Learner strategies for dealing with pronunciation issues in Mandarin

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Abstract

Learners have difficulty with the pronunciation of both consonants, vowels, and tones in Mandarin Chinese. While there are numerous studies which describe these difficulties, there seem to be few studies looking at the strategies that these learners actually use in order to cope with them. This study focused exclusively on oral production and not auditory comprehension, with special emphasis on the strategies that learners reported using in attempting to master pronunciation of Chinese. The study examined reported and actual difficulties in Chinese pronunciation, along with reported and actual pronunciation strategies. The findings showed both consistencies and inconsistencies between students' self-report of difficulties in pronunciation and the errors that they made. Likewise, there were found to be similarities and differences between what the students reported their strategies were for dealing with Chinese pronunciation and the strategies that were reportedly used in the read-aloud task.

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1. Introduction

This study was prompted by an interest in identifying the strategies that English-speaking learners use in dealing with the daunting challenges involved in pronouncing Mandarin effectively (DLI, 2010). The ultimate motive was to be able to provide these learners of Chinese suggested strategies for coping with pronunciation issues, especially those involving tones since English is not a tonal language.

2. Review of literature

A recent review of studies on the teaching of Chinese as a second or foreign language (L2 or FL) published in Chinese journals identified no fewer than 44 studies dealing with the teaching of the Chinese sound system (Ma, Gong, Gao, & Xiang, 2017). Characteristically, such studies describe pronunciation problems, but do not deal with students' means for dealing with these problems, such as through the use of language learner strategies. In fact, the Ma et al. review only mentions learners' strategies for Mandarin in passing.

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Chinese and Mandarin are being used interchangeably in this paper.
2.1. Pronunciation difficulties of first-language (L1) English learners of Mandarin

From previous research we know that English-L1 learners share common problems in distinguishing various consonants in Chinese, namely, /ts/ [ʃ], /ts’/ [ʃ], and /ɕ/ [ɕ]; /ts/ [ʂ], /ts’/ [ʂ] and /s/ [ʃ]; /ts/ [z], /ts’/ [s] and /s/. Students have been found, for example, to confuse the consonants /ts/ [ʈʂ] and /tʃ/ [ʃ] (Ni & Wang, 1992). With regard to vowels, learners have been found to have difficulties distinguishing the vowel /y/[ü] from /u/. In addition, while there have been signs of English vowel transfer in the production of Chinese vowels by American students, sometimes the students’ production of vowels has appeared to be random (Shi & Wen, 2009). Also, vowel sounds which are distinctively different from L1 vowels have been easier to acquire than those that are similar. Nevertheless, if the new vowels are heavily marked (e.g. having features strikingly different from those in the L1), then they are more difficult to acquire than more similar-sounding ones (Wen, 2010).

With regard to tones, research has found that especially beginning American learners may have difficulty approximating Chinese-L1 speakers’ pitch range (Chen, 1974), but that after a year or more of Chinese learning, they are able to achieve a similar pitch range to that of the native speakers (Miracle, 1989). They do, however, have difficulty with tone production (Chen, 1997; Guo & Tao, 2008; Miracle, 1989; Shen, 1989; Wang, 1995). Research has suggested that American learners have the most problems with the 2nd tone, somewhat less with the 3rd tone, even less with the 4th tone, and least with the 1st tone. Part of the problem is that English-L1 learners confuse the 2nd tone with the 3rd tone and also confuse the 1st tone with the 4th tone (Chen, 1997). Another part of the problem is that in naturally-occurring Chinese-L1 speech the 3rd tone it is not necessarily a falling-rising tone, but rather more of a low tone as a result of tone sandhi (Li, 2017). In other words, there is a tendency for the 3rd tone to change its pitch contour depending on the tone of the following syllable.

Yet another complicating factor is that American learners have been found to use English phrase-level intonation to map their Chinese tonal production, which hinders them from producing the actual Chinese tones. In fact, English intonation has been seen as the source for four typical types of tonal errors in Chinese as an FL: 1) using the same tone for each syllable in two-syllable Chinese words (e.g. to pronounce yì nián as yí nián); 2) using contrastive tones such as the rising 2nd tone and the falling 4th tone to pronounce single-syllable words that have a falling-rising change (e.g. to pronounce měi guò as měi guó); 3) using the 4th tone to pronounce the last syllable of a Chinese phrase (e.g. to pronounce shí nán de as shì nán de); and 4) using the 2nd and 4th tones repetitively in every two consecutive syllables (e.g. to pronounce yǒu yán xué xì as yǒu yán xué xì) (Gu, 2000).

Finally, interpreting research results is somewhat problematic in that the studies vary with regard to the length of time the learners spend studying Chinese, as well as with regard to the research methods employed. For example, participants in the Shen (1989) and the Wang (1995) studies had studied Chinese for about 4–5 months, whereas in Miracle’s (1989) study, participants had studied for a full year. Also, the various researchers used different tasks to measure participants’ tonal performance: reading a familiar text (Shen, 1989), reading sentences (Miracle, 1989), and reading words (Wang, 1995). So, the variation in tasks may also partially explain differences in the findings. This is one of the comments that Ma et al. (2017) made in their review of numerous studies published in Chinese journals — the unevenness of the research procedures. Because of the differences between studies of pronunciation focusing on elicited tasks as opposed to those looking only at pronunciation occurring in natural speech, our study just looked at pronunciation in elicited tasks.

What is largely lacking from this body of research studies is a focus on just what strategies learners might use to cope with the rather daunting task of learning how to pronounce Chinese. The following section deals with how the language learner strategy literature relates to the challenges that learners face in gaining control in this area.

2.2. Learners’ strategies for dealing with target-language pronunciation

Characteristically, studies have described problems that learners have with Chinese pronunciation, but have tended not to deal with students’ strategies for coping with these problems. Of late, there has been renewed interest in language learner strategies (LLS), including a comprehensive definition of what they entail: contextually-specific thoughts and actions that can be both mental and physical; combinable in clusters or chains; having cognitive, emotional, and social roles to play as determined by the individual; and characterized by complex patterns of self-regulation (Oxford, 2017). This new definition invites us to deal with strategies in a more rigorous way than in the past, where a one-size-fits-all approach often was used when describing strategies. By now it has been rigorously documented in the research literature that LLS can benefit learners’ efforts to deal successfully with their development of the various language skills, such as speaking, listening, reading, and writing (see Oxford, 2017).

What has characterized past research on LLS in Chinese is that it has used the Strategy Inventory for Language Learning (Oxford, 1990) or an adapted version to identify learners’ strategies for Chinese character learning (e.g. Everson & Ke, 1997; Shen, 2005), for reading (e.g. Chang, Lan, Chang, & Sung, 2010; Everson, 1986), for listening (e.g. Zhang, 2007), for speaking (e.g. Lu, 2005), and for describing learner variables (e.g. Wang, Spencer, & Xing, 2009). While Jiang and Cohen (2012) found numerous LLS studies dealing with Mandarin, conspicuously absent from this body of research were studies focusing on how English L1 learners might resolve specific pronunciation problems in Mandarin — such as studies providing a handy set of specific strategies to use in order to master language areas such as tones in Mandarin (Cohen, 2017).

Given the newly proposed rigor in dealing with LLS, it would appear to be a propitious moment to investigate the types of strategies operationalized in language skill areas such as that of learning pronunciation. Previous examples of efforts to deal
specifically with language strategies have included a website for Spanish grammar strategies, based on extensive empirical work to identify specific strategies that actually worked (Cohen, Pinilla-Herrera, Thompson & Witzig, 2011). It is our view that efforts could be made to apply insights from this domain in order to improve Chinese pronunciation.

2.3. The aim of the present study

Difficulties in pronouncing Chinese have traditionally been identified either through theoretical analyses, results of testing tasks, or observation of learners' performance. Consistent with the premise that learners know best what constitutes their areas of difficulty (Benson, 2007), the aim of this study was to explore Mandarin learners' descriptions of their learning experiences from collecting learners' perceptions of how they achieved success in producing more nativelike pronunciation while engaged in pronunciation tasks. The present study addressed the following research questions:

1. What do English-L1 learners report as their areas of difficulty in learning Chinese pronunciation and what strategies do they report using in order to cope with these difficulties?
2. What are students' actual pronunciation problems and reported strategies for dealing with them?

3. Method

3.1. Sampling

Ninety-two English-L1 students (54 males and 38 females) taking Chinese classes at a large Midwestern university in the USA participated in the study. Participants represented three proficiency levels as determined by a departmental placement test. There were 40 at the intermediate level (2nd year of language instruction), 38 at the lower-advanced level (3rd year of language instruction), and 14 at the upper-advanced level (4th year of language instruction). From all 92 responded to the survey questionnaire (described below), a subsample of 12 of the 92 deemed as “good” Chinese language learners by their teachers (4 at each level, 7 males and 5 females) were invited to respond to the second and third tasks, a read-aloud task, and a follow-up stimulated-recall interview (also described below). The teacher ratings were based on classroom observations of the learners' spoken Chinese and their academic record. The focus on so-called "good" learners was based on an expectation that these learners would be most likely to provide valuable insights as to strategies for Chinese pronunciation.

3.2. Instruments

In this study three instruments were used to collect data: a survey questionnaire, a read-aloud task, and a stimulated-recall interview.

3.2.1. Survey of difficulties in learning Chinese pronunciation and coping strategies

This survey questionnaire requested that respondents indicate whether nine specific sound contrasts in Chinese pronunciation were problematic for them and whether they used pre-identified strategies to cope with these difficulties (Appendix A). The original pilot questionnaire was based on interviews that the first author had had with students who were on a one-month exchange program learning Mandarin in China. The author interviewed 24 students, with 14 from Chicago University studying Chinese at the Chicago China Center, and 10 from Harvard studying Chinese at the Beijing Language and Culture University. Interviews were also conducted with 6 Chinese course instructors. The interview guide was adapted from Jiang and Sharpling (2011). Then, using a narrative analysis approach (Richards, 2003), Author 1 carefully studied the transcripts of the 30 interviews, identifying and categorizing items and cross-checking the categories. When reported problems were found to be shared by 3 and more participants, they were flagged for inclusion. After an analysis of the interview data, the initial questionnaire survey was further refined based on consultation with Chinese course instructors and piloted on 6 students who did not participate in the main study.

The final version of the survey instrument marked a slight departure from the traditional one-strategy-at-a-time approach. The open-ended interview data in the pilot study had revealed that participants used a cluster of strategies to successfully pronounce the ‘ü’ vowel (saying 'ü' aloud, paying attention to the position of their lips, and curling their tongue). Consequently, item #1 of the survey was comprised of this cluster of three strategies. Likewise, item #2 involved a cluster of strategies and #5 involved a pair of them. The other six items involved just one strategy. This approach to questionnaire design was innovative but introduced a problem in tabulating the results, as is mentioned in the Limitations section below. In addition, each item allowed for respondents to add their own possible strategies for dealing with problematic sound contrasts. The 10th item was open-ended — for respondents to provide other pronunciation problems and possible solutions. The survey took 30 min to answer.

3.2.2. Read-aloud task

A read-aloud task was designed to measure how accurately learners pronounced Chinese characters, recognizing that some Chinese characters themselves include a phonological component. The task material was selected from reading
resources provided by the course teachers at the three designated levels. The researcher asked the course instructors about the appropriateness of the reading material and requested that they identify the number of unknown characters. The task called for reading the paragraph aloud, with the knowledge that the text contained unknown characters which learners should do their best to read aloud. Each paragraph was adapted from course reading materials based on: problematic areas revealed in piloting, consideration of the participants’ proficiency level, and consultation with the course instructors.

The number of unknown characters (based on course instructors’ judgments) was kept at fewer than 10% of the total characters by paraphrasing unknown characters (as recommended by Gillet & Temple, 1994). This still left 10 unknown characters at the intermediate level, 9 at the lower-advanced level, and 11 at the higher-advanced level. Since these unknown characters had emerged as problematic from the pilot data, they were expected to elicit coping strategies. The final task entailed a 153-character intermediate-level paragraph, a 167-character lower-advanced-level paragraph, and a 186-character higher-advanced-level paragraph (see Appendix B). To encourage participants to read all the unknown characters aloud, the researcher (Author 1) alerted each participant to the fact that there were a few unknown characters in the text and that they should try their best to read them aloud. To reduce participants’ nervousness at reading before a stranger, participants were asked to read the paragraph silently first and then to read it aloud when ready. This process usually took 1-to-2 minutes, and the researcher took notes while audio-recording the participants’ read-aloud tasks.

3.2.3. Stimulated-recall interview

A stimulated-recall interview protocol was designed based on guidelines from Gass and Mackey (2000). It consisted of six fixed questions and additional probing questions intended to investigate more fully the participants’ difficulties with pronunciation of Chinese characters in the specific passage along with reported strategies for dealing with these difficulties (see Appendix C). The interview was conducted immediately after the read-aloud task, thus providing immediate-retrospective verbal report data (Cohen, 2013). The interview was semi-structured, involving both general probing questions (e.g. “Did you have any problems in … “ “How did you cope with … “), as well as questions based on pronunciation issues that the investigator identified as particular to a given individual participant’s performance in the read-aloud task. The interviews took 10–15 min.

3.3. Procedures for data analysis

Questionnaire responses were submitted to content analysis by proficiency level. Participants’ responses to “yes” or “no” answers were tallied numerically and converted to percentages for purposes of comparison across proficiency groups. A caveat here is that items #1 and #2 involved a cluster of strategies and item #5 involved a pair of strategies, thus rendering the percentages more suggestive of patterns, rather than definitive. Respondents did not add their own solution for those nine pronunciation items, as commented on in the Limitations section below. Since only a few participants responded to item #10 and there was no pattern to the responses, these data were not included in the survey results.

The read-aloud recordings were analyzed by two Chinese-L1 speakers. After determining the total number of tones in the read-aloud task for the three levels, the two researchers worked independently at calculating the participants’ errors in pronouncing consonants, vowels, and tones. The interrater reliability was 93%, with discrepancies in judgment regarding a few tonal errors resolved through comparison and discussion.

The simulated-recall interviews were transcribed and the transcriptions were checked over by the participants to confirm their accuracy (Richards, 2003). A thematic analysis of the transcriptions was conducted by Author 1 and the course director in order to identify the pronunciation strategies used by the respondents. When further issues emerged from analysis of participants’ read-aloud activity (e.g. incorrect pronunciation not discussed in the interview), the researcher emailed those participants for clarification.

4. Findings

First, findings from the survey questionnaire will be considered in order to answer the first research question regarding English L1 learners’ reported difficulties in learning Chinese pronunciation and their reported strategies for coping with these difficulties. Then, the findings from the read-aloud task and the stimulated-recall interview will be looked at, as a means for investigating participants’ actual pronunciation problems and their reported task-specific strategies for dealing with them.

4.1. Reported pronunciation difficulties and reported strategies used

Findings from the survey were that fewer than half of the respondents reported problems with the Chinese pronunciation issues that were included (see Table 1). It was noted that the reported problems decreased as students’ proficiency levels increased. For example, intermediate students reported the three pairs of consonants to be the most difficult pronunciation problems—which was not the case among the advanced students. There were, however, a few exceptions. As shown in Table 1, “pronouncing the tone change when there were two adjacent 3rd tones” was ranked as the biggest challenge by both lower- and higher-advanced students, while it appeared as the least problematic for intermediate students. Moreover, pronouncing /s/ and /ʃ/ [ʃ] did not appear to be a major problem among lower-advanced students, yet was ranked as the second most
Table 1
Participants’ reported difficulties with Chinese pronunciation.

<table>
<thead>
<tr>
<th>Pronunciation Difficulties</th>
<th>Total % (n)</th>
<th>Int. % (n)</th>
<th>Lower Adv. % (n)</th>
<th>Higher Adv. % (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distinguishing [j]/-[zh], [q]/-[ch], [x]/-[sh]</td>
<td>46% (41)</td>
<td>69% (27)</td>
<td>2% (12)</td>
<td>14% (2)</td>
</tr>
<tr>
<td>Pronouncing [c]/ and [j]/</td>
<td>36% (32)</td>
<td>52% (20)</td>
<td>27% (10)</td>
<td>14% (2)</td>
</tr>
<tr>
<td>Confusing 2nd /yù/[fish] and 3rd tones /yù/ [rain]</td>
<td>34% (31)</td>
<td>46% (18)</td>
<td>32% (12)</td>
<td>7% (1)</td>
</tr>
<tr>
<td>Stress shift from 2nd to 1st syllable /dídào/ [genuinely]</td>
<td>32% (29)</td>
<td>56% (22)</td>
<td>14% (5)</td>
<td>14% (2)</td>
</tr>
<tr>
<td>Pronouncing the neutral tone</td>
<td>31% (28)</td>
<td>44% (17)</td>
<td>24% (9)</td>
<td>14% (2)</td>
</tr>
<tr>
<td>Pronouncing the tone change if two adjacent 3rd tones</td>
<td>29% (26)</td>
<td>18% (7)</td>
<td>41% (15)</td>
<td>29% (4)</td>
</tr>
<tr>
<td>Pronouncing /s/ and /sh/</td>
<td>27% (24)</td>
<td>38% (15)</td>
<td>16% (6)</td>
<td>21% (3)</td>
</tr>
<tr>
<td>Pronouncing /iú/</td>
<td>20% (18)</td>
<td>23% (9)</td>
<td>24% (9)</td>
<td>–</td>
</tr>
<tr>
<td>Pronouncing /c/ and /ch/</td>
<td>20% (18)</td>
<td>23% (9)</td>
<td>22% (8)</td>
<td>7% (1)</td>
</tr>
</tbody>
</table>

Difficult problem by higher-advanced students. At the same time, pronouncing /ü/ appeared to be more problematic among lower-advanced than among intermediate students.

In addition, roughly 50% of the participants at each level reported using the strategies suggested in the questionnaire for dealing with pronunciation (see Table 2). For example, saying it aloud and paying attention to the lips and to curling the tongue when pronouncing /ü/, as well as paying attention to the tongue position, and listening to tapes and repeating the sounds when pronouncing /c/ and /ch/. In general, the lower- and higher-advanced students reported a higher percentage of strategy use in each of the identified difficulty areas than did the intermediate students. However, there were a few exceptions. For example, 82% of intermediate students reported using the strategy of thinking of the tones in known words (e.g. /nǐhào/ [hello]) and then imitating them when pronouncing two adjacent 3rd tones. In addition, 86% of lower-advanced students reported asking native speakers to demonstrate the pronunciation and then mimicking how they performed the stress shift to the 1st syllable in two-syllable words. In contrast to students at the other two levels, higher-advanced students reported no problems in pronouncing /ü/.

Additionally, a small number of participants offered other solutions for the above-mentioned pronunciation problems. For example, one lower-advanced student reported purposely exaggerating the differences between two sounds in his mind, using the ending sounds of ‘cats’ for /c/ and ‘beds’ for /z/ respectively to distinguish /c/ and /z/. Two higher-advanced students mentioned different ways to pronounce two adjacent 3rd tones: using the hand gesture ‘v’, lowering and raising of the voice in the same hand gesture; or visualizing the pitch point of the 2nd tone and 3rd tone, and then producing them while speaking slowly.

4.2. Actual pronunciation difficulties and strategies for dealing with them

Findings from the read-aloud task revealed that participants had problems with the target vowel /ü/ and that two lower-advanced students had consonant problems (see Table 3). Intermediate-level participant #6 confused /c/ and /z/. In the actual reading process, the researcher observed that the student hesitated between consonants /ts/ [time, this/ and /ts/ [z] when pronouncing /ci/ [time, this] and finally pronounced it as /zi/. When the researcher asked him about it in the stimulated-recall interview, his reply was as follows:

“I knew there was a difference between the two in terms of quantity of breath. However, I forgot which had less when doing the reading. Perhaps I was nervous.”

This suggested that the learner actually attempted to use his reported strategy in the read-aloud task (see /c/ and /z/ in Table 2).

Similar evidence was found in the interview with participant #7 regarding his problem with /ts/ [ch] and /tc/ [q]:

“I knew the tongue position of /ch/ was curled up, /q/ was flat, but the combination with /u/ was confusing. The pinyin strokes after them were similar, but the one with /q/ was actually /ü/ … I needed more time to figure that out …”

The participant was aware of the necessary strategies to deal with these difficult consonants, yet when confronted with the need to produce a particular consonant-vowel sequence, he needed more time.

While there were only two consonant problems found (one with /c/ and one with /ch/, both at the lower-advanced level), 9 of the 12 participants had problems producing the tones correctly. The largest percentage of errors (40%) occurred when reading characters calling for two adjacent 3rd tones, next in the stress shift to the 1st syllable in two-syllable words (33%) and then in the 3rd tone (22%) (see Table 3). Actually, most of the readers (7 out of 12) were not found to make reading errors, and pronunciation errors for those five who did make reading errors differed according to their proficiency level.

In the stimulated-recall interviews, when participants were asked whether they had noticed having problems with pronunciation of tones, only two (one from the lower-advanced level and one from the higher-advanced level) indicated this. When errors in tone were pointed out by the researcher, intermediate participant #4’s response was representative of the others as well:
I focused on the flow of my reading, so I did not pay much attention to individual characters, but focused on words or phrases. I don’t have problems with tones. Such an opinion was shared by most of the interviewees who were found to have errors in the pronunciation of tone. Lower-advanced participant #11, however, was aware of an error and attributed it to negative transfer from the L1:

“I saw /fángzi/ [house, 房子] and knew it meant ‘house.’ Since I was thinking of house, the intonation of ‘house’ in English affected my Chinese pronunciation. It just happened that way.”

In response to their explanations, the researcher conducting the interviews (Author 1) asked participants #4 and #11 to re-read the characters that were identified with tonal errors. Indeed, they could pronounce the characters correctly when they were singled out.

Participant #6 had majored in music and felt that spoken Chinese was like a melody to him. He reported:

“I have sharp ears and a very good memory. When I studied Chinese, I didn’t pay much attention to the tones of each character. However, I paid close attention to native Chinese speakers and imitated them. When I read I can feel what is right.”

So, this participant had reported that he got a general sense of Chinese intonation through memorizing what he heard as the “melody” produced by native Chinese speakers, rather than the individual tones associated with characters. It was difficult to judge how effective his strategy was since he produced the 1st and 2nd tones effectively but had many problems in producing the 3rd and 4th tones.

Participant #10, who was majoring in Chinese literature, took a different approach from that of participant #6:

“I thought in my major, reading and writing were much more important than speaking. That’s why I actually didn’t learn tones in my first two years. I only memorized characters and their meanings… Later I realized that tones were important. I started to spend more time learning pinyin and visualizing the pinyin strokes when speaking.”

His main problem was that he replaced all 2nd tones with 4th tones, and vice versa. This suggested that he was able to pronounce the two tones, but when reading specific characters, he tended to apply them incorrectly.
In addition to the strategies reported by the participants regarding the read-aloud task, interviews with participants who had no errors (participants #2, #8, and #12 — one from each of the three proficiency levels) revealed that they all shared the common strategy of speaking to their Chinese native-speaking language partners as often as possible. As participant #2 put it:

“We meet regularly three times a week. I will read Chinese texts and my partner corrects me if I mispronounce any character … I once had problems in pronouncing two adjacent 3rd tones. My partner demonstrated to me a few times and I imitated her.”

Other strategies entailed asking native speakers to demonstrate the pronunciation of certain sounds, as well as practicing the pronunciation of material that the native-speaking partner had prepared until mastering the pronunciation of the forms — in this case, the pronunciation of two adjacent 3rd tones.

So, in summary, participants seemed to have more problems with tones than with consonants in the read-aloud task. Although reading known words aloud might not necessarily be a challenge for language learners, the reading of unknown characters with a fully correct pronunciation was more significant obstacles for them. None of the 12 participants pronounced all the unknown characters correctly (see Tables 4–6).

Except for three intermediate participants who in most instances chose to omit the unknown words, participants tried their best to read the unknown characters aloud. When comparing the number of correctly pronounced characters across the three proficiency levels, the lower- and higher-advance students seemed to be more willing to mobilize strategies for pronouncing the unknown characters, consistent with findings from previous research (Shen & Ke, 2007). In a close examination of the errors produced in attempting to pronounce the unknown characters, it was found that participants at all proficiency levels generally used three strategies when reading these characters aloud:

1. **Guessing with reference to the possible phonemic components of the unknown characters.** For example, guān [place, 館] was pronounced as guān [official, 官] (participants #1, #3, and #4 in Table 5), xiá [leisure, 假] as jià [holiday, 假] or jiā [fake, 假] (Table 6), and yīng [reflect, 映] as yīng [center, 中] (#9, #10, and #11 in Table 6). Interview analysis showed that their strategies came from experience in learning Chinese pictophonetic characters. As pointed out by participant #2:

“I knew zhēng [right, 正] and zhēng [symptom, 症]. They share the same graphic component and they have the same pronunciation. So I guess zhēng [certificate, ‘visa’ in the text, 证] is the same.”

Using the strategy of making a prediction based on prior experience was confirmed by participant #5:

“Our teacher told us that most Chinese characters are pictophonetic. If you know the part for pronunciation then you know the whole character.”

2. **Borrowing the pronunciation from that of graphically similar characters,** which was termed a graphic substitution strategy (e.g. partial graphic cues, radicals, and substitution with existing characters in spoken language; Li, 1998, p. 141). The following are three examples: bì [close, 闭] as xiān [leisure, 闲] (participant #5 in Table 6), yān [hidden, 隐] as kuā [carry, 携] (participant #10 in Table 6), and gān [sweet, 甘] as tiān [sweet, 甜] (participant #11 in Table 6). Three participants offered similar explanations in the interviews, illustrated here by participant #7:

“I knew xiān [leisure, 闲] was composed by mén [door, 门] and mù [wood, 木]. Neither of them serves as phonetic cues for xiān [leisure, 闲]. I thought character bì [close, 闭] would be similar … it looks quite like xiān [leisure, 闲].”

Since sometimes it was difficult to identify the phonemic components of the unknown characters, these participants resorted to the pronunciation of graphic substitutions instead.

### Table 4

<table>
<thead>
<tr>
<th>Intermediate students’ pronunciation of 9 unknown characters.</th>
</tr>
</thead>
<tbody>
<tr>
<td>[参加]</td>
</tr>
<tr>
<td>S1</td>
</tr>
<tr>
<td>S2</td>
</tr>
<tr>
<td>S3</td>
</tr>
<tr>
<td>S4</td>
</tr>
</tbody>
</table>

Key: S = student; X = omission of character altogether in the read-aloud.
well. American learners of Mandarin not only mastered the sounds that were similar to English (e.g. /s/ and /ʃ/) but also characters. Having problems with all four tones (e.g., Chen, 1997; Wang, 1995). The interviewees in the current study attributed their what White (1981) and Gui (2000) had found in their studies. The research literature also had reported English L1 learners and then the 1st. One explanation for these errors, as reinforced by data from the stimulated-recall interview, was that all four tones (and with the neutral tone as well) with responses from the questionnaire data. In fact, in read-aloud activities the participants made errors in the production of pronunciation of 9 unknown characters.

5. Discussion

5.1. Reported and actual difficulties in pronunciation of Chinese

This study found that participants’ errors in the production of tones on the read-aloud task were not always consistent with responses from the questionnaire data. In fact, in read-aloud activities the participants made errors in the production of all four tones (and with the neutral tone as well) — the most errors occurring with the 4th tone, then the 3rd, then the 2nd, and then the 1st. One explanation for these errors, as reinforced by data from the stimulated-recall interview, was that negative transfer of English L1 intonation did occur in the participants’ efforts to produce the Chinese tones, consistent with what White (1981) and Gui (2000) had found in their studies. The research literature also had reported English L1 learners having problems with all four tones (e.g., Chen, 1997; Wang, 1995). The interviewees in the current study attributed their deviations from the Chinese-L1 norms for pronunciation of tones to their prioritizing fluency above accuracy. In fact, if asked to re-read characters which they had read with tonal errors, the participants were able to produce the correct tones for these characters.

This study would suggest that while negative transfer from their own L1 played a role, there were clearly other influences well. American learners of Mandarin not only mastered the sounds that were similar to English (e.g., /s/ and /ʃ/), but also...
were able to acquire sounds not found in English, such as /ü/. What emerged from the study was a realization among certain participants that it was of value to pay more attention to pronunciation at the beginning stage of learning (e.g. participants #6 and #10).

In addition, what participants reported as pronunciation difficulties in the survey did not always match their observed difficulties in the Chinese read-aloud task which was performed by the subsample of “good” language learners. One example was in the case of two adjacent 3rd tones, where participants reported not having problems but some actually did. Another example was the case of the participant who reported making mistakes with /ü/ but did not do so during the read-aloud.

The survey data showed a complicated response pattern: the 1st-year advanced students reported greater difficulty than did students at the intermediate and 2nd-year advanced levels. However, the read-aloud task results showed that intermediate participants made the most errors compared to their 1st- and 2nd-year advanced counterparts. Another example of such a discrepancy was in the production of consonants. The survey data indicated that while respondents viewed consonant problems as most salient, nonetheless read-aloud task performance revealed that they made more errors in pronunciation of tones than consonants. Participants explained that their errors in tones when performing the read-aloud task were due to a lack of attention rather than to a lack of ability to produce them correctly.

5.2. Reported and actual strategies for dealing with Chinese pronunciation

Regarding the consistency of participants’ reported and actual strategies for dealing with Chinese pronunciation, the results were mixed. First, there were several clear cases of consistency between participants’ reported strategies for dealing with encountered difficulties and their actual strategy use. For example, two interview participants were heard adjusting the strength of their breath in order to distinguish between the two consonants /c/ and /z/. This behavior was recorded in the researcher’s notes as well as being perceptible in the audio-taping of the read-aloud task. As for discrepancies between reported and actual strategies for dealing with difficulties in Chinese pronunciation, most survey respondents reported strategies for dealing with two adjacent 3rd tones, yet this remained the biggest challenge for the subsample who did the read-aloud task.

Having the participants read unknown characters aloud provided an opportunity to prompt strategy use. The challenge for the participants was to deal with figuring out the unknown characters, to retrieve the correct tones for the characters, as well as to try to use a natural rhythm of speech. Their oral output, then, was an outcome of this process, and while at times the strategies could be observed, the participants often needed to describe their strategies during the stimulated-recall interview in order for the investigator to get some sense as to what was really happening. Two participants reported being nervous about displaying their skill at pronouncing Chinese in front of a native-speaking stranger. In addition, participants tended to rely on their knowledge of the pronunciation for known characters as a strategy if they had problems in dealing with the tones for these characters (such as participants #6 and #10) — a strategy which tended to prove ineffective.

Furthermore, it appeared that learners’ strategy use was conditioned by other factors, such as their university major. For example, participant #6 reported taking advantage of his well-trained ear and good memory as a music major and preferred to map the Chinese "melody" that he heard in his head into his speaking. He could correctly produce both the 1st and 2nd tone in the read-aloud task. Likewise, participant #10 reported prioritizing Chinese reading and writing over speaking because his major was Chinese literature, which enabled him to recognize characters quickly. Although his learning of Chinese pronunciation had been put off until later, he used strategies of visualizing pinyin strokes to learn tones. As a result, he had no problem producing all four tones, except for his confusing the 2nd tone with the 4th tone when he read the paragraph aloud.

5.3. Participants’ perceptions of their problems with Chinese pronunciation and coping strategies

The survey results indicated that the learners perceived their distinguishing of various consonant pairs as more challenging than the production of individual tones. Nonetheless, when comparing participants’ error ratios in producing consonants vs. tones, it was found that they actually made more errors in tones than in the production of consonants. While this result supported the co-investigator’s observation that tone problems were the most prevalent among the learners, this was not the way that the participants perceived it. They viewed their errors in tone as simply reflecting a lack of attention. In the existing literature on American learners’ Chinese pronunciation problems, experts have held that tones are among the major difficulty for American language learners. One example was the case of the participant who reported making mistakes with /ü/ but did not do so during the read-aloud.

In addition, experts have noted that Chinese consonants and vowels are also difficult for American learners because of differences between English and Chinese (Ni & Wang, 1992; Wen, 2010). The findings from the present study would appear to be consistent with the literature.

Whereas previous research on pronunciation strategy use had tended to rely on observations and descriptions (Yu, 2013) or word-reading tests (Wang, 1995) in order to depict learners’ strategy use, this study explored target-language pronunciation strategies for Chinese using a probing, stimulated-recall interview immediately following a read-aloud task.

5.4. Limitations and suggestions for further research

This study had limitations which could be remedied in future studies. The first limitation was that most of the intermediate and advanced students who served as respondents to the questionnaire survey had already overcome most of their
pronunciation challenges, given the relatively modest number of pronunciation problems reported by the participants. Future researchers may consequently wish to focus more on the pronunciation strategies of learners at the beginning levels. It would also be worthwhile incorporating into the investigation of these students' reported strategy use the beginning course instructors' observations of their students' pronunciation difficulties, as well as their observations as to how students overcame these difficulties.

A second limitation is in regard to the survey questionnaire. Whereas items 1 and 2 involved clusters of three strategies, and item 5 involved a pair of strategies, respondents were simply asked to respond "yes/no" as to whether they had used these strategies. While they were given an opportunity to clarify which of these strategies they had actually used, and whether they used other strategies of their own, assumptions were made regarding strategy clustering and pairing in these three items. While future research can benefit from exploring the use of strategy pairs and clusters (as well as strategy sequences), provision needs to be given to indicate which of the strategies actually played a role in a given pronunciation situation triggering the use of strategies.

A third limitation had to do with the read-aloud task. It just looked at one task, namely, how good learners at intermediate and advanced levels fared when reading unknown characters out loud. Future studies could benefit from a series of pronunciation tasks, including structured conversation with a native speaker where student participants would have to use certain words and phrases in their communication.

A fourth limitation had to do with the questionnaire instrument. Although the survey was piloted and improved, the instrument could benefit form a validation study. The researchers assumed that the respondents would share more information on their own strategies for dealing with pronunciation issues by responding to the open-ended strategy probe, "my solution." This was not the case. Future research could entail more of a balance between structured questions and open-ended probes, giving participants more of an opportunity to provide verbal reports as to their actual strategies upon completing a series of pronunciation tasks.

Finally, this study focused on self-perceived problems in pronunciation rather than actual difficulties. It would be possible to design pronunciation tasks which respondents complete in a language laboratory in order to relate more closely their perceptions to their actual difficulties. In addition, future studies could also incorporate instruments to measure the learners' possible problems in hearing the correct sounds (an essential component in producing sounds correctly).

5.5. Pedagogical implications

This study has pedagogical implications mainly for teachers and learners of Chinese and other languages with characters and/or tones. Chinese course instructors should perhaps include instruction in pronunciation even for students at levels beyond the beginning one, given issues such as the tone change when there are two adjacent 3rd tones, as well as the pronunciation of /ü/ at lower-proficiency levels. Another suggestion is to give learners sufficient time to strategize in order to pronounce sounds correctly in an oral exercise. This approach may help reveal genuine errors in knowledge, as opposed to performance mistakes. In addition, teachers would want to be wary of pronunciation errors prompted by a given task, such as read-aloud. Furthermore, teachers can orient students in the use of different strategic approaches to pronouncing unknown words, such as through their phonemic components, by means of graphic substitution, or by using character networking. Finally, teachers should encourage learners' self-explorations as to strategies that work best for them and the best ways to employ both individual and shared strategies.

6. Conclusions

This study surveyed English L1 learners' reported difficulties in learning Chinese pronunciation and their reported strategies for coping with these difficulties. By means of a read-aloud task and a stimulated-recall interview, it investigated participants' actual pronunciation problems and their reported task-specific strategies for dealing with them.

The results from the survey were suggestive of strategies that intermediate and advanced learners of Mandarin perceived themselves as using to deal with pronunciation issues, and the results from the read-aloud task and follow-up interview provided data on pronunciation errors and learners' explanations as to why these errors occurred.

The study had just one task, which was performed by the "good" students at their respective levels, rendering it only suggestive of problems in pronunciation and offering only a modest inventory of strategies perceived. Nonetheless, it provided information about the areas where students at different proficiency levels actually deviated from native norms for pronunciation when reading a Chinese text, as compared to what the students perceived to be their weaknesses in pronunciation. In addition, the findings suggested that the participants were aware of strategies for pronouncing Chinese and that at times they used creative strategies for coping.

This study is seen as initiating an effort to identify strategies to improve pronunciation of a language that is challenging for English-L1 speakers, especially its pronunciation. The study suggests that target-language learning entails a complicated process whereby learners draw on their knowledge of pronunciation in order to perform successfully. These findings strongly support the necessity of carrying out contextualized research regarding learners' own voices (Benson, 2007). Ideally, subsequent research will identify a more comprehensive set of strategies that Chinese learners can use profitably in the sometimes daunting challenge of pronouncing Chinese accurately.
Endnotes

1. For the purpose of this paper, Mandarin and Chinese are used interchangeably, although Chinese also refers to Cantonese which has 6 tones, which makes it more difficult to pronounce than Mandarin which has 4.
2. Brackets are used in this paper to give the pinyin equivalent.
3. This study was financed by the Fundamental Research Funds for the Central Universities of China and from the Research Funds of Renmin University of China (14XN1010).
4. Given incomplete survey responses from an intermediate and from a lower-advanced respondent retrospectively, these two respondents were removed from the sample, and so data analysis was performed on 90 questionnaires.

Appendix A. Survey of Difficulties in Learning Chinese Pronunciation and Coping Strategies

**Instruction:** This survey is to find out your difficulties in learning Chinese pronunciation and your coping strategies in order to help you to overcome such difficulties. In each numbered item ‘a’ and ‘b,’ please respond according to your own experience. If you used a different way of solving the problem, please write an example in item ‘c.’ Thank you for your contribution! Email:_________________________ Level of class you are at___________________

1a. I have trouble saying the ‘ü’ sound as in女. Yes No
1b. I solved this by saying ‘ü’ aloud, paying attention to the position of my lips, and curling my tongue. Yes No
1c. My solution is:

2a. I have problems in pronouncing ‘c’ and ‘ch’, for example吃. Yes No
2b. I solved this by remembering the tongue position, listening to tapes, and repeating the sounds. Yes No
2c. My solution is:

3a. I have problems in pronouncing ‘c’ and ‘z.’ Yes No
3b. I solved this by paying attention to how breath is used, using more breath in [c]. Yes No
3c. My solution is:

4a. I have problems in pronouncing ‘s’ and ‘sh.’ Yes No
4b. I solved this by practicing each in different sentences before starting to practice words with similar sounds in sentences. Yes No
4c. My solution is:

5a. I can’t tell the difference between ‘j’ and ‘zh,’ ‘q’ and ‘ch,’ ‘x’ and ‘sh.’ Yes No
5b. I solved this by reminding myself of the tongue position and paying attention to unique vowel combinations with them. Yes No
5c. My solution is:

6a. I can’t distinguish the 2nd sound ‘ü’ in鱼 from the 3rd tone雨. Yes No
6b. I solved this by making sure of the pinyin stroke, visualizing the tones as I speak. Yes No
6c. My solution is:

7a. I have problems in pronouncing two 3rd tones, for example想. Yes No
7b. I solved this by thinking of known instances, i.e., 你好 in my mind, then imitating them. Yes No
7c. My solution is:

8a. I have trouble saying the neutral tone. Yes No
8b. I solved this by putting more stress on the neighboring syllable and getting used to how it should sound. Yes No
8c. My solution is:

9a. I have trouble with words that have tones on the first syllable and not on the second, such as地道. Yes No
9b. I solved this by asking native Chinese speakers to demonstrate and attempted to imitate their speech patterns. Yes No
9c. My solution is:

10a. Other difficulties in pronunciation:
10b. My solution is:

Appendix B. Read-Aloud Task

*Read-Aloud Task for Intermediate-Level Students*

小张和她的男朋友今年暑假要去北京大学参加一个语言班，所以，昨天他们起早坐火车到纽约中国领馆办签证。他们早上十点出发，十一点才到纽约。一路上共花了一小时四十分钟。人很多，他们排了很久的队才来到窗口。小张他们在办理的人是个女的，也姓张，很热情。她问小张为什么想去中国留学，小张回答说知道美国大学的设备好，老师教得也好，但是说中文的机会不多。（153字）
Read-Aloud Task for Lower-Advanced Students

Because it was a first time in the city, the group of friends got lost. They decided to ask for help from the local police. One of the members noticed a police station nearby and suggested that they go there. The police officer was very helpful; he offered them directions and even suggested some local restaurants to try. The group was grateful for the assistance and continued on their journey.

Read-Aloud Task for Higher-Advanced Students

The students were asked to read aloud a text in Chinese. They were given a list of questions to consider while reading:

1. Did you notice any problems in pronunciation, and if so, what were they?
2. How did you deal with pronunciation when you were unsure?
3. Did you have any problems in identifying the right tones or in producing them?
4. What strategies did you use to deal with tone problems?
5. Were there any Chinese characters that you did not recognize in the text?
6. How did you manage to read the new Chinese character out loud? What would you do afterwards?
7. Just now, I noticed that you ..., Do you have difficulties in ...? How do you deal with ...?

Appendix C. Guide for task-based interview

1. Did you notice any problems in pronunciation, and if so, what were they?
2. How did you deal with pronunciation when you were unsure?
3. Did you have any problems in identifying the right tones or in producing them?
4. What strategies did you use to deal with tone problems?
5. Were there any Chinese characters that you did not recognize in the text?
6. How did you manage to read the new Chinese character out loud? What would you do afterwards?
7. Just now, I noticed that you ..., Do you have difficulties in ...? How do you deal with ...?

Appendix D. Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.system.2018.04.012.

References