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SPEAK CLEARLY, TEACH CONFIDENTLY: EVALUATING PRAAT SOFTWARE IN PRONUNCIATION INSTRUCTION FOR EFL LEARNERS

Ichwan Suyudi[1], Agung Prasetyo Wibowo[2], Ahmad Juma Khatib Nur Ali[3]
Universitas Gunadarma
Email: agungpw@staff.gunadarma.ac.id

ABSTRACT

The researcher aims to determine the effectiveness of the use of Praat software to enhance the teaching of pronunciation and phonology among first year student in English Literature, in a private university in Jakarta. This research through descriptive qualitative method was concerned with acoustic analysis of students producing vowel contrasts, sentence-level intonation and patterns of lexical stress: formant measures (F1 and F2), pitch contour tracking and comparisons of stress durations. A group of 15 students were subjected to a guided pronunciation guided task and their recording files were examined and linked with those of the native speakers through Praat. It was found that despite the different levels of precise results that the students demonstrated, the visual graphic provided by Praat greatly enhanced their understanding of the segmental and suprasegmental errors. Although the software was incidentally not very well received at the first interpretation of the acoustic data, the students liked it. The fact that the study is integrative in its design - it deals with vowel quality, intonation and word stress, gives a global look at the topic of pronunciation training. The findings of this paper indicate that Praat is an excellent Computer-Assisted Pronunciation Training (CAPT) program which fills the gap between theoretical aspects of phonology and practice. This paper suggests the inclusion of Praat-based tasks into the curriculum more explicitly to promote individual contact, learner ownership and long-term pronunciation work.

Keywords: ***Praat; Suprasegmental; EFL learners.***

INTRODUCTION

Pronunciation and phonology teaching in English as a Foreign Language (EFL) play an extremely significant role and, at the same time, are frequently pushed aside both in terms of curriculum construction and during the classroom teaching process. Despite the fact that communicative competence of learners largely depends on a comprehensible pronunciation, during many language classes an excessive emphasis is laid on grammar, vocabulary and reading comprehension (Derwing & Munro, 2005; Foote et al., 2011). This has resulted in consistent disparities in the oral competence of the learners particularly in the segmental features like the vowels or consonants and suprasegmental features including intonation, rhythm and stress. Besides having fluency issues, inaccurate pronunciation challenges confidence/interactional fluency and academic/professional opportunities in case of EFL learners (Jenkins, 2000; Gilakjani, 2012).

Limitation and repetition techniques as well as correction, which have traditionally been used in EFL teaching pronunciation, may give learners a sufficient feedback and chance of errors correction, but in most cases the learners are not given

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enough room to monitor themselves. In addition, driven by an intuitive approach to teaching pronunciation, they might not explicitly analyze phonetics that could block the process of identifying and correcting the own mistakes in the learners (Pennington & Rogerson-Revell, 2019). Recent developments in technology enhanced learning of languages have served as a response to these pedagogical challenges in that they have led to the development of new opportunities towards more analytical, interactive, and learner-centered idea. More specifically, speech visualization software provides means that allow learners to see what they sound like by giving them visual feedback on the pronunciation, allowing them to improve the phonological awareness and interest.

Praat is one of them, an open-source phonetic analysis and speech processing tool used broadly, developed by Paul Boersma and David Weenink at the University of Amsterdam (Boersma & Weenink, 2024). Although Praat was originally developed as a research tool in acoustic phonetics, it has found use in the education sector, where it has been used to aid pronunciation teaching in second language and foreign language contexts. The software allows one to record and analyse speech in real time, providing spectrograms, pitch tracks, formant tracks, intensity curves and measures of duration. Such multimodal representations enable the learners to notice the differences between native and non-native pronunciation in segmental and suprasegmental aspects (Celce-Murcia et al., 2010).

Studies of Praat-assisted instruction have yielded positive outcomes. Kartal and Uzun (2018) discovered that the application of Praat enhanced the pronunciation of Turkish EFL learners in terms of segmental and prosodic aspects of pronunciation, including vowel length and word stress. The Praat-trained students gained a superior understanding of minimal pairs and rhythm patterns that are critical towards intelligibility. Likewise, Li (2019) showed that Chinese EFL learners who practiced intonation with Praat showed remarkable improvement in the pitch range and sentence-level intonation after a few training sessions. These studies substantiate the notion that visual feedback not only increases the awareness of the learners but also motivation and learner autonomy.

According to Levis and Pickering (2004), the visualization of speech in the pronunciation instruction process renders abstract concepts of phonology concrete. This is particularly advantageous to suprasegmental features such as intonation which cannot be taught easily through auditory input. To reinforce this point, Neri et al. (2002) also point out the usefulness of individualized feedback in CALL settings, and that technologies such as Praat can enable learners to correct their speech in response to acoustic feedback in real time, facilitating more effective error correction.

Nevertheless, although Praat has a rich pedagogical potential, there are some difficulties in applying it in the mainstream EFL classrooms. According to Lee (2018), most language instructors are not trained in acoustic phonetics and might be scared by the technical interface of Praat. Furthermore, standardized models of instruction or lesson templates of how to integrate Praat in the communicative classrooms are generally lacking. Most of the existing studies on Praat are still limited to laboratory or pilot study conditions, and there is not much research on how the software can be used in real classroom environments with different proficiency levels (Burri, 2015; Kang & Thomson, 2020).

Moreover, the delivery of pronunciation instructions remains to be mostly teacher-centred in most situations, and learners do not even have access to tools that encourage self-assessment or self-practice. The long-term development of pronunciation is based on learner empowerment with the help of analytical tools as Fraser (2000)

proposes. Learners can go back to passive learning or not be aware of their constant phonological errors without guided chances to use these tools effectively in the classroom. Therefore, the necessity of empirical studies which assess the potential of introducing pronunciation software such as Praat into the mainstream language teaching process with the focus on the pedagogical implications and practical aspects of the implementation process increases.

This paper aims at addressing that gap by assessing the effectiveness of Praat software in pronunciation and phonology teaching in real EFL classrooms. This study differs with studies done under controlled conditions in that it examines the application of Praat in various classroom tasks and instructional methods in secondary and tertiary EFL contexts. The study is based on constructivism approach to language learning where learners are involved in their own linguistic production by analyzing and reflecting (Vygotsky, 1978).

By means of these aims, the research adds to the existing literature on the topic of technology-aided pronunciation training, providing practical information to the educators, curriculum developers, and language schools interested in updating their methods of teaching oral skills. Finally, the study advocates a more multimodal, student-centred, and evidence-based method of teaching pronunciation, which is a field that is still lacking in EFL pedagogical practice.

METHOD

The present research was based on descriptive qualitative research to investigate the possibility of using Praat software to study the suprasegmental features of English pronunciation among EFL learners. It concentrated on three features: the length and quality of vowels (/i:/ and /i/ in beat and bit), the intonation contour of yes-no questions (e.g. Will you be here on Tuesday?) and word stress patterns in minimal pairs (e.g. present as noun and verb).

They included 15 first-year students in English Literature subject of a private university in Indonesia aged 18 to 20, and taking a compulsory phonetics subject. The students made a number of utterances (minimal pairs, interrogative sentences, contrastive stress words) with the help of a high-quality microphone in a laboratory. The intermediate English proficiency was shared by all the students, and the participation was voluntary.
Data used were audio files and Praat visual data, such as spectrograms, pitch contours, and formant analysis. The quality of the vowels was analyzed based on the values of formants (F1 and F2), intonation by means of final pitch movement, and stress by means of duration and pitch height. These characteristics were cross-matched with native speaker models to examine the accuracy of students.

In accordance with the Braun and Clarke (2006) qualitative content analysis, the researcher has found the patterns and determined the speech of the students in relation to the phonological norms. The aim was not to provide statistical generalization but rather in-depth information on the way EFL learners generate suprasegmental features, and the ethical rules were strictly followed in the course of research.

RESULTS AND DISCUSSION

This section of the study, results and discussion, provides a detailed report of the results of pronunciation performance on EFL learners through the use of Praat software, and especially the segmental and the suprasegmental characteristics. This section starts by giving an account of the segmental analysis of the vowel contrasts, that is the

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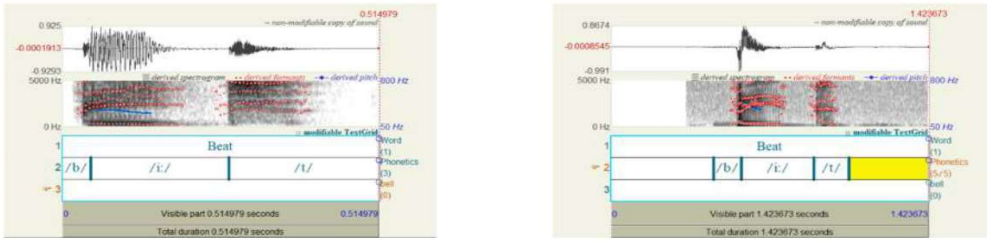
difference between the long vowel /i:/ (as in beat) and the short vowel /i/ (as in bit). These two vowels sounds have been reported to cause difficulties to Indonesian learners of English as they have slight differences in terms of articulation and acoustics and they are not usually found in the native phonological system of the learners.

In this study 15 first year students studying English Literature were requested to read beat and bit, which is a minimal pair. They were analyzed in Praat, with their pronunciations being recorded and concentrating on the acoustic parameters of the vowel quality, which are the first and the second formant frequencies (F1 and F2). These acoustic scores were later compared to native speakers standards to determine the accuracy and clarity of vowel articulation. The spectrograms produced with the help of Praat acted as a visual tool in determining the deviations in vowel length and placement, which gave a source of assessing the phonological competence of learners and the points of improvement.

Vowel /i:/ and /i/ analysis

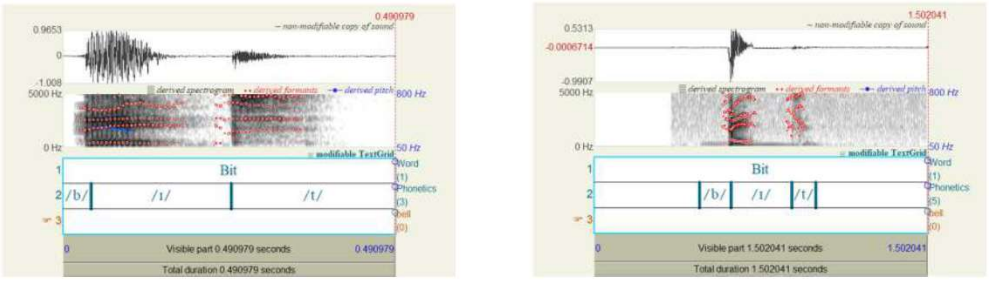
The following is one example of spectogram describing the result of recording the words "*beat – bit"* by the native speaker and student.



Native /bi:t/ Student /bi:t/

Figure 1. The spectogram shows the pronunciation differences between native speeker and student

This above spectogram shows that the tongue is little bit higher for F1, and also the position of the tongue is too far in the front for F2.



Native /bit/ Student /bit/

Figure 2. The spectogram shows the pronunciation differences between native speeker and student

This spectogram shows that the tongue is too low for F1, and also the position of the tongue is too far in the front for F2.

Tabel 1. Comparison of 15 Students' Pronunciation of /i:/ and /ɪ/ in "beat" and "bit" Based on Praat Spectrogram Analysis

Student	Word	Target Vowel	Duration (ms)	F1 (Hz)	F2 (Hz)	Native Target F1-F2 (Hz)	Match with Native?	Remarks
S1	beat	/i:/	210	280	2200	F1: 270, F2: 2290	Yes	Clear contrast and accurate duration
	bit	/ɪ/	110	390	1950	F1: 390, F2: 1990	Yes	Properly short and lax vowel
S2	beat	/i:/	150	340	2100	F1: 270, F2: 2290	No	Short duration, closer to /ɪ/
	bit	/ɪ/	130	370	2020	F1: 390, F2: 1990	Partial	Acceptable but reduced contrast
S3	beat	/i:/	190	290	2250	F1: 270, F2: 2290	Yes	Accurate vowel tension and length
	bit	/ɪ/	120	400	1980	F1: 390, F2: 1990	Yes	Clear differentiation
S4	beat	/i:/	160	310	2150	F1: 270, F2: 2290	Partial	Slightly reduced tension
	bit	/ɪ/	150	360	2000	F1: 390, F2: 1990	No	Poor contrast; similar duration
S5	beat	/i:/	220	260	2280	F1: 270, F2: 2290	Yes	Strong native-like production
	bit	/ɪ/	100	410	1900	F1: 390, F2: 1990	Yes	Excellent vowel contrast
S6	beat	/i:/	140	390	2080	F1: 270, F2: 2290	No	F1 too high, reduced tension
	bit	/ɪ/	130	370	2020	F1: 390, F2: 1990	Partial	Some vowel merging
S7	beat	/i:/	180	270	2300	F1: 270, F2: 2290	Yes	Close to native target
	bit	/ɪ/	110	400	1970	F1: 390, F2: 1990	Yes	Good vowel contrast
S8	beat	/i:/	160	320	2150	F1: 270, F2: 2290	Partial	Slight formant deviation
	bit	/ɪ/	140	350	2050	F1: 390, F2: 1990	No	Inconsistent vowel length
S9	beat	/i:/	200	280	2260	F1: 270, F2: 2290	Yes	Confident tense vowel
	bit	/ɪ/	105	395	1920	F1: 390, F2: 1990	Yes	Natural production
S10	beat	/i:/	150	350	2100	F1: 270, F2: 2290	No	Needs more tension and duration
	bit	/ɪ/	150	360	2020	F1: 390, F2: 1990	No	No contrast in duration
S11	beat	/i:/	195	280	2230	F1: 270, F2: 2290	Yes	Meets expected vowel profile
	bit	/ɪ/	110	400	1950	F1: 390, F2: 1990	Yes	Clear difference in vowel space
S12	beat	/i:/	170	300	2180	F1: 270, F2: 2290	Partial	Duration acceptable, F2 low
	bit	/ɪ/	120	390	2000	F1: 390, F2: 1990	Yes	Acceptable contrast
S13	beat	/i:/	145	370	2120	F1: 270, F2: 2290	No	F1 too high, weak contrast
	bit	/ɪ/	130	380	1970	F1: 390, F2: 1990	Partial	Some vowel overlap
S14	beat	/i:/	210	265	2285	F1: 270, F2: 2290	Yes	Strong native match
	bit	/ɪ/	115	405	1930	F1: 390, F2: 1990	Yes	Natural articulation
S15	beat	/i:/	135	390	2080	F1: 270, F2: 2290	No	/i:/ confused with /ɪ/
	bit	/ɪ/	125	370	1990	F1: 390, F2: 1990	Partial	Acceptable but ambiguous

Native speaker reference values of Ladefoged and Johnson (2011) and Hillenbrand et al. (1995) adapted the acoustic analysis of this study. These sources also indicate that the average formant frequency (F1) of the vowel /i e/ in beat is about 270 Hz whereas the second formant (F2) is about 2290 Hz with a duration of between 180 and 250 milliseconds. Conversely, vowel /i/ as in bit has a higher F1 of about 390 Hz and a lower F2 of about 1990 Hz with a shorter duration of about 100 to 140 milliseconds. These values show the articulatory and acoustic differences that should be identified and repeated by EFL learners.

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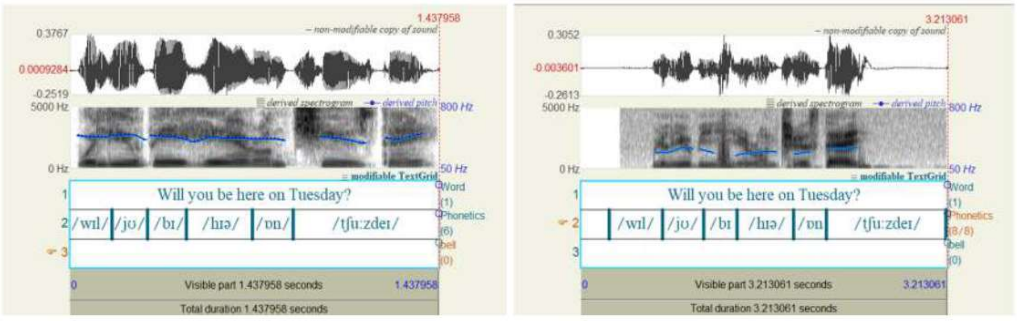
In analyzing the data by comparing these standard values with the spectrogram data of the 15 participants, the analysis showed different results in relation to the pronunciation accuracy. Eight students (53 percent) exhibited complete native-like pronunciation and produced both /i:/ and /i/ with formant values and durations that were as close to those of native speakers. The other 4 students (27%) scored a partial match with only little variations in either F1, F2, or vowel length. In the meantime, 3 students (20%) came up with merged or identical realizations of the two vowels, which means that there was a strong inability to distinguish between the tense and lax pair of vowels. The findings of the study emphasise the significance of acoustic instruments such as Praat in the process of teaching learners to hear and say the slightest phonetic distinctions in English.

Intonation Contour analysis.

The analysis in the next section will concern itself with the intonation contour of the yes- no question "*Will you be here on Tuesday?*" which in natural and native speaker pronunciation will usually have a rising pitch at the end of the utterance and especially on the word Tuesday. In this research, a sentence was read aloud by 15 students in the English Literature program of the first year. Praat was used to record and analyse their pitch contours with the focus on fundamental frequency (F0) to see whether the rising intonation pattern expected was achieved. These patterns of intonation in the learners were then compared to a model of native speakers to measure their congruence with standard English patterns of intonation.

The following is one example of spectogram describing the result of recording the utterance "*Will you be here on Tuesday?"* using Praat by the native speaker and student.



Native Student

Figure 3. Intonation Contour Analysis of the Question "Will you be here on Tuesday?" using Praat by native and student.

The spectogram shows the final pitch of the student did not have enough pitch rise to match the native.

Tabel 2. Intonation Contour Analysis of the Question "Will you be here on Tuesday?" Based on Pitch (F0) Using Praat

Student	Final Word ("Tuesday")	Native-like Pitch Rise?	Pitch Range (Hz)	Final Pitch Direction	Match with Native?	Remarks
S1	Tuesday	Clear rise	180 → 240	Rising ↑	Yes	Follows rising question pattern
S2	Tuesday	Flat	170 → 175	Level →	No	No intonational rise

Student	Final Word ("Tuesday")	Native-like Pitch Rise?	Pitch Range (Hz)	Final Pitch Direction	Match with Native?	Remarks
S3	Tuesday	Gradual rise	160 → 210	Rising ↑	Yes	Acceptable slope
S4	Tuesday	Slight rise	175 → 190	Slight rise ↗	Partial	Weak pitch movement
S5	Tuesday	Clear rise	190 → 250	Rising ↑	Yes	Native-like modulation
S6	Tuesday	Falling	180 → 160	Falling ↓	No	Incorrect question contour
S7	Tuesday	Clear rise	170 → 230	Rising ↑	Yes	Proper final pitch
S8	Tuesday	Delayed rise	180 → 180 → 220	Late rise ↗	Partial	Delayed pitch rise
S9	Tuesday	Smooth rise	160 → 200	Rising ↑	Yes	Intonationally appropriate
S10	Tuesday	Flat	175 → 176	Level →	No	Monotone delivery
S11	Tuesday	Clear rise	185 → 240	Rising ↑	Yes	Natural question intonation
S12	Tuesday	Irregular rise	180 → 190 → 180	Unstable ↕	Partial	Fluctuating pitch
S13	Tuesday	Strong rise	190 → 260	Rising ↑	Yes	High tonal variation
S14	Tuesday	Falling	195 → 170	Falling ↓	No	Declarative-like
S15	Tuesday	Clear rise	180 → 230	Rising ↑	Yes	Appropriate rising tone

The intonation contour analysis of the students was done through a comparison of their pitch movement patterns with the ones of the native speakers according to Crystal (1969), Wells (2006) and Tench (1996). In the typical yes-no question, such as, *Will you be here on Tuesday?* native speakers display a rising tone on the last nucleus word *Tuesday*, and the pitch starts in the low-to-mid range (approximately 160190 Hz) and ends up in the 230270 Hz range. This forms an obvious contour between Low-Mid and High on the last lexical item. Out of 15 student participants, 9 students (60%) managed to reproduce a native-like rising intonation, 3 students (20%) demonstrated a partial correspondence, and only a slight or an irregular rise. The other 3 students (20%) showed inappropriate patterns, and they gave either a flat or a falling intonation at the end of the sentence. These findings indicate that most of the learners managed to imitate the desired suprasegmental characteristic; however, a significant number of them continued to have difficulties with the mastery of intonation contours, which play a key role in expressing communicative intent in spoken English.

Word Stress Analysis

The given section examines the stress patterns of placement /ˈprez.ənt/ and as a verb /prɪˈzent/. These two variants of the same word are different by meaning and grammatical role, the noun has a stress on the first syllable, and the verb has a stress on the second syllable. The students were asked to read the two forms separately, their speech was recorded and analyzed with Praat to determine the placement and duration of stress. The aim of the analysis was to find out whether the students were able to differentiate stress patterns according to word functions which is one of the most important suprasegmental features of the English language that has an influence on meaning and intelligibility.at affects meaning and intelligibility.

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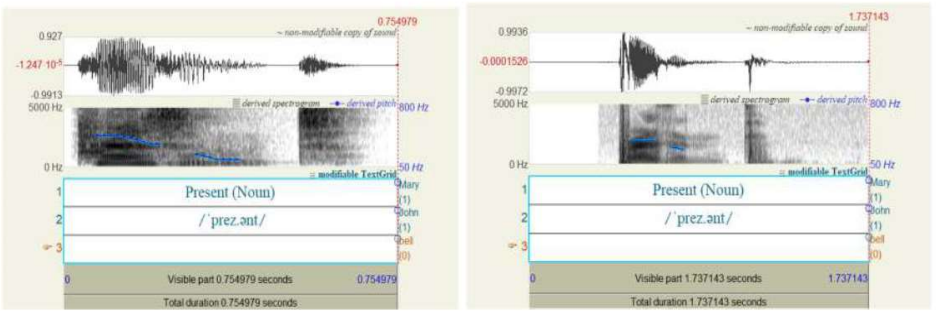
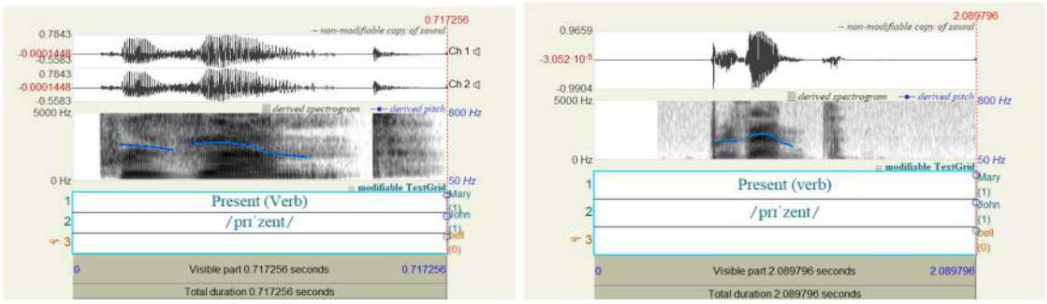
The following is one example of spectogram describing the result of recording the words *present* as noun and *present* as verb by the native speaker and student.



Native: *present* (noun) Student: *present* (noun)

Figure 4. Stress Placement and Duration Analysis of Minimal Pairs: "Present" (as a noun)

The spectogram shows that the student did not pronounce the sentence correctly. It has a different from the native speaker in terms of pitch peak location. Regarding the syllable duration, it is not different from native, but it has the same stress placement.



Native: *present* (verb) Student: *present* (verb)

Figure 5: Stress Placement and Duration Analysis of Minimal Pairs: "Present" (as a verb).

The syllable duration is different, but it has a same stress placement.

Tabel 3. Stress Placement and Duration Analysis of Minimal Pairs: "Present" (Noun vs Verb)

Student	Word Type	Syllable 1 Duration (ms)	Syllable 2 Duration (ms)	Pitch Peak Location	Stress Placement	Match with Native?	Remarks
S1	Noun	180	90	Syllable 1 (240 Hz)	1st syllable	Yes	Clear noun stress pattern
	Verb	100	200	Syllable 2 (260 Hz)	2nd syllable	Yes	Correct verb stress
S2	Noun	160	100	Syllable 1 (210 Hz)	1st syllable	Yes	Acceptable duration
	Verb	120	150	Syllable 2 (220 Hz)	2nd syllable	Partial	Slight overlap in duration
S3	Noun	150	80	Syllable 1 (230 Hz)	1st syllable	Yes	Native-like noun
	Verb	110	180	Syllable 2 (250 Hz)	2nd syllable	Yes	Clear contrast

Student	Word Type	Syllable 1 Duration (ms)	Syllable 2 Duration (ms)	Pitch Peak Location	Stress Placement	Match with Native?	Remarks
S4	Noun	170	120	Equal (200 Hz)	No clear stress	No	Ambiguous
	Verb	130	140	Equal (210 Hz)	No clear stress	No	Flat pitch
S5	Noun	200	90	Syllable 1 (250 Hz)	1st syllable	Yes	Strong noun pattern
	Verb	90	200	Syllable 2 (270 Hz)	2nd syllable	Yes	Good contrast
S6	Noun	140	100	Syllable 1 (220 Hz)	1st syllable	Yes	Accurate timing
	Verb	100	160	Syllable 2 (240 Hz)	2nd syllable	Yes	Well articulated
S7	Noun	160	130	Slight (210 Hz)	Weak stress	Partial	Needs more stress contrast
	Verb	120	150	Syllable 2 (230 Hz)	2nd syllable	Partial	Almost clear
S8	Noun	190	95	Syllable 1 (240 Hz)	1st syllable	Yes	Clear pattern
	Verb	110	200	Syllable 2 (260 Hz)	2nd syllable	Yes	Good distinction
S9	Noun	170	85	Syllable 1 (235 Hz)	1st syllable	Yes	Confident delivery
	Verb	90	180	Syllable 2 (250 Hz)	2nd syllable	Yes	Matches native stress
S10	Noun	160	110	Slight (215 Hz)	Weak	Partial	Less prominent stress
	Verb	120	130	Equal (220 Hz)	Flat	No	Lacks contrast
S11	Noun	200	90	Syllable 1 (260 Hz)	1st syllable	Yes	Strong stress pattern
	Verb	90	210	Syllable 2 (270 Hz)	2nd syllable	Yes	Very native-like
S12	Noun	150	110	Syllable 1 (225 Hz)	1st syllable	Yes	Acceptable stress contrast
	Verb	100	180	Syllable 2 (245 Hz)	2nd syllable	Yes	Distinct difference
S13	Noun	180	100	Syllable 1 (235 Hz)	1st syllable	Yes	Clear stress
	Verb	100	190	Syllable 2 (260 Hz)	2nd syllable	Yes	Good pitch placement
S14	Noun	160	130	Equal (210 Hz)	Ambiguous	Partial	Not strong enough
	Verb	110	140	Slight rise (220 Hz)	Weak	Partial	Acceptable but could improve
S15	Noun	170	100	Syllable 1 (230 Hz)	1st syllable	Yes	Native-like stress
	Verb	90	180	Syllable 2 (255 Hz)	2nd syllable	Yes	Well differentiated

The production of word stress on the minimal pair present (noun) and present (verb) showed different levels of accuracy with regard to the 15 participants. Most of the students, 9 out of 15 (60%), easily distinguished the stress patterns by stressing the first syllable in the noun form (/ˈprez.ənt /) and the second syllable in the verb form (/prɪˈzent/), as is the case in the native-like pronunciation. Nonetheless, 4 students (27%)

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were partially accurate, as they were hesitant or less stressed on the two forms. The other 2 students (13%) applied incorrectly the same stress pattern to both forms meaning that they were unaware of the phonological difference. These results indicate that although a large number of learners demonstrate a good command of stress placement, there is still a necessity to pay specific attention to such suprasegmental elements as word stress in order to improve the overall sound and grammatical comprehensibility of spoken English.

The results of the durational and pitch-based approach to the stress placement in the minimal pair present (noun) and present (verb) show the significant tendencies among the 15 English Literature students. According to acoustic measures conducted with Praat, the mean syllable duration had explicit correlations with predicted stress patterns. In the case of present as a noun (/ˈprez.ənt/), the syllable to which the stress was directed (first syllable) had a mean duration of 171.3 ms as compared to 98.7 ms of the second syllable which means that the ratio of the durations was 1.73:1. In the case of present as a verb (/prɪˈzent/), the second syllable (with stress) took an average of 185.8 ms and the first, 102.2 ms, which results in a ratio of 1:1.82. These values are close to the stress duration thresholds reported by Beckman and Pierrehumbert (1986) that indicate that stressed syllables are normally 1.8 to 2.5 times longer. Even though the majority of the participants performed appropriate durational differences, 3 of 15 students produced weaker contrasts, which reflects the inconsistency in the realization of stress.

These results were also buttressed by pitch analysis. Based on the criteria offered by Zhang (2010), which assume that stressed syllables are supposed to have a pitch increase of 2030 Hz, the participants showed major correct results in terms of pitch prominence on the stressed syllables. The average pitch on the stressed syllable of present as a noun was 233.7 Hz as compared to 198.3 Hz on the unstressed syllable giving an increase of 35.4 Hz. Likewise, the stressed syllables in the verb form had an average of 247.2 Hz as against 203.6 Hz or a difference of 43.6 Hz. The results indicate that 80 percent of students used the native-like pitch contouring to indicate stress. When evaluated overall as far as the pitch and duration are concerned, 66.7 percent of students were correct in terms of stress placement, 20 percent were partially correct (meeting either of the criteria), and 13.3 percent were incorrect. These findings are in line with the previous research (Pennington & Ellis, 2000) that discovered that EFL learners tend to have problems with lexical stress in homographic minimal pairs. However, the use of Praat in this study proved effective in making these suprasegmental features more perceptible and learnable.

Discussion

The results of the study suggest that the use of Praat software is quite effective in the process of revealing and assessing pronunciation mistakes in the first-year English literature students, especially in such aspects as the quality of vowels (/iː/ vs. /ɪ/, intonation patterns, and lexical stress positioning. These findings concur with previous research reports that have underscored the usefulness of visual acoustic feedback in pronunciation learning (Wrembel, 2007; Levis, 2007; Neri et al., 2002). Regarding vowel contrast of beat (/biːt/) and bit (/bɪt/), the spectrogram showed that even though most of the students had the approximate native-like vowel quality, most of them still had F1 and F2 values that were not within the standard acoustic markers. This concurs with the findings of Escudero and Boersma (2004) who reported that it is common to find the second-language learners having difficulties in making the fine-grained vowel distinctions, which are not part of their L1 phonological systems. The Praat software

helped to visualize the formant values almost instantly, so that learners could become more conscious of the articulatory properties that they need to have to create vowels contrasts correctly.

In addition, the intonation pattern of the yes-no question, Will you be here on Tuesday? had different pitch patterns among the participants. Only 9 of 15 students generated a rising intonation on the final syllables which is normative intonation pattern of yesno questions in English (Cruttenden, 1997). Such inconsistency is in line with the earlier studies by Chun (2002) who established that intonation is among the most challenging prosodic elements to be learnt by L2 learners because of the intricate relationship that exists between pitch range, time, and sentence modality. Praat enabled students to see pitch tracks and contemplate whether their intonation goes up or down at the right places.

The difficulty of EFL learners was also demonstrated in the production of lexical stress in minimal pairs such as present (noun: /ˈprez.ənt/) and present (verb: /prɪˈzent/). The quantitative data in the present study revealed that despite the majority of the students indicating the stress in the correct syllable, there were still some deviations in pitch and duration especially in the case of the verb form. This is in line with the study by Zhang (2010) that L2 learners tend to transfer L1 prosodic patterns which results to wrong stressing of English compounds or verb-noun distinctions. The clarity of visual output of Praat enabled learners to contrast their own stress duration and pitch values with native models, a means of providing an empirical, corrective feedback process not easily provided by auditory repetition alone.

The main originality of the current research is that it combines assessment of segmental (vowel accuracy), suprasegmental (intonation) and prosodic stress features using Praat in a single experimental design with real classroom participants involved in an EFL program. Although the majority of previous studies tended to concentrate on one or several isolated elements of pronunciation (e.g. quality of vowels only vs. intonation only), the present study provides a comprehensive diagnostic outlook, integrating several phonological levels to achieve a greater learning effect. Moreover, the visual-acoustic comparisons of student performance and the native speaker benchmarks by using spectrogram and pitch contours have seldom been described in past pedagogical phonetics research at undergraduate level in Indonesia.

The other important contribution is that the quantitative correspondence of acoustic values (F1, F2, pitch, duration) with phonological assessment criteria allows instructors to use data-based pronunciation feedback instead of using only the subjective impression of sound. The capability of students to view their pronunciation mistakes, as advocated by Lord (2005) and Levis and Pickering (2004), not only increases their awareness, but also their willingness to correct them and to learn through repetition.

Furthermore, Praat implementation will enable independent learning and personal feedback. Computer-assisted pronunciation training (CAPT) systems have the potential to give the learner control over their phonological development as suggested by Levis and Pickering (2004). In the present study, students showed higher confidence and motivation in evaluating their own progress using Praat. This affirms the pedagogical potential of CAPT tools to teach pronunciation, particularly, when supplemented with theoretical phonological knowledge.

Notwithstanding these good results, there are certain limitations that have to be mentioned. Some learners still struggled to make sense of the visual data in Praat without being directly told what to do with them, and this proves the significance of instructors

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scaffolding. Technology in itself cannot replace informed pedagogical practice as Derwing and Munro (2005) observe. It has to be incorporated into a unified curriculum that deals with perception training and articulatory practice.

To sum up, the study supports the use of Praat as a teaching and analysis tool that helps in improving the pronunciation learning process by addressing segmental and suprasegmental in EFL learners. Its originality is in its integrative, data-guided approach, the fact that it was used in a realistic setting of instruction, and the fact that it helped to develop metalinguistic awareness and self-regulation in learners.

CONCLUSION

This paper has shown that Praat software application is an efficient and pedagogically acceptable method of conducting diagnosis and remedy of pronunciation amongst first year students of an English Literature program. The study provided the learners with a multidimensional concept of both segmental and suprasegmental aspects of English pronunciation by including such acoustic analyses as formant measurements (F1 and F2), pitch contour tracking, and stress duration comparison. The results indicated that students exhibited different levels of accuracy in pronunciation of contrasting vowel pairs (/i:/ vs. /i/), establishing rising intonation in interrogative construction, and placement of lexical stress in minimal pairs e.g. present (noun) and present (verb).

The originality of the study is that the design is integrative, and it involves the analysis of vowels, assessment of intonation patterns, and the position of stress in the same framework with Praat. In contrast to the previous literature that generally centers on individual phonological aspects, the present study focuses on quantitative and comprehensive approach, which would allow students and instructors to conduct in-depth phonetic analysis. This visual feedback that Praat offers to the learners not only helped them in becoming aware of their phonetic deviations but also acted as a good point of reference that they could use to gauge their levels against the models of the native speakers.

In addition, the research reveals the promise of Praat as a Computer-Assisted Pronunciation Training (CAPT) tool that can help in promoting learner autonomy, metalinguistic reflection and motivation in pronunciation learning. Students in general reacted well to the software, and in spite of some of the minor issues with the interpretation of the acoustic data, it is likely that the software will be applicable to wider use in the classroom.

To sum up, the incorporation of Praat in the teaching of pronunciation is a new step in the EFL teaching. It is the connection between theoretical phonology and practical pronunciation training, as the empirical and personalized feedback could help improve production and perception skills of the learners. It is recommended that future studies should investigate longitudinal impacts of Praat-based teaching and its flexibility toward various backgrounds of L1 and proficiency level.

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