



An Acoustic Analysis of Word Stress Production by Indonesian Learners of English

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Abstract: *Although word stress is a crucial aspect of English speaking, it is not given much emphasis in Indonesia's EFL instruction. Students, consequently, lack the theoretical understanding of how to properly stress syllables in English words. This study uses a program named Praat to examine the acoustic parameters of word stress produced by EFL students in terms of its intensity level. These parameters can indicate whether the students pronounce two-syllable words of nouns and verbs accurately. The subjects of this research were the third-year students of English Education Department who were selected purposively based on the students' results of EF SET (Standardized English Test). The findings revealed that the students produced more inaccurate word stress when pronouncing nouns than they did when pronouncing verbs. Moreover, the inaccurate word stress produced by the students was divided into three categories: equation stress, no-stress placement, and reverse stress. Among the three categories, equation stress is the most common error found in this study. This study provides insight into the features of word stress and the acoustic measurement of word stress produced by Indonesian learners of English. It implies that there is a need to integrate explicit instruction on word stress. This could involve dedicated lessons on stress placement, incorporating practical exercises and feedback mechanisms to help students develop a theoretical understanding and practical skills in pronouncing English words accurately. The study also encourages future research in related areas, suggesting a focus on other pronunciation problems like intonation. This broader approach to research can contribute to a more comprehensive understanding of the challenges Indonesian learners face in mastering English pronunciation that can provide a foundation for curriculum development and instructional strategies aimed at enhancing English language proficiency in Indonesia.*

Keywords: *Acoustic analysis; Praat; Word stress; Intensity; EFL students*

INTRODUCTION

In Indonesia, pronunciation and other phonetic features of English are not heavily emphasized in English classes. While many English teachers encourage their students to study grammar and vocabulary, engage in practical conversation, use productive skills, as well as improve their listening and reading skills, they rarely pay attention to pronunciation. According to (Suciati & Diyanti, 2021), the lack of emphasis on suprasegmental pronunciation instruction in Indonesian curricula is regarded as a significant contributor to the students' errors in word

stress production. Most English teachers and students in Indonesia are unaware of the significance of word stress. They usually overlook word stress because they believe speaking fluency to be the most crucial aspect of speech. Harmer (2007) suggests that language learners should be aware of pronunciation aspects including sounds, stress, and intonation. An aspect that significantly affects the mutual understanding between speakers and listeners is word stress.

Word stress is a prosodic feature that differs between languages (Sabater in Ahmad, 2012). Specifically, Harmer (2007) stated that the term "stress" is used to define the point in a word or phrase where pitch changes, vowels lengthen, and volume increases. Word stress in English is essential because the meaning of some words can change depending on where the stress is placed (Margareht, 2020). Al-kubaisy (2018), who investigated how stress is used in English and how it affects meaning, found that a speaker can control where the primary word stress falls and do so according to the meaning they are trying to express. In certain circumstances, words are typically stressed to show negation, emphasis, and contrast (Alkubaisy, 2018). In line with that, Ladefoged & Gordon (2001) states that compared to most languages around the world, English uses differences in stress far more frequently. Therefore, understanding the word stress position has become challenging for language learners of any other language, such as Indonesian speakers.

Regard to stress pattern, Indonesian language is one of the suprasegmental languages that differs from English in terms of syllable timing, particularly in terms of lexical stress patterns. (Zanten and Goedemans, 2009). As claimed by Laksman (in Zanten & Goedemans, 2009), oral communication in Indonesian does not notably highlight the stress pattern. Although English has regular stress intervals, the unstressed syllables commonly occur in between the stresses despite the fact that the stresses fall at regular intervals (Crystal in Yana, 2017). The discrepancy has resulted in confusion for Indonesian students who often find it difficult to stress a certain syllable of words.

Since English is regarded as an international language, those who learn it undoubtedly desire to be proficient in it, especially in speaking. Non-native English speakers seek to match native speakers' level of proficiency. Stern (1983) suggests that for speakers of the target language, the proficiency of the native speakers serves as a crucial point of reference. In this case, correct pronunciation is one of the many English language abilities that students strive to master. Becoming good at pronunciation is not only about fluency because there are numerous components in it, including word stress. Producing accurate word stress is one of the goals for non-native speakers, since pronouncing English words is not as simple as it is for native speakers. For EFL learners, it has become challenging to pronounce English words correctly and consistently. Due to their frequent inattention to the correct placement of word stress, many students frequently make mistakes in their utterances of English words, such as mistakes in word stress. If the speakers do not correctly produce the word stress, there may be a misunderstanding (Alkhuli, 2002). According to Underhill (1994), improper word-stress placement makes it more difficult for listeners to understand what is being said.

Word stress becomes something that is put aside and becomes a significant issue for Indonesian speakers because most of them lack the theoretical understanding of how to lay the proper stress on the right syllable of English words. They frequently use Indonesian word stress patterns when speaking English, placing stress wherever they please, usually in the final syllable (Widagsa et al., 2019). This can confuse listeners, as English has certain rules and patterns of word stress. Yana (2017), in a study, reported that most Indonesian students avoid utilizing academic language in their presentations and had a propensity to under- or over-stress words due to their lack of familiarity with the English stress pattern. As Gilbert explains in Lasut (2015), English speakers seem to preserve vocabulary with patterns of syllable stress, making syllable stress a very significant factor in the language. Misplacing word stress can throw a conversation off track, especially if the speaker has trouble controlling English vowel sounds. Therefore, the more frequently speakers misplace word stress, the harder it is for listeners to comprehend what the speaker is trying to convey. One prevalent issue, according to Lasut (2015), is when students randomly place stress in any one of the syllables in a word, which frequently results in a meaning change from what was intended.

The purpose of this study was to analyze the acoustic parameters of word stress produced by the EFL students in terms of its intensity level. These parameters can indicate whether or not the students pronounce a word accurately. This study focused on the word stress production of two-syllable words of noun and verb. This study provides insights on phonological elements, particularly word stress.

LITERATURE REVIEW

Rules and Levels of Word Stress in English

Crane (1981) provides a comprehensive overview of the rules and levels of English word stress. He identifies three levels of stress in English words: primary stress, secondary stress, and unstressed. Primary stress is the strongest level of stress and is typically marked by a high pitch, longer duration, and greater intensity than surrounding syllables. It is present in isolated monosyllables as well as in the first syllable of polysyllables. Above the line before the stressed syllable, there will be a brief vertical mark to represent it, e.g., effort /'efət/. Secondary stress is a weaker level of stress that occurs in longer words with more than two syllables. It usually occurs in words with three or more syllables and is denoted by a small vertical mark below the line, as in the example word "educate" (/ˈeduket/). On the other hand, unstressed syllables are generally characterized by a lower pitch, shorter duration, and lower intensity than stressed syllables. Compared to primary and secondary stress, unstressed level is not marked, such as in the word open /'əʊpən /; announcer / ə'naʊnsər /; programmer / 'prəʊgrəmər/.

Moreover, Roach (2009) discusses the rules governing word stress in English. He notes that word stress in English is not entirely predictable and that there are many exceptions to the general rules. However, he identifies some general principles that can help learners of English understand word stress patterns. For example, stress tends to fall on the first syllable of words of

Germanic origin (such as "father" and "water"), while stress tends to fall on the second syllable of words of Romance origin (such as "rebel" and "banana"). He also notes that stress tends to fall on the penultimate syllable of longer words with three or more syllables.

Furthermore, Cruttenden (2001) discusses the Gimson's rules and levels of stress in English and notes that stress is an important aspect of English pronunciation. He provides a detailed overview of the rules governing stress placement in different types of English words, including compound words, borrowed words, and words with prefixes and suffixes. He also discusses the different levels of stress in English and notes that primary stress is the most prominent level of stress and is marked by a higher pitch and greater intensity than other syllables.

The theories by Crane (1981), Roach (2009), and Cruttenden (2001) shed light on the intricate nature of English word stress, offering a comprehensive understanding of its rules and levels. Students grappling with word stress production may find these theories useful in addressing their challenges. Crane's identification of primary stress, secondary stress, and unstressed levels provides a foundational framework. The students may encounter difficulties in mastering the nuances of primary stress, which demands a high pitch, longer duration, and greater intensity. The visual representation of stress through marks above or below the line aids in grasping the hierarchical structure of stress in both monosyllabic and polysyllabic words.

Moreover, Roach's insights add a layer of complexity by acknowledging the non-uniform predictability of word stress in English. Students may face challenges in recognizing exceptions to general stress rules. Students may encounter difficulties in applying stress to different word types, including compounds, borrowed words, and those with prefixes or suffixes. The emphasis on primary stress as the most prominent level, marked by higher pitch and greater intensity, could pose challenges in achieving a natural and accurate pronunciation.

The interconnected theories by Crane, Roach, and Cruttenden provide a multifaceted understanding of English word stress. Students grappling with word stress production may find the detailed rules and levels helpful, but the non-uniform nature of stress in English, as highlighted by Roach, might contribute to their challenges. Application of these theories requires a nuanced approach to navigate exceptions and achieve a more accurate pronunciation of stressed syllables.

Characteristics of Stressed Syllable

A syllable is a component of a word. In speech, a syllable consists of one vowel sound and may or may not be followed by a consonant. According to Crystal in Bernabé (2015), syllables are parts of speech that act as rhythmic units and are identified in English pronunciation by their consonant-vowel or vowel-consonant pairings. For instance, the two-syllable word "idol" is pronounced "i-dol." There is no consonant sound in the word "i," but in the syllable "dol," the consonant sounds "d" and "l" are visible on either side of the sound "o." One

syllable word "cheap" is another illustration. Despite having two vowels—'e' and 'a'—the word "cheap" is only pronounced with one vowel sound, particularly "chp." The number of syllables is therefore determined by the number of vowel sounds in the pronunciation rather than by the writing, according to the conclusion.

Roach (2009) indicates certain characteristics of stressed syllable:

1. *Intensity*, each stressed syllable includes an element of intensity. Syllables that are stressed typically louder than those that are not. This is a direct result of speech production factors. The greater intensity helps to make the stressed syllables more prominent and easier to hear.
2. *Length* is one of the emotional elements of stressed syllable that stands out. Compared to unstressed syllables, stressed syllables are longer and have stronger vowels.
3. *Pitch* is a crucial component of how we perceive the sound of speech. A word's syllables are created with either a low or high pitch for each one. A stressed syllable has a higher pitch and is therefore more noticeable.
4. *Vowel quality*, a stressed syllable has a vowel that is distinct from those of the surrounding syllables. Therefore, by comparing a stressed syllable to others close by, the prominence of the stressed syllable can be demonstrated.

When students struggle with word stress, they may encounter difficulties related to the characteristics of stressed syllables outlined by Roach. For instance, the intensity of stressed syllables being louder can be a challenge for learners who may not be accustomed to emphasizing specific syllables in words. This might result in their speech sounding monotonous or lacking the natural rhythm that native speakers possess. The length of stressed syllables could pose another hurdle for students. They may unintentionally shorten stressed syllables, leading to a loss of the emotional and rhythmic elements that characterize natural speech. This deviation from native-like pronunciation may affect the overall comprehensibility of their speech. Pitch is a crucial aspect of word stress, and students might struggle to differentiate between high and low pitch in stressed and unstressed syllables. This could result in a lack of prominence for stressed syllables, hindering effective communication and potentially leading to misunderstandings. Lastly, the vowel quality of stressed syllables, being distinct from surrounding syllables, adds another layer of complexity. Students may face challenges in accurately reproducing this distinct vowel quality, impacting the perceptual prominence of stressed syllables in their speech.

The theory provides a foundation for understanding the components of syllables and the characteristics of stressed syllables. When exploring the problems faced by students in producing word stress, these characteristics become crucial points to address in language instruction. Teachers can focus on helping students develop a sense of intensity, length, pitch, and vowel quality in stressed syllables to enhance their overall pronunciation and communication skills.

Acoustic Analysis

Several studies have elaborated on the terms of acoustic analysis of speech. According to Rana (2016), through acoustic analysis, voiced sounds are molded by the resonance of the vocal tract filter, contain harmonics of the pitch, and have most of their energy in the lower formants, whereas unvoiced sounds are nonharmonic and typically have more energy in the higher formants. In other words, the duration, pitch, intensity, and spectral features of vowels in stressed and unstressed syllables are frequently measured in acoustic analysis. For example, a study by Harrington et al. (1998) have demonstrated that stressed and unstressed syllables have distinct acoustic characteristics, which mostly relate to vowel quality, pitch/F0, duration, intensity, and presumably some additional elements, such spectral balance or high-frequency emphasis. To measure the acoustic aspects of an utterance cannot be done only by listening to the utterances.

With the development of technology, the analysis of acoustic signals can be performed using freely accessible softwares. One of the programs is called "Praat". It is an open-source, free application that enables analysis and manipulation of voice signals (Lieshout, 2003). One advantage of Praat is its user-friendly interface, which enables researchers with little to no programming experience to utilize it. It also has a number of features geared for advanced users, including the ability to script and automate analysis tasks.

Praat can be used to assess the strength of speech signals and spot word stress patterns. Measuring the intensity of stressed and unstressed syllables in words is one typical technique for evaluating word stress using Praat (Widayanti, 2022). One method for analyzing English word stress is intensity analysis. To detect which syllable in a word is stressed, it includes gauging how loud the various syllables are in relation to one another (Laia, 2022). In acoustics terminology, decibels (dB) are units of measurement for intensity.

RESEARCH METHOD

This study employed a qualitative method. Numerous well-known qualitative researchers (Creswell 2002; Pope & Mays 1995) assert that the goal of qualitative research is to fully explore, comprehend, and interpret a phenomenon in its natural setting. In this case, the study focused on exploring, comprehending, and interpreting the acoustic measurement of word stress produced by EFL students.

Participants

The participants were third-year students of the English Education Department in Islamic higher education in South Sulawesi. The participants were selected purposively based on the students' results of EF SET (Standardized English Test). The EF SET is a standardized English test that accurately measures all skill levels, beginner to advanced, which is equivalent to an agreed international standard. Based on the results of the test, 3 out of 20 students had an intermediate level of English, while the rest were beginners. Therefore, the 3 intermediate students were chosen as the subject of this study. The purpose of this

thorough selection was to include individuals who had adequate L2 input. The number of respondents was not crucial because this study focused on analyzing each word that the respondents produced.

Data Sources

The primary data source came from the students' voice recordings when reading the sentences that have been provided (Tabel 1). Given that, the focus was to see how the students produced the two-syllable-word stress of nouns and verbs in the sentences. The second data source was the transcripts taken from *Praat* Software. *Praat* Software was used to transcribe the students' utterances into textGrid-object and intensity measurement (dB=decibels), to be able to analyze the stress patterns produced by the students. The third data source involved the audio pronunciation from the digital dictionary of Merriam-Webster. The data was used as a comparison to confirm whether the students' utterances of word stress were correct.

Table 1. *List of Words*

No.	Words	Function in Sentences	
		Noun	Verb
1.	Consist	In addition to meaning <i>terdiri</i> , ' consist ' also means <i>susunan</i> .	Stars such as the sun consist mostly of hydrogen.
2.	Construct	If three of the five points were damaged, the construct would immediately stop functioning.	Construct your own sentences using the words which you have noted in your dictionary.
3.	Content	I have been producing original video content for YouTube.	The rainy weather spoiled our plans for the beach, so we had to content ourselves with a relaxing day at home.
4.	Object	I see an object in the distance.	A lot of people will object to the book.
5.	Present	I will give a present for my friend's graduation.	He will present a heartbreak song at his ex's wedding.
6.	Progress	The progress of her research is going on.	I want to progress further with my studies.
7.	Project	You got a big project in Makassar for six months.	He will project next year's costs to be slightly higher than this year.
8.	Record	He wants to set up a record band.	He wants to record my speech.

The procedures of collecting data in the research were as follows:

Pre-recording Directions

At the beginning of data collection, the researcher used the following pre-recording directions to generate speeches of the subjects of this study. These directions are provided in the data collection instruments along with the sentences given. The pre-recording directions could be expressed as:

1. Look at the text carefully!
2. Please read the text loudly. Raise your voice and produce the sounds clearly!
3. Before reading the text, take one minute to pay attention to the text.

4. To get accurate data, the researchers recorded the sounds.
5. Reading Aloud Test: after reading all the pre-recording directions, the students were allowed to look at the text shown on the data instrument for at least 60 seconds. The researcher gave sentences and asked the student to read the text.
6. Recording; as the students spoke in turn, the researcher used a mobile phone to record the sounds produced by the students.
7. Transcribing, when the recording is complete, the praat software is used to convert the sound into sound waves and intensity graphs. The sound waves and intensity graphs are segmented syllable by syllable to analyze the movement of the intensity then the stress pattern can be drawn and seen.

Data Analysis Techniques

The data was analyzed using the three procedures suggested by Miles et al. (2014): data condensation, data display, and conclusion drawing and verification. First, all the data resulted from *Praat* Software was sorted out. In this stage, the students’ utterances of the two-syllable words were identified through acoustic method which shows the differences between stressed and unstressed syllables. In this case, if syllables are uttered with low intensity and high intensity, the high-intensity syllable will be heard as stressed and the others as unstressed. The transcribed sound-object was displayed in the form of textGrid object and intensity measurement (dB=decibels). Then, the conclusion was developed based on the comparison between the intensity of the students’ utterances and the audio from the dictionary.

FINDINGS AND DISCUSSION

Students’ Stress Production of Nouns

This part consists of the detailed analysis of the students’ stress production of the two-syllable words that function as nouns. For the acoustic analysis, the data from the students’ stress production was compared to the acoustic data of the audio from the Meriam-Webster dictionary to assess the accuracy of the students’ production. The data is displayed in the form of tables that contain the acoustic data with the intensity measurement of each research subject.

Table 2. *The acoustic data of student 1 (Intensity/dB)*

Subject	Word (Noun)	Student’s production		Audio from dictionary	
		First syllable	Second syllable	First syllable	Second syllable
Student 1	Consist	68.2	73.2	75.4	66.4
	Construct	70.5	70.5	73.9	70.0
	Content	65.8	72.8	71.1	65.4
	Object	67.0	78.0	78.2	65.0
	Present	77.3	77.3	82.0	70.9
	Progress	75.1	76.5	79.5	68.1
	Project	73.2	75.5	79.7	70.8
	Record	72.3	74.6	76.8	70.8

Based on the acoustic data of student 1, all the stress productions of student 1 were in contrast with the ones from the digital dictionary. 6 out of 8 words uttered by student 1 had higher intensity of stress in the second syllable, while the one from the dictionary shows that the stress should be placed in the first syllable of the words. In addition, there is no stress given to the word 'construct' and 'present' by student 1, proved by the same intensity between the first and second syllable of the words. Whereas as a noun, according to the audio from the dictionary, the word 'construct' and 'present' should be given higher intensity to the first syllables: ['kän-strəkt] (CONstruct) and ['pre-zənt] (PREsent). Therefore, these indicate that the student's stress production of the given words is all inaccurate.

Table 3. *The acoustic data of student 2 (Intensity/dB)*

Subject	Word (Noun)	Student's production		Audio from dictionary	
		First syllable	Second syllable	First syllable	Second syllable
Student 2	Consist	72.1	66.5	75.4	66.4
	Construct	72.1	71.9	73.9	70.0
	Content	69.3	68.2	71.1	65.4
	Object	69.7	66.7	78.2	65.0
	Present	74.7	68.6	87.0	70.9
	Progress	77.2	72.7	79.5	68.1
	Project	70.7	65.6	79.7	70.8
	Record	72.4	81.0	76.8	70.8

Table 3 above shows the acoustic data of stress placement by the second subject. The data shows that student 2 placed accurate stress to most of the given words. 7 out of 8 words were given higher intensity in the first syllables which indicates that the stress was placed in the first syllables by the subject. This is similar to the intensity measurement of the audio from the dictionary. However, the stress placement by the student seems to be inaccurate for the word 'record'. According to the audio from the dictionary, the stress should be placed in the first syllable: ['re-kərd], while the student 2 places the stress in the second syllable with higher intensity.

Table 4. *The acoustic data of student 3 (Intensity/dB)*

Subject	Word (Noun)	Student's production		Audio from dictionary	
		First syllable	Second syllable	First syllable	Second syllable
Student 3	Consist	78.9	81.4	75.4	66.4
	Construct	76.2	81.5	73.9	70.0
	Content	75.3	77.5	71.7	65.4
	Object	78.7	83.4	78.2	65.0
	Present	85.0	82.7	82.0	70.9
	Progress	85.5	84.3	79.5	68.1
	Project	84.3	82.6	79.7	70.8
	Record	78.9	82.9	76.8	70.8

The data in table 4 presents the intensity of the word stress produced by student 3 compared to the one from the dictionary. According to the numbers presented, the student produced higher intensity of stress in the first syllables of three given words: *present*, *progress*, and *project*, which is identical with the word stress from the dictionary. This indicates that the student stressed the three words properly. However, inaccurate stress was deemed to exist when the student uttered the word *consist*, *construct*, *content*, *object*, and *record*. Based on the acoustic measure of the word stress, the student placed higher intensity of stress in the second syllable of the verbs, which is in contrast with the stress position suggested by the dictionary.

Students’ Stress Production of Verbs

This section provides in detail how the students stressed the two-syllable words that served as verbs. The data is displayed in the form of tables that contain the acoustic data with the intensity measurement.

Table 5. *The acoustic data of student 1 (Intensity/dB)*

Subject	Word (Verb)	Student’s production		Audio from dictionary	
		First syllable	Second syllable	First syllable	Second syllable
Student 1	Consist	66.0	72.1	70.1	72.3
	Construct	67.8	71.6	69.1	75.0
	Content	66.9	70.6	66.6	68.1
	Object	69.1	76.2	76.2	78.5
	Present	78.1	72.3	74.1	79.2
	Progress	71.3	75.2	71.7	74.1
	Project	75.1	74.6	71.7	75.2
	Record	77.5	75.8	68.4	75.9

Based on the acoustic data in table 5, it can be inferred that student 1 produced inaccurate stress in three different verbs: *present*, *project*, and *record*. Student 1 chose to place the stress on the first syllable. In contrast, the audio from the dictionary indicates that the stress should be on the second syllable in the three words: *ˈpre--zənt*, *prə-ˈjekt*, and *ri-ˈkɔrd*. However, student 1 has accurately produced stress on the other five verbs: *consist*, *construct*, *content*, *object*, and *progress*. The student put the stress on the second syllable of those five verbs, which corresponds to the audio in the dictionary.

Table 6. *The acoustic data of student 2 (Intensity/dB)*

Subject	Word (Verb)	Student’s production		Audio from dictionary	
		First syllable	Second syllable	First syllable	Second syllable
Student 2	Consist	70.8	70.1	69.1	75.0
	Construct	80.1	79.6	69.1	75.0
	Content	68.8	68.8	66.6	68.1
	Object	70.0	71.3	76.2	78.5
	Present	72.0	70.3	74.1	79.2
	Progress	74.5	71.9	71.7	74.1
	Project	74.8	69.3	71.7	75.2
	Record	71.0	77.9	68.4	75.9

In table 6, the acoustic data shows that student 2, as the second subject, produced inaccurate stress in most of the given verbs. It can be seen from the different numbers of intensity between the student's utterances and the audio from the dictionary. Two words were uttered with very slight intensity of word stress: *consist* and *construct*. In addition, the word "*content*" was uttered by the student with no stress at all. These three words should have been uttered by stressing more on the second syllable. Moreover, the other three verbs (*present*, *progress*, and *project*) were given stress on the first syllable, which was in contrast with the audio from the dictionary. Therefore, among all the given verbs, there were only two words uttered accurately by the student: *object* and *record*.

Table 7. *The acoustic data of student 3 (Intensity/dB)*

Subject	Word (Verb)	Student's production		Audio from dictionary	
		First syllable	Second syllable	First syllable	Second syllable
Student 3	Consist	76.9	78.8	70.1	72.3
	Construct	84.1	84.1	69.1	75.0
	Content	74.4	74.3	66.6	68.1
	Object	80.4	83.0	76.2	78.5
	Present	81.9	83.6	74.1	79.2
	Progress	82.7	85.0	71.7	74.1
	Project	82.6	83.4	71.7	75.2
	Record	75.2	84.1	68.4	75.9

Based on the data in table 7, it can be concluded that student 3 accurately produced stress to most of the given verbs. six out of eight verbs were given stress on the second syllable which was in accordance with the word stress provided by the dictionary. However, there were two verbs (*construct* and *content*) uttered incorrectly by the student. Based on the acoustic data above, the student put almost no stress when uttering the word '*construct*' and '*content*', since there was very minor difference between the word stress intensity in the first syllable and the second syllable. This was in contrast with the audio from the dictionary which suggested that higher intensity of word stress should be given to the second syllable.

To conclude, the acoustic measuring data revealed that each student produced words with incorrect word stress. When pronouncing nouns, students 1, 2, and 3 placed the word stress more incorrectly than they did when pronouncing verbs. In particular, student 1 made 100% error, student 2 made 87.5% error, and student 3 made 62.5% error of the noun pronunciation. On the other hand, when pronouncing the verbs, student 1 made 37.5% error, student 2 made 62,5% error, and student 3 made 25% error. Based on the findings, the students' production of word stress was mostly inaccurate.

DISCUSSION

This study has analyzed the acoustic measures of word stress produced by EFL learners using the *Praat* software. In this case, the acoustic analysis was based on the intensity patterns of stressed and unstressed syllables of words that function both as nouns and verbs. Based on the findings, it can be concluded that the students' word stress productions were commonly inaccurate. There are a total

of 48 utterances made by the students. 50 percent of the utterances were inaccurate. The inaccurate productions were divided into three categories: equation stress, no-stress, and reverse stress.

Table 8. *Categories of students' word stress production*

No	Words	Student 1	Student 2	Student 3
1	Consist (N)	equation	equation	equation
	Consist (V)			
2	Construct (N)	no-stress (N)	equation	no-stress (V)
	Construct (V)			
3	Content (N)	equation	no-stress (V)	reverse
	Content (V)			
4	Object (N)	equation	correct	equation
	Object (V)			
5	Present (N)	no-stress (N)	equation	correct
	Present (V)			
6	Progress (N)	equation	equation	correct
	Progress (V)			
7	Project (N)	reverse	equation	correct
	Project (V)			
8	Record (N)	reverse	equation	equation
	Record (V)			

The term “equation stress” refers to the equal production of the spoken stress between the noun and verb classes. Even though the class of words provided was different, several students were unable to distinguish the location of word stress between them. For instance, student 1 produced stress in the second syllable of the noun “consist” with the intensity of 68.2 dB on the first syllable and that of 73.2 dB on the second syllable. Similarly, when uttering the verb “consist”, the student also stressed the second syllable, producing intensity at 66.0 dB and 72.1 dB (see figure 1). Therefore, it indicates that the student performed the equation by stressing the same syllable for both word classes (noun and verb) of the word, even though according to dictionary production, the focus should be on the first syllable for the noun and the second syllable for the verb. This study's findings indicate that 54.2% of errors were in the area of equation. This type of error might be influenced by their native language, Bahasa Indonesia. According to Krisdianata and Bram (2022), word stress in Indonesia only for emphasis; it was not used to indicate different meanings.

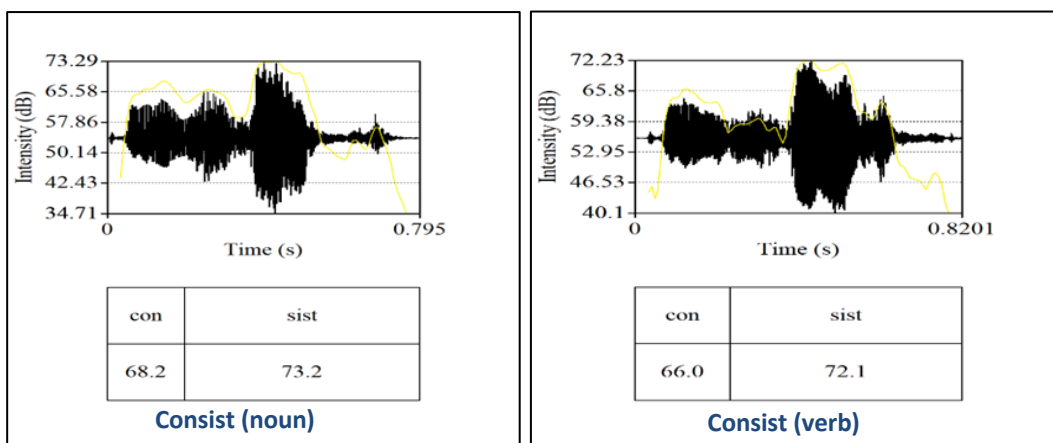


Figure 1. *Acoustic data of equation stress*

Moreover, in uttering the given words, some students did not give any stress to either the first syllable or the second syllable. This type of production was called no-stress placement. According to Jones et al. (2017), no-stress means to give the same amount of stress to all the word's syllables. In this case, the acoustic data showed that the intensity parameters of the first and the second syllable are similar. Based on the findings, no stress occurred four times; when student 1 uttered the noun “present”, student 1 and 3 uttered the verb “construct”, and student 2 uttered the verb “content”. For instance, in detail, the utterance of the verb “content” by student 2 showed a similar number of word stress intensity between the first and second syllable, which was 68.8 dB. It was different from the intensity parameters of the audio from the dictionary, where the second syllable should be given more stress than the first syllable. No stress was also found when student 1 uttered the noun “present” with the intensity of 77.3 dB for both syllables (see figure 2). Based on this result, 16.7% of the students' mistakes involved no-stress placement. According to Indrayani (2019), this kind of error occurs because English is a stress-timed language, where stressed syllables are uttered at generally regular intervals and unstressed syllables shrink to meet this rhythm, while Indonesian is a syllable-timed language, where each syllable takes roughly the same amount of time. Karjo (2016) claimed that many Indonesian learners of English have not had the knowledge of stress placement based on word classes.

Indonesian EFL learners face difficulties in learning English word stress (Septiyanda et al., 2023). They tend to put stress on words with two syllables at the beginning of the word (Indrayani & Rizki, 2019). Word stress is often ignored and not considered a serious problem in Indonesian EFL, and most teachers only focus on lexical items (Widagsa & Putro, 2017). The production of word stress patterns in English noun-to-verb conversion words by adult EFL learners in Indonesia is a common issue in phonological studies (Indrayani & Rizki, 2019). Some of the problems with English word stress placement made by

Indonesian learners of English include stress placement in English words (Weda, 2018). In a phonological study, it was found that adult EFL learners in Indonesia produced word stress errors such as verb stress placement in nouns, noun stress placement in verbs, unstressed words, and double-stressed words (Indrayani & Rizki, 2019).

Indonesian EFL learners face challenges in learning English word stress, and they tend to put stress on words with two syllables at the beginning of the word. Word stress is often ignored in Indonesian EFL, and most teachers only focus on lexical items. The production of word stress patterns in English noun-to-verb conversion words by adult EFL learners in Indonesia is a common issue in phonological study, and some of the problems with English word stress placement made by Indonesian learners of English include stress placement in English words.

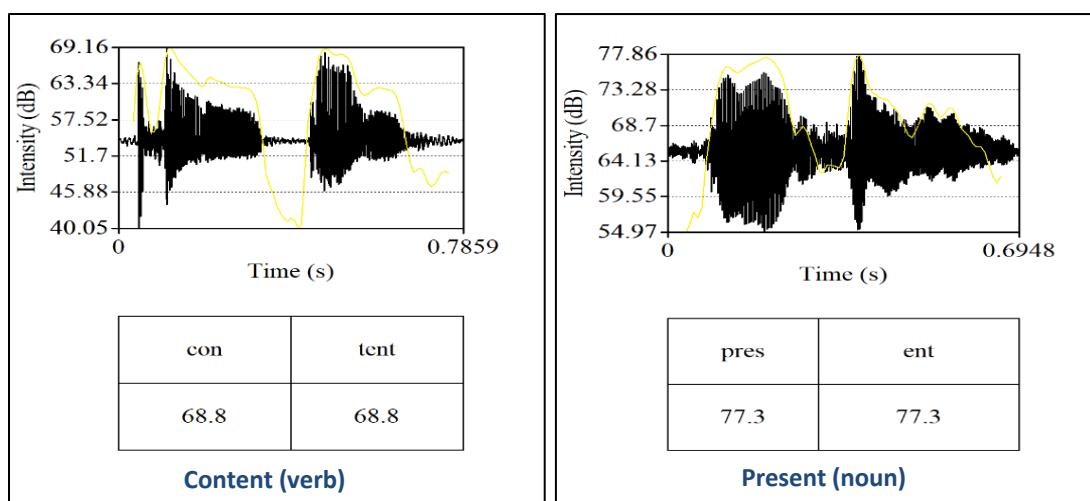


Figure 2. Acoustic data of no-stress placement

The other inaccurate stress production found in the data was called reverse stress. Reserve stress occurred when the students place the stress in noun the way the verb is stressed and vice versa. This type of error can be seen in the acoustic data of the word “record” uttered by student 3. When the student uttered the word “record” as a noun, the word stress was given in the second syllable with the intensity of 74.6 dB compared to the first syllable with the intensity of 72.3 dB. On the other hand, when the word “record” as a verb was uttered, the student placed the word stress in the first syllable with the intensity of 77.5 dB compared to the second syllable with the intensity of 75.8 dB (see figure 3). The results demonstrated that 12.5% of these errors were made. The student’s utterance was categorized as reverse stress because it was the opposite of how the dictionary suggested that the word stress should be. As suggested by the dictionary, the verb

"record" should be stressed on the second syllable and the noun "record" should be stressed on the first syllable. Students might find it difficult to differentiate where to place the stress on a word that can function as both a noun and a verb. Widagsa et al. (2019) suggests that in Indonesian, there are no words with the same combination of vowels and consonants that differ in their patterns of stress (and subsequently in their meanings).

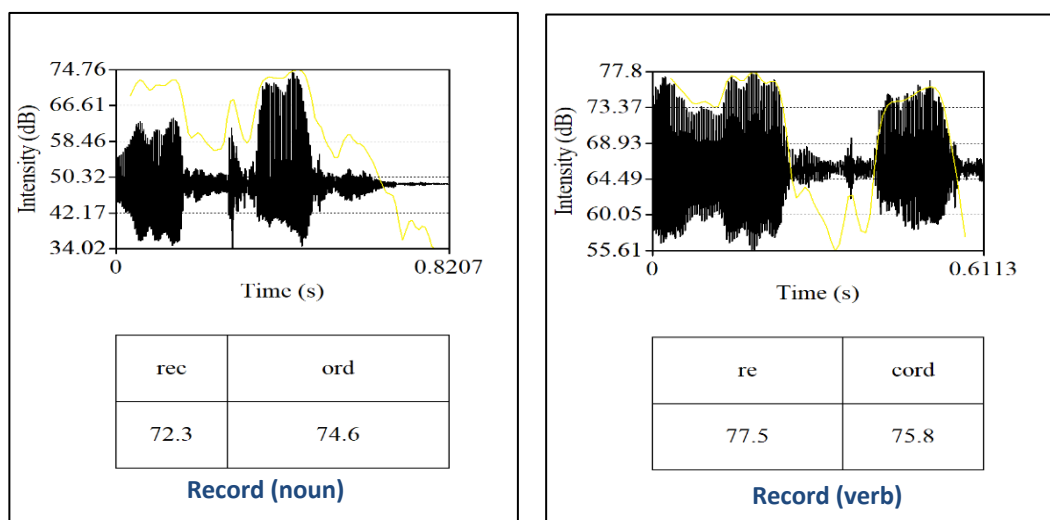


Figure 3. *Acoustic data of reverse stress*

A real example of the absence of word stress in Indonesian can be seen from the word “*bisa*”, which can function either as a noun or a verb. In the sentence “*Dia bisa bernyanyi*”, the word “*bisa*” serves as a verb, while the sentence “*Ular itu mempunyai bisa*” uses the word “*bisa*” as a noun. There is no difference of stress when pronouncing the word in both sentences. Therefore, it can be challenging to determine a word's meaning in Indonesian if it is just pronounced by itself without being followed by another word or phrase that clarifies what it means.

The lack of suprasegmental characteristics in the Indonesian affects the students’ production of English sound, particularly word stress. As stated by Zanten & Goedemans (2009), the absence of prosodic characteristics in the Indonesian had an impact on the process of learning a second language. Word stress in Indonesian is not regulated like it is in English. Indonesian speakers frequently run into difficulties when attempting to learn English because it is a demanding language, and the words call for appropriate stress. English is a syllable-time language, meaning that words must be stressed in a certain syllable (Yana, 2017). This factor contributed to the students' tendency to incorrectly place the stress on words while pronouncing English, and they also encouraged them to adopt their Indonesian-speaking habits when speaking English.

Moreover, In Indonesia, pronunciation is not seen as a key component of English learning. English is exclusively taught in schools as a subject; it is not utilized for conversation. Teachers and lecturers also mostly speak their native languages when instructing in English. English is not the language that teachers use to instruct students in English. As a result, pronunciation was disregarded, which undoubtedly has an impact on how less sensitive English learners perceive English sounds and prosodic elements. Altmann (2006), in his dissertation, examined how the word stress of a native language affects the word stress of a foreign language. It was discovered that word stress is a crucial aspect of English and determines its meaning. Only the word's stress can tell between a number of identical English words with various meanings. Therefore, if EFL students are unaware of the prosodic function of English, misunderstandings can occur.

CONCLUSION

This study explored the acoustic measurement of the EFL students' production of the two-syllable-word stress of nouns and verbs in sentences. The findings revealed that the students produced more inaccurate word stress when pronouncing nouns than they did when pronouncing verbs. Moreover, the inaccurate word stress produced by the students was divided into three categories: equation stress, no-stress placement, and reverse stress. Among the three categories, equation stress is the most common error found in this study. The inaccurate production of English word stress is more likely affected by the lack of suprasegmental characteristics in Indonesian, the student's native language. Unlike English, Indonesian has no specific regulation on word stress production. Word stress does not alter a word's meaning in Indonesian. Besides, pronunciation, especially word stress, is not primarily taught in EFL classes.

While this study provides valuable insights into the acoustic measurement of word stress production among EFL students, it is essential to acknowledge its limitations. The sample size and demographic characteristics of the participants may impact the generalizability of the findings. Additionally, the study focused on a specific set of linguistic errors related to word stress, and other factors influencing pronunciation were not extensively explored. Future research could benefit from a more diverse participant pool and a broader examination of language background and learning experiences.

The implications of this study extend to both pedagogy and linguistic research. Educators teaching English as a foreign language should be aware of the challenges that students may face in acquiring accurate word stress, particularly when it comes to nouns. Incorporating targeted pronunciation instruction, with a focus on word stress patterns, into EFL curricula could potentially enhance students' overall pronunciation skills. Furthermore, the study highlights the importance of considering language-specific features and their impact on second-language pronunciation.

Based on the findings, it is recommended that EFL curriculum developers and instructors integrate explicit instruction on word stress patterns, especially for

nouns, into their teaching materials. This may involve incorporating activities that allow students to practice and receive feedback on their word stress production. Additionally, considering the influence of the native language, in this case, Indonesian, on word stress patterns, instructional strategies should be tailored to address these specific challenges. Collaborative efforts between language educators and linguists can contribute to the development of effective teaching methodologies that take into account both linguistic universals and language-specific characteristics.

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