Problematic Phonological Features of Foreign Accented English Pronunciation as Threats to International Intelligibility: Thai EIL Pronunciation Core

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Abstract

English as an International Language (EIL) is grounded in the concept of multiplicity. Such proliferation of non-native varieties of English leads to several controversies including the intelligibility of its speakers to listeners from various language backgrounds. Although this concern has been continuously addressed in EIL research, the focus was mainly on major ESL accents. English language educators form English periphery accents know very little about the scenario of their own English in relation to its use in international settings. This study explored the Thai-accented English pronunciation features that result in intelligibility failure. It employed the innovative and comprehensible intelligibility measurement of which the results can be applied to other English accents with the similar phonology patterns such as tonal and syllabic-timing languages as most of languages in Asian mainland continent. Thai-accented English spontaneous speech was measured for overall intelligibility using a transcription task performed by the listeners from a variety of different L1 backgrounds. The errors in transcription were phonetically analysed to ascertain which phonological features of Thai English pronunciation which led to a detriment in intelligibility. These features; hence, must be the focus in teaching English for international communicative purposes. Analysis of the results revealed that the salient features identified as posing the highest threat to international intelligibility were cluster simplification, consonant devoicing, lack of final consonant released, and fully stressed unstressed vowels.

Keywords: intelligibility, Thai English, pronunciation, accent, non-native speakers

Introduction

The global proliferation of English has resulted in the rapid diversification of English use throughout worldwide nations as an international language, which drives its status as the world's dominant language. The diversification of English into numerous varieties underpins the concept known as World Englishes (WE), and furthermore resulted in the ascendency of English as an International Language (EIL). In the context of Thailand, despite her lack of direct colonial experience and the scarcity of an intra-functional role of English in the country, the significance of English use is becoming more

prevalent due to globalization. Importantly, in the international use of English those from different L1s manifest indigenous sounds in their production of English. Non Native Speakers (NNSs) Englishes are considered to show the most divergence in terms of pronunciation (Jenkins, 2000, 2002) due to the pervasive patterns of the speakers L1. Such foreign accent is the result of the assimilation of characteristic L1 phonological features into the articulation and pronunciation of L2 speech. These non-pathological speech patterns acquired in English as L2 have been demostrated as problematic for international communication (Gorlach, 1999; Jenkins, 2000, 2007; Kirkpatrick, 2010; Major, 2001). This highlights a pivotal concern in EIL communication, as English has taken on many sociocultural forms and is no longer primarily used for communication with English native speakers (NSs) but between NSs and English NNSs as well as between NNSs themselves; how can the disintegration of English into unintelligible dialects be avoided (Trudgill, 1998, as cited in Jenkins, 2002)? Consequently, one of the overarching issues on the EIL stage is intelligibility. Although the construct of intelligibility has various conceptualizations in research, fundamentally, it refers to the idea of how easily speech can be recognized as targeted by the speakers and is influenced by various factors such as the proficiency of language users and linguistic elements (Nelson, 2011). Regarding the latter, there is consensus among EIL academics (e.g. Jenkins, 2000; Kirkpatrick, 2010; McKay, 2002; Seidlhofer, 2004) that differences in pronunciation are the most prominent factor affecting mutual intelligibility. In the forum of EIL diverging pronunciation, the challenge relates to what level of intelligibility can be considered acceptable across different varieties of English (McKay & Bokhorst-Heng, 2008). The effect of differences in L1 background on English pronunciation led to international intelligibility failure and communication failure as elucidated by numerous studies in the field such as the Interlanguage Talk Data (ILT) in Jenkins (2000) and the investigation of ASEAN community English talk of Kirkpatrick (2010).

Additionally, more specifically to English language teaching, McKay (2009) notes that English language teaching direction has dramatically changed in the past forty years – from English as a foreign language (EFL) to EIL. Educators and researchers are now obliged to carefully examine the implicit goal of learners within their specific context as a basis for determining learning goals. As English is now an international language, it should not be shackled to the model of native speaking countries and thus a reformulation of ELT is required which recognizes the pluralistic nature of English.

Previous research in EIL intelligibility and pronunciation has been conducted from a variety of perspectives which has led to a disparity in definitions of the key meaning of intelligibility. The current study explored intelligibility in terms of phonological intelligibility of Thai-accented English. That is, how Thai-accented English segmental features pronunciation was perceived by participants from different L1 backgrounds, how their perception deviated from the production target, and which phonetic elements were vital in

their perception. How participants understood (semantic function: comprehensibility) or interpreted (pragmatic function: interpretability) the speech was omitted from the scope of the study. Using participants' feedback through transcription tasks, the current intelligibility research makes predictions regarding which sound features are communicative threats to phonological intelligibility and should, therefore, be prioritized in pronunciation teaching within the EIL community. Additionally, results will be used to inform the basis of a Thai EIL pronunciation core for implementation both in EIL and ELT frames.

Literature Review

Thai – English pronunciation

Although EIL celebrates the value of diversity and variety of English usage including pronunciation, a minimum standard of proficiency should be established to safeguard intelligibility allowing for the use of some L1 pronunciation features provided they are not a threat to intelligibility. Jenkins' (2000) Lingua Franca Core (LFC) fostered major accents to establish a pronunciation core for such purposes. However, the data collected did not include minor accents. Though there are sporadic reports on comparative studies of Thai and English phonology (Kruatrachue, 1960; Luksaneeyanawin, 2005; Smyth, 1987), there has been very little systematic, experiential, and experimental study on Southeast Asian English including Thai English problematic pronunciation features for EIL intelligibility.

In Asian mainland, the languages of the continent are predominantly governed by three major language families: Austro-Asiatic (Khmer, and Vietnamese), Tai Kadai (Thai and Lao), and Tibeto-Burman (Burmese). As such, the significant linguistic characteristics shared among each family can be reported as; monosyllabic (with some exceptions), lexical tone (except Khmer), large inventory of consonants, very limited in consonant clusters, and syllable-timed. In addition, among consonants in the languages of this region, voicing quality is not a distinctive feature but rather aspiration; i.e. there are often two series of stops: aspirated versus unaspirated. On the contrary, English is an alphabetic, reflexive, disyllabic, stressed-timed, and non-tonal language. Such typological distance between Thai and English leads to the common and well-known pronunciation of Thai English such as the lack of vowel reduction and stress are all resulted by these phonological discrepancies. For example, Thai speakers are generally unaware that vowel reduction and stress are the distinctive features of the English language (Goddard, 2005). Phonological characteristics of both Thai and English is evident that they possess a relatively different phonology, and the interference of Thai L1 phonological characteristics on English pronunciation clearly results in the unique pronunciation of Thai-accented English. The overall picture of this phenomenon is illustrated in Table 1.

Table 1
Comparison of phonological features between English, Thai-English, and Thai

Aspects	English sound system	Thai – English	Thai sound system
Devoicing	/z/, /dʒ/, /ʒ/, /g/	/k/, /k^h/ used instead of /g/ /s/ used instead of /z/ /tɕ/ used instead of /dʒ/ /$tɕ^h$/ used instead of /ʒ/	No /z/, /dʒ/, /ʒ/, /g/ in Thai (systematic gap)
Shift in terms of place and/or manner of articulation	Interdental fricatives /ð, θ/ and voiced labio-dental fricative /v/	/t/, /d/, /f/ used instead of /ð, θ, v/	No /ð, θ, v/ sounds.
Reduced initial aspiration	Aspiration occurs in the ONSET; unaspirated consonants only occur after /s/	Aspiration is used interchangeably.	Contrast between aspirated and unaspirated sounds
Deletion of final consonants	Final consonants can be in a cluster form.	A cluster is pronounced as a single consonant.	Final consonant is not in a cluster form but in a single form and fricatives do not occur.
Cluster reduction	Clusters in the ONSET and CODA vary.	Deletion of cluster	Clusters in the ONSET occur only /l, r, w/, no CODA cluster
Stress in words	Stress patterns are fixed.	Variation in use of stress	No stress patterns
Heavy-end stress: tone groups as intonation patterns	Utterances are divided into tone groups and marked by unit-final intonation patterns.	Tone groups in pronunciation are not used - intonation is not clear.	Not intonation language but tone language
Lack of reduced vowels	Vowels in unstressed syllable are reduced to schwa (Weak form).	No reduced vowels or weak forms – all vowels are pronounced equally.	No stress distinction by terms of tones
Monophthongization	Glides	Glides omission - diphthongs with glides are pronounced as plain vowel	No glides

Given the high frequency of phonological differences between Thai and English, it is unreasonable to presume that all emerging discrepancies will result in international intelligibility failure and therefore an experimental study is required.

Intelligibility measurement

Regarding the instruments chosen for intelligibility measurement, there is still no universally accepted way of assessing intelligibility (Munro & Derwing, 1995). Moreover, among the existing works investigating intelligibility, various methods have been employed. For instance, Lane (1963) measured intelligibility by counting the total numbers of words listeners transcribed correctly, Brodkey (1972) used paraphrasing, and Smith and Rafiqzad (1979) used cloze tests. Furthermore, Smith and Bisazza (1982) employed picture selection in response to a stimulus, Anderson-Hsieh and Koehler's (1988) research consisted of comprehension questions whereas Barefoot, Bochner, Johnson, and von Eigen (1993) counted percentages of key words recognised. Munro and Derwing (1995) asked participants to determine truth value, Fayer and Krasinski (1987), Win (1998) and Lu (2007) asked listeners to directly rate intelligibility on a questionnaire using a Likert scale. Each of the approaches mentioned has strengths and limitations. The question of which method to employ is considered a result of the purposes of the research.

Regarding the current intelligibility research, the transcription task was considered the most direct and reliable method to investigate intelligibility that was specific to phonology, and where semantic and pragmatic functions were not involved. From the review of literature into EIL intelligibility and the methods used, it is clear that any works using a transcription task to measure intelligibility were measuring phonological intelligibility, and the use of transcription tasks has become a widely-accepted approach in research of this type (Derwing & Munro, 1997, 2001; Munro & Derwing, 1995).

The type of speech for measuring intelligibility is another challenging issue for intelligibility researcher. Unlike isolated words, in connected speech, vowel and consonant segments can have different phonetic realizations. They undergo a process where reduction and articulatory simplification are found because of the need to speak faster. The factors that can affect connected speech are, speed of the utterances and accent of the language (Low, 2015). In addition, the process of isolated word speech construction is conducted in a sound recording laboratory where the speaker is fully aware of their pronunciation, resulting in a lack of ecological validity and where there is doubt regarding whether or not it is their real communicative production in an authentic situation. Again, this substantiates the points mentioned above in EIL intelligibility, that measuring connected speech is considered more beneficial than isolated words especially in the context of authentic communication.

Furthermore, the topic of spontaneous speech used in speech intelligibility tests can generally be classified into two main types, namely text dependent, that the text to be spoken is known by or in the familiar field of the listener, and text independent, that the listener does not know or have any clues about the topics and words in the speech to be tested (Holmes & Holmes, 2001). Though some EIL scholars such as Kirkpatrick, Deterding, and Wong (2008), Pongpairat (2011), and Walt (2000) used as general and vague a topic as possible for intelligibility measurement to avoid any confusion of words that might occur, it is supposed that to elicit the phonological features affecting intelligibility the speech samples should have as narrow a topic as possible to avoid the chances of predictability and context guessing. Topics such as talking about vacations and self-introductions are considered too predictable in content and pose difficulty for ascertaining whether accuracy in transcription was resulted by phonological intelligibility or a consequence of guessing from context clues. Hawley (1977) asserts that the characteristics of a good speech intelligibility test should have some level of difficulty to reduce the ease with which content can be predicted which was applied to the current study.

Methodology

Construction of speech sample

In the construction of Thai-accented English speech for intelligibility measurement, there were a total of 11 Thai English speakers, studying at tertiary level in the UK, asked to give a spontaneous speech regarding a controlled topic as their dissertation or term project. All participants were deemed to have attained a competent level of English proficiency as NNS students require IELTS of at least 5.5 to study at a UK tertiary institution. To elicit natural L2 continuous speech, each speaker recorded a 10-minute talk in an authentic setting where there was background noise such as traffic, surrounding noises, and background conversation. In such an environment, the speakers were believed to speak more freely and without pressure as opposed to the controlled recording process in a sound laboratory setting, and therefore would monitor their pronunciation less. However, after the initial recordings were finished, all speech samples were auditorily edited for clarity and volume by the Pro Tool programme in a professional sound editing laboratory, where background noise was eliminated to increase effectiveness of the intelligibility listening test. Speech samples were then assessed for quality, clarity and perception of sounds by 20 judges.

After that, the 11 speech samples with the approved voice quality were sent to five linguistic experts (trained phoneticians) and 20 non-linguistic experts (English NSs). They were asked to rate their perception regarding the level of foreign accentedness of the speech samples on the 3-point Likert scale from weak, moderate to strong. The results from both non-linguistic experts

and linguistic experts were in consensus regarding which samples were representative of each level of accent and therefore inter-rater reliability was confirmed. There were finally three speech samples selected for the representation of each accent level. Following identification of the speech samples to be tested, the location to assign the internal pause (where to pause the recording), in which the participants were to perform the transcription in the one-minute speech, was determined. The orthographic transcription of the selected speech sample was processed by the researcher and validated and checked for the authenticity by a Thai TESOL teacher, an English NS TESOL teacher who has taught in Thailand for more than five years, and the speaker of that speech sample to ensure that the speech transcription was accurate.

Construction of Transcription Task: Innovatively Designed "Pseudo Transcription"

A transcription task *per se* is the orthographic record of spoken language performed by the transcriber, and transcription performance is dependent on the level of speech intelligibility possessed by the individual language user. Nevertheless, transcription in an experimental setting is not simply writing down whatever you heard. Unlike other forms of transcription that employ the International Phonetic Alphabet (IPA) as the means for transcribing, spelling pronunciation or orthographic transcription is the only form of transcription that uses alphabets or orthography to transcribe how the utterance is pronounced. Subsequently, there is a sub-type of transcription in the sphere of spelling pronunciation called pseudo- or proto- transcription. This form of transcription uses orthography for the transcription (spelling the sound) but is only used when the transcriber is not aware of the written form of the word.

According to the aims of the research which is the investigation of problematic sound features for intelligibility, both transcription methods: orthographic and pseudo transcription, were considered appropriate and thus were selected for use. Underpinning this selection was the sample population (listeners or transcribers) who lacked the technical knowledge for IPA. English NS and NNS participants who transcribed the utterances (Thai-accented English speech) in this research were general language users in an authentic situation, not trained phoneticians. Therefore, it was understood that they were not IPA expert users. After careful consideration of all the compounding factors, the transcription tasks chosen for the present study were Orthographic Transcription and Pseudo Transcription with the use of a specially designed Pronunciation Respelling System to aid the sound spelling which was adapted from Scholastic Dictionary. It is free of non-alphabetic symbols and diacritics and very comprehensive for listeners who lack a phonetic background and require minimal time for training.

Using the mentioned methods and instruments, the participants were instructed to perform the transcription tasks as follows: based on their judgment, for words participants were certain were heard clearly, recognized,

and that they knew how to spell, they were required to use the form of common orthographic transcription to allow for a critical analysis of the intelligibility of the speech. However, participants were advised to use the pronunciation respelling system; pseudo-transcription, for those words not heard clearly or that they did not know how to spell. This method was to elicit which sound features of the speech samples resulted in problems for the listeners.

Listeners (Participants)

According to the context of Thai-accented English communication, similar to many other accents of English, the interlocutors can be classified into three groups as English native speakers, English non-native speakers who do not share L1, and those sharing L1. In this study, there were three groups of participants involved in measuring Thai English intelligibility; English NSs, English NNSs who were non-Thai, and Thai speakers. Each group consisted of 15 participants. Regarding the group of English NNSs who were not Thai, the selection of participants was based on their L1 using information from UNESCO (http://www.bbc.co.uk/languages/guide/languages/) which listed the most commonly used L1s in the world and the availability of the listeners source. Consequently, there were five different L1s selected; Arabic, Spanish, Portuguese Chinese, and Japanese. Three participants from each of these L1s were included in the study. In total, the sample for the current study consisted of 45 participants (n = 45). Aside from L1, which was the main criteria in selecting the NNS participants, participants were only considered if they had attained a bachelor degree to ensure they had sufficient academic skill to ascertain academic language in general. NNSs were postgraduate students in the UK, and similar to the Thai speakers that recorded the samples, must have scored at least IELTS 5.5 to study at a UK institution.

Data Collection Procedures

The total 45 participants were sub-grouped as the group of three for each data collection session (for the more effective way of data collection) based on their first language and time convenience. Therefore, there were 15 data collection sessions took place with the exactly same process details. After explaining the purposes of the research and asking for the participants consent, 30 minutes were allowed for the participants to be familiar with transcription form, pronunciation respelling system, and process trial. Then, the three speech samples of Thai English pronunciation with different levels of Thai accent were played to the participants in a randomized order. Participants were asked to transcribe what they acoustically perceived. The recording was paused at the location of natural pause allowing for participants to transcribe the chunk of speech just heard. There was no time restriction imposed on the

participants. Once all participants had completed the transcription task the next chunk of speech was played.

Results

The errors chosen for the phonetic analysis for the intelligibility threads were the words that more than 50% of the participants incorrectly transcribed using orthographic and pseudo transcription. Of the entire 157 mistranscribed words, there were eight words determined as problematic from more than 50% of the listeners which was 5.1% of the total words. Of these eight words, two words were found phonetically unintelligible for all groups of listeners and were probably from the weak accent condition and "lesbianism" from the moderate accent condition. Five words were found unintelligible specifically for NSs and NNSs; namely, "genre" from the moderate accent condition and "hypothesis", "environmental", "management", and "design" from the strong accent condition. Only one word was identified as unintelligible for NNSs and Thais which was *dressing* from the moderate accent condition. The relatively low amount of mistranscribed words from the current study indicates that, in general, Thai-English pronunciation can be considered intelligible for global listeners. However, even though the number of errors found was minimal, the problematic sound features which comprised those words leading to intelligibility failure were consistent and the trend is drawn out and analyzed.

The eight problematic words were phonetically transcribed by the researcher and a trained phonetician. With the use of PRAAT 6.0.21 software for spectral analysis and segmenting features in the syllables of these words, a careful examination of the single sound, transition and whole word was conducted for the most precise documentation of the phonetic transcription. All transcriptions of the problematic words were then analyzed for the non-standard pronunciation features which led to intelligibility failure by comparison to the standard pronunciation reference from Carnegie Mellon Pronouncing Dictionary (American English: Am E): CMU, and Longman Pronunciation Dictionary (British English: Br E and American English: Am E). This investigation was to determine the Thai-accented English pronunciation features that were pronounced differently from the standard pronunciation. Whether these features should be claimed as variants or errors when compared with the selected guidelines of NS pronunciation, led to the development of the list of non-standard sound features used by Thai speakers in the study. The rationale for selecting the CMU dictionary for the pronunciation reference was that the pronunciation data provided in the dictionary was collected from authentic speech (Kominek & Black, 2004). However, using one finite dictionary was not considered sufficient for reliability in assessment of whether a sound feature was, in fact, pronounced the same across English L1. Therefore, the use of the Longman Pronunciation Dictionary which includes both American (Am E) and British (Br E)

pronunciation was implemented alongside the CMU to increase the reliability of pronunciation assessments. This does not imply that the researcher considered the pronunciation presented in the selected dictionaries the best or most accurate way of pronouncing English, but rather, a NS reference was required to ascertain the non-standard sound features which led to intelligibility failure. Through the analysis explained, list of non-standard pronunciation instances of Thai English speakers reported as threat of intelligibility by different groups of international listeners (as marked ✓) was produced as illustrated in Table 2.

Table 2
List of non-standard pronunciation features from the problematic words through each group of listeners

Sound Features	Unintelligible for		
	NSs	NNSs	Thais
Syllables			
The reduction of number of syllables in the word: the combination of two median unstressed syllables [vaɪ] and [rən] of the word as one syllable as [wə] in "environmental"	✓	✓	×
The reduction of number of syllables in the word: the omission of median unstressed syllable [bə] in "probably", and [nə] in "cinematic"	✓	✓	✓
The reduction of number of syllables in the word: the omission of final unstressed syllable [rə] in "genre"	✓	✓	×
Vowels			
Vowel Heightening: The pronunciation of open back vowel [ɒ] as open-mid back vowel [ɔ] in "probably", "genre", "environmental"	✓	✓	✓
Vowel Heightening: The pronunciation of open front vowel [æ] as close-mid front [e] in "management"	✓	✓	×
The pronunciation of diphthong [əɪ] as [aɪ]: pronouncing schwa [ə] as open front [a] in "hypothesis"	✓	✓	×
The pronunciation of schwa [ə] as close front vowel [i] in "lesbianism", "hypothesis", and "management", close-mid front [e] in "management",	✓	✓	×
Monophthongization: the pronunciation of [iə] as open front vowel [æ] in "lesbianism"	✓	✓	✓
Consonants			
Voiced as voiceless: voiced fricative alveolar [ʒ] as voiceless fricative alveolar counterpart [ʃ] at the onset position in "genre"	✓	✓	×
Voiced as voiceless: voiced labiodental fricative [v] as voiceless bilabial glide [w] in "environmental"	✓	✓	×

Voiced as voiceless: voiced alveolar lateral [l] as voiceless bilabial glide [w] at the coda position of the final syllable in “environmental”	✓	✓	×
Voiced as voiceless: voiced alveolar fricative [z] as voiceless alveolar fricative [s] in “design”	✓	✓	×

Sound Features	Unintelligible for		
	NSs	NNSs	Thais
Voiced as voiceless: voiced dental fricative [ð] as voiceless alveolar stop [t]	✓	✓	×
Velar nasal [ŋ] as alveolar nasal [n] at the coda position in “genre”	✓	✓	×
Stop bilabial [b] in [bə] as nasal bilabial [m] in “probably”	✓	✓	✓
Wrong consonant cluster production: [dr] at the initial position of the word as [d^w] in “dressing”	×	✓	✓
Consonant cluster deletion: [bl] as [l] in “probably”	✓	✓	✓
Consonant cluster deletion: [nt] as [n] in “management”	✓	✓	×
Lack of final consonant released: voiced alveo-palatal affricate [dʒ] as voiceless fricative alveolar [s] in “management”	✓	✓	×

Notes: Mark ✓ for listeners with problems, cross mark ✕ for listeners without problems

Discussion

With the empirical data obtained in this study, the pattern of Thai non-standard English segmental features pronunciation leading to international intelligibility failure can be summed up and reported as shown in Table 3.

Evidenced from the critical analyses, the majority of intelligibility issues arose due to an inexistence of those English sounds in Thai phonology. However, this discrepancy was not the only contributing factor. Though both Thai and English share certain phonological sounds, instead of facilitating Thai pronunciation of English, they resulted in greater disparity. In other words, the sounds that are closely mapped between Thai and English, such as /n/ and /d/, are not identical, for example, /n/ in English is more alveolar whereas /n/ in Thai is dental. Additionally, /t/ and /d/ which are more dental in Thai are alveolar in English (Kruatrachue, 1960). The results obtained provided further insight into other possible causes of mispronunciation that led to intelligibility failure, such as phonotactic constraints, sound distribution patterns, and the confusion of the spelling system of English sounds in Thai.

Table 3
Thai EIL pronunciation core

Segmentals	Features	Examples
Consonants	Clusters:	
	Final Cluster: lack of final release	Dropping of the final segment such as [t] in "management" and [n] in "design", etc
	Initial Consonant Insertion	[dr] as [d^w] in "dressing"
	Initial Consonant Deletion	[bl] as [l] in "probably"
Consonants	Substitution of sounds in final syllable position	[l] is substituted by [w] in "environmental" [b] is substituted by [m] in "probably" [dʒ] is substituted by [s] in "management"
Consonants	Voiced pronounced as voiceless	[z] is substituted by [s] in "design" [ʒ] is substituted by [ʃ] in "genre" [v] is substituted by [w] in "environmental"
Vowels	Full stress is produced on unstressed vowel (schwa)	[mənt] as [men] in "management"
	Vowel Heightening	[æ] as [e] in "management" [ɑ] as [ɔ] in "genre" [ɑ] as [o] in "hypothesis"
Segmentals	**Features**	**Examples**
	Monophthongization	[iə] as [æ] in "lɛmænɪsim"
Syllable Structure	Reduction/omission of unstressed syllables	[rə] in "genre" [bə] in "probably" [vai] and [rən] in "environmental"

Interestingly, the problematic features identified in the current study did not completely substantiate either Jenkins (2000) or Kirkpatrick (2010) which are the significant research of the area. The current research echoes Jenkins (2000) in the feature of cluster simplification as a threat to intelligibility only, and concurs with Kirkpatrick (2010) in the features of cluster simplification, lack of reduced vowels, and monophthongization. Also, additional features were found in the current study but never mentioned in the

cited works, such as the omission of an unstressed syllable. However, it is worth noting that these three studies collected pronunciation production and perception data from different groups of language users and employed a different methodology. Several methodological inconsistencies make comparisons among studies difficult and, therefore, it is not surprising that the results of sound features found are not identical.

The Thai-accented English features from the current research can be explained through features that caused intelligibility failure among international users as follows.

Lack of final release consonant: A recognised characteristic of Thai English pronunciation occurs when the initial consonants in stressed syllables are aspirated voiceless plosives: /p^h/, /t^h/, /k^h/. Thais tend to pronounce them with an inaudible released resulting /p̚/, /t̚/, /k̚/. In addition, when final positions are consonant clusters, the Thai speaker omitted the final segment of sound with such phonological behaviour resulting in intelligibility failure to the listeners. In addition, in this case, content words were not considered as critical as function words when speakers fail to pronounce /t/ for {-ed} past tense morpheme as in "picked". Therefore, the ability to pronounce final consonants accurately is considered crucial for EIL intelligibility.

Failure to produce certain initial clusters: The insertion of a short vowel after the first segment of the cluster in an attempt to create the new fully stressed syllable in initial clusters that do not exist in Thai such as /dr/, /sw/, /fl/ further confounded intelligibility.

Sound substitution: For English initial sounds, when there are no equivalent sounds in Thai including voiced sounds, the following substitution occurs - /w/ for /v/, /t/ or /s/ for /θ/, /s/, /d/ or /t/ for /ð/, /ʧ/ for /ʃ/ and /s/ for /z/. Similarly, when English final consonants are /d/ /θ/ /ð/ /s/ /z/ /ʃ/ /ʒ/ /ʧ/ /ʤ/, they are substituted by Thais with /t/. These patterns of sound substitution led to intelligibility failure in listeners.

Monophthongization: As Thai does not have glide, when diphthong with glide occurs, Thais tend to drop the second element of the vowel and pronounce the plain vowel. This resulted in intelligibility failure in the present study. The problem is highlighted in centering sequence diphthong such as /iə/, that it may be pronounced either as two syllables separately or pronounced in a way that the second segment is less prominent than the first one. Simplification of diphthongs is widely found in East Asian English.

Lack of reduced vowels: Differences in language timing results in discrepancies in vowel production. The syllable-based timing of Thai requires equal weight on every syllable. This transfer to English pronunciation, in which there is a natural use of unstressed vowels in speech results in an

impediment to speaker intelligibility. Generally speaking, English weak vowels are not as weak as they should be when pronounced by Thais.

Heightening vowels: Thais tend to heighten the position of a vowel from the accurate pronunciation in English. Though not reported in the literature reviewed, this study found that this feature occurred consistently across the data and led to a failure in phonological intelligibility among participants.

Omission/reduction of unstressed syllable: As stress is not in Thai phonology, both unstressed vowels and unstressed syllables are a source of difficulty for Thais in their production of English. The current study revealed that when encountering unstressed syllables, Thai speakers have two strategies: first to make it fully stressed or to drop it completely. Both cases led to intelligibility failure.

Conclusion

While these features were identified as problematic, the occurrence of a single feature was not regarded as significant enough to result in unintelligibility of the word. Rather, it was the combination of multiple features that led to the failure in comprehension of whole words. For example, in the pronunciation of design as /dɪsaɪ/ instead of /dɪzaɪn/, the errors in pronunciation were the substitution of voiced /z/ as voiceless /s/ and lack of final consonant cluster release: dropping /n/. Moreover, from the analysis, mispronunciation in vowels was shown to cause more problems than in consonants. This finding supports previous results, such as Cunningham (2010) who stated that error in consonant articulations was less salient than vowel quality. Munro, Derwing, and Morton (2006) also said that intelligibility was higher in words with more vowels. The position mispronunciation error was also demonstrated to have a critical effect on intelligibility. From the analysis, it was found that in a word with more than two syllables such as “environmental”, “hypothesis”, and “management”, if errors occurred consecutively in the first two syllables, the proceeding syllables were not mapped to the targeted word regardless of how it was pronounced. The case was even more prominent in words with one or two syllables such as *dressing*, [dr] pronounced as [d^{w}r]. Although the rest of the sounds were pronounced accurately to the standard pronunciation of English in all sources; failure in pronouncing the initial sound was critical and resulted in a mismatch to the targeted word. These sound features of Thai English pronunciation are therefore a necessity in teaching EIL pronunciation in Thailand and for Thai learners for international communicative purposes. They are also the features that should be included as the minimum standard of Thai English pronunciation for safeguarding international intelligibility so-called the Thai English pronunciation of EIL intelligibility core.

Regardless of how the pronunciation core; either LFC or Asian phonology core or Thai EIL pronunciation core, is analysed and established,

this study suggests that any pronunciation core should be developed by English educators, researchers and authorities in the local area who are exposed to the socio-cultural context instead of being governed by NS scholars based in Anglophone speaking countries. As the local authorities of English pedagogy, their experiences of learning English as an additional language and shared L1 can enable them to develop language awareness and provide adequate linguistic information about the language to learners, anticipate their difficulties, and set realistic goals. In addition, this research suggests that the established core should be utilised in the assessment of communication skills of L2 learners, rather than used as a teaching model. In other words, during pronunciation teaching in class, especially in a formal education system, the focus should be on accent reduction because, as explained by standard English authorities such as Trudgill, standard English can warrant all contexts of English usage. Under no circumstances will having a more native-like or weaker foreign accent negatively affect the users.

The case is when errors are identified during assessment of English L2 learners' communicative skills, consideration must be given to their impact on intelligibility prior to standard model. If the errors are established as part of the core, it is imperative to advise and correct the pronunciation. This does not negate the necessity for assessment of non-core features; it simply transfers the onus onto attainting proficient communicative competency within one's own endonormative variety of English. Additionally, errors made outside the core should not be judged as failures as they are shown to have no salient effect on intelligibility. The core should inform teaching practices by providing data and guidelines on local features that impede intelligibility over providing a standard model of teaching. Whilst non-core features are regarded as less vital for intelligibility. Furthermore, even if cluster simplification was not identified as an intelligibility threat, it would be extremely misguided if a teacher encouraged the students to produce English with cluster simplification on the basis that it is their L1 influence and is not identified as threat to intelligibility.

It is absolutely agreed that for international communicative purposes there should be a minimum standard pronunciation set to safeguard intelligibility, additionally it is agreed that the attainment of native like proficiency for L2 learners is unrealistic as stated in LFC (Jenkins, 2000). However, this study suggests that the established core would be best utilised in assessing learners' communication skills in an authentic setting, rather than as a base from which to teach pronunciation. Regardless, within the concept of WE and EIL, it is the responsibility of language teachers to drive learners to acquire the targeted language to their highest potential and under no circumstances should the standard be lowered (Liu, 1999). However, there are several limitations in language teaching that must be considered such as the unrealistic approximating of native-like fluency, including the load and burden for learners especially in classroom context teaching (Jenkins, 2000). Moreover, the pronunciation core would be a further concern in the mind of

the teachers. It is undeniable that judging or assessing L2 learners against native-like competency is unfair, and learners should be respected as genuine users of the language. Learners must be encouraged to reach their full potential which may well exceed the minimum required basic intelligibility.

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Appendix

Summaries of the identified problematic features are shown in Tables 4 – 11. In the rows of "Standard Pronunciation", the phonetic data is the pronunciation of the word as described in the Carnegie Mellon Pronunciation Dictionary (CMU: American English only) and the Longman Pronunciation Dictionary (British English: BrE and American English: AmE). The Thai English pronunciation of the speaker is referenced in the row titled "Speech Sample Transcription" and is represented as T-E in the Tables. To explicate, in their connected spontaneous speech, the pronunciation of the problematic words as reflected from the transcription task of the listeners was further phonetically transcribed by the researcher and another two phoneticians in order to compare it with the pronunciation described in the references and the transcription from the listeners. Lastly, per each group of listeners, the transcription is provided in the rows of "Trend of Transcription". The phonetic data provided in these rows was the main trend of the transcription data obtained through each listener group, from both orthographic and pseudo-transcription, that were phonetically compatible to the targeted words. These sound features were converted to IPA symbols by the researcher as illustrated in the Tables for the systematic phonetic analysis. Those features perceived accurately as targeted by the speakers are marked with ✔ and the features that deviated too far from the pronunciation, were too inconsistent for a trend to be identified, or the features were left blank in the transcription are marked with ✖. The annotation T-E corresponds to the pronunciation of Thai English by the speaker employed in the experiment. As demonstrated, the conversion of all pronunciation production and reception data to IPA, allowed for a more thorough and systematic phonetic analysis.

All symbols and colours in Tables 4 - 11 can be represented as follows:

Different pronunciation between standard pronunciation and Thai-English pronunciation that led to unintelligibility.

Same pronunciation between standard and stimulus pronunciation that led to unintelligibility.

✔ Intelligible sound features perceived as the standard pronunciation by most of the participants.

✖ Too inconsistent or empty data among the participants.

According to the theoretical framework of the LFC (Jenkins, 2000), that communication breakdown is the main and ultimate focus, the problematic non-standard pronunciation features to be included in the Thai EIL pronunciation core must be the sound features that were not only deviated from the reference pronunciation but also failed to be perceived accurately from the targeted word of the speaker by participants. If the sound feature was pronounced differently from the reference pronunciation but did not negatively affect comprehension, the feature was excluded from the core.

Table 4

Phonetic transcription of "probably"

Standard Pronunciation	CMU	pr	ɒ	b	ə	b l	i
	BrE	pr	ɒ	b	ə	bl	i
	AmE	pr	ɑ:	b	ə	bl	i
Speech Sample Pronunciation	T-E	pr	ɔ	m	-	- l	i
Trend of Transcription	NSs	✔	ɔ	m	✖	- l	i
	NNSs	✔	ɔ	✖	✖	✖	✖
	Thai	✔	ɔ	✖	ɪ/ i	✖	✖

Table 5

Phonetic transcription of "dressing"

Standard Pronunciation	CMU	dr	ɛ	s	ɪ	ŋ
	BrE - AmE	dr	e	s	ɪ	ŋ
Speech Sample Pronunciation	T-E	d^w	ɛ	s	ɪ	ŋ
Trend of Transcription	NSs	✔	✔	✔	✔	✔
	NNSs	✖	✖	✖	✖	✖
	Thai	✖	eɪ	✔	✔	k

Table 6

Phonetic transcription of "genre"

Standard Pronunciation	CMU	ʒ	ɑ	n	r	ə
	BrE	ʒ/dʒ	ɒ/ ɑ: /ɔ̃	n	r	ə
	AmE	ʒ	ɑ:	n	r	ə
Speech Sample Pronunciation	T-E	ʃ	ɔ	n	-	-
Trend of Transcription	NSs	ʃ	ɔ	n	✖	✖
	NNSs	ʃ	ɑ:/ ɔ	ŋ/n/m	✖	✖
	Thai	✔	✔	✔	✔	✔

Table 7
Phonetic Transcription of "lesbianism"

Standard Pronunciation	CMU	l	ɛ	z	b	iə	N	ɪ	z	ə	m
	BrE–AmE	l	e	z	b	iə	N	ɪ	z	ə	m
Speech Sample Pronunciation	T-E	l	ɛ	s	m	æ	N	ɪ	s	i	m
Trend of Transcription	NSs	✔	e/ɛ/æ	s	m	ɛ	✔	i	s	✖	n
	NNSs	✔	e	s	m	æ	✔	i	s	✖	✔
	Thai	✖	ɛ	s	p/m	æ	✔	✔	s	ə	✔

Table 8
Phonetic Transcription of "hypothesis"

Standard Pronunciation	CMU	H	əɪ	p	ɑ	Θ	ə	s	ə	s
	BrE-AmE	H	əɪ	p	ɒ	Θ	ə	s	ɪ	s
Speech Sample Pronunciation	T-E	H	aɪ	p	o	T	i	s	i	s
Trend of Transcription	NSs	✔	a/əɪ	p/b/ k^w	o	L	i	✖	eɪ/ɪ	✖
	NNSs	✖	✖	g/b/p/ k/ k^w	o	L	ɪ	s	ɪ	✖
	Thai	✔	✔	✔	✔	✔	✔	✔	✔	✔

Table 9
Phonetic transcription of "environmental"

Standard Pronunciation	CMU	ɪ	N	v	aɪ	r	ə	n	m	ɛ	n	t	ə	l
	BrE	ɪ/e/ ə	N	v	aɪᵊ	r	ə	n	m	e	n	t		ᵊl
	AmE	ɪ	N	v	aɪ	r	ə	n	m	e	n	t̬		ᵊl
Speech Sample Pronunciation	T-E	ɪ	N	wa				-	-	-	t	ɔ w	-	
Trend of Transcription	NSs	ɛ	M	✖	✖	h	e ʊ	m	✖	✖	✖	✖	✖	✖
	NNSs	✖	✖	✖	✖	h	e ʊ	m	✖	✖	✖	✖	✖	✖
	Thai	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔

Table 10

*Phonetic transcription of "**management**"*

Standard Pronunciation	CMU	M	æ	n	ə	dʒ	m	ə	n	t
	BrE-AmE	M	æ	n	ɪ/ə	dʒ	m	ə	n	t
Speech Sample Pronunciation	T-E	M	e	n	e	S	m	ɪ	n	-
Trend of Transcription	NSs	✔	ɪ	✔	ɪ	T	✔	✖	✔	✖
	NNSs	✔	ɪ	✔	✖	✖	✔	aɪ	✔	✖
	Thai	✔	✔	✔	✔	✔	✔	✔	✔	✔

Table 11

Phonetic transcription of "design"

Standard Pronunciation	CMU	d	ɪ	Z	aɪ	n
	BrE-AmE	d	i/ə	Z	aɪ	n
Speech Sample Pronunciation	T-E	d	ɪ	S	aɪ	-
Trend of Transcription	NSs	✔	✔	S	✔	d
	NNSs	✔	✔	S	✔	d
	Thai	✔	✔	✔	✔	✔