

THE EFFECTS OF SPEAKING RATE AND PAUSING ON COMPREHENSIBILITY OF
NON-NATIVE ENGLISH

BY

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THESIS

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ABSTRACT

This study examined the effects of the temporal variables (i.e., speaking rate and pausing) on comprehensibility ratings of second language (L2) speech. Twenty advanced Chinese speakers of English were audio-recorded as they read 3 short airline flight announcement passages. For each passage, the speakers adjusted their speech based on the instructions provided (i.e., natural speed, slightly slower speed, and natural speed with attention to pauses). All the speech samples were rated by 20 native speakers of English for comprehensibility. The results showed that although the Chinese speakers were successfully able to read aloud each passage and adjust their speech differently based on the instructions, the change in their reading style did not bring about any statistically significant difference in the comprehensibility ratings. The possible reasons for the speech adjustments having no effect on the ratings are discussed in terms of raters' topic familiarity and the cross-linguistic phonological difference in Chinese and English as well as pedagogical implications.

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CHAPTER 1: INTRODUCTION

One of the ultimate goals of second language (L2) pedagogy is to provide learners with assistance so that they can effectively communicate with others in their L2. With this goal in mind, L2 teachers have been striving to provide instruction that focuses on specific language features (e.g., grammar; vocabulary; pronunciation) to improve their learners' overall proficiency, drawing on the available findings. With regard to oral skills, L2 practitioners often emphasize the importance of learners' comprehensibility, broadly defined as how easy or difficult it is for listeners to understand speakers; they have made a variety of attempts to identify what linguistic variables affect L2 comprehensibility as well as the best ways to increase L2 comprehensibility (Derwing, Munro, & Wiebe, 1998; Isaacs & Trofimovich, 2012; Saito, Trofimovich, & Isaacs, 2015). This study will also examine the comprehensibility of L2 oral speech.

This study originates from my anecdotal experience which I had when I was traveling abroad. I was flying with a Japanese airline company, and thus I had several instances in which I heard airline announcements in English made by native speakers of Japanese. When I was paying attention to their announcements both at the airport and in the airplane, I realized that some of the announcements were difficult to understand compared to others because the announcements flowed a little bit too fast; I wondered whether I could understand the announcements better, if they were made at a slower speed.

In fact, speaking rate, defined as the speed at which a person speaks, is known to affect comprehensibility (Anderson-Hsieh & Koehler, 1988; Munro & Derwing, 2001). For instance, Munro and Derwing (2001) found that too slow or too fast L2 speech may undermine L2 comprehensibility. It is important to note, however, little is known about speaking rate compared to other linguistic variables such as vocabulary (Isaacs & Trofimovich, 2012; Saito, Trofimovich,

& Isaacs, 2015; Saito, Webb, Trofimovich, & Isaacs, 2015), and specific pronunciation features (Derwing et al., 1998; Field, 2005) in the context of research targeted at L2 comprehensibility. In particular, practical or pedagogical implications with regard to speaking rate have rarely been provided. In order to fill the gap, this study aims to reinvestigate the effect of speaking rate on L2 comprehensibility in a methodological design that allows for practical implications.

CHAPTER 2. LITERATURE REVIEW

Comprehensibility

Comprehensibility, which refers to “a listener’s perception of how difficult it is to understand an utterance” (Derwing & Munro, 2005, p. 385), has been receiving both second language teachers’ and researchers’ attention in the last 20 years. It is often compared with accentedness defined as “a listener’s perception of how different a speaker’s accent is from that of the L1 [first language] community” (Munro & Derwing, 2005, p.385), which is similar to comprehensibility yet is another important concept (Saito, Trofimovich, & Isaacs, 2015; Trofimovich & Isaacs, 2012) in the context of L2 pedagogy and research. The significance of comprehensibility has begun to be widely acknowledged partly due to a number of research findings that propose completely native-like proficiency is quite hard for non-native speakers to attain (e.g., Abrahamsson, 2012; Johnson & Newport, 1989) especially when they start learning an L2 at a later stage of their life (DeKeyser, 2000; Flege, Munro, & MacKay, 1995; Huang, 2014). Researchers such as Derwing and Munro (2005, 2009) and Levis (2005) advocate the importance of distinguishing between accentedness and comprehensibility based on the findings that L2 speakers can be highly comprehensible even when their speech is characterized by a non-native accent (Derwing & Munro, 1997; Munro & Derwing, 1995). They argue that L2 instruction should focus on improving learners’ comprehensibility rather than pursuing native-like accent-free proficiency.

Research on L2 comprehensibility has revealed that various linguistic features affect L2 comprehensibility. Field (2005), for instance, found that wrong placement of lexical stress in English affects both native and non-native listeners’ comprehension in a negative way, and he suggested L2 English pronunciation teaching programs address lexical stress. Hahn (2004)

discovered that the lack or wrong use of primary stress in English (i.e., stress that is placed to emphasize important information in speech) may undermine native listeners' comprehension. Building on Isaacs & Trofimovich (2012), Saito, Trofimovich, and Isaacs (2015) have recently conducted a fine-grained study to examine linguistic variables that influence L2 comprehensibility and accentedness, employing 120 Japanese learners of English at various proficiency levels and 10 native speakers of English as raters. They found that while accentedness ratings were heavily connected to pronunciation (segmentals in particular), comprehensibility ratings were related not only to pronunciation but also to grammar (both accuracy and complexity) and vocabulary (lexical appropriateness and variety). They also provided pedagogical implications for learners at different proficiency levels. For instance, they suggested that prosody and vocabulary richness and appropriateness are particularly important for learners at beginner to intermediate levels while improving segmental and prosodic accuracy in pronunciation and accurate use of grammar helps intermediate to advanced learners in order for them to become more comprehensible.

Although much has been investigated about linguistic variables that affect L2 comprehensibility, there still remains room for further research on the subject. Among many linguistic variables, speaking rate has been a linguistic feature that needs to be further examined, considering that it has received little attention compared to others and that there have been mixed findings on the role that speaking rate plays in L2 comprehensibility. The relevant literature is reviewed in the subsequent section.

Speaking rate

Definition of speaking rate and characteristics of L2 learners' speaking rate. The speaking rate, broadly defined as the speed at which a person speaks, of L2 learners as well as

native speakers, has been investigated by researchers for many years. Although the ways in which speaking rate is measured vary depending on the methodology employed in the research, some of the measures commonly used to calculate speaking rate are speech rate (i.e., the number of syllables articulated per unit of time, including pauses), articulation rate (i.e., number of syllables divided by speaking time, excluding pauses), mean length of run (i.e., mean number of syllables between pauses), and so forth. It has been reported that L2 learners' speaking rate is usually slower than that of a native speakers', and this seems to be true even for advanced learners. To list a few studies, Anderson-Hsieh and Koehler (1988) found that the speech rate of Mandarin speakers was lower than that of native speakers when reading passages aloud. Munro and Derwing (1995) reported that speech rate of advanced Mandarin learners of English in a sentence read-aloud task was significantly lower than that of native speakers of English. Examining the relationship between speech rate and learners' age of first exposure to English in the target country, Guion, Flege, Liu, and Yeni-Komshian (2000) found the overall tendency of L2 speech to be slower in a sentence repetition task; they also discovered that the earlier the age of first exposure to English was the faster learners' speech rate tended to be.

In addition to the comparison between L2 learners' speaking rate and that of the native speakers', L2 learners' speaking rate has been examined in relation to that of their own first language (L1) as well. For instance, having proficient learners give a presentation in their L1 and L2, Hincks (2009) discovered that learners who spoke at a relatively slower speed in their L1 also tended to speak slower in their L2. In spite of the oft-reported slower L2 speaking rate, it should be noted that learners' speaking rate increases as the length of residence increases (Saito, 2015) and as a result of instruction (Sato & Lyster, 2012; Tavakoli, Campbell, & McCormack, 2015).

Speaking rate and its relation to fluency. Combined with the analysis of other speech characteristics such as pauses (filled and/or unfilled), repetition, and restarts, speaking rate has been the focus of research on second language learners' fluency. (Note that fluency here roughly refers to how effortlessly and smoothly L2 speech flows rather than its broader definition, which is a learner's global proficiency or the level of command of the L2. See Kormos & Dénes (2004) and Tavakoli et al. (2015) for more details about the complexity and variety in defining the construct.) Kormos & Dénes (2004), for instance, analyzed correlations between temporal variables of L2 speech and its perceived fluency and found that speech rate, mean length of runs, phonation time ratio (i.e., percentage of time spent speaking as a percentage proportion of the time taken to produce the speech sample), and number of stressed words per minute were good predictors of the learners' fluency scores in a picture description task.

Although scrutinizing L2 learners' speaking rate in relation to their fluency is intriguing and will provide theoretical insights in the field of language testing (de Jong, Groenhout, Schoonen, & Hulstijn, 2015; Pinget, Bosker, Quené, & de Jong, 2014) as well as pedagogical implications (Derwing, Munro, Thomson, & Rossiter, 2009), the present study examines L2 learners' speaking rate in terms of comprehensibility. Below, the relevant literature is reviewed with more focus on comprehensibility.

Speech rate and its effect on comprehensibility and accentedness. As reviewed earlier, there exists a body of research on comprehensibility and accentedness of L2 oral speech; however, to the best of the author's knowledge, the effect of L2 speaking rate on comprehensibility is under-examined; furthermore, the findings are confounding.

On the one hand, Anderson-Hsieh and Koehler (1988) compared comprehensibility ratings of passages read aloud at three different rates: slower speed, natural speed, and faster

speed. They found that the native listeners' comprehension scores were higher for the passages read at the regular speed than those at the faster rate regardless of the learners' proficiency and that there were no significant differences between the ratings of the passages delivered at a slow speed and those at a normal speed for any speakers. With regard to accentedness, the comprehensibility scores dramatically decreased for the speakers with a heavy accent; heavy accented speech tended to be perceived as relatively faster.

Munro and Derwing (2001), on the other hand, concluded that L2 speaking rate affected native listeners' ratings on comprehensibility independently of phonological accuracy and that L2 speech that was somewhat faster than the L2 average tended to receive higher comprehensibility ratings, indicating that L2 speakers will benefit from accelerating their speaking rate. The speech samples used in Munro and Derwing's (2001) research were sentence-length utterances obtained from high proficiency Chinese speakers of English. They digitally modified the speech tokens, increasing and decreasing the rate by 10%, and native listeners judged the comprehensibility of the modified speeches as well as the original ones. It should be noted that although they emphasized the potential benefit of speeding up L2 speeches, they, at the same time, found a curvilinear relationship between speech rate and comprehensibility and accentedness ratings, respectively, which indicates too slow and too fast speeches have a negative effect on the ratings of the two constructs.

It is important to keep in mind that the mixed results in Anderson-Hsieh and Koehler (1988) and Munro and Derwing (2001) reviewed above may largely be due to the differences in the experimental designs. First, while the former study employed learners at different proficiency levels, the participants of the latter were highly proficient speaker of English. Secondly, the task used to collect speech samples in each study also differed: the learners in Anderson-Hsieh and

Koehler (1988) read arcane passages whereas those in Munro and Derwing (2001) engaged in reading short individual sentences composed of high frequency words. Third, although faster and slower speeches were examined in both studies, there is a difference in the nature of these speeches: while Anderson-Hsieh and Koehler (1988) employed naturally slowed down and sped up speeches, Munro and Derwing (2001) used digitally modified speeches, using a speech compression-expansion software. Finally, the degree of the speaking rate adjustments examined in the two studies varied. In Anderson-Hsieh and Koehler (1988), the faster rate was about 30% faster than the normal speed; the slower rate was about 25 % slower than the normal speed. In contrast, in Munro and Derwing (2001), the normal utterances were both compressed and expanded by 10%.

Speaking rate in the present study. The present study aims to examine the important yet unclear effect that speaking rate has on L2 comprehensibility by means of a reading task in a laboratory setting like the previous studies (Anderson-Hsieh and Koehler, 1988; Munro & Derwing, 2001) but with a larger number of L2 participants (note the number of L2 participants was only 3 in Anderson-Hsieh and Koehler (1988) and 10 in Munro and Derwing (2001)). In particular, the present study is targeted at naturally slowed down L2 speech from a practical point of view (see Chapter 4: Methodology, for more details) as well as the incorporation of pauses, which is closely related to naturally slowed down speech in discourse. Pausing, like speaking rate, is a variable that is known to affect comprehensibility, yet a variable for which practical application seems to remain underdeveloped. The last section of the literature review will examine the research on pausing and discusses the significance of incorporating pausing in the present study.

Pausing

Pausing is a natural behavior in everyday speech of both native and non-native speakers. It is of interest to the current study since pausing is a temporal variable similar to speaking rate. More importantly, pausing is closely related to speaking rate in that slower speech may not necessarily be due to lower articulation rate, but due to longer and/or more frequent pauses (Griffiths, 1991).

In the context of L2 research, non-native speakers' pausing styles have often been examined in relation to fluency in a narrow sense under the research question *What constitutes fluent L2 speech?* (Kormos & Dénes, 2004; Rossiter, 2009) as well as in an attempt to compare an L1 and L2 (Bosker, Quené, Sanders, & de Jong, 2014; Hincks, 2010; Riazantseva, 2001). Major findings about pausing in such fluency research as well as the research that aimed to describe differences in pausing characteristics between L1 and L2 speeches are that (a) pauses may or may not affect listeners' perception of L2 fluency, though the degree of the effect does differ study by study (Kormos & Dénes, 2004; Rossiter, 2009); (b) there may exist cross-linguistic differences in pausing styles (Riazantseva, 2001); (c) L2 learners, especially those who are less proficient, tend to produce pauses more frequently, produce longer pauses, and produce pauses inappropriately (Anderson-Hsieh & Venkatagiri, 1994); (d) L1 pausing characteristics may be transferred into L2 speech, but L2 speech is likely to approximate pausing norms of the target language as learners become more proficient in the L2 (Iwashita, Brown, McNamara, & O'Hagan, 2008; Riazantseva, 2001).

It is important to note that while characteristics of L2 pausing and the roles that pausing play in relation to L2 fluency have caught researchers' attention, pausing in terms of comprehensibility has received little attention in the context of L2 research, as has also been the

case for speaking rate. Influenced by Krashen's (1985) widely recognized comprehensible input hypothesis, the early research on L2 comprehensibility focused on variables that facilitate L2 learners' comprehension of native speech to promote L2 acquisition, rather than comprehensibility of L2 speech. In such context, Blau (1990, 1991) conducted two rare studies, in which the researcher found the facilitative role of pausing for L2 learners to comprehend the target language. In addition, as Kang (2010) mentioned, "research on the relationship between NNSs' [non-native speakers'] pauses and comprehensibility judgments has been rare" (p. 303); to the best of my knowledge, there are only a few studies that examined the relation between pausing and comprehensibility of L2 speech (Bae, 2015; Kang, Rubin, & Pickering, 2010), findings of which contradict each other especially regarding pause length.

Recently, Bae (2015) has investigated the exclusive effects of pausing on comprehensibility. In her research, she had native speakers of English judge comprehensibility of four excerpts from an academic lecture read by an advanced L2 speaker, which she modified for pause characteristics in the following way: (a) no modification; (b) irregular placement of pauses; (c) increased frequency of pauses; (d) longer pauses. She found that irregular placement of pauses (i.e., pauses within a phrase and pauses between an article and a noun) affected the comprehensibility ratings most negatively, followed by increased frequency of pauses, and she provided implications of the importance of learning and teaching formulaic language. Although the overall rating of the text with longer pauses was similar to the normal text rating, Bae pointed out that two of the four rater groups assigned a higher score to the former than the latter, indicating that longer pauses facilitated the two groups' comprehension. Thus, the effects of longer pauses on comprehensibility of L2 speech remain rather unclear, and the current study, while investigating the effects of speaking rate, aims to contribute to the literature on L2

pausology and comprehensibility with a focus on speakers' speech adjustment techniques, instead of artificially modifying speech. The next section will address the research questions of the current study.

CHAPTER 3: THE CURRENT STUDY

This study examines the effects of speaking rate and pausing on comprehensibility of L2 speech in a read-aloud task. More specifically, this study asks L2 speakers to slightly slow down and pay attention to pauses in reading tasks, and subsequently native speakers of English are asked to rate the comprehensibility of speech samples produced under three reading conditions, including regular speech. Employing naturally modified speech samples reflects real speech, and is therefore more practically-oriented, when compared to creating artificially modified stimuli. Naturally sped up speech was not incorporated into the methodological design of the current study, given that intentionally slowing down seems to be a strategy that is more likely to be employed by both L1 and L2 speakers (e.g., when talking to someone who is less proficient) and that adding one more variable is challenging due to the time constraints and available funds (i.e., compensation for the participants). The following are the two research questions this study aims to investigate:

1. Are there any differences in temporal variables of L2 speech among the three reading conditions (natural speed, slightly slower speed, and natural speed with a focus on pauses)?
2. Are there any differences in comprehensibility ratings of L2 speech among the three reading conditions (natural speed, slightly slower speed, and natural speed with a focus on pauses)?

By setting the first research question, this study examines if L2 speakers are able to follow instructions and control their speaking rate as well as pausing. It also intends to examine how L2 speakers interpret “slowing down” and adjust their speech since previous research addresses that slowing down does not necessarily mean pronouncing each word slowly but may

involve just elongating pauses (Griffiths, 1991). Regardless of the comprehensibility ratings, the results will shed light on the characteristics of L2 speech that is naturally adjusted by the speakers. The temporal variables being measured are speech rate, articulation rate, and mean length of pauses.

While the first research question may be preliminary, the second research question directly relates to the primary purpose of this research. With this question, the present study aims to re-examine in a more practically-oriented way the effects of the two temporal variables (i.e., slightly slower speaking rate and longer pause length) on L2 comprehensibility, for which mixed results were obtained in the previous research (see Anderson-Hsieh & Koehler, 1988; Munro & Derwing, 2001, for slower speaking rate; see Bae, 2015; Kang et al., 2010, for pausing). This research will contribute to the findings on this subject using a different methodological approach and authentic speech samples. The next chapter describes the methodology of the study.

CHAPTER 4: METHODOLOGY

Participants

Native speakers of Chinese for audio-recording. Twenty native speakers of Mandarin Chinese, who grew up in China, were recruited at a public Midwestern university in the US in order to prepare speech samples for comprehensibility ratings. The researcher created a flyer and posted copies on several bulletin boards on campus as well as distributed them to Chinese students in his classes. The Chinese participants were all advanced-level speakers of English, considering that they were enrolled in a degree program at the university in the US (see Appendix A for their self-reported TOEFL iBT scores). One of the participants' (Speaker 16) TOEFL iBT speaking score was relatively low (i.e., 18.5), which was converted from her IELTS speaking score based on the conversion table provided by Educational Testing Service (2016); however, she was still regarded as an advanced speaker, considering that the score was from a few years ago and that she had lived in the US for 18 months.

Of the 20 participants, 5 were male and 15 were female; both graduate ($n = 6$) and undergraduate ($n = 14$) students participated. Their age varied from 19 to 28 years old, and the average age was 21.9 years of age. Their length of residence (LOR) in the US ranged from one and a half years to three and a half years. The mean LOR was 2.8 years. See Table 1 below for a summary of the Chinese participants' demographic information (see also Appendix B for their individual demographic information).

Table 1

Demographic information of native speakers of Chinese

Gender		Enrollment Status		Age	LOR ^a
Male	Female	Undergraduate	Graduate	<i>M</i>	<i>M</i>
5	15	14	6	21.9	2.8

^a Length of Residence in the US (year)

Native speakers of English for audio-recording. Three native speakers of English were recruited from the researcher's classes at the university. One was female and the other two were male speakers ($M_{age} = 23.7$ years), and all of them were from the state of Illinois. They completed the same audio-recording task as the Chinese participants did, which is described later. The purpose of including the native speakers was not to compare the native speakers' performance and that of Chinese speakers but to examine raters' reliability (see the section below titled "Audio-recording native speakers of English" for more detail).

Native speakers of English as raters. Twenty native speakers of English were recruited as raters from the same university as the Chinese participants. As was done for the recruitment of the Chinese participants, the researcher created a flyer and posted copies on several bulletin boards on campus as well as distributing them to students whose native language is English in his classes. Additionally, the researcher sent a recruitment email to office managers of several departments in the university and asked them to forward the email to the students. The requirements for the rater were (a) be a native speaker of North-American English; (b) not be familiar with English spoken by individuals whose first language is Chinese; (c) have never learned Chinese; (d) have no experience of learning linguistics and teaching English. With regard to the first requirement, this research defines a native speaker of North-American English as a person who was born and grew up in the US or Canada who has been exposed to English since birth. The purpose of the second requirement was to avoid the familiarity effect on the ratings,

given that familiarity with a certain accent is likely to lead to more lenient ratings of speech with that accent (Carey, Mannell, & Dunn, 2011; Gass & Varonis, 1984). Similarly, the third requirement was included because learning experience of or familiarity with a particular language may facilitate the comprehension of L2 speech spoken by native speakers of the language (Winke & Gass, 2013). In other words, if a rater has linguistic knowledge of Chinese, he/she may assign higher scores on English spoken by native speakers of Chinese compared to other raters without knowledge of Chinese; the third requirement was set to avoid that influence. The rationale behind the last requirement was to recruit linguistically naïve or untrained raters, following the previous research on comprehensibility of L2 speech (Isaacs & Trofimovich, 2012; Saito et al., 2015); it is important to note that English as a second language teaching experience may allow the rater to become familiar with a variety of non-native accents and that this familiarity may also affect comprehensibility ratings of non-native speech, whether or not the speech is characterized by an accent one is used to (Gass & Varonis, 1984).

Of the 20 raters, 9 were male and 11 were female; there were both graduate ($n = 3$) and undergraduate students ($n = 17$). Their majors or specializations varied including Biology, Geography, Philosophy, Psychology, Physics, and Sociology. They ranged in age from 18 to 27 years, the average age being 21. Four of the 20 participants reported that they spoke a language other than English with native-like proficiency. They answered a question about their familiarity with English spoken by Chinese people on a 9-point Likert scale (i.e., 1 = very familiar, 9 = not familiar at all). Their self-reported familiarity with Chinese accented English varied from 4 to 8 ($M = 5.95$); given the large population of Chinese speakers in the university, it can be said that the participants represent a group of people who are only moderately used to Chinese accented English. They also answered a question asking about their familiarity with airline

announcements on a 9-point Likert scale (i.e., 1 = very familiar, 9 = not familiar at all), given that their familiarity may affect their ratings (Gass & Varonis, 1984). Their self-reported familiarity with airline announcements varied from 1 to 9 ($M = 5.25$). All of them reported having normal hearing. Their demographic information is summarized in Table 2 (see also Appendix C for the raters' individual demographic information).

Table 2

Demographic information of native English-speaking raters

Gender		Enrollment Status		Age	Familiarity w/CAE ^a	Familiarity w/AA ^b
Male	Female	U ^c	G ^d	<i>M</i>	<i>M</i>	<i>M</i>
9	11	17	3	21	5.95 ^e	5.25 ^e

^a Familiarity with Chinese accented English

^b Familiarity with Airline announcements

^c Undergraduate

^d Graduate

^e 1 = very familiar, 9 = not familiar at all

Procedures

Preparing passages for audio-recording. Airline flight announcements were chosen for comprehensibility ratings in this study. The selection criteria for the topic was largely due to the researcher's preference; however, it is important to note it is highly likely that one may hear airline announcements made by non-native speakers of English in real life, and thus results of comprehensibility ratings on airplane announcement by non-native speakers may be able to provide practical implications.

The supposedly authentic scripts of the airline announcement in the British Airways Community Learning Centre Primary Resource Pack (British Airways, n.d.) served as a base to create three airline flight announcement passages. A different situation was assigned to each of the three passages: welcoming (Passage A), safety (Passage B), and landing (Passage C). The original scripts were slightly modified in order to ensure that the three passages were comparable

to each other in length, vocabulary difficulty, and grammatical complexity as well as to replace British-sounding wording with the American English equivalents (e.g., overhead lockers→overhead bins). The number of syllables of Passages A, B, and C are 128, 127, and 123, respectively; they consist of 92 words (seven sentences), 82 words (eight sentences), and 88 words (eight sentences), respectively. According to Word and Phrase .info, which is an interface of the Corpus of Contemporary American English (COCA) (Davies, 2008), 86% of the vocabulary in Passage A falls under the 3,000 most commonly used words, whereas the percentages are 83% and 84% for Passages B and C, respectively. (Note that COCA is composed of a large number of recent texts from different genres including spoken texts, newspapers, and academic texts, and therefore was regarded relevant in the current study that involves reading aloud passages.) Each passage includes one *that* clause (e.g., *we are delighted that...*; *we hope that...*) and two complex sentences; the rest were either simple sentences or compound sentences. As will be described in more detail below, Passage A was read at a natural speed; Passage B was read at a slightly slower speed than a natural speed; Passage C was read at a natural speed with attention to the pause placements marked with slashes. To determine the locations of the pauses in Passage C, the researcher informally audio-recorded three native speakers of English reading aloud the passage, and he marked all the locations where all of the three speakers made a pause. The three passages are provided in Appendix E, and Table 3 below shows the summary of linguistic profile of each passage. In addition to the three passages, the researcher prepared two other passages that were also airline announcements, but these were only used either for practice (Practice Passage) or as a distractor (Wrap-up Passage) and were neither rated nor analyzed (see Appendix F for the two passages).

Table 3

Linguistic profile of three passages

Passage	Number of syllables	Number of words	Number of sentences	3,000 words ^a (%)
A: Normal speed	128	92	7	86
B: Slightly slower speed	127	82	8	83
C: Normal speed & Attention to pauses	123	88	8	84

^a 3,000 most commonly used words

Audio-recording native speakers of Chinese. The researcher was contacted by Chinese participants who were interested in participating in the research, and he scheduled individual meetings via email for audio-recording. All the audio-recording sessions were held in a sound-attenuated booth in the phonetics lab at the university. The participants first read and signed a consent form and filled out a questionnaire about their language background (see Appendix G for the questionnaire). Then, the researcher audio-recorded the participants reading aloud the five passages one at a time. The passages were presented in the following order: (a) Practice Passage, (b) Passage A, (c) Passage B, (d) Passage C, and (e) Wrap-up Passage; there were instructions as to how to read aloud for each passage. The participants were instructed to read Practice Passage, Passage A, and Wrap-up Passage at a natural speed. For Passage B, they were instructed to read at a slightly slower speed than natural speed. They were instructed to read Passage C at a natural speed but to pay attention to the slashes that indicate the expected locations of pauses (see Appendices A and B for the reading instructions). Before audio-recording each passage, the researcher asked the participants to read the passage silently to understand the content and to ask him about any word that they do not know. The participants were not informed of the purpose of the first passage (i.e., Practice Passage) and the last one (i.e., Wrap-up Passage). All the recordings were carried out, using an AKG MicroMic C520 microphone, a Marantz Professional PMD 570 recorder, and a Grace Design Model 101 preamplifier, and were saved as .wav files.

The entire meeting with a participant took approximately half an hour; after completing the audio-recordings of the five passages, the participant was compensated \$10 for their time. The researcher continued to recruit participants and set up meetings for audio-recording until the number of Chinese participants reached 20 (note that the demographic information of the 20 Chinese participants is provided in Table 1 above.). As a result, 100 speech samples were obtained (five passages from each of the 20 participants); 60 of the speech samples (Passages A, B, and C from each of the 20 participants) were used for analysis and comprehensibility ratings.

Audio-recording native speakers of English. Each of the three native speakers of English volunteered to contribute speech samples of the five airline passages. The procedure for collecting the speech samples was exactly the same as for the Chinese participants described above except that they read all the passages at a natural speed. The rationale for having the native speakers read all the passages naturally was to ensure high ratings for all the native speech samples. It might be possible that the native speakers' speech becomes less comprehensible if they are asked to adjust their speech based on the reading instructions (note that this study did not intend to compare non-native speakers' ability to adjust their speech with that of native speakers' nor did it intend to compare comprehensibility scores of both groups). Of the 15 speech samples, 9 samples (Passages A, B, and C from each speaker) were used for comprehensibility ratings as distractors in order to examine whether the raters followed the rating instructions and rated accordingly (i.e., assigning a low score to a native-speaker token would indicate rater's inability to understand and follow the instructions, which undermines the reliability of scores provided by the rater). The rating procedures are provided below.

Preparing speech stimuli for comprehensibility ratings. The 69 speech samples obtained from the Chinese participants and the native speakers of English were modified using

Praat, a free computer software for speech analysis created by Boersma and Weenink (2016), so that each sample had a 0.5 second silence both before the first syllable produced and after the last syllable produced in each passage. Then, the researcher created 20 sets of 69 speech samples, in each of which the order of the speech samples appeared in random order (note that the randomization was carried out, using a Microsoft Excel® spreadsheet function for generating random numbers). Each set of 69 speech samples was placed in a separate folder and received a number label. After each speech sample file in each folder, the researcher added an audio file made up of 20 seconds silence that serves as rating time. Each of the raters was provided with one of the 20 folders on iTunes (see Appendix D for how 69 speech samples were randomized for each rater) in the comprehensibility rating sessions, the procedure of which is described below.

Comprehensibility ratings by native speakers of English. The researcher was contacted by native English speaking participants who were interested in participating in the research, and he scheduled two individual rating sessions for each participant via email. In the first rating session, the participant first read and signed an informed consent form and filled out a questionnaire asking about their language background information (see Appendix H for the questionnaire). Then, the researcher explained the rating procedures such as the concept of comprehensibility, use of the entire rating scale, and how many times they were allowed to listen to each sample (i.e., once), which were also provided as instructions on the rating sheet (see Appendix I for the rating sheet). The participants rated each sample on comprehensibility, using a 9-point Likert scale (1 = very easy to understand, 9 = very difficult to understand). They first had a practice rating session, where they rated three non-native Practice Passages to make sure that they understood the rating procedure. Following the practice session, they rated 30 samples

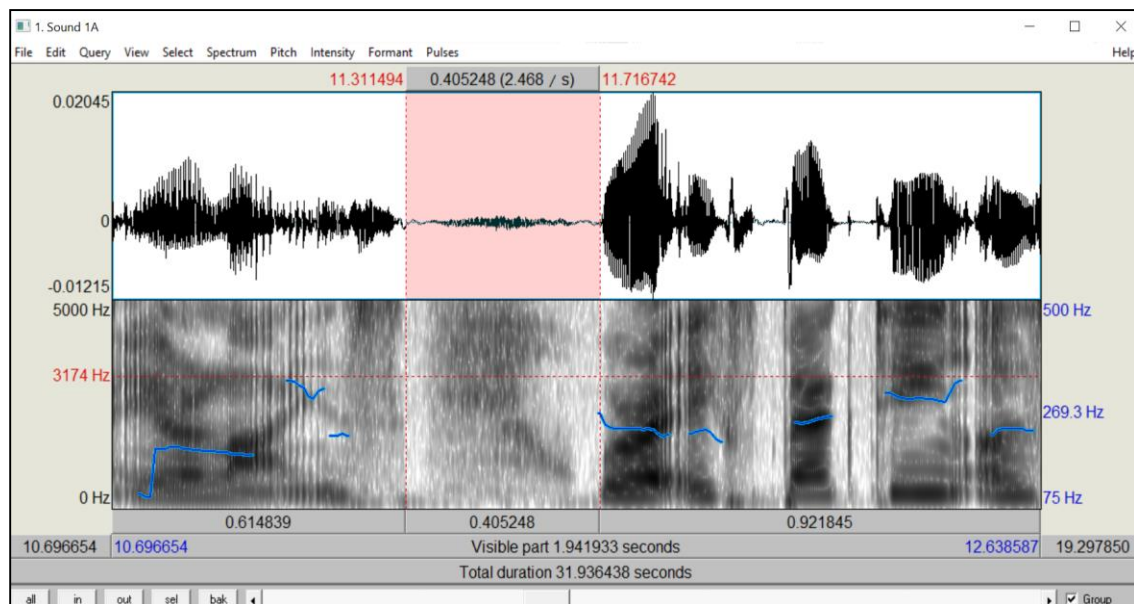
in the first session and the rest (i.e., 39 samples) in the second session. The two sessions were held on a different day, and all the raters completed the second session within a week of the first session. All the rating sessions were held in a quiet place on campus; the speech stimuli were played on iTunes on either the researcher's laptop (Lenovo's ThinkPad) or tablet (iPad) with the participant's headphones. Combined, both meetings for each participant took approximately 70 minutes; upon completing all the ratings, the participants were compensated \$15 for their time.

Analysis

Speaking rate and pauses. Speech rate (i.e., the number of syllables articulated per unit of time, including pauses), articulation rate (i.e., number of syllables divided by speaking time, excluding pauses), pause length, and mean length of sentence-final pauses of 60 non-native tokens were measured to analyze whether there was any difference of reading behaviors among the three reading conditions. In this study, a pause is considered a silence longer than 0.1 second given the controlled-nature of speech (i.e., reading aloud passages) rather than extemporaneous speech, in which speakers need to plan what idea to produce and need more planning time that may result in longer and a greater number of pauses (Bae, 2015). In calculating speech rate and articulation rate, disfluencies such as errors, hesitations, and repetitions were also regarded as syllables although these phenomena may not frequently occur in a read-aloud task. All the pauses were measured, using Praat (see Figure 1 for an example of pause measurement, in which a sentence-final pause (0.4 seconds) is highlighted).

Figure 1

Example of pause measurement in Praat



Neither total length of pauses nor mean length of pauses were compared because the number of possible locations of pauses was not controlled for each passage. Rather, such control is almost impossible given that there are individual differences among even native speakers for where to pause in the middle of sentences when reading a passage (Bae, 2015). Furthermore, it is important to note that pauses within sentences are generally shorter than pauses between sentences (Vaissière, 1995), which raises a question for calculating the mean length of pauses when the number of pauses between sentences and the number of possible sentence-within pauses are not controlled. For these reasons, the total length of pauses of each speech token was measured to only calculate the speech rate and articulation rate; the mean length of pauses of each speech sample was not calculated nor compared.

Once the researcher had measured all the speech variables, he asked a statistician, who is also an expert of language testing, for assistance in statistics. A repeated-measure ANOVA was

conducted to see if there was any significant difference in speech rate, articulation rate, and mean length of sentence-final pauses among the three passages.

Comprehensibility ratings. Ratings by the 20 native speakers of English for the Chinese speakers' tokens were analyzed to examine whether there was any difference among the comprehensibility ratings for the three reading conditions. As he did for the analysis of speaking rate and pauses, the researcher contacted the same statistician for support. First, inter-rater reliability was calculated, using the g-coefficient (Brennan, 2001). Measuring inter-rater reliability is important to know whether raters assigned scores based on the same criteria. It is also crucial to examine inter-rater reliability if their backgrounds differ. The raters in the present study are all native speakers; however, the differences in their backgrounds, such as familiarity with the topic (i.e., airline announcements) (Gass and Varonis, 1984), degree of fatigue (Ling, Mollaun, & Xi, 2014), gender (R. Sadler, personal communication, April 15, 2016), and musical experience (Isaacs & Trofimovich, 2011), may lead to different perception of L2 speech. A high inter-rater reliability would suggest that the raters interpreted the rating instructions and rated the L2 speech samples in a similar way regardless of the differences in their backgrounds.

Subsequently, a repeated-measure ANOVA was conducted to examine whether there was any difference in the comprehensibility ratings among the three reading conditions. The next chapter reports the results of the analysis.

CHAPTER 5: RESULTS

In order to answer the first research question “Are there any differences in temporal variables of L2 speech among the three reading conditions (natural speed, slightly slower speed, and natural speed with a focus on pauses)?”, speech rate, articulation rate, and mean length of sentence-final pauses of each non-native passage were measured. Table 4 shows the average and standard deviation for each temporal variable for the three reading conditions.

Table 4

Measurement of the temporal variables for the three passages

Passage	Speech rate (Syllables/sec)		Articulation rate (syllables/sec)		MLSP ^a (sec)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
A: Normal speed	4.13	0.41	4.80	0.42	0.52	0.11
B: Slightly slower speed	3.45	0.32	4.20	0.39	0.62	0.14
C: Normal speed & Attention to pauses	3.70	0.43	4.67	0.39	0.70	0.19

^a Mean length of sentence-final pauses

To see if there is any significant difference in each temporal variable across the three reading conditions, a repeated-measure ANOVA was conducted for each variable. The results are summarized below in this chapter.

Speech Rate

Results of a repeated-measure ANOVA suggest that there were significant differences among the three passages: $F = 44.213$ (2, 38), $p < 0.05$. As a follow-up, a pair-wise comparison with Bonferroni adjustments for significance level was conducted. Results show that the speech rate for Passage A was significantly higher than that of Passage B and Passage C; in addition, the speech rate for Passage C was significantly higher than that of Passage B.

Articulation Rate

Results of a repeated-measure ANOVA suggest that there were significant differences

among the three passages: $F = 42.247 (2, 38), p < 0.05$. As a follow-up, a pair-wise comparison with Bonferroni adjustments for significance level was conducted. Results show that the articulation rate for Passage A was significantly higher than that of Passage B; additionally, the articulation rate for Passage C was significantly higher than that of Passage B. However, there was no significant differences between Passages A and C.

Mean Length of Sentence-final Pauses

Results of a repeated-measure ANOVA suggest that there were significant differences among the three passages: $F (2, 38) = 17.969, p < 0.05$. As a follow-up, a pair-wise comparison with Bonferroni adjustments for significance level was conducted. Results show that the mean length of sentence-final pauses for Passage A was significantly lower than those of Passage B and Passage C; however, there was no significant differences between Passages B and C.

Taken together, the Chinese speakers overall not only produced syllables or words more slowly but also placed longer pauses when they were instructed to slightly slow down for Passage B. When they were instructed to pay attention to pauses while reading at a natural speed for Passage C, they did place longer pauses, based on the instructions, while maintaining their normal articulation rate.

Comprehensibility ratings

Prior to analyzing the comprehensibility ratings to answer the second research question “Are there any differences in comprehensibility ratings of L2 speech among the three reading conditions (natural speed, slightly slower speed, and natural speed with a focus on pauses)?”, it was necessary to examine the raters’ reliability. To this end, ratings of the native speakers’ speech tokens were first examined, considering that low ratings on native speakers’ tokens would indicate lack of understanding the rating instructions. Almost all native speakers’ speech samples

received a score of 1 (i.e., very easy to understand) with several scores of 2 and one score of 3; because raters deemed the native speakers' speeches to be comprehensible and low on the Likert scale, all the ratings from 20 raters were used in the subsequent analysis.

Then, the inter-rater reliability was measured using the g-coefficient under the generalizability-theory framework (Brennan, 2001) in order to examine the raters' reliability in more depth. The g-coefficient for Passage A, B, and C was 0.92, 0.91, and 0.92, respectively. This suggests that for each reading condition the 20 raters rated the Chinese speakers of English with satisfactory reliability using the 9-point comprehensibility scale. Table 5 provides the mean comprehensibility score and standard deviation for each reading condition.

Table 5

Mean score and standard deviation for each reading condition

Passage	<i>M</i>	<i>SD</i>	Range
A: Normal speed	4.86 ^a	1.92	2.60-6.60
B: Slightly slower speed	4.96	1.95	1.95-7.35
C: Normal speed & Attention to pauses	4.66	1.86	2.00-7.05

Note. The lower score indicates that the speech was more comprehensible.

^aThe mean score of Speaker 16, whose TOEFL iBT speaking score was the lowest among the 20 participants, was 4.50.

To see whether there exists any significant difference of the comprehensibility ratings across the three passages, a repeated-measure ANOVA was conducted. Results suggest that no significant difference was observed: $F = 2.065 (2, 38)$, $p = 0.141$.

In summary, although the Chinese speakers were successfully able to follow the reading directions and read aloud each passage differently, this difference in reading style did not bring about any statistically significant difference in the comprehensibility ratings. The results are discussed in the next section.

CHAPTER 6: DISCUSSION

Differences in the temporal variables among the three reading conditions

The first research question asked “Are there any differences in temporal variables of L2 speech among the three reading conditions (natural speed, slightly slower speed, and natural speed with a focus on pauses)?” Recall that measuring the temporal variables (i.e., speech rate, articulation rate, and mean length of sentence-final pauses) was particularly important in order to know if any difference in the comprehensibility ratings is due to a decrease in the speakers’ speaking rate. Investigating how L2 speakers slow down their speech in detail was also of interest to this study since slower speech may be due to longer pauses rather than drawing out individual words (Griffiths, 1991). In the current study, the differences in the temporal variables among the three passages showed that the Chinese participants not only articulated individual syllables or words more slowly but also elongated pauses when they were instructed to read Passage B at a slightly slower speed than a natural speed. It was also found that when they were instructed to read Passage C at a natural speed with attention to pauses, they were able to do so by putting longer pauses while maintaining their articulation rate in Passage A, which they were asked to read at a natural speed. This assures that any difference in the comprehensibility ratings among the three passages can be ascribed to the speakers’ speech modification based on the instructions regarding speech rate and pausing. Since the primary purpose of this study is to investigate how slower speaking rate affects L2 comprehensibility and not to examine why L2 speakers can slow down, why they slowed down in a specific way, and/or other issues irrelevant to comprehensibility, the results of the differences in the temporal variables in this study are only briefly discussed in comparison with the results in the relevant studies below.

The results regarding the way in which the Chinese speakers slowed down their speech in

Passage B build on similar research conducted by Anderson-Hsieh and Koehler (1988). Anderson-Hsieh and Koehler also instructed Chinese participants to naturally slow down in a read-aloud task, but only reported speech rate, from which it is impossible to know how the speakers slowed down in terms of articulation rate and pause length. It is also important to note that Munro and Derwing (2001), who also examined comprehensibility of L2 slow speech and fast speech, did not reveal in what ways L2 speakers may slow down their speech because they artificially modified normal speech samples to create slow speech samples. The results of the present study suggest that L2 speakers tend to articulate individual syllables or words more slowly as well as to lengthen pauses. With regard to L2 speakers' ability to intentionally slow down their speech, Anderson-Hsieh and Koehler (1988) speculated that it may be hard for L2 speakers with higher proficiency though they did not clearly state the reason why higher proficiency may negatively affect the ability to slow down. However, the Chinese participants in the present study, who were advanced English speakers, successfully decreased their speaking rate by articulating syllables or words more slowly and placing longer pauses.

With regard to Passage C, which the Chinese participants were instructed to read at a natural speed while paying attention to pauses, they prolonged pauses while maintaining their normal articulation rate. This finding alone is difficult to interpret since to the author's best knowledge, no previous research has examined nor discussed L2 speakers' ability to intentionally place longer pauses. Thus, it will only be discussed in relation to the results of the comprehensibility ratings in the next section. The results of how the Chinese participants slowed down when reading Passage B will also be further discussed below in terms of the comprehensibility ratings.

No differences in the comprehensibility ratings among the three reading conditions

The second research question asked “Are there any differences in comprehensibility ratings of L2 speech among the three reading conditions (natural speed, slightly slower speed, and natural speed with a focus on pauses)?” The results revealed that native English-speaking raters overall assigned a similar score to each of the three passages and that neither of the Chinese speakers’ speech adjustments (i.e., articulating individual syllables or words slowly while placing longer pauses; just placing longer pauses) contributed to their increased comprehensibility nor undermined their comprehensibility. Thus, the present study failed to support a commonly-held idea that slower speech characterized by lower articulation rate and/or longer pauses may allow for more processing time and thus facilitate listeners’ comprehension.

The results that there was no difference in ratings between Passage A (i.e., natural speed) and Passage B (i.e., slightly slower) concur with the findings by Anderson-Hsieh and Koehler (1988) in that there was no significant difference in the comprehensibility ratings between the normal speech samples and those that were naturally slowed down by about 25%. It is important to note, however, that the mean speech rate for slower speech in the current study was 3.45 syllables/sec while it was 2.54 syllables/sec in Anderson-Hsieh and Koehler (1988). In contrast, the results disagree with those in Munro and Derwing (2001), who found that normal speech samples were rated better than slower speech samples that were created by artificially expanding the normal speech samples by 10%. The mean articulation rate for slower speech in the present study was 4.20 syllables/sec whereas it was 2.92 syllables/sec in Munro and Derwing (2001) (note that articulation rate is compared because Munro and Derwing (2001) employed a short-sentence reading task). These comparisons have to be interpreted with caution since each of the three studies (i.e., Anderson-Hsieh & Koehler, 1998; Munro & Derwing, 2001; the present study) differ to a great extent in methodological design. For instance, there were only three

speakers, and their proficiency levels varied in Anderson-Hsieh and Koehler (1988) while the participants in the present study were 20 advanced speakers of English. It is also important to mention that the slow speech samples in Munro and Derwing (2001) were digitally slowed down versions of the regular speech samples, whereas the participants in the present study were instructed to slow down their speech. Although Munro and Derwing (2001) reported that the raters did not notice that they rated artificially modified speech samples, digitally expanded speech samples in general may not reflect how speakers actually slow down their speech. When speakers slow down, there is not only a decrease in speaking rate but there may also be a change in coarticulation of neighboring sounds (Daniloff & Hamarburg, 1973). The results of the current study imply that such change as well as slower speaking rate may not affect comprehensibility although the analysis of change in coarticulation and other pronunciation features such as prosody is out of the scope of this study. However, it should be reminded that the participants in this study were advanced Chinese learners of English whose mean speaking rate was quite high (i.e., 4.13 syllables/sec for speech rate and 4.80 syllables/sec for articulation rate).

The results that there was no statistically significant difference in comprehensibility ratings between Passage A (i.e., natural speed) and Passage C (i.e., natural speed with attention to pauses) suggest that longer pauses do not affect L2 comprehensibility ratings. This seems to lend support for Bae's (2015) tentative conclusion that longer pauses neither facilitate nor undermine comprehensibility of L2 speech; however it is important to highlight the differences in the present study and Bae (2015). One of the differences is while the participants in the current study were instructed to put longer pauses, Bae (2015) artificially extended the length of some of the pauses of recorded passages. The length of sentence-final pauses in the present study ranged from 0.3 to 1.1 seconds ($M = 0.7$ sec) while the length of manipulated sentence-final pauses in

Bae (2015) ranged from 1.0 to 1.6 seconds ($M = 1.3$ sec). Most importantly, while there were 20 Chinese participants with advanced proficiency as speakers in the present study, the speech samples from Bae (2015) were obtained from only one advanced Korean speaker of English who clearly produces segmental sounds.

To summarize, the findings of this study may suggest that advanced Chinese speakers of English should maintain their original speaking rate and pausing patterns when reading aloud a passage to native speakers of English, given that there was no statistically significant difference of the comprehensibility ratings among the three reading conditions. However, this should be interpreted carefully for three reasons. First, although the three airline announcement passages were modified to ensure comparability in terms of vocabulary frequency, there still might have been differences in the readability of the passages. The researcher noticed that many of the Chinese participants mispronounced words that have a consonant cluster at the end such as *Airlines*, *masks*, and *sides*, by, for example, dropping the final consonant. In fact, according to Deterding (2010), Chinese speakers of English find it problematic to pronounce final consonant clusters due to the lack of consonant clusters in Chinese. This observation led to the examination of the number of words that have a final consonant cluster in the passages used in the current study: the number of words that have a final consonant cluster was only two (i.e., *Airlines*, and *hours*) in Passage A, while there were eight in Passage B (i.e., *details*, *routes*, *masks*, *lifejackets*, *exits*, *sides*, *fails*, and *masks*) and Passage C (i.e., *Airlines*, *welcomes*, *seatbelts*, *aircraft*, *comes*, *bins*, *items*, *Airlines*), respectively. This difference might have affected the ratings, considering that mispronunciation is highly salient in a read-aloud task, in which readers are free from other types of mistakes such as wrong vocabulary choice and ungrammatical structures. Furthermore, it is important to note that the last consonant of some final consonant clusters convey

grammatical information. For instance, the last *s* in *masks* conveys that the noun is plural; *s* in *comes* indicates that the subject of the present simple verb is third-person singular such as *he* and *it*. If a speaker mispronounces and drops the last consonant of the final consonant clusters, the error may be perceived as not a phonological error but as a grammatical error, which is also known to negatively affect comprehensibility (Isaacs & Trofimovich, 2012; Saito, Trofimovich, & Isaacs, 2015). It might be possible that raters in this study assigned a lower score to speech samples of Passage B or Passage C when they heard errors in those final consonant clusters.

Secondly, the raters' familiarity with the topic (i.e., airline announcements) may have affected the results given that listeners' comprehension of L2 speech increases if they are familiar with the topic (Gass & Varonis, 1984). The raters' self-reported familiarity with airline announcements varied from 1 (i.e., very familiar) to 9 (i.e., not familiar at all), the mean being 5.25 ($SD = 2.55$). However, it is also important to note that each rater listened to 23 tokens for each passage and that this might have overly familiarized the raters with the content of the passages. Thus, it might be likely that the possible facilitative effect of slowing down and/or longer pauses on comprehensibility was not observed due to the raters who may have been highly familiar with the passages.

Finally, it is important to keep in mind that although there was no statistically significant difference of the comprehensibility ratings among the three reading conditions, individual differences did exist among the scores each Chinese speaker of English received. In other words, while some of the Chinese participants benefited from slowing down and/or longer pauses for better comprehensibility, for others comprehensibility was sacrificed due to the reading strategy(ies). For instance, the mean comprehensibility score of Passage B read by Speaker 5 decreased by 1.15 (Passage A = 6.35, Passage B = 5.20) (note that the lower the number was,

more comprehensible the speech was); the mean comprehensibility score of Passage C read by Speaker 5, Speaker 14, and Speaker 16 was lower than that of Passage A by 1.70 (Passage A = 6.35, Passage C = 4.65), 1.25 (Passage A = 6.60, Passage C = 5.35), and 1.00 (Passage A = 4.50, Passage C = 3.50), respectively. In contrast, the mean comprehensibility score of Passage B read by Speaker 11, Speaker 13, and Speaker 19 was higher than that of Passage A by 1.00 (Passage A = 4.05, Passage B = 5.05), 1.05 (Passage A = 3.75, Passage B = 4.80), and 1.00 (Passage A = 4.45, Passage B = 5.45), respectively; the mean comprehensibility score of Passage C read by Speaker 6 decreased by 1.00 compared to that of Passage A (Passage A = 3.55, Passage C = 4.55). The reason why only particular speakers benefited from the reading aloud strategies while others did not or even suffered from the strategies, is beyond the scope of this research. Further research should examine the issue in depth by, for example, analyzing accentedness together with comprehensibility. Such a study will allow for better understanding of the facilitative effect of speaking rate and pauses on L2 comprehensibility. At the same time, however, it should be kept in mind that prioritizing comprehensibility by articulating syllables or words slowly and/or placing longer pauses may sacrifice, to some extent, fluency (Derwing et al., 2009) and the amount of content delivered during a specific time period (Hincks, 2009).

CHAPTER 7: CONCLUSION

The present study has provided evidence of non-native speakers' ability to slow down their speech and to produce longer pauses when reading aloud a passage. Based on the findings, it can be said that advanced L2 speakers tend to articulate words slowly as well as to extend the length of pauses when they read slowly, and that they can also produce longer pauses, maintaining their normal articulation rate. However, the current study failed to support the view that slowing down and/or longer pauses allow(s) listeners more time to process the L2 and thus the L2 speech becomes more comprehensible. The possible reasons for no significant effect of slowing down and longer pausing were linguistic differences among the three passages (i.e., the number of final consonant clusters) and the raters' familiarity with the content of the passages (i.e., airline announcements).

Pedagogical implications

Successful presenters are known to manipulate speaking rate and pausing in order to convey information effectively. For example, they may intentionally articulate an important point more slowly to emphasize and/or pause longer after providing important information to allow for enough time for the audience to understand. The findings that the Chinese participants in the present study were able to adjust their speech based on the reading instructions suggest that people may be able to employ such public speaking techniques in L2. With regard to L2 learning and teaching, these techniques may particularly benefit those who teach in their L2 such as international teaching assistants (ITAs) at a university. Courses targeted at improving ITAs' teaching efficacy may incorporate the techniques into the curriculum.

Limitations and implications for future research

While this study builds on the previous research on the relationship between L2

comprehensibility and speaking rate (Anderson-Hsieh & Koehler, 1998; Munro & Derwing, 2001) and the relationship between L2 speaking rate and pausing (Bae, 2015; Kang et al., 2010) with the use of naturally read passages (cf. Bae, 2015; Munro & Derwing, 2001) by a larger number of L2 speakers (cf. Anderson-Hsieh & Koehler, 1998; Bae, 2015; Munro & Derwing, 2001), several methodological limitations should be highlighted here. First, the current study employed a reading aloud task in a laboratory setting to elicit speech samples for comprehensibility ratings, and, therefore, the findings only apply to controlled speech. Given that the ultimate purpose of the use of L2 is to engage in communication exchanges efficiently, further study needs to explore the effect of temporal variables on comprehensibility in extemporaneous speech (note that controlling for other variables such as grammatical accuracy and lexical appropriateness will be necessary for the use of extemporaneous speech).

Secondly, in spite of the relatively larger number of L2 speakers, it has to be acknowledged that the results in this study alone, both from the Chinese speakers of English ($n = 20$) and the native English speaking raters ($n = 20$), may not be generalized to L2 speakers of English as well as native English speaking listeners. Thus, future studies should seek to obtain much more data to capture a more refined picture of the complex relation between L2 comprehensibility and temporal variables. It may also be interesting to include non-native listeners, considering the current status of English as a lingua franca (Jenkins, 2002; Walker, 2010).

Thirdly, the speech samples used in the current study were three airline announcements, and the raters listened to each of the three passages multiple times (i.e., 20 times) to rate the Chinese speakers. The airline passages may have originally been familiar to some of the raters; in addition, listening to each of the passages repeatedly, the raters might have been more familiar

with the passages. These two familiarity issues might have skewed the results. Therefore, it is crucial for further research to strictly control for the familiarity effect by, for example, selecting a topic that is not familiar to raters and/or using extemporaneous speech samples. It is only when these limitations are overcome in future research that more solid understandings of the complex relation between L2 comprehensibility and temporal variables are possible.

Finally, it is important for future research to examine comprehensibility of naturally sped up speech of L2 speakers. The results that the L2 speakers were able to slow down their speech upon being instructed to do so suggest they may also be able to speed up their speaking rate. Further research may examine, for example, the effect of naturally sped up speech by instructing L2 learners to slightly speed up or to decrease the length of pauses. This speech adjustment may or may not contribute to better comprehensibility. Further study is needed to confirm this hypothesis.

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APPENDIX A: TOEFL iBT SCORES OF CHINESE SPEAKERS

	Reading	Listening	Speaking	Writing
Speaker 1	30	29	23	28
Speaker 2	30	28	24	29
Speaker 3	24	30	26	25
Speaker 4	25	26	21	20
Speaker 5	28	23	25	29
Speaker 6	29	28	20	29
Speaker 7	30	25	28	27
Speaker 8	29	30	24	25
Speaker 9	25	25	27	30
Speaker 10	28	29	24	25
Speaker 11	30	20	24	25
Speaker 12	29	29	23	22
Speaker 13	25	24	25	24
Speaker 14	25	25	23	21
Speaker 15	25	25	25	25
Speaker 16	25	27	18.5	21
Speaker 17	28	28	23	28
Speaker 18	30	29	23	27
Speaker 19	24	24	23	29
Speaker 20	30	21	22	25

Note. Scores of Speaker 14 and Speaker 16 were converted from their IELTS scores based on the comparison tables provided by Educational Testing Service at the following website:
<https://www.ets.org/toefl/institutions/scores/compare/>

APPENDIX B: CHINESE SPEAKERS' DEMOGRAPHIC INFORMATION

	Year in School	Age	Gender	LOR ^a (year)
Speaker 1	Graduate	28	Female	3
Speaker 2	Graduate	25	Female	2.5
Speaker 3	Graduate	25	Male	3
Speaker 4	Junior	20	Male	2.5
Speaker 5	Sophomore	20	Male	1.5
Speaker 6	Junior	19	Female	3
Speaker 7	Graduate	24	Female	2
Speaker 8	Junior	21	Female	6
Speaker 9	Graduate	25	Female	3
Speaker 10	Junior	20	Female	3
Speaker 11	Sophomore	20	Male	2
Speaker 12	Junior	21	Female	3
Speaker 13	Junior	21	Female	2.5
Speaker 14	Junior	21	Female	3
Speaker 15	Junior	21	Female	3
Speaker 16	Graduate	24	Female	1.5
Speaker 17	Senior	21	Male	4
Speaker 18	Junior	21	Female	2.5
Speaker 19	Sophomore	20	Female	1.5
Speaker 20	Senior	21	Female	3.5

^a LOR (Length of Residence in the US)

APPENDIX C: RATERS' DEMOGRAPHIC INFORMATION

	Year in School ^a	Major	Age	Gender	CAE ^b	AA ^c	Native-like proficiency
Rater 1	3	Environmental Science	21	F	4	4	
Rater 2	3	Music Education	20	F	5	3	
Rater 3	2	Communication	20	M	5	8	
Rater 4	4	Sociology & Philosophy	21	F	4	6	Farsi
Rater 5	1	General Studies	19	F	7	7	Polish
Rater 6	1	Communication	18	F	6	1	
Rater 7	G	History	23	M	8	1	
Rater 8	4	Psychology & Philosophy	21	F	6	9	Gujarati
Rater 9	4	Geography & GIS	22	M	4	8	
Rater 10	G	History	24	F	8	3	
Rater 11	4	History & Communication	21	M	8	2	
Rater 12	3	Physics	22	M	6	6	
Rater 13	4	Psychology	21	F	6	4	
Rater 14	1	Aerospace Engineering	18	M	8	8	German
Rater 15	3	Computer Science	21	M	5	5	
Rater 16	G	History	27	F	5	5	
Rater 17	2	Physics	19	M	7	3	
Rater 18	2	Specialized Physics	19	M	7	7	
Rater 19	4	Industrial Design	21	F	5	6	
Rater 20	4	Integrative Biology	22	F	5	9	Russian

^a G indicates a graduate student

^b Familiarity with Chinese accented English (1 = very familiar, 9 = not familiar at all)

^c Familiarity with Airline Announcements (1 = very familiar, 9 = not familiar at all)

APPENDIX D: RANDOMIZATION FOR EACH RATER

	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18	R19	R20
1	08B	05C	16A	19C	10C	13A	11A	18B	01C	12A	14B	17B	16B	01B	09C	13C	15A	06A	20A	10C
2	18B	17C	08A	11A	12B	12B	03C	01B	12C	01A	03C	06C	02C	19C	04A	02A	13B	07B	02A	17A
3	06A	20B	16B	02A	09A	20A	20C	15A	06B	13C	20C	13C	16C	04B	06C	04C	02C	06B	19C	02A
4	04B	11A	10B	03A	01A	10A	14A	12B	01B	06A	05B	17A	13B	09C	05C	03A	14B	16B	07B	20A
5	20C	08B	02C	18A	09C	18C	06B	05C	19B	12B	09A	09B	01C	02B	12B	07B	19A	20B	17A	15A
6	02A	18A	08C	04A	13C	05B	14B	05B	11B	04B	07A	09C	02B	08B	03B	19B	09B	10C	17B	12B
7	N3A	N1B	N3C	N1B	N1C	N3A	N2C	N1B	N1C	N3A	N2A	N3C	N1B	N2C	N3A	N3B	N3A	N3C	N1C	N1B
8	08A	03C	09C	15B	04B	19C	03B	16B	03A	20A	01B	11B	08A	11C	08C	02C	10A	13A	05B	11B
9	19A	04A	05C	05A	15B	13C	06C	20B	18B	11C	12B	12C	03C	13B	01A	04A	09A	05A	16C	16C
10	10A	17A	09A	16A	17A	06A	15C	14C	10B	14B	02A	03A	08C	05C	13B	17C	15C	04A	14A	19C
11	05B	08A	04B	02C	08A	01B	01B	02A	02B	16A	20A	02A	17C	10A	18C	11B	03C	14C	13C	10A
12	N2A	N2A	N1A	N1A	N2C	N3C	N1A	N2C	N2C	N3B	N1B	N2A	N3B	N1C	N2C	N2B	N2A	N1A	N1B	N2C
13	10C	04C	12B	04C	10A	08A	17C	14B	17A	08A	18C	01B	10C	18A	14B	12C	08C	15B	04A	06B
14	11A	13A	06A	04B	11C	10B	01C	02B	07B	02B	15B	15B	10B	9A	03C	16B	08A	07C	03B	1B
15	06B	02A	03C	12A	01C	02A	10A	11B	20C	03C	18A	10B	15B	11A	17A	19A	12C	10B	16A	04C
16	06C	14C	14B	12B	17C	13B	04B	10B	11C	09B	17A	11A	12A	18B	08B	10B	11C	15A	13A	03B
17	09C	08C	07C	13B	07C	12A	15B	19A	09C	09C	10C	18C	12B	03A	12C	10C	16B	01A	13B	16A
18	10B	15B	13B	05B	16A	10C	05C	10C	18C	17A	17C	20C	09A	03C	02A	12B	04A	06C	09B	14C
19	N1C	N3B	N1C	N3A	N1A	N3B	N2B	N2A	N3B	N2A	N2B	N1C	N3C	N2B	N3B	N1B	N3B	N2B	N3C	N1A
20	14C	07C	01A	13C	05A	16A	09B	11C	19C	06C	16C	13B	07C	06C	01B	15A	06B	13C	11C	07A
21	16C	12A	20C	20B	06A	05C	13C	18A	16B	05A	14A	08A	14A	02C	15A	06C	18B	03C	06A	13A
22	04A	20C	17B	08A	17B	07B	14C	02C	14C	08B	20B	19B	06C	16C	20A	16C	20B	02C	02C	18B
23	01B	09C	20A	06C	12A	16B	20A	11A	09B	08C	14C	05C	17B	19A	06B	14A	11A	18B	08A	11A
24	05A	12B	12C	14C	06C	14C	04C	09C	10C	14C	12C	03C	17A	06B	19B	18C	10B	12B	15C	16B
25	19B	06C	17C	10A	20B	07C	02C	13C	05C	05B	08A	18B	07B	08A	11C	09C	01B	04B	19A	05B
26	N1B	N1C	N3B	N1C	N3B	N2C	N3A	N1A	N3A	N1B	N1C	N3B	N2C	N1A	N1B	N2A	N1B	N2A	N2C	N3C
27	03A	01A	02A	09A	15A	15B	05A	12C	10A	02C	13C	08B	06B	17B	07C	11A	06C	01C	10A	04A
28	09A	10B	05B	19A	13B	14B	12A	01C	04B	12C	06B	08C	19B	02A	08A	01B	09C	08C	16B	01C
29	13C	20A	18C	10B	08B	18B	13B	16A	17C	19A	08B	12A	02A	10C	14A	06B	01C	19A	06C	19A
30	11B	15C	15B	01A	18A	15C	02A	04C	20A	19C	17B	11C	12C	15C	11A	17B	14C	16A	07C	15C

31	14B	19B	07B	17A	03B	19B	19A	03C	14B	01B	11C	17C	16A	11B	15B	08B	18C	09A	11A	18A
32	02B	16B	19A	06B	03C	05A	08C	17B	06C	16C	03B	06A	05C	12C	18A	07A	17A	12A	10C	11C
33	12B	12C	12A	05C	09B	17B	19C	04A	18A	06B	12A	07C	04C	17C	10A	12A	20C	15C	15B	05C
34	N1A	N3A	N1B	N2A	N3C	N1B	N1B	N3B	N1B	N1A	N2C	N1A	N1A	N1B	N2B	N3C	N2B	N3A	N3A	N1C
35	18C	18C	09B	20A	02C	03B	16A	08B	11A	07C	11A	07A	08B	16A	04C	05C	05A	11B	08B	20B
36	01C	13C	03A	15C	08C	04C	11C	08C	04A	07C	11B	04C	20C	12B	20B	05B	12B	18A	18A	09C
37	03B	14B	18B	01B	14B	06C	20B	09A	13C	07B	05A	12B	05A	09B	16C	20A	14A	08B	10B	13B
38	17B	16C	11A	07B	06B	14A	12C	15C	05B	18B	09B	16C	03A	03B	06A	18B	07A	03A	12B	01A
39	15C	07A	02B	14B	20A	04B	16C	01A	15C	05C	19A	20A	15A	20C	05A	19C	17C	03B	01A	03A
40	16A	14A	03B	11B	03A	03A	10B	09B	03C	17C	15A	15C	13C	04A	11B	11C	10C	01B	14B	13C
41	N2C	N2C	N3A	N3C	N3A	N1A	N3B	N3A	N1A	N2B	N3C	N2C	N1C	N3A	N3C	N1A	N3C	N1C	N3B	N2B
42	15B	16A	20B	03C	07A	09A	15A	10A	08C	03B	07B	10A	11B	15B	16A	13B	15B	11C	04C	19B
43	14A	19A	05A	07A	19B	17A	11B	20A	06A	02A	16A	07B	20A	14B	07B	15C	13C	10A	05C	09A
44	20B	01C	11C	07C	15C	06B	16B	17A	09A	10B	06A	14B	11C	12A	02B	20C	07C	02A	14C	02C
45	03C	11C	04A	18C	02B	02B	07B	19B	12B	07A	19C	19C	13A	07A	03A	03B	03B	09B	18C	08C
46	09B	9B	17A	03B	14A	20C	17A	04B	17B	15A	02B	20B	18C	05B	12A	05A	08B	17C	03C	17C
47	N3C	N2B	N2B	N2C	N1B	N1C	N3C	N3C	N3C	N2C	N3B	N3A	N2A	N3C	N2A	N3A	N2C	N2C	N1A	N3A
48	01A	06A	19B	9C	07B	11C	09C	15B	15B	03A	04B	06B	15C	10B	17C	04B	05C	17B	11B	15B
49	11C	19C	18A	17C	16B	18A	06A	06C	13A	16B	10B	14C	01A	20B	20C	20B	05B	12C	17C	07B
50	18A	02C	19C	06A	20C	17C	05B	13A	05A	10A	03A	02C	14C	05A	16B	03C	19B	11A	07A	12C
51	13B	11B	07A	09B	16C	16C	04A	19C	02C	19B	13B	04A	19C	13C	09A	18A	18A	20C	20B	03C
52	19C	13B	15C	16C	19A	20B	18C	06A	01A	13B	04B	03B	18A	01A	19C	08C	01A	16C	01C	07C
53	17C	05A	14C	11C	05C	01C	07A	17C	04C	09A	08C	19A	01B	17A	14C	09A	06A	20A	20C	20C
54	20A	07B	13C	16B	02A	03C	18A	06B	20B	10C	09C	10C	11A	13A	07A	02B	13A	09C	06B	17B
55	N3B	N1A	N2A	N3B	N2B	N2B	N2A	N2B	N2A	N3C	N1A	N1B	N2B	N3B	N1A	N1C	N1A	N1B	N2A	N3B
56	17A	06B	06C	10C	14C	12C	17B	05A	08A	04A	01A	14A	09C	16B	05B	14B	04C	05B	12A	08A
57	15A	04B	10A	08C	01B	02C	01A	03B	03B	11B	19B	04B	04B	07B	13A	06A	17B	14B	19B	08B
58	13A	01B	04C	15A	11A	01A	02B	18C	08B	13A	15C	05A	10A	08C	09B	01A	11B	19C	09C	14A
59	12C	10A	14A	13A	04C	11A	08B	07C	02A	18A	07C	01A	03B	19B	01C	09B	02A	19B	01B	14B
60	07C	03B	11B	20C	13A	08B	09A	07A	12A	17B	04C	18A	07A	15A	02C	08A	02B	08A	18B	12A
61	07A	10C	15A	02B	11B	19A	03A	14A	07A	11A	18B	15A	04A	14C	13C	13A	07B	02B	08C	10B
62	N2B	N3C	N2C	N2B	N2A	N2A	N1C	N1C	N2B	N1C	N3A	N2B	N3A	N2A	N1C	N2C	N1C	N3B	N2B	N2A
63	02C	18B	06B	18B	18C	08C	18B	03A	16A	15C	10A	01C	09B	14A	15C	15B	19C	14A	12C	02B
64	16B	15A	01B	12C	04A	09B	12B	16C	13B	18C	05C	02B	06A	06A	18B	01C	03A	07A	05A	06C
65	04C	03A	08B	17B	05B	07A	08A	12A	19A	01C	01C	16B	05B	18C	10C	14C	16A	04C	09A	18C
66	05C	02B	13A	01C	12C	09C	19B	20C	16C	20C	02C	09A	18B	07C	19A	17A	04B	05C	15A	09B
67	08C	09A	10C	19B	10B	04A	07C	07B	15A	15B	13A	13A	14B	04C	17B	16A	20A	13B	02B	04B
68	12A	05B	01C	08B	19C	15A	10C	13B	07C	14A	06C	16A	19A	01C	10B	10A	12A	17A	03A	05A
69	07B	17B	16C	14A	18B	11B	13A	08A	14A	20B	16B	05B	20B	20A	04B	07C	16C	18C	04B	06A

Note. R stands for Rater, and N stands for Native speaker of English. “01A”, for example, indicates Passage A read by Speaker 1.

APPENDIX E: THREE PASSAGES

Passage A

Please read aloud the following passage at a natural speed:

Good afternoon, ladies and gentlemen. It's a pleasure to have you on board this flight to Chicago. We are delighted that you have chosen to fly with China Airlines. We are expecting a smooth flight of 12 hours. Please fasten your seatbelt to prepare for our departure and make yourself comfortable. While we wait to depart, please take a moment to look over the safety booklet in the pocket attached to the seat in front of you. If there is anything we can assist you with, please do not hesitate to ask.

Passage B

Please read aloud the following passage at a slightly slower speed than a natural speed:

Ladies and gentlemen. May I have your attention, as we are now going to take you through our safety procedures and equipment. Please watch and listen carefully. The safety card shows details of escape routes, oxygen masks, and lifejackets. Emergency exits are located on both sides of the aircraft and are being pointed out to you now. Please make sure that your seatbelt is securely fastened. If the cabin air system fails, oxygen will be provided. Masks like this will appear automatically.

Passage C

Please read aloud the following passage at a natural speed. However, make sure to pay attention to the slashes that indicate locations of a pause:

Ladies and gentlemen./ China Airlines welcomes you to Chicago./ The local time is 3:45 pm./ For your safety,/ please keep your seatbelts fastened/ until the aircraft comes to a complete stop./ When you open the overhead bins,/ please be careful./ Items may have shifted during flight./ We hope that you have enjoyed your flight with us today/ and look forward to seeing you on another flight soon./ Have a safe and pleasant rest of your journey/ and thank you for choosing to fly with China Airlines./

APPENDIX F: OTHER TWO PASSAGES

Practice Passage

Please read aloud the following passage at a natural speed:

Ladies and gentlemen. This is the pre-boarding announcement for flight 89B. We are now inviting those passengers with small children, and any passengers requiring special assistance, to begin boarding at this time. Please have your boarding pass and identification ready. Regular boarding will begin in approximately ten minutes. Thank you.

Wrap-up Passage

Please read aloud the following passage at a natural speed:

Ladies and gentlemen. We apologize for our late arrival and for any inconvenience this may have caused. If you have missed your connection, you will be automatically rebooked on the next available flight.

APPENDIX G: QUESTIONNAIRE FOR CHINESE SPEAKERS

Please fill out the following information:

Name: _____

1. What is your year in school?

- ___ Freshman
- ___ Sophomore
- ___ Junior
- ___ Senior
- ___ Graduate

2. What is your age?

3. What is your gender?

- ___ Male
- ___ Female

4. What is (are) your native language(s)?

5. How long have you been living in the US?

6. Have you ever lived in an English-speaking country other than the US?

Yes No

If "Yes," indicate where and when?

Where: _____ When: _____ (Example: 2004-2006)

7. When and in what context did you first start learning English?

Example: In the 3rd grade of elementary school as a required subject. Three hours a week.

8. Have you received any special English education in your home country or elsewhere?
(Example: International school, immersion program, foreign language high school)

Yes No

If “Yes,” where and when was it?

Where: _____ When: _____

9. If you have taken the TOEFL iBT and/or ILETS, please provide your scores.

TOEFL iBT: Total _____ Reading _____ Listening _____ Speaking _____ Writing _____

IELTS: Total _____ Reading _____ Listening _____ Speaking _____ Writing _____

10. Other than English and Chinese, what language do you speak or have you learned before?

Language	How long	How fluent (native-like/advanced/intermediate/beginner-level)
----------	----------	---

_____	_____	_____
-------	-------	-------

_____	_____	_____
-------	-------	-------

_____	_____	_____
-------	-------	-------

APPENDIX H: QUESTIONNAIRE FOR RATERS

Please fill out the following information:

Name: _____

1. What is your year in school?

- ___ Freshman
- ___ Sophomore
- ___ Junior
- ___ Senior
- ___ Graduate
- ___ Faculty

2. What is your major or specialization?

3. What is your age?

4. What is your gender?

- ___ Male
- ___ Female

5. What is (are) your native language(s)?

6. What language do you speak or have you learned before?

Language	How long	How fluent (native-like/advanced/intermediate/beginner-level)
----------	----------	---

_____	_____	_____
-------	-------	-------

_____	_____	_____
-------	-------	-------

_____	_____	_____
-------	-------	-------

7. Have you ever lived in a foreign country?

Yes No

If “Yes,” please indicate where and when?

Where: _____ When: _____ (Example: 2004-2006)

Where: _____ When: _____

Where: _____ When: _____

8. Which of the following situations applies to you?

___ I have a close friend who speaks Chinese.

___ I am taking or have taken a course taught by a Chinese speaker of English.

___ I am attending or have attended a course in which I hear(d) a Chinese classmate speaking English

___ I have or had a colleague who speaks Chinese

___ I am teaching or have taught Chinese-speaking students

9. To what extent do you think you are familiar with English spoken by Chinese people?

(very familiar) 1 2 3 4 5 6 7 8 9 (not familiar at all)

10. Have you ever rated English spoken by non-native speakers?

Yes No

If “Yes,” please describe your experience:

11. To what extent, are you familiar with airplane announcements in English?

(very familiar) 1 2 3 4 5 6 7 8 9 (not familiar at all)

12. Are you specialized in any of the following?

___ English phonetics

___ Applied phonetics

___ Teaching English as a second or foreign language

___ Teaching English pronunciation as a second or foreign language

13. How would you evaluate your ability to rate English spoken by non-native speakers in terms of accent?

(very competent) 1 2 3 4 5 6 7 8 9 (not competent at all)

14. Do you have any known hearing impairments such as hearing loss, buzzing in your ears, or noise-induced hearing loss?

Yes No

APPENDIX I: RATING SHEET

[1st meeting]

*Please listen to each speech sample and rate them in terms of **how difficult or easy it is to understand**. You will hear passages read by different speakers, and each passage should be 20-40 seconds long. Make sure to listen to the sample fully before giving it a rating. Try to use the entire scale.*

Warm-up:

A.

(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)

B.

(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)

C.

(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)

End of Warm-up

1.

(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)

2.

(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)

3.

(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)

4.

(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)

5.

(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)

6.

(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)

7.

(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)

8.

(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)

9.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
10.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
11.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
12.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
13.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
14.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
15.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
16.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
17.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
18.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
19.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
20.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
21.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
22.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
23.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)

24.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)

25.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)

26.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)

27.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)

28.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)

29.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)

30.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)

[2nd meeting]

*Please listen to each speech sample and rate them in terms of **how difficult or easy it is to understand**. You will hear the same passage read by different speakers, and each passage should be 20-40 seconds long. Make sure to listen to the sample fully before giving it a rating. Try to use the entire scale.*

31.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)

32.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)

33.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)

34.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)

35.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)

36.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
37.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
38.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
39.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
40.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
41.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
42.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
43.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
44.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
45.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
46.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
47.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
48.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
49.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
50.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)

51.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
52.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
53.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
54.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
55.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
56.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
57.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
58.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
59.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
60.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
61.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
62.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
63.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
64.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)
65.
(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)

66.

(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)

67.

(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)

68.

(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)

69.

(very easy to understand) 1 2 3 4 5 6 7 8 9 (very difficult to understand)