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From Phonetic Knowledge to Production: A Multi-Factor Explanation of English Word Stress Errors among Thai EFL Learners with IPA Familiarity

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Abstract

Although the International Phonetic Alphabet (IPA) is widely used to support pronunciation learning in English as a Foreign Language (EFL) context, its effectiveness in improving word stress pronunciation, particularly in self-directed pronunciation, remains unclear. This study investigates English word stress errors among Thai EFL learners familiar with the IPA and examines their underlying factors. Using a self-recording approach to capture actual performance, 52 undergraduate students completed a word-list reading task and a questionnaire. The results indicate that accuracy was highest for words with fewer syllables and decreased as syllable length increased. Errors occurred most frequently in multisyllabic and compound words, and in items involving stress shifts within word families. The findings reveal a gap between learners' phonetic knowledge and its application in production.

Analysis of questionnaire data indicates that errors arise from several factors, including interlingual differences, the complexity of stress rules, and limited confidence in using phonetic transcriptions. Some learners relied on Thai transliterations instead of the IPA. The study provides a multi-factor explanation of persistent word stress errors, showing that these difficulties stem from interacting linguistic, cognitive, and strategic factors. This underscores the need for instructional practices that support effective application of phonetic knowledge in speech production.

Keywords: English word stress, Thai EFL learners, Phonetic knowledge, IPA, L2 pronunciation learning

Introduction

Word stress is a major contributor to comprehension, intelligibility, and effective communication in English (Cutler, 2015; Luchini, 2024). It also plays a crucial role in fluency and overall pronunciation proficiency. Mastering word stress not only makes speech clearer and more intelligible but also helps listeners process spoken language more efficiently (Field, 2005). Conversely, incorrect stress placement may reduce listeners' ability to recognise words and delay processing time (Hahn, 2004). Previous research has shown that explicit instruction in word stress can strengthen learners' listening skills. For example, such instruction has helped Polish learners decode spoken language more effectively (Sardegna & Jarosz, 2023) and improve listening comprehension among Thai learners (Unnahasuttiyanon & Meesri, 2020). These findings highlight the importance of word stress for both speech production and listener comprehension.

Thai learners of English often face challenges with word stress due to differences in the prosodic systems of the two languages (Jaiprasong & Pongpairoj, 2020). Thai is often described as having relatively equal prominence across syllables, with no vowel reduction (Dauer, 1983), whereas English exhibits variable stress across multisyllabic words (Roach, 2009). These differences complicate the learning process, and even learners who are familiar with the International Phonetic Alphabet (IPA) continue to make stress errors (Gralińska-Brawata & Rybińska, 2017). This suggests that familiarity with phonetic transcription does not necessarily result in accurate production. Understanding the factors contributing to these errors is therefore essential for improving word stress pronunciation.

Despite the importance of word stress and the increasing demand for English proficiency in international communication, research on Thai learners' difficulties with English word stress remains limited. Previous studies have examined word stress errors among Thai learners of English as a Foreign Language (EFL) with several focuses, e. g. recognition or perception and production (Aungcharoen, 2006; Soontornwipat, 2023), the production of stress shifts in suffixed words and in compound words (Jaiprasong & Pongpairoj, 2020), stress patterns in multisyllabic words in medical terms (Thongsongsee & Watanapokakul, 2023), and stress assignment in two-syllable noun and verb pairs (Plansangket, 2016).

However, these studies have not explored whether familiarity with the IPA improves word stress accuracy, nor have they addressed the persistence of errors despite such familiarity. In addition to this gap, previous research has generally examined the role of the IPA in pronunciation learning. Studies with Indonesian learners have reported that the IPA supports clearer speech, increases confidence, and promotes independent learning (Jonathan, 2023; Putri, 2018). Similar findings have been reported among Thai learners, where phonetic transcriptions helped improve stress placement and learner confidence (Charoensuk & Prasertsang, 2024; Chootharat & Veerachaisantikul, 2016; Dandee & Pornwiriyakit, 2022).

Additionally, most studies on English word stress have focused on learners' perceptions or controlled productions rather than their actual pronunciation performance. Typical methodologies primarily rely on reading aloud tasks, which do not reveal whether learners actively use phonetic transcriptions or depend on other strategies, such as English spelling or patterns from their first language (L1).

To date, there is little published research on word stress production using a self-recording approach, and even less is known about how learners use phonetic transcriptions as a resource during self-directed pronunciation tasks. This study addresses this gap by examining how learners apply their IPA knowledge in production and why errors persist despite this knowledge. The factors examined in this study are organised into three dimensions: linguistic (e. g. L1 transfer and the complexity of English stress rules), cognitive (e. g. limited confidence and difficulties applying phonetic transcription), and strategic (e.g. the use of the IPA, self-monitoring, and transliteration). These dimensions together provide the conceptual framework that guides the analysis and discussion of the findings.

The findings enhance our understanding of the gap between phonetic knowledge and pronunciation performance by showing how this gap is shaped by interacting factors during self-directed pronunciation and inform more effective pronunciation instruction in EFL contexts. This study contributes to the literature by (1) examining self-directed pronunciation through a self-recording approach, (2) demonstrating a gap between phonetic knowledge and its application, and (3) providing an empirically grounded multi-factor account of persistent word stress errors.

Based on these aims, this study addresses the following research questions:

1. What are the patterns of accuracy in English word stress production among Thai EFL learners familiar with the IPA across two-, three-, and four-syllable words?

2. What factors contribute to the persistent word stress errors among Thai EFL learners familiar with the IPA?

Literature review

Differences in word stress between English and Thai

Word stress refers to the emphasis given to certain syllables in a word, typically characterised by increased loudness, pitch, and length (Roach, 2009). English and Thai differ significantly in their stress systems, which can complicate the acquisition of English word stress. In English, the vowel in an unstressed syllable is often reduced, making vowel reduction an important feature of English pronunciation (Roach, 2009), whereas in Thai, syllables are pronounced with relatively equal duration and prominence (Dauer, 1983). These differences require learners to adjust to unfamiliar stress patterns, which may result in incorrect stress placement or the absence of vowel reduction in unstressed syllables (Chootharat & Veerachaisantikul, 2016).

English is widely characterised as a free-stress language, reflecting the fact that stress can fall on any syllable within a word. Unlike fixed-stress languages, English word stress is variable and influenced by factors

such as word structure, grammatical category, although not all stress patterns can be predicted by rules (Levis, 2018; Roach, 2009). Word stress can also differentiate the part of speech or grammatical category of a word. For example, the word permit, when used as a noun, carries stress on the first syllable (/ˈpɜːmɪt/), whereas when used as a verb, the stress shifts to the second syllable (/pəˈmɪt/) (Cutler, 2015).

By comparison, Thai word stress is relatively fixed, typically occurring on the final syllable (Nacasakul, 2016). Consequently, Thai learners may experience difficulty acquiring English word stress, as they must adapt from a relatively predictable stress system to one in which stress placement varies across words and is often less predictable. This mismatch between the two systems often leads learners to transfer Thai stress patterns when producing English words, contributing to inaccurate stress placement.

Challenges faced by EFL learners in word stress pronunciation

Although word stress is a vital feature of intelligible English speech, many EFL learners experience difficulty in mastering English stress patterns due to a combination of several dimensions. First, the influence of L1 plays a significant role in shaping learners' ability to acquire word stress. For example, Chinese learners in Bu and Zhou's (2021) study reported that they found English word stress problematic due to the lack of variable stress patterns in Chinese. Similarly, Indonesian learners' common stress errors are often attributed to the lack of stress-based prosody in their native language (Nurpahmi et al., 2023), while Mandarin speakers also commonly misplace word stress when speaking English (Liu, 2017). In line with previous studies, Jaiprasong and Pongpairoj (2020) found similar results, showing that many Thai learners incorrectly placed the stress on the final syllable of words, demonstrating transfer of stress patterns from Thai. Taken together, these studies suggest that L1 influence is a common source of difficulty, although the specific patterns vary across linguistic backgrounds.

Second, the complex nature of English word stress rules, which are notoriously irregular and involve numerous exceptions, can also make learning more challenging for non-native speakers of English. Several studies have identified this complexity as a source of errors. For example, Vietnamese learners tend to have difficulty with the complexity of word stress rules (Duong, 2018). As noted by Nurpahmi et al. (2023), Indonesian learners also struggled to identify the correct syllable to stress, resulting in three types of errors: equal stress, no stress placement, and reverse stress. In a similar vein, Soontornwipat (2023) found that English majors at a Thai university experienced difficulty with both complex stress rules and limited knowledge of syllable structure. These factors, in turn, contributed to errors in both the recognition and production of English word stress.

Third, the acquisition of word stress requires a balance between the accurate articulation of sounds and appropriate stress placement, which may place a considerable cognitive load on learners. According to Sa'di et al. (2022), Arabic-speaking learners often hesitate or engage in self-repair, resulting in fragmented and disjointed speech. Such hesitation suggests that learners are required to consciously monitor multiple aspects of pronunciation at the same time, including segmental accuracy and stress placement. This may reduce fluency and make it difficult for learners to produce word stress smoothly. As a result, learners may find it difficult to produce word stress correctly, particularly when dealing with longer or more complex words.

Fourth, word familiarity also plays a role in word stress production. This is reported in the study by Thongsongsee and Watanapokakul (2023), who examined the word stress pronunciation of first-year Thai medical students in medical terms ranging from two to more than four syllables. Their findings suggested that less familiar words, such as abscess, malignant, heparin, and thrombosis, were more challenging for learners, particularly those in the low-ability group.

Other contributing factors include learners' English proficiency and word length. For example, Arabic-speaking learners made more errors as the number of syllables increased, whereas advanced learners performed better than intermediate learners (Baagbah & Jaganathan, 2023). Another under-examined area is the correlation between musical ability and word stress accuracy. For instance, a study by Gralińska-Brawata and Rybińska (2017) found a

positive impact of musical ability on the production of word stress. The findings indicated that Polish EFL learners who had stronger musical skills tended to perform better in producing stress patterns.

Overall, these studies suggest that difficulties in English word stress arise from multiple interacting factors, including learners' L1 background, the complexity of English stress patterns, cognitive demands during speech production, word familiarity, English proficiency, word length, and individual differences such as musical ability.

The role of the IPA in pronunciation learning

The IPA is widely used as a tool for supporting pronunciation development in EFL settings. A substantial body of research has examined its role in facilitating pronunciation learning across different contexts. Previous studies have consistently reported that learners perceive the IPA as beneficial for improving clarity, confidence, and independent learning, particularly in relation to word stress. Moreover, Nugroho and Priyatmojo (2026) argue that the IPA promotes learner autonomy by enabling learners to consult dictionaries and online resources to access phonetic transcriptions without relying on teacher assistance. From the teachers' perspective, Durukan and Gokgoz-Kurt (2024) found that the IPA facilitated word stress pronunciation learning by giving learners a consistent visual system for noticing, practising, and correcting stress placement, thereby improving learners' accuracy and promoting learner autonomy.

Despite these reported benefits, research has also highlighted both the limitations of IPA use in pronunciation teaching that may limit the effectiveness. These include students' lack of training and motivation, as well as teachers' own confidence and methodological challenges in integrating the IPA into word stress instruction. Nevertheless, as noted by Gavilanes (2024), the IPA is not just a transcription system; it is a pedagogical tool that empowers learners to master stress placement, improve clarity, and engage more confidently in English communication.

With specific reference to Thai learners, Chootharat and Veerachaisantikul (2016) found that the IPA helped first-year university students majoring in English for International Communication who were taking a phonetics course to place word stress more accurately, increase their confidence, and foster positive attitudes, although some learners still found phonetic symbols problematic. Similarly, Charoensuk and Prasertsang (2024) reported that IPA-based instruction improved Grade 5 students' engagement and pronunciation performance, although some learners continued to experience difficulty and required additional support.

Similar findings have been reported in other English-learning contexts. Abg Abu Nawas et al. (2026), in a study of Kedayan secondary students in Malaysia, found that students generally viewed phonetics instruction as beneficial for improving pronunciation, but they also perceived it as cognitively demanding. The authors also found that students reported feeling both more confident and more anxious about their pronunciation following phonetics instruction. This suggests that increased phonetic awareness does not necessarily translate into greater confidence in pronunciation.

In many cases, research has relied on reading aloud tasks, in which learners are asked to pronounce word lists and their performance is evaluated. While such tasks provide controlled data on pronunciation accuracy, they do not capture how learners make use of available resources when completing pronunciation tasks under self-directed conditions. In particular, they offer limited insight into whether learners rely on phonetic transcriptions or other strategies, such as spelling or their L1, when completing pronunciation tasks without immediate teacher guidance.

More importantly, the effective use of the IPA involves more than recognising phonetic symbols. To use phonetic notation during pronunciation, learners must interpret the symbols and stress markers and apply this information accurately when producing speech. As noted by Mompean and Lintunen (2015), learners require active rather than passive knowledge of phonetic symbols to use phonetic notation effectively for self-monitoring and independent learning. Similarly, Mompean and Fouz-González (2021) argue that learners may find it easier to recognise phonetic symbols than to apply them effectively in speech production.

While previous studies have highlighted learners' positive perceptions of the IPA, fewer studies have examined how learners apply this knowledge during pronunciation tasks. More specifically, limited attention

has been given to how learners use phonetic transcription during self-directed pronunciation without guidance from a teacher or a pronunciation model. Overall, these gaps point to the need for research that examines learners' pronunciation under less controlled conditions, using a self-recording approach, which provides insight into learners' strategic behaviour during self-directed pronunciation. To address this research gap, the present study investigates how learners make use of phonetic transcriptions during self-directed pronunciation tasks and why word stress errors persist despite the availability of phonetic transcriptions. The findings may also have pedagogical implications by highlighting the need for additional pronunciation practice to help learners apply phonetic knowledge more effectively during speech production and foster greater confidence in using the IPA for pronunciation reference.

Research methodology

Participants

The population consisted of 79 second-year Thai undergraduate students enrolled in English and English Education programmes at a public university in Thailand. All participants had completed an English phonetics and phonology course, in which word stress assignment was one of the key components. Using convenience sampling, 52 participants were selected based on their availability and willingness to participate. Of these, 12 were male and 40 were female, ranging in age between 20 and 24 years (M = 20.83, SD = 0.83).

Research instruments

To address the research objectives, this study employed two instruments: a word stress pronunciation test and a questionnaire to examine learners' production accuracy and the factors underlying persistent word stress errors.

Word stress pronunciation test

A word-list reading task was designed to assess English word stress production**.** Word-list reading tasks have been widely employed to assess English pronunciation among EFL learners, including both segmental and suprasegmental features. Previous studies have used this approach to examine segmental features such as word-final consonant production (Pathanasin et al., 2026), both segmental and suprasegmental features, including consonants, vowels, and word stress (Trinh et al., 2022), and suprasegmental features such as word stress (Baagbah & Jaganathan, 2023; Jaiprasong & Pongpairoj, 2020; Thongsongsee & Watanapokakul, 2023). The widespread application of word-list reading tasks across these different aspects of English pronunciation supports the suitability of this approach for the present study.

The reading task consisted of 50 words, divided into three groups:

20 two-syllable words: Ten with stress on the first syllable and ten on the second syllable.

15 three-syllable words: Three sets of five words, each set with stress on the first, second, or third syllable.

15 four-syllable words: Three sets of five words, each set with stress on the first, second, or third syllable.

The vocabulary was selected from the Years 1-6 vocabulary lists (English Language Institute, Office of the Basic Education Commission, 2016). The words were written in standard English spelling and accompanied by phonetic transcriptions from the Oxford Advanced Learner's Dictionary (https://www.oxfordlearnersdictionaries.com/). This word list was chosen to align with the participants' academic backgrounds, as most were English education majors, who had studied phonetic symbols through their coursework.

Word selection followed three criteria: (1) balanced stress position, whereby words within each syllable group were distributed across all possible stress positions (i.e. first, second, or third syllable, as applicable) to ensure broad coverage of stress patterns; (2) familiarity, with words selected from those commonly encountered in English language curricula at Thai primary schools; and (3) part of speech, with nouns prioritised because noun stress patterns formed a core component of the English Phonetics and Phonology course completed by the participants.

Questionnaire

A 5-point rating scale questionnaire was used to collect data on the factors contributing to word stress errors. It was divided into four parts:

1. Part one collected demographic information (e.g. age and the age at which participants began learning English).

2. Part two explored learners' perceptions of word stress and the factors underlying pronunciation errors. This section consisted of 20 statements adapted from Laredj and Fiala (2018), Misfer and Busabaa (2019), and Niamthet (2016), rated on a scale from 1 (strongly disagree) to 5 (strongly agree). The questionnaire was presented in Thai to facilitate comprehension.

3. Part three examined the strategies learners employed during the pronunciation task. Eight response options were provided, and participants could select more than one. The eight options represented three broad categories of strategy: self-monitoring during recording (re-recording errors or overlooking them); pre-reading strategies (checking stress patterns and consulting the IPA (always, occasionally, or not at all) or relying on prior familiarity); and transliteration into Thai script prior to recording.

4. Part four invited additional comments on word stress and pronunciation learning. Participants were encouraged, but not required, to provide their views.

A pilot study involving 20 English majors from a previous cohort was conducted to test and refine the research instruments. Participants completed a 50-word pronunciation test and a 5-point rating scale questionnaire. The pronunciation test was reviewed by three ELT experts for content validity in relation to word stress accuracy and alignment with the research objectives. The content validity of the questionnaire was established using the Index of Item-Objective Congruence (IOC), with the same three experts evaluating each item based on its relevance to the research objectives. The IOC values ranged from 0.50 to 1.00, with a mean IOC of 0.87, indicating a high level of content validity. Items were revised based on expert feedback before inclusion in the final version, particularly to improve the clarity of wording and reorder the items. The reliability of the questionnaire demonstrated acceptable internal consistency (Cronbach's $\alpha = 0.80$). Based on the pilot study and expert review, the research instruments were considered appropriate for use in the main study.

Ethical considerations

Ethical approval for this study was granted by the relevant institutional review board prior to data collection. After the release of course grades, students were invited to participate via a Facebook group announcement to ensure that their decision was made independently of academic outcomes. Participation was voluntary. Before data were collected for research purposes, the researcher explained the study's purpose, procedures, potential risks, and participants' right to withdraw at any time without affecting their course grades. All participants then provided written informed consent by indicating their agreement to the written consent statement. Of the 79 students, 52 agreed to participate and completed the questionnaire via Google Forms. To ensure privacy, all participant data were anonymised.

Data collection

For the main study, students taking the English phonetics course completed a 50-word pronunciation test as part of their final assessment. The words in the test were organised according to their stress positions, with phonetic transcriptions and an audio file provided as reference materials. Participants recorded their pronunciation of the 50-word list as video files using their personal devices and submitted the recordings via Google Forms. They were free to re-record their pronunciation as many times as they wished before submitting their final version. Participants completed the recording task under self-directed conditions to minimise performance anxiety associated with the presence of the researcher and time constraints. Although participants had access to standard English spelling, phonetic transcriptions, and a model audio file throughout the task, no real-time teacher guidance was provided. The self-recording format was also intended to capture naturalistic pronunciation performance, allowing the study to examine how learners applied their knowledge of word stress and phonetic transcription without immediate teacher guidance. Following the submission of their recordings, students who agreed to participate in the study completed a questionnaire via Google Forms.

Data analysis

Pronunciation scoring followed the frameworks proposed by Aungcharoen (2006) and Tuan (2017). Aungcharoen's (2006) framework distinguishes between correct and incorrect stress placement in Thai EFL learners' oral production, using a binary scoring system in which a response is scored as correct only

when the primary stress falls on the target syllable with intelligible pronunciation. Tuan's (2017) framework similarly employs binary scoring but additionally addresses cases of equal stress, in which no single syllable is given greater prominence than the others, and unintelligible pronunciation, in which the utterance cannot be reliably assessed. Drawing on both frameworks, participants received one point for correct primary stress placement accompanied by intelligible pronunciation and zero points for incorrect stress placement, equal stress across syllables, or unintelligible pronunciation.

The recordings were initially scored by the researcher. Primary stress was identified perceptually by considering the relative prominence of syllables in terms of loudness, duration, and higher pitch (Roach, 2009). A second rater, a Thai national with a doctoral degree in English and over 15 years of experience in ELT, including teaching English phonetics and phonology at the university level, independently scored the recordings without knowledge of the first rater's assessments. The two sets of scores were compared, and any disagreements were resolved through discussion. Cases in which stress placement remained unclear were further analysed using Praat software (Boersma & Weenink, 2024) to verify the final ratings.

Pronunciation scores and questionnaire data were analysed using descriptive statistics (means, frequencies, and percentages) across the three groups of words, as categorised in the research instrument. Responses from Part three, which examined the recording methods and strategies used, were summarised using percentages. Part four, which invited additional comments, was analysed using thematic analysis (Braun & Clarke, 2006). This approach was selected because it provides a flexible yet systematic method for identifying and interpreting patterns of meaning across participants' responses. Following Braun and Clarke's six-phase approach, the researcher repeatedly read all 52 responses to become familiar with the data before generating initial codes related to learners' difficulties with English word stress. The codes were then collated into themes, which were reviewed and refined against the entire dataset to ensure internal coherence and clear distinctions between themes. The final themes were subsequently defined and named, and representative quotations were selected to illustrate each theme. This process resulted in three main themes: Uncertainty in stress placement, reduced confidence and fluency, and overthinking and self-correction.

Findings

Of the 52 participants, almost all (n = 49, 94.23%) began learning English at the start of their schooling. Specifically, 25 participants (48.08%) started at ages 3–5 in their first year of kindergarten, while 24 (46.15%) began in Year 1 at ages 6-7. Only two participants (3.85%) started in Year 5 at ages 10-11, and one (1.92%) began in Year 7 at age 15. These demographic data suggest that the majority of participants were introduced to English at an early stage in their education. Pronunciation test scores ranged from 27 to 50 out of 50 (M = 44.13, SD = 5.43), with only eight learners scoring below 40 points.

Accuracy percentages of two-, three-, and four-syllable words

The overall mean accuracy rates were highest for two-syllable words (90.58%), slightly lower for three-syllable words (90.13%), and lowest for four-syllable words (82.69%). These data indicate that learners performed better with fewer syllables and encountered more difficulty as the number of syllables increased. Within each syllable group, accuracy varied considerably depending on stress position and word type, with certain words emerging as particularly problematic.

The percentages of accuracy for each stress pattern and syllable group are presented in Tables 1–3. The findings are arranged from the highest to the lowest accuracy rates.

The average accuracy rate for two-syllable words with first-syllable stress was 91.16%. The item fashion achieved perfect accuracy (100%), while most remaining items scored between 80.80% and 98.10%. The lowest accuracy was observed for the word orange (76.90%).

Two-syllable words with second-syllable stress showed a slightly lower average accuracy (90.01%). The word canteen was produced with 100% accuracy, while guitar and museum showed the lowest accuracy rates of 65.40% and 73.10%, respectively. Overall, the mean accuracy for two-syllable words was 90.58%.

Accuracy for three-syllable words showed some variation across stress positions, with an overall mean accuracy of 90.13%. First-syllable stress words had the lowest accuracy (83.44%). While the word elephant showed the highest accuracy (90.40%), pineapple and cucumber were more challenging, with accuracy rates of 78.80% and 75.00%, respectively. Words with second-syllable stress demonstrated the highest accuracy (95.40%). The words eraser and papaya were produced with 100% accuracy, whereas mosquito was comparatively more difficult (82.70%). Learners also performed well on words with third-syllable stress, with an average accuracy of 91.54%. While kangaroo and magazine showed high accuracy (96.20%), souvenir was notably more problematic (76.90%).

Table 1 Accuracy rates for the pronunciation of two-syllable words (N = 52)

Stress pattern	Words	IPA	Correct stress	
			n	**%**
First syllable	fashion	/ˈfæʃn/	52	100
	sugar	/ˈʃʊgə(r)/	51	98.10
	autumn	/ˈɔːtəm/	51	98.10
	brother	/ˈbrʌðə(r)/	50	96.20
	period	/ˈpɪəriəd/	48	92.30
	sandwich	/ˈsænwɪtʃ/	48	92.30
	onion	/ˈʌnjən/	48	92.30
	salad	/ˈsæləd/	44	84.60
	birthday	/ˈbɜːθdeɪ/	42	80.80
	orange	/ˈɒrɪndʒ/	40	76.90
			Mean	**91.16**
Second syllable	canteen	/kænˈtiːn/	52	100
	giraffe	/dʒəˈrɑːf/	51	98.10
	balloon	/bəˈluːn/	51	98.10
	goodbye	/ˌgʊdˈbaɪ/	51	98.10
	routine	/ruːˈtiːn/	51	98.10
	hello	/həˈləʊ/	48	92.30
	hotel	/həʊˈtel/	47	90.40
	predict	/prɪˈdɪkt/	45	86.50
	museum	/mjuˈziːəm/	38	73.10
	guitar	/gɪˈtɑː(r)/	34	65.40
			Mean	**90.01**
			Overall mean	**90.58**

Accuracy for four-syllable words was the lowest, with an overall mean accuracy of 82.69%. Among the three stress patterns, first-syllable stress was the most challenging (71.16%), with learners tending to misplace stress on the third syllable. While *television* and *pomegranate* showed relatively higher accuracy (75.00%), the words *motorcycle* and *calculato*r were more problematic, with accuracy rates of 67.30% and 65.40%, respectively. Second-syllable stress showed moderate performance, with an average accuracy of 83.08%. *Professional* was produced with 100% accuracy, whereas *photographer* was the most difficult item (57.70%). Learners performed best on words with third-syllable stress, which had the highest mean

accuracy (93.84%). While *occupation* showed 100% accuracy, *cafeteria* was comparatively more difficult (78.80%).

The results from Tables 1-3 indicate that accuracy decreased as syllable length increased, with particular difficulty observed in first-syllable stress patterns in longer words.

Table 2 Accuracy rates for the pronunciation of three-syllable words (N = 52)

Stress pattern	Words	IPA	Correct stress	
			n	**%**
First syllable	elephant	/'elɪfənt/	47	90.40
	telephone	/'telɪfəʊn/	45	86.50
	hospital	/'hɒspɪtl/	45	86.50
	pineapple	/'paɪnæpl/	41	78.80
	cucumber	/'kju:kʌmbə(r)/	39	75.00
			Mean	**83.44**
Second syllable	eraser	/ɪ'reɪzə(r)/	52	100
	papaya	/pə'paɪə/	52	100
	banana	/bə'nɑ:nə/	51	98.10
	umbrella	/ʌm'brelə/	50	96.20
	mosquito	/mə'ski:təʊ/	43	82.70
			Mean	**95.40**
Third syllable	kangaroo	/ˌkæŋgə'ru:/	50	96.20
	magazine	/ˌmægə'zi:n/	50	96.20
	entertain	/ˌentə'teɪn/	49	94.20
	understand	/ˌʌndə'stænd/	49	94.20
	souvenir	/ˌsu:və'nɪə(r)/	40	76.90
			Mean	**91.54**
			Overall mean	**90.13**

Table 3 Accuracy rates for the pronunciation of four-syllable words (N = 52)

Stress pattern	Words	IPA	Correct stress	
			n	**%**
First syllable	television	/'telɪvɪʒn/	39	75.00
	pomegranate	/'pɒmɪgrænɪt/	39	75.00
	watermelon	/'wɔ:təmelən/	38	73.10
	motorcycle	/'məʊtəsaɪkl/	35	67.30
	calculator	/'kælkjuleɪtə(r)/	34	65.40
			Mean	**71.16**
Second syllable	professional	/prə'feʃənl/	52	100
	environment	/ɪn'vaɪrənmənt/	48	92.30
	intelligent	/ɪn'telɪdʒənt/	44	84.60
	immediately	/ɪ'mi:diətli/	42	80.80

Stress pattern	Words	IPA	Correct stress	
			n	**%**
	photographer	/fə'tɒgrəfə(r)/	30	57.70
			Mean	**83.08**
Third syllable	occupation	/ˌɒkju'peɪʃn/	52	100
	situation	/ˌsɪtʃu'eɪʃn/	51	98.10
	information	/ˌɪnfə'meɪʃn/	51	98.10
	exhibition	/ˌeksɪ'bɪʃn/	49	94.20
	cafeteria	/ˌkæfə'tɪəriə/	41	78.80
			Mean	**93.84**
			Overall mean	**82.69**

Table 4 Learners' perceptions of word stress by category

Category	Positive (%)	Neutral (%)	Negative (%)
Importance of word stress			
• Clear communication	94.20	5.80	0.00
• Improvement in listening ability	84.60	13.50	1.90
• Impact on speech clarity	88.50	11.50	0.00
• Natural and fluent speech	94.20	5.80	0.00
• Impact of pronunciation on overall proficiency	80.80	17.30	1.90
Challenges of word stress pronunciation			
• Confidence in stress placement	13.50	65.40	21.10
• Lack of confidence in self-directed pronunciation	19.20	50.00	30.80
• Complexity of word stress rules	48.10	42.30	9.60
• Difficulties with loanwords	63.50	25.00	11.50
• Influence of the Thai sound system	17.30	26.90	55.80
• Transfer of Thai stress patterns	25.00	36.50	38.50
• Word stress as a major challenge	53.80	42.30	3.90
• Uncertainty in reading the IPA	73.10	25.00	1.90
Learning behaviours			
• Regular attention to word stress	61.50	25.00	13.50
• Greater focus on grammar and vocabulary than pronunciation	23.00	30.80	46.20
• Greater focus on message over word stress accuracy	32.70	34.60	32.70
• Self-practice through media and interaction with others	51.90	38.50	9.60
• Effect of imitation ability on accuracy	78.80	19.20	1.90
• Use of dictionaries to check word stress	59.60	36.50	3.90
• Dependence on the IPA for word stress	32.70	44.20	23.10

Results from the questionnaire

Learners' perception of word stress

The results of the 5-point rating scale questionnaire provide insight into the factors underlying word stress errors (Table 4) . The questionnaire examined learners' perceptions across three categories: the importance of word stress, challenges of word stress pronunciation, and learning behaviours. For ease of presentation, responses were grouped into positive (*strongly agree* and *agree*) , neutral, and negative (*disagree* and *strongly disagree*) categories.

Participants strongly agreed that word stress is a key aspect of effective spoken English. The majority recognised the importance of correct stress placement for clear communication and natural, fluent speech, with both aspects rated at 94.20%. Participants also believed that word stress enhances listening ability (84.60%) and affects speech clarity (88.50%). Furthermore, 80.80% of participants agreed that pronunciation contributes to overall English proficiency. Negative responses in this category were minimal (0.00%-1.90%), suggesting that participants widely acknowledged the role of word stress in communication.

Despite this strong consensus on the importance of word stress, participants showed varying levels of agreement regarding the challenges. With respect to stress placement, only 13.50% reported confidence, while the majority (65.40%) selected the neutral option. When producing word stress independently without a pronunciation model, 19.20% reported a lack of confidence, whereas 30.80% disagreed. Word stress rules were considered complex by nearly half of the participants (48.10%), while 42.30% were undecided, indicating uncertainty or limited understanding.

Participants also reported difficulties with English loanwords, with 63.50% agreeing. Only 17.30% acknowledged the influence of the Thai sound system, whereas more than half (55.80%) responded negatively. Similarly, only 25.00% recognised the transfer of Thai stress patterns, while 38.50% did not.

Additionally, 53.80% of participants perceived word stress as a major challenge in pronunciation learning. A notable difficulty was reading the IPA, with 73.10% reporting difficulty and 25.00% selecting the neutral option. Across these items, the relatively high proportion of neutral responses may indicate hesitation or limited awareness of specific difficulties with word stress.

Regarding learning behaviours, about 61.50% of participants reported regularly paying attention to word stress. However, 32.70% prioritised conveying meaning over accurate stress placement, while the same proportion disagreed, indicating differing views on fluency and accuracy. Only 23.00% reported focusing more on grammar and vocabulary than pronunciation, whereas 46.20% disagreed, suggesting that more participants prioritised pronunciation over grammar and vocabulary.

In terms of strategies, a high proportion (78.80%) agreed that imitation ability contributes to accurate pronunciation. Over half (51.90%) reported practising through media and interaction with others, and 59.60% used dictionaries to check the word stress of new vocabulary items. By contrast, only 32.70% agreed that they relied on the IPA for word stress. The high proportion of neutral responses regarding IPA use (44.20%) further supports earlier findings that participants were uncertain about the use of phonetic transcription.

Reflections on self-recorded pronunciation tasks

Part three of the questionnaire examined the production strategies participants employed during the self-recording task, providing behavioural evidence of how participants engaged with the available phonological resources during production. The responses showed that most participants (92.00%) re-recorded their pronunciation to correct errors, whereas 11.50% did not, as multiple responses were permitted. Over half of the participants (57.70%) reported checking stress patterns before reading each word, while 36.50% did not.

The use of phonetic transcriptions showed mixed patterns. While 38.50% of participants consistently consulted the phonetic transcriptions, 50.00% occasionally read them, and 5.80% avoided using the IPA due to a lack of confidence. Notably, 38.50% of participants admitted to relying on their own Thai transliterations, despite having received prior instruction in the IPA during the phonetics course.

Qualitative insights into word stress challenges

In addition to the structured questionnaire (Part two), the open-ended responses in Part four further illustrated participants' difficulties with word stress. Following Braun and Clarke's (2006) thematic analysis, responses were inductively coded and grouped into recurring patterns. Three overarching themes emerged: uncertainty in stress placement, reduced confidence and fluency, and overthinking and self-correction. These themes align with the questionnaire findings and offer a deeper understanding of participants' difficulties with word stress. These additional comments are presented in Table 5, with selective sample quotes transcribed verbatim.

Table 5 Thematic summary of participants' comments on word stress challenges

Theme	Description	Selective Quotes
Uncertainty in stress placement	Participants expressed confusion about stress placement, particularly in longer words.	*"I don't always remember where to place the stress, which makes it very difficult to sound natural."* (P3) *"Sometimes I get confused about the stress of each word."* (P12) *"I struggle to pronounce words with multiple syllables because I'm not sure about which syllable to stress."* (P19)
Reduced confidence and fluency	Participants reported uncertainty about word stress, which affected their confidence and led to anxiety, hesitation, and reduced fluency.	*"I'm not confident in which syllable to stress, and this makes me worry that I'll say the word incorrectly."* (P7) *"I overthink the stress in words, and this makes me hesitate or sound unnatural when speaking."* (P15) *"Not knowing where to stress words makes pronunciation feel much harder for me."* (P22)
Overthinking and self-correction	Participants indicated that they often became overly focused on producing correct word stress, which led them to repeat words and resulted in reduced fluency.	*"I keep focusing on which syllable to stress, and this overthinking makes my speech less fluent."* (P9) *"If I'm not confident about the stress, I tend to repeat the word until I think I've got it right."* (P16) *"I often practise the same word several times because I'm unsure of the stress."* (P27)

Discussion

This section discusses the challenges faced by Thai EFL learners in producing English word stress and examines the factors contributing to these errors despite the availability of phonetic transcriptions. The discussion is organised according to the two research questions.

Research question 1: *What are the accuracy patterns of English word stress production among Thai EFL learners familiar with the IPA across two-, three-, and four-syllable words?*

Despite being familiar with the IPA, learners continued to make persistent errors when reading a word list presented in both standard English spelling and phonetic transcriptions. These error patterns suggest systematic difficulties rather than random variation, indicating that learners experienced specific difficulties with certain words.

For two-syllable words, such as *guitar* and *museum*, Thai learners might be expected to place the stress on the final syllable, reflecting the stress pattern of English loanwords in Thai. Surprisingly, most learners stressed the first syllable rather than the second. This misplacement resulted in accuracy rates of only 65.40% and 73.10%, respectively. This finding contrasts with that of Jaiprasong and Pongpairoj (2020), who reported that Thai learners tended to misplace the stress on the final syllable as a result of transfer from Thai. It is also possible that these errors stem from orthographic influence, where learners apply a first-syllable default strategy when encountering unfamiliar words in writing, particularly two-syllable nouns. This tendency suggests that learners rely on familiar stress patterns and overgeneralise them to irregular items. This result is consistent with that of Gralińska-Brawata and Rybińska (2017), who reported overgeneralisation of word stress rules among Polish EFL learners, rather than transferring the rules from their L1.

Moreover, these specific errors highlight gaps in explicit instruction on English stress patterns, particularly for words of specific etymological origins or unusual spellings. The noun *guitar* (of French origin) and *museum* (of Latin origin) do not follow the general English stress rule that most two-syllable nouns are

stressed on the first syllable. Interestingly, the test contained ten two-syllable words with final-syllable stress, and the errors with *guitar* and *museum* were among the most predictable. In this case, the learners may have avoided assigning stress to the final syllable, following the Thai stress pattern.

Another possible explanation is learners' limited prosodic awareness, particularly in perceiving and producing pitch variation in stressed syllables. This difficulty with *guitar* and *museum* reflects what Ivanova (2024) describes as learners' limited ability to perceive and produce prosodic cues— pitch, duration, and intensity—even when they conceptually know the stress rules. The findings suggest that most participants demonstrated limited awareness of, or an inaccurate perception of, their own pitch on stressed syllables. In other words, they appeared to know the stress patterns but did not realise that they were not assigning the appropriate prominence to the target syllable.

Moreover, the pronunciation of three-syllable words posed significant challenges for the learners, probably due to the greater variability of English stress patterns, where stress can fall on the first, second, or third syllable, even in words with the same part of speech. Under these conditions, learners who did not consult the phonetic transcriptions were more likely to make errors. The most problematic case involved words with first-syllable stress, with lower accuracy, including *cucumber*, *telephone*, *hospital*, and *pineapple*, where learners frequently misplaced the stress on the second syllable. For *pineapple*, learners may have been influenced by the familiar stress pattern of *apple*, in which the stress falls on the first syllable, leading to incorrect stress placement.

Word familiarity also appeared to positively influence performance. For instance, *elephant* showed relatively high accuracy (90.40%), whereas *cucumber* and *souvenir*, which may be less familiar, had lower accuracy rates (75.00% and 76.90%, respectively). This finding is in agreement with that of Thongsongsee and Watanapokakul (2023), who reported that medical students performed better with more familiar words, as opposed to unfamiliar terms. This suggests that greater exposure to certain words may support more accurate stress production.

Furthermore, four-syllable words presented greater difficulty, particularly those with first-syllable stress, such as *motorcycle* and *calculator*, which showed lower accuracy. Baagbah and Jaganathan (2023) found similar results among Arab EFL learners, showing better performance in identifying stress in two-syllable words compared to three-syllable words. This indicates that as words increase in length, stress patterns vary more, and this variability makes it harder to determine the correct stress placement. Furthermore, Thongsongsee and Watanapokakul's (2023) study, involving low-, mid-, and high-ability learners, also found that multisyllabic words posed a challenge even for the high-ability group.

It is interesting to note that errors in four-syllable words, such as *motorcycle* and *watermelon*, may be attributed to misunderstandings of stress patterns in compound words. Learners may recognise the stress of individual components (e.g. *water* /ˈwɔːtə(r) / and *melon* /ˈmelən/; *motor* /ˈməʊtə(r)/ and *cycle* /ˈsaɪkl/), and therefore apply stress to the first syllable of each component within the compound. This may reflect a lack of awareness that the stress patterns change in compound nouns, where only one syllable typically carries the main stress. For example, in the word *motorcycle*, learners might stress the first syllable in both *motor* and *cycle* individually, but the correct pronunciation places stress only on the leftmost syllable, as in /ˈməʊtəsaɪkl/. This suggests that learners may have overgeneralised this rule without recognising the specific stress rules for compound nouns.

Research question 2: *What factors contribute to the persistent word stress errors among Thai EFL learners familiar with the IPA?*

The findings of this study highlight several key factors contributing to persistent word stress errors among Thai EFL learners. These can be grouped into three main categories: linguistic, cognitive, and strategic factors.

The most prominent linguistic factor is related to differences in the stress systems of Thai and English. This difference makes it difficult for learners to recognise and apply variable stress patterns in English, particularly in multisyllabic words. This difficulty is further complicated by the complexity and irregularity of English stress rules, as stress placement depends on factors, such as grammatical category, syllable structure, and morphological patterns, often with numerous exceptions. This is reflected in the

questionnaire responses, where most participants perceived word stress rules as complex and reported particular difficulty with loanwords. Thus, learners experienced difficulty in applying these stress patterns consistently. This finding is consistent with that of Jaiprasong and Pongpairoj (2020), who reported that Thai learners faced challenges with multisyllabic and compound words, as well as with suffixes that shift stress (e. g. - *ic*, - *ity*, - *tion*), and attributed these difficulties to differences between Thai and English stress systems.

Cognitive factors were also evident in the findings. Most participants expressed uncertainty or a lack of confidence when applying word stress without a model, such as a teacher's example or an audio recording. This is supported by the questionnaire results, where only a small proportion of participants reported confidence in stress placement, while 73. 10% reported uncertainty when reading the IPA. The findings support previous research suggesting that familiarity with phonetic symbols does not necessarily translate into their effective application during pronunciation tasks (Mompean & Fouz- González, 202; Mompean & Lintunen, 2015; Nugroho & Priyatmojo, 2026). This difficulty may also help explain participants' low confidence in stress placement, which aligns with previous research showing that pronunciation self-efficacy positively correlates with EFL learners' pronunciation performance, strategy use, and attitudes.

Strategic factors also play an important role. Exposure to English outside the classroom, such as through media or interaction with others, may enhance learners' awareness of stress patterns and improve pronunciation accuracy, as suggested by previous research (Uchihara et a., 2022). However, although many participants in this study reported using media and dictionaries, their use of these resources was not always consistent. Findings from the self-recorded pronunciation tasks show that, while most learners re-recorded their speech, only some consistently checked the stress patterns or consulted phonetic transcriptions before producing the words. Some learners relied on imitation without engaging in deeper processing, such as analysing stress patterns or consulting phonetic transcriptions. This suggests that awareness of strategies does not necessarily lead to their effective or consistent use.

Furthermore, participants' use of the IPA reflects both cognitive and strategic dimensions. Although familiarity with the IPA can support correct stress placement, most participants reported difficulty remembering and applying phonetic symbols. Some preferred using Thai transliterations after listening to the model audio. This is also reflected in the responses from Part three of the questionnaire, where some participants reported relying on Thai transliterations rather than reading directly from phonetic transcriptions. This discrepancy may reflect limited confidence or insufficient practice with phonetic transcriptions. Similar findings were reported by Putri (2018), who found that Indonesian learners perceived the IPA as complex and difficult to memorise. By contrast, Chootharat and Veerachaisantikul (2016) reported that Thai university students developed greater confidence and more positive attitudes towards phonetic transcription following instruction. Similarly, Jonathan (2023) also found that younger learners generally perceived learning the IPA as easier and more enjoyable.

Finally, learners demonstrated active use of self-monitoring strategies, with most participants re-recording their speech to improve accuracy. However, the inconsistency in reviewing stress patterns and reading the IPA suggests that these strategies have not yet been fully internalised. Some learners also reported relying on Thai transliterations, which may reinforce L1 influence and result in pronunciation errors in both segmentals (i. e. consonants and vowels) and suprasegmentals (i. e. word stress). The qualitative findings further confirm that, despite familiarity with the IPA, learners continue to experience difficulties with English word stress. These results underscore the importance of encouraging the consistent and effective use of phonetic tools, particularly at earlier stages of learning.

Conclusion

This study investigated word stress errors among Thai EFL learners familiar with the IPA and identified factors contributing to these difficulties. The findings provide a multi-factor explanation for the persistent and predictable errors observed among the participants, despite the availability of phonetic transcriptions, stress-marked word lists, and a model audio file. The results

show that errors tend to occur in specific word types, including loanwords, multisyllabic words, compound nouns, and items involving stress shifts. These patterns indicate a gap between phonetic knowledge and its effective application in production.

The findings of this study further suggest that these errors are shaped by interacting linguistic, cognitive, and strategic factors. Linguistically, differences between the stress systems of Thai and English, together with the complexity of English stress rules, make English stress challenging for Thai EFL learners. Cognitively, learners reported low confidence and difficulty using phonetic transcriptions, which may limit their ability to apply stress accurately. Strategically, learners did not always use available resources consistently and sometimes relied on Thai transliterations rather than phonetic transcriptions.

More importantly, by using a self-recording approach, this study contributes to our understanding of how learners move from phonetic knowledge to production during self-directed pronunciation in less controlled conditions. The findings show that familiarity with phonetic transcriptions alone is insufficient; learners also require opportunities to apply this knowledge consistently in speech production.

Pedagogical implications

In light of the findings, several pedagogical implications can be drawn. First, instruction should move beyond familiarising learners with the IPA and instead provide opportunities to use phonetic transcriptions actively during word stress practice. This helps learners develop the ability to use the IPA rather than relying on alternative strategies such as transliteration. Second, word stress instruction should integrate listening and speaking activities, allowing learners to apply their knowledge in context. Authentic materials, such as online content, films, and songs, may help bridge the gap between isolated word practice and fluent speech, particularly by increasing exposure to natural stress patterns in context. Third, AI-powered tools and mobile applications with speech recognition and immediate feedback may support independent learning by enabling learners to notice and adjust their stress placement more effectively. For example, freely available resources, including the *Praat* software, the *YouGlish* website, and a waveform visualisation application, such as *Say It: English Pronunciation*, may support word stress practice by providing opportunities for pronunciation comparison, self-monitoring, and feedback. These resources may be most effective when combined with explicit instruction focusing on challenging word types, including words with suffixes that trigger stress shifts, word families with changing stress patterns (e. g. *photograph– photography– photographer*), and multisyllabic and compound words.

Additionally, learners should be given opportunities to practise pronunciation through self-directed tasks, where they monitor and adjust their own production without immediate teacher support. More intensive and repeated practice with the IPA is needed to build confidence in using it independently. Teachers should also raise awareness of the advantages of phonetic transcriptions over Thai transliteration, particularly for representing stress patterns accurately, to encourage more consistent use. Overall, instruction should address the linguistic, cognitive, and strategic factors identified in this study by helping learners understand complex stress patterns, build confidence in using phonetic transcriptions, and develop effective self-monitoring strategies.

Limitations and directions for further studies

Although this study provides useful findings, it is limited by the relatively small sample size and the use of a word-list reading task rather than connected or spontaneous speech. These limitations should be considered when interpreting the findings and generalising them to other EFL contexts. In addition, participants' English proficiency levels were not formally assessed. Consequently, the influence of proficiency on word stress production could not be examined. Future studies should include a standardised measure of English proficiency to better understand the relationship between proficiency and word stress production.

Future research should examine word stress production in more naturalistic contexts, such as connected or spontaneous speech, and explore learners' pronunciation behaviour in self-directed tasks across different proficiency levels and learning contexts. In addition, the effects of ear training on learners' perception and production of word stress represent another important direction for investigation,

particularly when combined with visual support such as spectrograms. Further studies could also examine the development of instructional materials that integrate phonetic transcriptions and evaluate their impact on pronunciation intelligibility. Such materials should encourage learners not only to recognise phonetic symbols but also to use phonetic transcriptions effectively as guides for accurate word stress placement.

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Declaration of generative AI in scientific writing

During the preparation of this manuscript, the author used ChatGPT to improve the language and readability of the manuscript. Following the use of this tool, the author carefully reviewed and edited the content and takes full responsibility for the accuracy, integrity, and originality of the work. The AI tool was not used in the research design, data collection, data analysis, or interpretation of the findings.

CRediT author statement

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