Reflections from the Chinese, Japanese and Korean languages* (pp. 293–312). John Benjamins.

Kuo, L. J., & Anderson, R. C. (2008). Conceptual and methodological issues in comparing metalinguistic awareness across languages. In K. Koda, & A. M. Zehler (Eds.), *Learning to read across languages: Cross-linguistic relationships in first- and second-language literacy development* (pp. 39–67). Routledge.

Lasagabaster, D. (1998). The threshold hypothesis applied to three languages in contact at school. *International Journal of Bilingual Education and Bilingualism*, *1*(2), 119–133. https://doi.org/10.1080/13670059808667678

Levesque, K. C., Breadmore, H. L., & Deacon, S. H. (2021). How morphology impacts reading and spelling: Advancing the role of morphology in models of literacy development. *Journal of Research in Reading*, *44*(1), 10–26. https://doi.org/10.1111/1467-9817.12313

Littlewood, W., & Shufang, W. (2022). The role of 'learners' first language in the foreign language classroom. *Language Teaching Research Quarterly*, *31*, 174–182. https://doi.org/10.32038/ltrq.2022.31.12

Liu, Y. (2013). *L1 reading ability, L2 linguistic knowledge, and L2 semantic gap filling ability* [Unpublished doctoral dissertation]. Carnegie Mellon University, Pittsburgh, PA.

Matsuo, T. (2017). *The roles of lexical size, depth, and automaticity of word recognition on reading comprehension* [Unpublished doctoral dissertation]. Temple University, Philadelphia, PA.

Muroya, N., Inoue, T., Hosokawa, M., Georgiou, G. K., Maekawa, H., & Parrila, R. (2017). The role of morphological awareness in word reading skills in Japanese: A within-language cross-orthographic perspective. *Scientific Studies of Reading*, *21*(6), 449–462. https://doi.org/10.1080/10888438.2017.1323906

Park, E. C. (2004). *The relationship between morphological awareness and lexical inference skills for English language learning with Korean first-language background* [Unpublished doctoral dissertation]. Carnegie Mellon University, Pittsburgh, PA.

Plonsky, L., & Derrick, D. J. (2016). A Meta-Analysis of Reliability Coefficients in Second Language Research. *Modern Language Journal*, *100*(2), 538–553. https://doi.org/10.1111/modl.12335

Qi, S., Teng, M. F., & Fu, A. (2024). LexCH: A quick and reliable receptive vocabulary size test for Chinese Learners. *Applied Linguistics Review*, *15*(2), 643–670. https://doi.org/10.1515/applirev-2022-0006

Riches, C., & Genesee, F. (2006). Crosslanguage and crossmodal influences. In F. Genesee, K. Lindholm-Leary, W. Saunders, & D. Christian (Eds.), *Educating English language learners: A synthesis of research evidence* (pp.64–87). Cambridge University Press.

Sparks, R. L. (2022). Where does language aptitude come from? Redux. *Language Teaching Research Quarterly*, *31*, 19–40. https://doi.org/10.32038/ltrq.2022.31.03

Taylor, I., & Taylor, M. M. (2014). *Writing and literacy in Chinese, Korean and Japanese: Revised edition* (Vol. 14). John Benjamins.

Teng, M. & Fang, F. (2024). Translanguaging pedagogies in developing morphological awareness: the case of Japanese students learning Chinese in China. *Applied Linguistics Review*, *15*(4), 1477–1506. https://doi.org/10.1515/applirev-2022-0138

Wen, Z., Yang, J., & Han, L. (2022). Do polyglots have exceptional language aptitudes? *Language Teaching Research Quarterly*, *31*, 53–66. https://doi.org/10.32038/ltrq.2022.31.05

Zhang, D., Koda, K., & Leong, C. K. (2016). Morphological awareness and bilingual word learning: A longitudinal structural equation modeling study. *Reading and Writing: An Interdisciplinary Journal*, *29*, 383–407.

Zhang, H., Han, Y., Cheng, X., Sun, J., & Ohara, S. (2024). Unpacking cross-linguistic similarities and differences in third language Japanese vocabulary acquisition among Chinese college students. *Journal of Multilingual and Multicultural Development*, *45*(2), 101–113. https://doi.org/10.1080/01434632.2020.1865987