How do native Chinese speakers learning Japanese as a second language understand Japanese kanji homophones?

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The present study investigated causal relations between lexical/grammatical knowledge and the ability to make homophonic distinctions among 170 native Chinese speakers learning Japanese as a second language (L2). The result of a structural equation modelling (SEM) analysis indicated that the ability to distinguish homophones depending on sentential context was strongly affected by grammatical knowledge, though not by lexical knowledge. Therefore, grammatical knowledge greatly assists Chinese learners of L2 Japanese to identify the specific homophone appropriate in a sentential context among multiple candidates.

Keywords: Japanese kanji; Homophone; Chinese native speakers learning Japanese.

Learning to read a second language (L2) seems to be much easier when L2 uses symbols similar to those of the writing system of the first language (L1). As a major part of the writing system, the Japanese language has adapted Chinese characters, called kanji in Japanese. As a result, due to the application of their knowledge of Chinese characters, native Chinese speakers learning Japanese as a second language seem to be able to process Japanese kanji more quickly than native English speakers who use the alphabet script (e.g., Tamaoka, 1997, 2000). There are at least three times as many homophones in Japanese as in Chinese (Mochizuki, 1981), so that the correct word usually must be identified with the help of the kanji script (Tamaoka, 1991; Tamaoka & Makioka, 2004a). Thus, like native Japanese speakers, native Chinese speakers learning Japanese (hereafter, Chinese learners of L2 Japanese) make homophonic errors as they learn many words written in kanji. They experience difficulties avoiding the homophonic trap embedded in the Japanese writing system. The present study therefore tested Chinese learners of L2 Japanese to investigate which factors affect their ability to identify the specific homophone among multiple candidates that fit into a Japanese sentence.

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The writing system for the modern Japanese language consists of the kanji and kana scripts. Kanji are morphological units adapted from Chinese. In contemporary Japanese, kanji represent not only lexical items originated from Chinese (Kango) but also native Japanese vocabulary (Wago) created by Japanese speakers. Two-kanji compound words are extremely common, making up approximately 70% of the entries in a typical Japanese dictionary (Yokozawa & Umeda, 1988).

The kana script further consists of two sets, hiragana and katakana. The hiragana script is cursive in shape and used for grammatical morphemes as well as for some content words. The katakana script is angular in shape, and usually used for writing loanwords from languages written with alphabets, as well as the names of animals and plants. The hiragana and katakana scripts fundamentally describe Japanese sounds on the basis of mora-to-kana correspondence. Three scripts of kanji, hiragana, and katakana are simultaneously used in modern written Japanese texts.

Mochizuki (1981) counted type frequency of homophones listed in a Japanese dictionary, *Shin-meikai Kokugo-jiten* [New Coherent Japanese Dictionary] published in 1972. He found 21,270 homophones out of the total of 58,431 words, or 36.40%. In contrast, using a Chinese dictionary, *Hanyu Pinyin Cihui* [Chinese Pinyin Dictionary] published in 1963, Mochizuki counted 5,249 homophones out of the total of 45,200 words, or 11.61%. This includes the use of tonal differences to distinguish homophones. Thus, although the percentages of homophones identified by Mochizuki among Japanese and Chinese words are not directly comparable, it may allow us to estimate that there are approximately three times as many homophones in Japanese as in Chinese.

From the point of view of mapping between orthography and phonology, we will consider two directions for kanji mappings. First is the direction from orthography to phonology. A single Japanese kanji often has two different types of readings or pronunciations: On-readings derived from the original Chinese pronunciation and Kun-readings originating from the Japanese pronunciation (see Hirose, 1992; Kess & Miyamoto, 1999; Leong & Tamaoka, 1995; Tamaoka, 1991; Tamaoka & Makioka, 2004b). As depicted in Figure 1, the kanji 星 meaning “stars” is pronounced *hoshi* in Kun-reading and *see* or *shoo* in On-reading. Kun-readings frequently appear as a single kanji, often having a concrete meaning by themselves. In contrast, On-readings are generally used for multiple-kanji compound words such as 星座 *see za* meaning “constellation”, 衛星 *ee see* “satellite”, and 星条旗 *see joo ki* “the Stars and Stripes”. Kun-reading is also occasionally used for multiple-kanji compounds as in 星空 *hosi zora* “a starry sky”.

In a recent experiment, Tamaoka and Taft (2010) presented kanji that are given an On-reading around 50% of the time. These kanji were presented in a context of other kanji that had either a highly dominant On-reading or a highly dominant Kun-reading. The kanji reading was very much biased towards the type of phonological environment in which it was embedded. Native Japanese speakers easily shifted between On- and Kun-readings, depending on phonological context, suggesting that separate On and Kun sublexica exist within the phonological lexicon. Generally speaking, On-readings are used for Kango while Kun-readings are used for Wago. As such, a single kanji is mapped into multiple phonological units of On and Kun sublexica, as depicted in Figure 1.
The second mapping direction is from phonology to orthography. The standard Mandarin form of Chinese has the four tones, which greatly contribute to distinguish multiple homophones. However, the Japanese sound system does not have tones to differentiate homophones. The Japanese pitch accent may help identify a word, but it varies depending on dialect, so pitch is often unreliable for this purpose. Different ways of pronouncing kanji were borrowed from China during various periods (Miller, 1967; Saito, Inoue, & Nomura, 1979). Consequently, different pronunciations simultaneously exist in the pronunciation of kanji used in modern Japanese. In simplifying pronunciations of the Chinese tones and adapting three different ways of pronouncing forms borrowed from China, the Japanese language created a great number of kanji whose On-readings are homophonic. As shown in Figure 2, a mora or syllable is mapped into multiple kanji. For instance, according to Tamaoka, Kirsner, Yanase, Miyaoa, and Kawakami (2002), a sound koo (which consists of two morae, ko and o, or a single syllable koo) can be written with 65 different kanji among the Jyoyoo Kanji (旧常用漢字, the list of 1,945 commonly used kanji formerly used in public education), including one Kun-reading. In the same way, a single mora sound ka can be written with 37 different kanji, including three Kun-readings.

A two-kanji compound word kooka is made by combining the two sound units koo and ka as shown in Figure 2. This combined sound kooka can represent at least eight relatively high-frequency two-kanji compound Kango words, as depicted in Figure 3: 校歌 (school song), 高価 (expensive price), 工科 (technological faculty), 硬化 (calcification), 効果 (effect), 硬貨 (coin), 降下 (descent), and 高架 (elevated). These compound words are all On-reading combinations.

Homophones are also seen in Wago. For example, as depicted in Figure 4, toru can be written using at least eight different kanji as 取る “wild-craft” or “adapt”, 取る “take”, 改る “take (a picture)”, 売る “steal”, 銷る “record”, 捕る “catch”, 拭る “consume”, and 執る “administer”. Meanings of these homophones are distinguished by the orthographic aspect of kanji, which carry concepts. However, it is context that determines which of the homophones fits in a certain sentence.

Figure 1. Kanji orthography to phonology mapping.
In the present study, kanji homophones are defined as the same sound shared by different kanji, regardless of verb inflections. For instance, 付ける tsuku is an intransitive verb while 付ける tsukeru is a transitive verb. These words inflect differently, 付ける (tsuk+u) inflects as a godan verb while 付ける (tsuke+ru) as an ichidan verb. For this study, however, since both verbs share the same kanji 付, they are considered as (kanji) homophones. In fact, test items used by the Japan Association for Testing Japanese Kanji Abilities (Nihon Kanji Nooryoku Kentei Kyookai, 日本漢字能力検定協会) similarly include homophones which differ in verb inflections.

Given the large number of homophones existing among Japanese words, incorrect homophonic kanji or two-kanji compound words are occasionally selected even by native Japanese speakers when they write an essay (e.g., Hatta, Kawakami, & Tamaoka, 1998, 2002). Of the types of errors that native Japanese speakers make, phonologically related kanji writing errors were the most numerous (60.0%), followed by orthographically related errors (43.6%) and semantically related errors (29.7%). Based on the large percentage of phonologically related kanji errors, we can assume that native Japanese speakers activate multiple kanji or their compounds by a single sound, and occasionally replace the target with another inappropriately activated homophonic kanji. In fact, psycholinguistic studies (e.g., Sakuma, Sasanuma, Tatsumi, & Masaki, 1998; Tamaoka, 2005, 2007; Wydell, Patterson, & Humphreys, 2000) have shown that native Japanese speakers can activate multiple kanji from a single sound.

**Figure 2.** Kanji phonology to orthography mapping.
1993) found that multiple kanji and their compound words are simultaneously activated from a single phonological form.

KNOWLEDGE USED FOR HOMOPHONIC DISTINCTIONS BY CHINESE L2 JAPANESE LEARNERS

Learning kanji homophones is a major focus of L2 Japanese kanji learning above the intermediate level (e.g., Ishida, 1999; Okazaki, 1993). Like native Japanese speakers, L2 Japanese learners activate multiple homophonic units in lexical items as they memorise many kanji-presented words. Since Chinese learners of L2 Japanese can easily use their knowledge of Chinese characters to understand Japanese kanji (Tamaoka, 1997, 2000; Yamato & Tamaoka, 2009, 2011), they are expected to make homophonic errors similar to those native Japanese speakers do. Then, how do Chinese learners of L2 Japanese find the appropriate kanji from multiple homophonic candidates?

An earlier study of native Japanese speakers by Inoki (1976) found context effects on retrieving homophones among native Japanese speakers. In other words, native Japanese speakers select the proper kanji-presented lexical item out of multiple homophonic words based on context. Likewise, Kawaguchi (1993) and Takebe (1989) suggest that the acquisition of homophonic words by L2 learners requires not only kanji knowledge but also contextual knowledge for each homophone. As Chinese learners of L2 Japanese already know a reasonable number of words written in kanji at the intermediate level of Japanese language-learning, or at least their L1 lexical knowledge is fundamentally applicable to understand L2 Japanese lexical items, their kanji knowledge is expected to play a major role in identifying the proper homophone among multiple candidates. To accomplish this process, basic grammatical knowledge enables Chinese learners of L2 Japanese to properly understand the meanings of sentences prior to identifying an appropriate homophone.
The present study, therefore, aimed to clarify causal relations between lexical/grammatical knowledge and the ability to make homophonic distinctions depending on sentence context among native Chinese learners of L2 Japanese. Using a structural equation modelling (SEM) analysis, a causal model of lexical/grammatical knowledge affecting the ability to distinguish homophones was tested against the obtained data.

**METHOD**

**Participants**

A total of 170 native Chinese-speaking undergraduate students learning Japanese in China (17 males and 153 females) participated in the study. Ages ranged from 18 years and 0 months to 23 years and 3 months for a mean of 20 years and 5 months with a standard deviation of 10 months. All participants were majoring in the Japanese language, and had just completed their first ($n = 65$) or second year ($n = 105$) coursework.

**Three latent variables for structural equation modelling (SEM)**

Three latent variables for SEM, homophonic distinction, lexical knowledge, and grammatical knowledge, were measured by actual tests (i.e., observed variables). The means, standard deviations, correlations, and reliabilities of these tests are reported in Table 1.

**Tests of homophonic distinction**

Homophonic distinction was measured by using two tests for Kango and Wago homophonic words. Two sentences written in kana were given to participants. Participants were asked to select appropriate words to complete the two different sentences from a list of four homophonic words. For example, two kana sentences

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![Homophones in Wago](image)

*Figure 4. Homophones in Wago.*
TABLE 1
Means, standard deviations, and correlations for observed and latent variables

<table>
<thead>
<tr>
<th>No.</th>
<th>Observed variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Japanese origins (Wago)</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Chinese origins (Kango)</td>
<td>0.515***</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Alphabetic loanwords</td>
<td>0.606***</td>
<td>0.550***</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Function words</td>
<td>0.410***</td>
<td>0.551***</td>
<td>0.543***</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Morphological inflections</td>
<td>0.323***</td>
<td>0.326***</td>
<td>0.356***</td>
<td>0.266***</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Local dependency</td>
<td>0.133*</td>
<td>0.150*</td>
<td>0.104</td>
<td>0.142*</td>
<td>0.311***</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Complex structure</td>
<td>0.256***</td>
<td>0.367***</td>
<td>0.337***</td>
<td>0.370***</td>
<td>0.366***</td>
<td>0.437***</td>
<td>–</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Wago homophones</td>
<td>0.104</td>
<td>0.151*</td>
<td>0.100</td>
<td>0.184**</td>
<td>0.231***</td>
<td>0.186**</td>
<td>0.318***</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Kango homophones</td>
<td>0.182**</td>
<td>0.254***</td>
<td>0.185**</td>
<td>0.328***</td>
<td>0.212**</td>
<td>0.236***</td>
<td>0.379***</td>
<td>0.533***</td>
<td>–</td>
</tr>
</tbody>
</table>

Mean: 8.06 8.96 8.79 6.59 9.22 9.38 9.38 8.75 6.69 8.15
Standard deviation: 2.87 1.82 2.09 2.72 1.66 1.61 1.97 1.99 1.87

Note: n = 170. *p < .05; **p < .01; ***p < .001.
Osanai koro-o (kaisoo) shita “(I) looked back on my childhood” and Rookyuuka shita tenpo-o (kaisoo) shita “(I) renovated a decrepit shop” were given to participants, who were then asked to select two homophones out of four kanji-presented choices, all pronounced as kaisoo, to complete the above two sentences. There were 11 pairs in Kango and 12 pairs in Wago, with two correct homophones presented among four choices for each pair of sentences. These two observed variables construct ability of homophonic distinctions. The reliability of the 23 question items \((n=170)\) as measured by Cronbach’s alpha was .678.

The 11 pairs or 22 homophones of Kango are listed in Table 2. All these words and their embedded sentences with four homophone choices are presented in the Appendix. As shown in Table 2, 15 homophones out of 22 are not included in the lexical list of the formerly used Japanese Language Proficiency Test (Japan Foundation, 2002). Yet, 16 Kango homophones out of 22 exist in the Chinese language: native Chinese speakers in the present study were expected to be able to guess the meanings of a majority of the Kango homophones. Word frequency of each word was established using Amano and Kondo (2000, 2003 for the CD-ROM version). This index of word frequency was calculated using a corpus from editions of the Asahi Newspaper printed from 1985 to 1998, containing a total type frequency of 341,771 morphemic units (not word units) and a total token frequency of 287,792,797 morphemic units. According to this database, the average word frequency of the 22

<table>
<thead>
<tr>
<th>No.</th>
<th>Targets</th>
<th>Sound</th>
<th>Japanese proficiency level</th>
<th>Word frequency</th>
<th>Corresponding Chinese words</th>
<th>Sound</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>雄志</td>
<td>yuushi</td>
<td>High aspiration</td>
<td>Beyond the levels</td>
<td>140</td>
<td>Not existing</td>
</tr>
<tr>
<td>2</td>
<td>有志</td>
<td>yuushi</td>
<td>Volunteers</td>
<td>Beyond the levels</td>
<td>1,929</td>
<td>Existing</td>
</tr>
<tr>
<td>3</td>
<td>強正</td>
<td>kyoosee</td>
<td>Forcing</td>
<td>1st level</td>
<td>8,779</td>
<td>Existing</td>
</tr>
<tr>
<td>4</td>
<td>固辞</td>
<td>koi</td>
<td>Firm refusal</td>
<td>Beyond the levels</td>
<td>759</td>
<td>Not existing</td>
</tr>
<tr>
<td>5</td>
<td>謀示</td>
<td>koi</td>
<td>Ostentation</td>
<td>Beyond the levels</td>
<td>1,296</td>
<td>Existing</td>
</tr>
<tr>
<td>6</td>
<td>意向</td>
<td>ikoo</td>
<td>Inclination</td>
<td>1st level</td>
<td>23,158</td>
<td>Existing</td>
</tr>
<tr>
<td>7</td>
<td>行移</td>
<td>ikoo</td>
<td>Transition</td>
<td>1st level</td>
<td>9,480</td>
<td>Not existing</td>
</tr>
<tr>
<td>8</td>
<td>想想</td>
<td>kaisoo</td>
<td>Recollection</td>
<td>Beyond the levels</td>
<td>1,066</td>
<td>Existing</td>
</tr>
<tr>
<td>9</td>
<td>改裝</td>
<td>kaisoo</td>
<td>Renovation</td>
<td>Beyond the levels</td>
<td>1,410</td>
<td>Existing</td>
</tr>
<tr>
<td>10</td>
<td>持仕</td>
<td>hoosi</td>
<td>Volunteers</td>
<td>1st level</td>
<td>2,082</td>
<td>Not existing</td>
</tr>
<tr>
<td>11</td>
<td>胞子</td>
<td>hoosi</td>
<td>Spores</td>
<td>Beyond the levels</td>
<td>114</td>
<td>Existing</td>
</tr>
<tr>
<td>12</td>
<td>維承</td>
<td>keeshoo</td>
<td>Inheritance</td>
<td>Beyond the levels</td>
<td>3,847</td>
<td>Existing</td>
</tr>
<tr>
<td>13</td>
<td>警鐘</td>
<td>keeshoo</td>
<td>Warning</td>
<td>Beyond the levels</td>
<td>933</td>
<td>Existing</td>
</tr>
<tr>
<td>14</td>
<td>交欽</td>
<td>kookan</td>
<td>Enjoyment</td>
<td>Beyond the levels</td>
<td>398</td>
<td>Not existing</td>
</tr>
<tr>
<td>15</td>
<td>好感</td>
<td>kookan</td>
<td>Favourable impression</td>
<td>Beyond the levels</td>
<td>1,609</td>
<td>Existing</td>
</tr>
<tr>
<td>16</td>
<td>景気</td>
<td>keeki</td>
<td>Cyclical</td>
<td>2nd level</td>
<td>43,255</td>
<td>Existing</td>
</tr>
<tr>
<td>17</td>
<td>契機</td>
<td>keeki</td>
<td>Moment</td>
<td>2nd level</td>
<td>3,702</td>
<td>Existing</td>
</tr>
<tr>
<td>18</td>
<td>巧妙</td>
<td>koomyoo</td>
<td>Artifice</td>
<td>1st level</td>
<td>246</td>
<td>Existing</td>
</tr>
<tr>
<td>19</td>
<td>光明</td>
<td>koomyoo</td>
<td>Light</td>
<td>Beyond the levels</td>
<td>285</td>
<td>Existing</td>
</tr>
<tr>
<td>20</td>
<td>丹精</td>
<td>tansee</td>
<td>Painstaking</td>
<td>Beyond the levels</td>
<td>144</td>
<td>Not existing</td>
</tr>
<tr>
<td>21</td>
<td>嘆声</td>
<td>tansee</td>
<td>Sigh</td>
<td>Beyond the levels</td>
<td>33</td>
<td>Existing</td>
</tr>
</tbody>
</table>

Note: “Beyond the levels” refers to a word not included in the lexical list of the formerly used Japanese-Language Proficiency Test.
Kango homophones tested was 4,784 occurrences with a standard deviation of 9,809, varying from 33 times for 嘘声 to 43,255 times for 景気.

Likewise, as listed in Table 3, 12 pairs or 24 Wago homophones were used for the present study. All these words and the sentences where they are embedded with four homophone choices are presented in the Appendix. As shown in Table 3, three homophones were at the lowest proficiency level, the fourth level of the formerly used Japanese-Language Proficiency Test (Japan Foundation, 2002), 13 at the 2nd level, 3 at the 1st level, and 5 beyond the levels of the test. A large majority of the kanji used for stems of Kango homophones (22 out of 24 kanji) exist in the Chinese language. Thus, native Chinese speakers in the present study can guess the meanings of a majority of the items. Word frequency of each word was established using Amano and Kondo (2000, 2003 for the CD-ROM version). According to the database, the average word frequency of the 24 Wago homophones was 4,808 occurrences with a standard deviation of 7,495, varying from 70 times for 薬 ken to 32,981 times for 図る.

Tests of lexical knowledge

Lexical knowledge was gauged by four tests classified on the basis of word categories (Miyaoka, Tamaoka, & Sakai, 2011): function words, Kango, Wago, and loanwords (Gairaigo). This test has been used multiple times, almost always with high reliability.

Table 3

Japanese originated homophones (Wago) used for test items of homophonic distinction

<table>
<thead>
<tr>
<th>No.</th>
<th>Kanji</th>
<th>Word</th>
<th>Sound</th>
<th>Meaning</th>
<th>Japanese proficiency level</th>
<th>Word frequency</th>
<th>Corresponding Chinese kanji</th>
<th>Sound</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>答</td>
<td>a-geru</td>
<td>あげる</td>
<td>Give (example)</td>
<td>Fourth level</td>
<td>21,449</td>
<td>Existing</td>
<td>ju</td>
</tr>
<tr>
<td>2</td>
<td>還</td>
<td>a-geru</td>
<td>あげる</td>
<td>Fry</td>
<td>Second level</td>
<td>1,084</td>
<td>Existing</td>
<td>yang</td>
</tr>
<tr>
<td>3</td>
<td>留</td>
<td>susu-meru</td>
<td>すすめる</td>
<td>Invite</td>
<td>Second level</td>
<td>5,002</td>
<td>Existing</td>
<td>quan</td>
</tr>
<tr>
<td>4</td>
<td>窓</td>
<td>susu-meru</td>
<td>すすめる</td>
<td>Recommend</td>
<td>Beyond levels</td>
<td>241</td>
<td>Existing</td>
<td>jian</td>
</tr>
<tr>
<td>5</td>
<td>繰</td>
<td>to-ru</td>
<td>とる</td>
<td>Recruit</td>
<td>Second level</td>
<td>3,834</td>
<td>Existing</td>
<td>cai</td>
</tr>
<tr>
<td>6</td>
<td>繰</td>
<td>to-ru</td>
<td>とる</td>
<td>Take (picture)</td>
<td>Fourth level</td>
<td>6,648</td>
<td>Existing</td>
<td>cuo</td>
</tr>
<tr>
<td>7</td>
<td>繹</td>
<td>tsu-gu</td>
<td>つぐ</td>
<td>Continue</td>
<td>First level</td>
<td>3,149</td>
<td>Existing</td>
<td>ji</td>
</tr>
<tr>
<td>8</td>
<td>老</td>
<td>tsu-gu</td>
<td>つぐ</td>
<td>Follow</td>
<td>Second level</td>
<td>11,554</td>
<td>Existing</td>
<td>ci</td>
</tr>
<tr>
<td>9</td>
<td>更</td>
<td>hu-keru</td>
<td>くれる</td>
<td>(Night) go</td>
<td>Second level</td>
<td>70</td>
<td>Existing</td>
<td>ceng</td>
</tr>
<tr>
<td>10</td>
<td>老</td>
<td>hu-keru</td>
<td>くれる</td>
<td>Age</td>
<td>First level</td>
<td>101</td>
<td>Existing</td>
<td>Lao</td>
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<tr>
<td>11</td>
<td>汰</td>
<td>ka-ru</td>
<td>かる</td>
<td>Mow</td>
<td>Second level</td>
<td>439</td>
<td>Not existing</td>
<td>–</td>
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<tr>
<td>12</td>
<td>懲</td>
<td>ka-ru</td>
<td>かる</td>
<td>Urge</td>
<td>Beyond the levels</td>
<td>121</td>
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<td>qu</td>
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<td>13</td>
<td>懲</td>
<td>ka-ru</td>
<td>かる</td>
<td>Cash</td>
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<td>huan</td>
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<td>14</td>
<td>懲</td>
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<td>かる</td>
<td>Make up</td>
<td>Second level</td>
<td>1,640</td>
<td>Existing</td>
<td>ti</td>
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<tr>
<td>15</td>
<td>要</td>
<td>i-ru</td>
<td>いる</td>
<td>Need</td>
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<td>yao</td>
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<td>16</td>
<td>射</td>
<td>i-ru</td>
<td>いる</td>
<td>Shoot</td>
<td>Beyond the levels</td>
<td>357</td>
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<tr>
<td>17</td>
<td>絶</td>
<td>ta-tsu</td>
<td>たつ</td>
<td>Break off</td>
<td>Beyond the levels</td>
<td>2,786</td>
<td>Existing</td>
<td>jue</td>
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<td>断</td>
<td>ta-tsu</td>
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<td>Forswear</td>
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<td>1,390</td>
<td>Existing</td>
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<td>19</td>
<td>著</td>
<td>tsu-ku</td>
<td>たく</td>
<td>Arrive</td>
<td>Second level</td>
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<td>Existing</td>
<td>zhaolzhe</td>
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<td>付</td>
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<td>たく</td>
<td>Add</td>
<td>Second level</td>
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<td>fu</td>
</tr>
<tr>
<td>21</td>
<td>横</td>
<td>osa-meru</td>
<td>オサメる</td>
<td>Pursue</td>
<td>Beyond the levels</td>
<td>147</td>
<td>Existing</td>
<td>xiu</td>
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<tr>
<td>22</td>
<td>横</td>
<td>osa-meru</td>
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<td>Pay</td>
<td>Second level</td>
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<td>Existing</td>
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<td>図</td>
<td>haka-ru</td>
<td>はかる</td>
<td>Promote</td>
<td>Second level</td>
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<td>–</td>
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<tr>
<td>24</td>
<td>横</td>
<td>haka-ru</td>
<td>はかる</td>
<td>Measure</td>
<td>Second level</td>
<td>2,932</td>
<td>Existing</td>
<td>ce</td>
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</table>

Note: “Beyond the levels” refers to a word not included in the lexical list of the formerly used Japanese-Language Proficiency Test.
These words were taken from the vocabulary list of the Japanese Language Proficiency Test (Japan Foundation, 2004). There were 12 words for each of the lexical categories of Kango, Wago, and Gairaigo, consisting of four nouns, four adjectives, and four verbs. In addition, 12 words from each category were cross-matched with lexical difficulties among the three lexical categories using the first to fourth level of the Japanese-Language Proficiency Test (Japan Foundation, 2004). Kango were selected from two-kanji compound words such as guchi (“complaint”), fukyoo (“recession”), shumi (“hobby”), yuuboo-da (“promising”), kengaku-suru (“to visit”), and chuuunon-suru (“to order”). Examples of Wago are arasuji (“story”), sakasama (“upside-down”), yayakoshi-i (“complicated”), detarame-na (“nonsense”), hakadoru (“to make progress”), and unazuku (“to nod and agree”). Gairaigo are taken from alphabetic languages, in this case English, such as saizu (“size”), kyaria (“career”), dorai-da (“dry, sentimental”), ruuzu-da (“loose”), massaajsi-suru (“to massage”), and sutoppu-suru (“to stop”). As items of function words, we used grammatical words consisting of more than two morphemes such as -ga-hayaita-ka (“no sooner ... than ...”), -ta-tokoro-de (“even if ...”), itaru-made (“until ...” or “up to...”), kawa-kiri-ni (“start by...”), and yogi-naku-sa-reru (“be obliged to...”).

Lexical knowledge showed a high Cronbach’s alpha reliability of .867 (48 items, n = 170).

Tests of grammatical knowledge

Grammatical knowledge was measured by three tests: morphological inflections, local dependency, and complex structure. Morphological inflections can be correctly judged within a single lexical unit requiring inflections. For example, a participant had to choose a correct answer to fill in an empty bracket of a sentence, Ayamatte kabin-o kowashita watashi-o, chichi-wa ( ). “My father (did not blame) me who mistakenly broke the flower vase” out of the four choices of seme-nakat-ta (a correct form for “did not blame”), seme-nai-dat-ta, semeru-nakat-ta, and seme-naku-te-dat-ta (incorrect forms for “did not blame”). In this question item, the correct answer can only be the lexical unit seme-nakat-ta, as the others are not grammatically correct. In contrast, local dependency is defined as reference to two neighbouring units to determine a correct expression. For instance, the correct answer for the empty bracket of the sentence Kanojo-wo itsumo tamagoyaki-o ( ) tsukuru “She always cooks omelets (very well)” cannot be determined by only referring to a single lexical unit. Among the four choices, joozu-ni (correct answer for “very well” in the item), joozu-de, joozu-no, and joozu-na all four choices are grammatically correct expressions by themselves. The correct choice is only identified by noting that the verb tsukuru (to cook) follows it and require a word ending in -ni. This is a complex structure which requires reference to a whole sentence in order to determine the correct answer. In another example sentence, Don’nani kanojo-ga ( ), ano daigaku-niwa gokaku shinai daroo “(No matter) how hard she (tries), she would not pass an entrance examination at that university”, the four choices for the empty bracket are ganbat-temo (correct answer for “no matter ... tries hard”), ganbat-te, ganbaru-noni, and ganbaru-ga. Each of these four expressions is grammatically correct by itself. However, since an unexpected negative conclusion follows the prior sentence don’nani ... temo [no matter how ...], the correct choice has to be ganbat-temo. Grammatical knowledge items showed a Cronbach’s alpha reliability of .679 (36 items, n = 170).
RESULTS

Results of SEM

The SPSS AMOS 17.0J (2008) package was used to conduct SEM in order to investigate a causal model constructed with two latent variables of lexical and grammatical knowledge predicting one latent variable of homophonic distinction. Each latent variable was measured by the observed variables of the tests previously described. The model fitting of the present SEM analysis converged to a proper solution with excellent fit \( \chi^2(24) = 34.613, p = .074, \text{ns.} \); GFI = .957; AGFI = .919; CFI = .975; RMSEA = .051]. The correlation between lexical and grammatical knowledge \((r = .59, p < .001)\), between lexical knowledge and homophonic distinction \((r = .54, p < .001)\) and between grammatical knowledge and homophonic distinction \((r = .89, p < .001)\) were all significantly high. As shown in Figure 5, the four observed variables of lexical knowledge showed excellent factor loadings indicating 0.70 for Wago, 0.74 for Kango, 0.79 for Gairaigo and 0.69 for function words. The three observed variables of grammatical knowledge also showed good factor loadings of 0.54 for morphological inflections, 0.52 for local dependency, and 0.77 for structural complexity. The two observed variables of homophonic distinction showed relatively high factor loading of 0.66 for Kango and reasonable factor loading of 0.43 for Wago. All these factor loadings were statistically significant. A causal relation leading from grammatical knowledge to homophonic distinction was significant \((\beta = .58, p < .001)\). However, no significant causal relation from lexical knowledge to homophonic distinction was found \((\beta = .01, \text{ns.})\). Therefore, only grammatical knowledge was a major factor for Chinese learners of L2 Japanese in distinguishing lexical homophones.

Figure 5. SEM analysis with standardised path coefficients—A causal model which solves the acquisition process of L2 learners’ homophonic distinction by native Chinese speakers learning Japanese.
DISCUSSION

The present study indicated that grammatical knowledge has a strong influence on identifying the proper word from multiple homophones in a sentential context. The results suggest that the ability of Chinese learners of L2 Japanese to distinguish homophones was strongly affected by grammatical knowledge, though not by lexical knowledge. This accords with arguments by Kawaguchi (1993) and Takebe (1989) with respect to the importance of contextual knowledge regarding homophones. Since participants in the present study were all native Chinese speakers who had already acquired Chinese characters, which share the same origins as Japanese kanji, they could roughly guess homophonic stems or words presented in kanji. Therefore, only their grammatical knowledge was a significant predictor of understanding homophones in a sentence.

In order to distinguish multiple homophones in a sentential context, Chinese learners of L2 Japanese needed to have sound grammatical knowledge for selecting the appropriate homophone. Morphological inflections assist proper selection of verb homophones, including different verb conjugation of ichidan and godan. The present study also tested local dependency as one part of grammatical knowledge. Knowledge for two neighbouring units helped to determine a correct expression. Furthermore, knowledge of complex structures was also an important key in improving the ability to make homophonic distinctions in determining appropriate homophones for complex sentential conditions.

The results of the present study can only be applied to native Chinese speakers learning L2 Japanese. Japanese learners with different language backgrounds may display different results. For native Korean speakers learning L2 Japanese, due to a lack of kanji and kanji-presented word knowledge, lexical knowledge may contribute strongly to identifying a proper homophonic word among multiple candidates. Otherwise, both lexical and grammatical knowledge may be needed to distinguish homophones. Thus, a further study should be conducted to identify any actual influential factors for understanding Japanese lexical homophones among speakers of different L1 backgrounds with different degrees of lexical/grammatical knowledge.

REFERENCES

Hepburn style romanization with no vowel repeated for a long vowel is used for describing Japanese proper nouns, and the same style with vowel repeated for a long vowel is used for article titles.


Appendix. Test items of homophonic distinctions

Kunrei-style romanization with two vowels repeated for a long vowel (e.g., oo, uu) is used to transcribe Japanese sentences.

Chinese originated homophones (Kango)

1 (1) 雄志 ゆうしを抱き上京を決意した。
Yuushi o iduki zyookyoo o ketui sita.
(I) decided to move to Tokyo with high aspiration.
(2) 有志 職場のユウシでチームを作った。
Yoosha no yuusii de timu o tukutta.
Volunteers built a team in our workplace.

Choice 雄志 有志 融資 有史

2 (1) 強制 会議に出席するようキョウセイされた。
Kaigi ni syusseki suruyoo kyoossee sareta.
(I) was forced to attend the meeting.
(2) 矯正 娘の歯並びをキョウセイする。
Musume no hanarabi o kyoossee suru.
(I) let (my) daughter have orthodontic treatment.

Choice 強制 矯正 共生 強勢

3 (1) 固辞 会長に推されたがヨジした。
Kaityoo ni osareta ga kozii sita.
(I) was nominated as the president, but (I) refused firmly.
(2) 誇示 対立国に国の力をヨジした。
Tairituokoku ni zikoku no tikara o kozii sita.
(We) showed off the power of our country toward the conflicting country.

Choice 固辞 誇示 孤児 故事

4 (1) 意向 先方のイユウを確認する。
Senpoo no ikoo o kakunin suru.
(I) check the other side’s inclination.
(2) 移行 新しい制度へのイユウを検討している。
Aturasii seido eno ikoo o kentoo siteiru.
(We) consider transition to a new system.

Choice 意向 移行 威圧 以降

5 (1) 回想 幼い頃をカイソウした。
Osanai koro o kaisoo sita.
(I) recalled when (I) was a child.
(2) 改装 老朽化した店舗をカイソウした。
Rookyuu ka sita tenpo o kaisoo sita.
(We) rebuilt the dilapidated store.

Choice 回想 改装 陳腐 回送

6 (1) 奉仕 地域へのホウウ活動に力を注ぐ。
Tiiki eno hoosti katuudo ni tikara o sosoga.
(I) devoted (my) energy for volunteer activities in the community.
(2) 胞子 この植物はホウウで増える。
Kono syokubutu wa hoosti de huuru.
This plant reproduces by means of spores.

Choice 奉仕 胞子 花志 法師
7 (1) 繼承 事業のケイショウを決意した。
Zigyoo no keezyoo o ketui sita.
(I) determined to take over the enterprise.

(2) 警鐘 その事件が社会全体へのケイショウとなった。
Sono ziken ga syakai zentai eno keezyoo to natta.
The case served as a warning against the entire society.

Choice 繼承 警鐘 警告 敬称

8 (1) 交換 学生主催でヨウカン音楽会を開く。
Gakusei syusai de kookan ongakukai o hiraku.
Students host an enjoyable concert.

(2) 好感 明るい性格にヨウカンを抱いた。
Akarui seikaku ni kookan o itaita.
(I) had a favorable impression of his/her cheerful character.

Choice 交換 好感 交換 公開

9 (1) 景気 新聞でケイキの変動を調べる。
Sinbun de keeki no hendoo o siraberu.
(I) check cyclical changes in newspapers.

(2) 契機 事故をケイキに歩道ができた。
Ziko o keeki ni hodoo ga dekita.
A sidewalk was built after the accident.

Choice 景気 契機 制盤 計器

10 (1) 巧妙 ヨウミュウな手口で人をだます。
Koomyoo na teguti de hito o damasu.
(I) deceive someone with a clever trick.

(2) 光明 暗闇に一筋のヨウミュウを見出す。
Kurayami ni hitsuzi no koomyoo o miidasu.
(I) see a ray of light in the dark.

Choice 巧妙 光明 高名 功名

11 (1) 丹精 タンセイを含めて植木を育てる。
Tansee o komete ueki o sodateru.
(I) lovingly take care of garden trees.

(2) 嘆声 見事な庭園にタンセイを発した。
Migoto na teien ni tansee o hassita.
(I) let out a sigh about the fabulous garden.

Choice 丹精 嘆声 端正 善性

Japanese originated homophones (Wago)

1 (1) 抜 具体例をアけて説明した。
Gataree o agete setumee sita.
(I) illustrated with some specific examples.

(2) 揚 夕食にてんぷらをアげる。
Yunyoku ni tempura o ageru.
(I) fried Tempura for dinner.

Choice 抜 揚 上 職

2 (1) 勧 野球部への入部をススめる。
Yakkyyubu eno nyyuubu o susumeru.
(I) invite (him) to join the baseball club.

(2) 薦 会長候補に彼女をススめた。
Kaityyoo koohee ni kanzyoo o susumeta.
(I) recommended her as a candidate for the chair.

Choice 薦 薦 奉 進

3 (1) 採 今年も新入社員を上る予定です。
Kotosi mo sin'nyuusyain o toru yotec desu.
(We) again plan to recruit new employees this year.
4 (1) 続 ついに父の志をつぐ決意をした。
Tuini tityi no kokorozasi o tgu ketui o sita.
(I) eventually decided to continue my father’s objective.

4 (2) 東京に賑わう都市と自負している。
Tookyoo ni tgu tosi to zihu siteiru.
(We) feel proud of our city as the second after Tokyo.

5 (1) 更 秋の夜が次第に訪れていく。
Aki no yo ga sidai ni hukete iku.
An autumn’s night gradually goes on.

5 (2) 老 年齢よりも訪れて見られる。
Nenrei yori mo hukete mirareru.
(I) look older than (I) actually am.

6 (1) 割 農地で稲の収入が始まる。
Nootyi de ine no kariire ga hazimaru.
In rice farming lands, harvest time has begun.

6 (2) 駆 突然不安に訪られる。
Totuzen huan ni karareru.
(I) suddenly get a feeling of dread.

7 (1) 換 銀行で手形を現金にかえる。
Ginkoo de tegata o genkin ni kaeru.
(I) exchange a bill at the bank.

7 (2) 替 日曜日に出勤したので月曜日に休日を振りカエた。
Nityiyoobi ni kyuuzitu o huri kaeta.
Because of working on Sunday, (I) made up a compensating holiday on Monday.

8 (1) 妥 アパートを借りるには保証人がいる。
Apaato o kariru niwa hosyooin ga iru.
A guarantor is required for renting an apartment.

8 (2) 射 的をイタ質問だった。
Mato o ita situmon datta.
It was a well-directed question.

9 (1) 絶 友人との交流を止む。
Yuuzin to no kooryuu o tatu.
(I) break off relations with friends.

9 (2) 断 願掛けで好きなお茶を取つ。
Gankake de suki na otya o tatu.
(I) make a wish to a god and forswear tea which (I) like.

10 (1) 着 電車は予定通りに駅に着いた。
Densya wa yotee doori ni eki ni tuita.
The train arrived at the station on time.

10 (2) 付 条件をつけて許可する。
Zyookun o tukete kyoka suru.
(I) give permission with reservations.
11 (1) 修 大学で物理学をオサめる。
Daigaku de buturigaku o osameru.
(1) pursue physics at university.
(2) 納 期日内に税金をオサめる。
Kizitu nai ni zeekin o osameru.
(1) pay taxes by the due date.
Choice 修 納 治 収

12 (1) 図 事業の合理化をハカる。
Zigyoo no goorika o hakaru.
(We) promote the streamlining of the enterprise.
(2) 測 保健所で血圧をハカる。
Hokenzyo de ketuatu o hakaru.
(1) measure (my) blood pressure at a healthcare center.
Choice 図 測 量 謀