



The impact of non-native accented English on rendition accuracy in simultaneous interpreting

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Abstract: Accent is known to cause comprehension difficulty, but empirical interpreting studies on its specific impact have been sporadic. According to Mazzetti (1999), an accent is composed of deviated phonemics and prosody, both discussed extensively in the TESL discipline. The current study seeks to examine, in the interpreting setting, the applicability of Anderson-Hsieh, Johnson and Koehler's (1992) finding that deviated prosody hinders comprehension more than problematic phonemics and syllable structure do. Thirty-seven graduate-level interpreting majors, assigned randomly to four groups, rendered four versions of a text read by the same speaker and then filled out a questionnaire while playing back their own renditions. Renditions were later rated for accuracy by two freelance interpreters, whereas the questionnaires analysed qualitatively. Results of analyses indicated that 1) both phonemics and prosody deteriorated comprehension, but prosody had a greater impact; 2) deviated North American English post-vowel /r/, intonation and rhythm were comprehension problem triggers. The finding may be of use to interpreting trainers, trainees and professionals by contributing to their knowledge of accent.

Keywords: accent; non-native English; listening comprehension; simultaneous interpreting; phonemics; segmentals; prosody; suprasegmentals

1. Introduction

English is undoubtedly the most popular *lingua franca* of our times: speakers of various language backgrounds worldwide, native or not, use the language as a means of intercultural communication. As a cross-cultural medium, the interpreter is almost sure to work with a wide variety of English accents.

In reality, interpreters do recognise accent as a frequent and serious problem. In a study conducted by the International Association of Conference Interpreters (AIIC) in 2002, 62% of participating interpreters regarded 'difficult accent' as a major source of stress (AIIC, 2002). Compilers of interpreting textbooks (e.g. Zhong, 2006; Lin, Lei, & Chen, 2006) have also included different accents in the materials for training. Despite practitioners' and trainers' concerns, accent has not yet been thoroughly studied in interpreting settings with regard to its specific influence on listening comprehension. Nonetheless, researchers that embarked on this topic did

point out that what interpreters loosely refer to as a ‘foreign accent’ goes far beyond phonemic deviations and extend to ‘prosodic, lexical and syntactic deviations’ (Pöchhacker, 2004, p.129), among which the first two are directly related to what the working simultaneous interpreter receives via headphones.

In fact, phonemics and prosody play important but different roles in constituting the message of a spoken text. Phonemics, alternatively referred to as ‘segmentals’, refers to phonemes, ‘sounds of a language that can be used to differentiate words’ (Ladefoged, 2001, p.23). As phoneme is directly related to the identification of sound segments as meaningful units (such as ‘dig’ and ‘dog’ as two different words), phonemic deviations may therefore give rise to misinterpretation at word level. Prosody or ‘suprasegmentals’ is the features superimposed on syllables (Ladefoged, 2001, p.15), usually consisting of intonation, stress and rhythm. As elicited by Huber (1988, p.33, cited in Ahrens, 2005, p.52), prosody serves to ‘structure the acoustic continuum produced by the speaker’, as well as to ‘emphasise elements the speaker considers important.’. Deviated prosody may therefore fail to reflect the underlying syntactic structures and semantic functions within the source text (ST), resulting in miscommunication on the receiving end, i.e., misinterpretation by the interpreter.

Although both phonemics and prosody play a part in an accent, disagreements exist concerning which of the two impedes speech intelligibility more (Anderson-Hsieh et al., 1992). In addition to unsettled conclusions, the possibly unequal weights of phonemics and prosody in influencing speech intelligibility are yet to be corroborated in the interpreting context. On one hand, accent may cause more interference to listening comprehension in the interpreting context than in usual talks, as non-verbal cues that are important to listening comprehension are not always available to the simultaneous interpreter, who generally works in a sound-proof booth without necessarily a clear sight of the speaker (Chau & Chan, 1988). On the other hand, the interpreter differs from other listeners in the involvement of cross-language multi-tasking (Jones, 1998; Liu, 1993). Lambert (1988) concluded in her empirical study that pure listening ensured better comprehension than any mode of interpreting; in other words, multi-tasking impedes comprehension to a certain extent. Facing such interference, the interpreter filters the core message from the given acoustic continuum and sometimes make logical predictions on what will be heard next (Liu, 1993). In conclusion, TESL researchers’ findings in accent intelligibility may have new implications on the interpreting context.

A better understanding of accent and its precise interference with perception and comprehension will hopefully help practicing interpreters know what to expect from a non-native speaker. Moreover, with textbooks including native variations and non-native accents as a result of compiler’s conscious selection, further exemplification of what constitutes an accent may help trainers dilate on the issue. Likewise, interpreting trainees may benefit from the prospective results of the current study, for better understanding of elements of accent may allow prospective interpreters to learn more efficiently than being obliged to solve the conundrum through trial and error.

The current study attempts to piece together observations and findings from TESL and interpreting disciplines and propose an experiment that investigates how predominant phonemic and prosodic features in non-native English affect the simultaneous interpreter’s listening comprehension by examining the resulting decrease in rendition accuracy. Specifically, the study seeks to answer the following four questions:

1. In simultaneous interpreting, does a source text in English that features non-native phonemics affect rendition accuracy of a target text in Chinese?
2. In simultaneous interpreting, does a source text in English that features non-native prosody affect rendition accuracy of a target text in Chinese?
3. Between phonemics and prosody, which one is a stronger predictor of rendition accuracy?
4. According to participants' retrospective thoughts, what makes understanding a given accent difficult?

2. Literature review

Given the immense number of accents existing in the world, the study places selective focus on certain phonemic and prosodic features of English that often cause pronunciation difficulties among ESL/EFL speakers in order not to confine accent to any specific one. As the participants of the study will be pre-service interpreters in Taiwan, an EFL environment where North American English (NAE) is the norm of English taught in formal education, the native accent referred to in this study will be based on NAE.

2.1 Non-native English phonemics

Non-native deviations are found to have most to do with the speaker's language background (Brown, 2000; H. Wang & Heuven, 2004). Phonemic deviations result from ESL and EFL speakers' tendency to substitute English phonemes that do not exist in their native language with ones that exist (Rau & Chang, 2005; H. Wang & Heuven, 2004). In the phonemic inventory of the English language, one may find certain 'problematic' phonemes, namely those which seldom exist elsewhere and often pose pronunciation difficulties to non-native speakers.

2.1.1 Problems with consonants

Among the universally acknowledged 'pitfalls' in the pronunciation of English are the interdental fricatives [θ] and [ð], two highly marked phonemes that are rare in the languages of the world. The most commonly identified substitution variants for the fricatives found in non-native speech are [t], [s] and [f], without necessarily the voiced counterparts of the three phonemes [d], [z] and [v] (Lee & Cho, 2002; Lombardi, 2003).

Another potential problem trigger in the pronunciation of English is the American type of [r], one of the least frequent phonemes found in fewer than 5% of the languages worldwide (Locke & Pearson, 1992). The distinction between English [r] and [l] has long been regarded as a typical pronunciation problem for those whose native language is among Japanese, Korean or Cantonese, for the central/lateral distinction does not exist in these languages (Hallé, Best, & Levitt, 1999; Ingram & Park, 1998).

Still another well-known feature of non-native English speech is the mispronunciation of consonant clusters. By nature, consonant clusters violate the CV (consonant-vowel) structure, the most universal type of human language syllable structure and the easiest to acquire (Wode, 1992). For ESL/EFL speakers whose native languages have less complicated syllable structures than English, clustering difficulties are resolved in ways that allow L2 (second language) clusters to conform to syllable structures allowed in L1 (first language). In Celce-Murcia, Brinton and Goodwin's (1996) observation, learners from Asian language backgrounds may delete word-final consonant clusters entirely, such as pronouncing /kəʊ/ instead of /kəʊld/

for the word ‘cold.’ On the other hand, word-initial clusters are simplified by adding a vowel after each consonant in the cluster. This approach is common among ESL/EFL speakers whose L1 either has a strict CV pattern (such as Japanese) or allows only a limited number of non-obstruent consonants in syllable-coda position (such as Mandarin Chinese).

2.1.2 Problems with vowels

Fourteen ‘distinct’ stressed vowels exist in NAE (Celce-Murcia et al., 1996, p.93)¹, which may be further categorised into tense and lax vowels.

Contrastable tense/lax pairs of NAE vowels include

[i:] vs. [ɪ], [eɪ] vs. [ɛ], and [u:] vs. [ʊ]. The tense/lax distinction often confuses ESL/EFL speakers. For [i:]/[ɪ], non-native learners tend to produce a sound midway between the two, which is perceived as [i:] when the native speaker expects [ɪ] and vice versa. As to [eɪ]/[ɛ], non-native speakers are likely to omit the gliding process of the tense vowel and produce [ɛ] instead. Finally, the situation of [u:]/[ʊ] is the other way around, i.e., non-native speakers tend to opt for the tense vowel [u:] where [ʊ] should be produced (Celce-Murcia et al., 1996).

In addition to tense/lax confusion, the NAE low-front vowel [æ] may be problematic for ESL/EFL learners, for the sound does not occur in the first language of many of them (Celce-Murcia et al., 1996). The most common substitutes for [æ] are [ɑ] and [ɛ]. The former is usually adopted by speakers who have previous exposure to British English; the latter, which is articulatorily closer to [æ], is generally preferred by other ESL/EFL speakers (Celce-Murcia et al., 1996).

Still another NAE vowel that often causes pronunciation problems among non-natives is *r*-colored [ɚ], which is excluded from the aforementioned 14 vowels because it cannot be described in terms of position. The phonetic term of the *r*-coloring phenomenon is rhotacization, which occurs not only in [ɚ], where the whole vowel is rhotacized (such as in ‘bird’ and ‘herd’), but also in environments where the consonant /r/ follows a vowel and occurs in the same syllable (such as in ‘beard’ and ‘here’). Many learners have severe difficulty achieving rhotacization and may substitute [ɚ] with the mid-central vowel [ɜ] (Ladefoged, 2001). As for ‘vowel + /r/,’ the /r/ tends to be replaced by the central, unstressed [ə], resulting in a diphthong (Ladefoged, 2001).

2.2 Non-native English prosody

2.2.1 Problems with intonation

Intonation serves such functions as reflecting grammatical function and conveying emotion. In oral communication, intonation often dictates sentence type (i.e. declarative or interrogative) and completion (i.e. whether the speaker has finished his/her points to make). Moreover, changing the intonation of an utterance may allow the speaker to express different attitudes such as indifference, enthusiasm and sarcasm (Celce-Murcia et al., 1996).

Common ESL/EFL intonation inadequacies include: 1) the overgeneralisation of intonation patterns (i.e., falling or rising); 2) unnatural

¹ The number of NAE stressed vowels is in fact contested. For instance, many native speakers of NAE both in the United States and Canada do not distinguish [ɑ] and [ɔ], but instead use [ɑ] for both vowels (Celce-Murcia, *et al.*, 1996, pp.93, 98). An additional vowel feature called ‘*r*-coloring’, or more technically ‘rhotacization’, will be discussed later in the study. In all forms of English, the symbol [ə] may be used to specify a range of mid-central vowels that have a reduced vowel quality when they are unstressed (Ladefoged, 2001, pp.78-79).

pitch variation. Inappropriate application of intonation may either fail to signal that the speaker has not yet finished the remark or cause the speaker to sound unusually hesitant. On the other hand, overly narrow pitch variation appears perfunctory, whereas exaggerated variation sounds pretentious (Celce-Murcia et al., 1996).

2.2.2 Problems with stress

Stress may be discussed at word and sentence levels, with the latter being integrated to the discussion of rhythm. Word stress in English is usually captured in three degrees, known alternatively as strong (primary), medial (secondary) and weak (tertiary or unstressed). The difficulty lies in the fact that in English, the difference between stressed and unstressed syllables is greater, and that the rules for assigning word stress more complex than in most other languages (Celce-Murcia et al., 1996). Common non-native stressing problems include: 1) overgeneralising one's L1 stress pattern when producing English words, which often results in less stressed-unstressed distinction than in native English; 2) reversing the stressing order of such words as 'record' and 'insult', which marks a change in grammatical function (Ladefoged, 2001).

2.2.3 Problems with rhythm

Stresses and pauses combine to create the rhythm of a spoken language. The rhythm of English is influenced by its stress-timed nature, i.e. the length of an utterance depends not on the number of syllables (as it would in syllable-timed languages) but rather on the number of stresses, which implies variable syllable length. ESL/EFL learners tend to show less differentiation in stress and in syllable duration between stressed and unstressed elements than do native speakers (Anderson-Hsieh, *et al.*, 1992). As to pausing, appropriate pauses should reflect sentence structure and should therefore appear at grammatical boundaries. Non-native speakers may pause frequently and at inappropriate points, i.e., within grammatical boundaries (Anderson-Hsieh & Venkatagiri, 1994).

2.3 Non-native English and listening comprehension: phonemics vs. prosody

According to psycholinguistic theories, one's knowledge of a word includes 'phonological, syntactic, morphological and semantic' dimensions (Carroll, 2008, pp.104-110). Assuming that the phonological representation of a word is also stored when the word is stored in one's long-term memory and that incoming auditory clues trigger word retrieval from the memory, retrieval difficulties may occur when deviations from pre-stored phonological clues exist in the auditory source. Since ESL/EFL speakers substitute English phonemes that do not exist in their native language with ones that exist, the resulting deviation may thus hinder word recognition (i.e. meaning retrieval) by the listener.

If phonemics dictates word recognition, prosody then serves to convey the intended message. The listener's comprehension process is guided by the structure and prominence of messages expressed in the prosody of source speech (Ahrens, 2005; Anderson-Hsieh, *et al.*, 1992). Of the three prosodic aspects discussed in the previous section, intonation indicates the structure of the utterance (Ahrens, 2005; Seeber, 2001), word stress reflects both meaning and syntactic function of a word (Celce-Murcia et al., 1996; Ladefoged, 2001), while sentence stress and rhythm are crucial to the avoidance of misunderstanding (Shlesinger, 1994).

In recent years, the focus in ESL/EFL pronunciation teaching in appears to have shifted from phonemics to a more balanced allocation of importance to both phonemics and prosody (Hardison, 2004). Celce-Murcia et al., (1996) pointed out that whereas phonemic deviations usually led to minor misunderstandings, non-native prosody might in fact be more serious:

If these (nonnative) learners use improper intonation contours, they can be perceived as abrupt, or even rude; and if the stress and rhythm patterns are too non-native like, the speakers who produce them may not be understood at all (p.131).

Before prosody became an emphasis in ESL/EFL pronunciation teaching, researchers had generally agreed that it was more crucial than phonemics in overall speech intelligibility. Feeling the need of more empirical evidence, Anderson-Hsieh *et al.* (1992) investigated the correlation between native speakers' judgments of non-native pronunciation and actual deviance in segmentals, prosody, and syllable structure. It was found that whereas segmentals, prosody and syllable structure all showed a significant influence on the pronunciation ratings, the prosodic variable had the strongest effect.

So far, most discussions about the possibly uneven importance of phonemics and prosody in non-native speech intelligibility have occurred in TESL studies. In fact, the issue of accent also impacts interpreters, who work with cross-cultural communications. Given the 'preferred interpreting direction from one's B- into A-language' (Chau & Chan, 1988, pp.93-94), interpreters, who don't often listen to their A-language at work are not necessarily comparable to the 'native raters' in the setting of the empirical studies mentioned previously.

2.4 Accent comprehension in interpreting

Among the small number of empirical interpreting studies dedicated to accent comprehension, Mazzetti's (1999) contribution took on a slightly broader scope. Her study employed a German speech read with either native German accent or non-native accent featuring a large number of phonemic and prosodic deviations. Five native German participants and five native Italian ones interpreted the degraded version of the speech, while the other five participants were Italian students interpreting the control version. The author concluded that the degraded version impaired the performance of native Italian subjects more than that of native German ones. Although the study did register the different roles that phonemics and prosody played in ST, it was not meant to address the issue of 'phonemics vs. prosody'. Besides, whether the findings may be applied to language pairs other than German-Italian remains uncertain. In fact, confining 'accent' to a particular one appears to be the most common solution found in past accent-related studies.

Previously, the issue of ST prosody was examined by Gerver (1971) in a setting unrelated to non-native accents. The researcher had six professional interpreters render ten texts from French into English. Five of the texts had been read on tape with standard prosody; the rest had been read with minimal intonation and stress, and all pauses lasting for 250 milliseconds or more had been deliberately eliminated. Based on the percentage of 'words correctly translated', Gerver found that monotonous source speech resulted in significantly lower accuracy. The study strongly suggests that prosodic cues assist interpreter in structuring and processing ST message.

Given the lack of empirical evidence, the issue of non-native ST needs to be further investigated with regard to phonemics and prosody in the interpreting context in order to determine which component plays a more important role in interpreters' comprehension. In sum, the current study aims

to examine, in an empirical fashion, the conclusions drawn by Anderson-Hsieh *et al.* (1992) and to extend Mazzetti's (1999) observation of source text phonemics, prosody, and their disruption to comprehension during simultaneous interpretation (SI).

3. Method

To answer the research questions, a controlled experiment was proposed in which the participants were thirty-seven Taiwanese interpreting students having received formal SI training in the Chinese-English combination. Instruments were four versions of the same English text read by the same non-native speaker at the same speed. Each version was played to one of the four groups of participants, who rendered the text simultaneously into Chinese, their A-language. After the interpretation had ended, all participants was given the ST in print, played back their own renditions and compared them with the ST. During playback, participants filled out a questionnaire in which they provided personal background, self-estimated comprehension percentage, and specific points where miscomprehension had occurred. Participants' renditions were rated numerically according to their accuracy, after which the data were entered into a computer for quantitative analysis in order to analyse the impact of non-native phonemics and prosody on the participants' rendition accuracy. Participants' retrospective feedbacks, on the other hand, were analysed qualitatively.

3.1 Participants

The study recruited thirty-seven MA-level interpreting majors from four postgraduate programs in Taiwan. Having Mandarin Chinese as A- and English as B-language, all of them were acquainted with SI skills thanks to previous SI training ranging from one to six semesters. Almost all of the participants that reported having taken language proficiency tests (thirty-one out of thirty-two) were above level C1 of the Common European Framework of Reference for Languages (CEFR), the proficiency level suggested by the Ministry of Education to participants in the Chinese and English Translation and Interpretation Competency Examinations in Taiwan.

Individual differences in competency existed among participants, especially because all were not from the same program. Although such differences were not easily detectable, it was certain that students in the same program had undergone equivalent selection processes, while those in the same class had received the same length of SI training. Therefore, participants in the same class of the same program were divided into four groups in order to ensure homogeneity in grouping.

3.2 Instrumentation

The ST was a 583-word, 21-sentence excerpt of an authentic, non-technical speech. Given 'phonemic deviations' and 'prosodic deviations' as two independent variables, four versions of the ST are proposed here to allow subsequent statistical analysis:

	Prosodic deviations (+)	Prosodic deviations (-)
Phonemic deviations (+)	Version 1 (rendered by Group 1, 9 participants)	Version 2 (rendered by Group 2, 10 participants)
Phonemic deviations (-)	Version 3 (rendered by Group 3, 9 participants)	Version 4 (control) (rendered by Group 4, 9 participants)

Table 3.1 Summary of the four versions of ST used in the experiment

In Table 3.1, plus ('+') indicates presence of phonemic/prosodic deviations in the version, while minus ('-') indicates absence. Phonemic and prosodic deviations reflected in the manipulated experiment versions were those reviewed in the previous section, namely:

1. Phonemic deviations (in Versions 1 and 2):
 [θ][ð] → [f]²;
 word-initial [r] → [l];
 syllable-initial consonant clusters → insertion of vowels;
 syllable-final consonant clusters → deletion;
 tense/lax distinction → confusion;
 [æ] → [ɑ];
 NAE [ɜ:][ɝ] → [ɜ][ɚ];
 NAE post-vowel [r] → [ə].
2. Prosodic deviations (in Versions 1 and 3):
 overgeneralisation of falling intonation;
 monotonous delivery;
 reversed stress order;
 less stressed/unstressed distinction within words;
 less differentiation in stress and in syllable duration between stressed and unstressed elements in a sentence;
 inappropriate pauses.

To make sure that phonemics and prosody were the only independent variables and that both speech rate and speaker's voice quality were under control, the four versions were recorded at around 120 words per minute by the same speaker, a twenty-five-year-old non-native female capable of manipulating her speech according to specifications. For the control version, the speaker imitated the speech of the same text read by a female native speaker to ensure that no trace of non-nativeness was included.

In addition to the ST, the study also involved a questionnaire consisting of three parts: 1) instructions, 2) participants' personal information (school, year, gender, age, group, length of exposure to SI, and scores of standardised

² In Rau and Chang's (2005) study, Taiwanese and Mainland Chinese participants reported exactly the same order of acceptable variants of [θ]: [s] > [ʃ] > [t] > [f]. Given that one understands familiar accents better (Tauroza & Luk, 1997), the chosen substitute for [θ,ð] is [f], the least preferred among the 3 aforementioned substitutes by Taiwanese non-native English speakers. This is to avoid the impact of accent being offset by familiarity.

English proficiency tests), and 3) participants' self-evaluated comprehension during SI and problem triggers.

3.3 Data analysis

Among the four research questions, the first three were answered by means of quantitative analysis based on data collected in the SI experiment.

Participants' responses to the questionnaire were analysed qualitatively, with attention on the convergence of answers, to answer the last research question.

3.3.1 Quantitative analysis

Raters

Two freelance interpreters were recruited to serve as raters of the renditions collected in the experiment, both were active in service and possessed the Certificate of Competency in Chinese and English Interpretation issued by the Ministry of Education.

Assessment criteria

The current study adopted Liu, Chen, Chang, Lin and Wu's (2007) criteria for assessment of fidelity in interpretation, written originally in Chinese.

Table 3.2 is an English translation of the criteria provided by Wang (2010, p.57).

Grade	Description
5	The message conveyed in the rendition is very close to that of the original, without misunderstandings or distortions.
4	The message conveyed in the rendition is a bit different from that of the original, with one or two minor omissions, misunderstandings, or additions.
3	The message conveyed in the rendition is different from that of the original, with one gross error or several minor omissions, misunderstandings, or additions.
2	The message conveyed in the rendition is extremely different from that of the original, with several gross errors, omissions, misunderstandings, or additions.
1	The message conveyed in the rendition is totally different from that of the original in that the rendition totally changes the meaning meant to be conveyed by the original passage.

Table 3.2 Liu et al.'s (2007) criteria for assessment of fidelity in English-Chinese interpretation (cited in Wang, 2010, p.57)

The twenty-one sentences in the ST were divided into twenty-three assessment units, with each the first two sentences (consisting of forty-eight and fifty words respectively) being divided into two units whose meaning is complete whereas each of the rest nineteen sentences was a unit. The raters evaluated each participant's rendition by giving a grade to each assessment unit. Based on the 5-grade criteria, the maximum score was 115 points, whereas the minimum score was twenty-three points.

Statistic analysis

Two raters graded each participant's rendition based on accuracy independently; the average score for each participant was calculated. These averaged accuracy scores constituted the dependent variable of the statistical analysis, namely two-way analysis of variance (ANOVA). The A factor of the analysis represented the presence of phonemic deviations ('1' for presence whereas '2' for absence), while the B factor represented the presence of prosodic deviations ('1' for presence whereas '2' for absence). The significance level (α) was set at .05.

3.3.2 Qualitative analysis

Firstly, participants' self-estimated comprehension percentage was compared among groups to identify any interaction between grouping rationale (i.e. presence of phonemic/prosodic deviations) and comprehension. Responses to the open-ended question about specific were compared and contrasted to determine where in particular comprehension failure arose. These points of 'comprehension crisis' were then related to properties of the ST (i.e., unfamiliar words and expressions, structural complexity, phonemics, and prosody) to identify possible roots of the problem.

4. Results and discussion

4.1 Impacts of non-native phonemics and prosody on rendition accuracy

The cell mean and marginal mean of each condition (i.e., phonemics or prosody) are shown in Table 4.1. The inter-rater correlation coefficient (r) is .92, indicating that the scores given by the two raters are highly consistent. The average score of all the thirty-seven participants is 51.20.

		Prosodic deviation		Marginal mean
		+	-	
Phonemic deviation	+	36.17 (Group 1)	54.80 (Group 2)	45.48
	-	49.95 (Group 3)	63.50 (Group 4)	56.72
Marginal mean		43.06	58.92	

Table 4.1 Cell mean and marginal mean of each condition
Maximum score: 115; minimum score: 23

The ranking of each group's mean score of rendition accuracy is: Group 1 < Group 3 < Group 2 < Group 4. The impact of accent is evident: the mean score of the control group is obviously higher than that of any experimental group. The impacts of phonemics, prosody, and the interaction between these two factors on rendition accuracy were assessed with a two-way ANOVA analysis. The results are summarised in Table 4.2.

Source	SS	df	MS	F	Sig.	Effect size
Phonemic deviations	1165.96	1	1165.963	8.412*	.007	.448
Prosodic deviations	2391.06	1	2391.057	17.251*	.000	.663
Interaction	59.50	1	59.501	0.429	.517	
Error	4573.82	33	138.601			
Corrected Total	8113.23	36				

Table 4.2 Results of two-way ANOVA

* $p < .05$

The effect of phonemic deviations is statistically significant [$F(1, 33) = 8.412, p < .01$]. The mean score of accuracy with phonemic deviations (43.06) is statistically significantly lower than that without phonemic deviations (58.92). Based on Cohen's (1988) guideline, an estimated effect size of .448 demonstrates the presence of phonemic deviations has a notable effect on rendition accuracy. The result supports research question 1 that, under the settings of this study, an ST featuring non-native phonemics significantly affects the accuracy of its target text (TT).

The effect of prosodic deviations is statistically significant [$F(1, 33) = 17.251, p < .001$]. The mean score of accuracy with prosodic deviations (45.97) is statistically significantly lower than that without prosodic deviations (56.72). An effect size of .663 demonstrates the presence of prosodic deviations also has a notable effect on rendition accuracy. The result supports research question 2 that, under the settings of this study, an ST featuring non-native prosody significantly affects the accuracy of its TT.

The interaction between the two independent variables is not significant. Since the two main effects are both significant, a comparison of the estimated effect size may serve to evaluate the relative influence of phonemics and prosody on interpreters' performance. Although both phonemics and prosody are powerful effects (.448 and .663 respectively) according to Cohen (1988), the effect of prosodic deviations is larger. Hence, the data collected in the experiment suggest that non-native prosody had greater impact on rendition accuracy in SI than non-native phonemics did. Findings of the study supported Anderson-Hsieh *et al.*'s suggestion (1992): whereas phonemics and prosody both influence comprehension, prosody has a stronger impact than phonemics.

4.2 Difficulties in accent comprehension

Comprehension percentage of the majority of the participants ranges between 20 % and 79 %. It is noteworthy that no participants in Group 1 or Group 3 (both having listened to prosodically deviated versions) reported having understood above 80 %, while no participants in Group 4 (control group) reported having understood below 20 %. This finding is basically consistent with the ranking of each group's mean score of rendition accuracy (Group 1 < Group 3 < Group 2 < Group 4).

To exclude the impact of non-native phonemic deviations that may cause word identification problems, one may examine lexical and structural

complexity by reviewing problems reported by participants in the control group. In fact, only two lexical items (namely the word ‘*eclipse*’ used as a verb and the compound ‘*IT packages*’ involving the highly polysemous ‘*package*’) were identified by more than three participants of Group 4. On the other hand, 3 of the 21 sentences, involving conditional and inversion sentence structures as well as the superlative expressed in ‘negation + comparative’, were pointed out. In sum, problems caused by structural complexity appear rather few.

Looking at phonemics-related comprehension problems, the authors found that all the frequently misunderstood vocabulary items involved a derhotacized ‘*r*’. Surprisingly, [r] seems to be the only one amidst all the consonants and vowels manipulated in the experiment to directly cause miscomprehension. Moreover, the problem with [r] lies in the derhotacization but not in its confusion with [l] confusion. In the current study, the discussion of non-native phonemics was from the perspective of production; however, all the phonemes regarded as ‘difficult to pronounce’ did not seem to cause comprehension problems in the proposed experiment. This finding implies possible disparity between production and perception. It may also point to a potential difficulty of Taiwanese interpreters working from British English into Mandarin Chinese, since no post-vowel [r] in British English is rhotacized.

As to prosody-related problems, an analysis of misunderstood messages may reveal which prosodic features are the most critical to the interpreter’s correct understanding. In this aspect, overly flat intonation, which may fail to indicate the sentence structure and completion, prevented participants from understanding the meaning of certain sentences in full. Moreover, inappropriate pauses disrupted participants in their parsing and caused them to be unable to correctly identify subject-predicate structure, enumeration and subordinate clauses. The findings are in line with Anderson-Hsieh and Venkatagiri’s (1994) suggestions that appropriate pauses should appear at grammatical boundaries. Almost all the participants dealing with prosodically deviated versions described the ST as ‘monotonous’ and ‘lacking pauses’, but no one spotted the problems of incorrect word stresses or insufficient stressed/unstressed distinction. It is suggested that although intonation, stress and rhythm are all components of prosody, the impact of the three components are not necessarily equal in speech perception.

5. Conclusion

The current study examined in an interpreting setting the applicability of TESL researchers Anderson-Hsieh *et al.*’s (1992) suggestion that deviated prosody hinders accent comprehension more than phonemics. Thirty-seven graduate students of interpreting rendered a 583-word source text read with phonemic and/or prosodic deviations. Quantitative analysis of rendition accuracy indicated that both phonemics and prosody were significant in deteriorating accuracy, but prosody had a stronger effect. Qualitative analysis of participants’ comprehension problems suggested that whereas derhotacized /r/ was the only manipulated phonemic deviation to cause misunderstanding, unnatural intonation and rhythm both thwarted the processing of sentences.

Findings of the study may be of use to interpreting trainers and trainees alike. When prosody no longer reflects sentence structure and intended focuses, interpreters may need to dedicate more effort to parsing and finding out messages from context. Moreover, the finding of participant’s difficulty

in identifying derhotacized /r/ may be especially useful in Taiwan; trainers may consider including more British accents in teaching materials.

This study serves only as a small step to better understanding of accent, an issue that involves extremely high complexity, as deviations can be severe or negligible. Furthermore, limitation on the number of subjects has long been an issue in interpreting studies, as the interpreting profession by nature involves a rather small population of practitioners. Although utmost efforts were attempted to reach out for participants, the number of participants in this study remains rather small. It is hoped that future researchers may recruit more participants with more innovative ideas in order for quantitative analyses in interpreting studies to be more valid and have wider applicability.

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