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A Gender-Based Acoustic Analysis of English Lexical Stress by Khowar Speakers.

Abstract

The nature of English lexical stress is quite unpredictable and at the same time this supra segmental feature of English cannot be ignored by its foreign learners due to its dominant presence in the language. Because of such inherent nature, foreign learners of English generally find it hard to produce lexical stress of English correctly. The present study was carried out to analyze acoustic differences between the male and female speakers of Khowar language in the area of English lexical stress after they had studied it for one month. The researchers selected 6 commonly used English words to be pronounced by a sample of 20 Khowar/Chitrali speaking students studying at Diploma level in the Department of English, National University of Modern Languages, and Islamabad, Pakistan. The study sample (N 20) was equal in gender-wise distribution. The study sample was audio recorded in a language lab. The data was analyzed with the help of Praat, version 5.4.08. The given words were analyzed with the help of Waveform analysis and Spectrographic Analysis with a focus on Pitch and Duration which are two main contributing factors to lexical stress. The analysis of the data suggests that there are Pitch and Durational differences between the male and female speech though the performance in the area of lexical stress was same; most of them pronounced the given words either in a flat and unstressed manner or placed stress on the wrong syllable. The results suggest that English lexical stress is a difficult phenomenon for its foreign learners.

Key word: *Lexical stress, Khowar, Pitch, Duration, Acoustic analysis, Praat*

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INTRODUCTION

Khowar is spoken in the north mountainous region of Pakistan and it is used as the *lingua franca* in Chitral District. It is an Indo-European, Indo-Iranian, Indo-Aryan (Indic) language of the Dardic, Chitral sub-group. Khopeople are its native speakers, concentrated mainly in Chitral in Khyber Pakhtunkhwa, in the Ghizer district of Gilgit- Baltistan and in parts of Upper Swat. Khowar is spoken as a second language in the rest of Gilgit and Hunza. *Arniya* is the name given to Khowar speakers by the Shina-speaking people. Pakhtoons call the people and language *Kashgari*(sometimes spelled *Qashqari*). The Kalasha call Khowar speakers *Patu*. In Swat, Khowar speakers call themselves and their language *Kashgari* or *Chitrali.* Although the precise date is unclear, it is certain that by the late 1950s an alphabet had been adapted for Khowar based on Arabic and Urdu writing systems (Morgenstierne 1961; Strand 1973).

Lexical Stress and Related Issues

Supra segmental features of a language are not less important than its segmental features since they also significantly contribute to what we call successful and effective communication. This means they can cause a serious threat to intelligibility if they are faulty or their articulation is not up to the mark (Anderson-Hsieh, Johnson & Koehler, 1992; Derwing, Munro, & Wiebe, 1998; Hahn, 2004; Kang, Rubin & Pickering, 2010). Some linguists carry this notion further by suggesting that faulty production of L2 supra-segmental features has a more significant role to play with regard to foreign accent than inaccurate execution of segmental features (Magen, 1998; Trofimovich & Baker, 2006).

English as a foreign language is not an easy task for its learners in terms of its segmental as well as supra-segmental features but supra-segmental features become more difficult since they cannot be studied and taught like the segmental features. Among all supra segmental features of English, its lexical stress seems to be the most difficult one and, as a matter of fact, English is heavily stress-timed (Abercrombie, 1967; Pike, 1966; Baker & Goldstein, 1990; O'Connor, 1980).Different linguists have defined stress differently. Some name it loudness, the others call it prominence and yet others call it syllabic loudness (Jones, 1976; Cleghorn & Rugg 2011; Crystal, 1995, 1992; Ou, 2004). The biggest problem of English lexical stress is its unpredictable nature even though linguists and EFL teachers across the globe have been assisting and facilitating learners by formulating sets of 'rules' to both describe and predict stress placement (Arnold, 1957; Burzio, 1994; Chomsky &Halle, 1968; Fudge, 1984; Halle & Keyser, 1971).Despite all these efforts, this phenomenon of English seems to be uncontrollable and unmanageable for foreign learners due to its

complicated nature (Archibald, 1993,1997; Flege & Bohn,1989; Benrabah, 1997; Low & Grabe,1999). A large number of studies suggest that L1 interference is the most prominent contributor to wrong treatment of English lexical stress at the hand of its foreign learners. This trap set by the L1 hoodwinks learners of English into pronouncing English lexical stress according to their L1 prosodic features (Erdmann,1973,cited in Guionetal., 2004; Maris, 1989, cited in Guionetal.,2004; Archibald, 1992, 1993, 1997;Chen et al., 2001a; Juffs, 1990; Hung, 1993; Nguyen & Ingram 2005).As regards the issue of gender vis-a–vis use of language, it seems to be quite crucial since different studies suggests that women use language differently from men. These studies suggest that women are more careful users of language and they opt for linguistic choices which may be termed as more formal and careful (Lakoff 1972, 1973, 1975; Holmes 1998; Trudgill, 1972, 1978, 1998; Portz 1982; Fasold 1990).

Lakoff (1975) suggests ten different speech features which distinguish women from men. These features are hedging, tag question, rising intonations on declaratives, empty adjectives, specialized vocabularies (precise color terms), intensifiers, hypercorrect grammar, super polite forms, avoidance of strong swear words, and emphatic stress. As far as gender-based pronunciation is concerned, it is something well researched. Researchers believe that pronunciation of words by women is more formal and careful. In a study conducted by Lakoff (1973), it was found out that there is a peculiar sentence intonation-pattern found in English only among women. A similar study was carried out by Permatasari (2010) which suggests that women use more rising intonation. Another study conducted by Pan (2011) establishes the same fact. Pan found out that women use rising intonation, higher pitch and standard pronunciation as compared with their male counterparts. According to Elgin (1993), one distinguishing feature which differentiates men and women with regard to pronunciation is that women tend to pitch their voices higher than men.

A study carried out by Mills (1995) suggests that the important difference between men and women speech lies in their vocal track resonance. It is because of the fact that male's vocal tract tends to be larger than female's vocal tract. A study conducted on the pitch patterns of men and women by Elgin (1993) establishes that women tend to pitch their voices higher than men and strike against them in almost every language interaction, whereas men have lower tone in their speaking. The present study is thus an attempt to find out how female and male learners with Khowar language background are different from each other in terms of lexical stress of English with special focus on Pitch and Duration.

Research Questions

1. How do female learners of English with Khowar background differ from their male counterparts in the area of English lexical stress?
2. What are the Pitch and Durational differences which distinguish pronunciation of female members with Khowar language background from that of their male counterparts?

Objectives

The researchers undertook the study with the aim to find out:

- How learners of English with Khowar language background produce lexical stress of English
- How these male and female learners differ from each other in terms of pitch
- What duration they consume in producing stressed syllables of the given English words.

The present study will be a useful contribution to the existing knowledge in the area of acoustic phonetics with regard to English lexical stress. The analysis carried out with the help of Praat will provide a great deal of insight into gender-based performance of the study sample with special focus on Pitch and Duration.

Delimitation

The present study was delimited to the Department of English, National University of Modern Languages (hereafter NUML), Islamabad and it was conducted at Diploma level. The researchers selected 6 commonly used English words for the study sample to pronounce. The primary stress given to the words was studied with the help of Praat. The main focus was on the Duration and Pitch of the tonic/primary syllable.

METHODOLOGY

The current study seeks to find out how Khowar speaking learners of English produce English lexical stress. The researchers selected (10) Khowar speaking boys and (10) girls studying at Diploma English in NUML, Islamabad Pakistan. The members of the study sample were asked to pronounce a short list of 06 words. The division of the given words with regard to syllabification is as follows:

Words with 2 syllables: 2 (**Cassette** and **present** {verb})

Words with 3 syllables: 2 (**tobacco** and **establish**)
Words with 4 syllables: 2 (**democracy** and **invitation**)

The subjects were recorded in a language lab. These recordings were made with the help of a mobile phone (Lenovo A328, Baseband version: MOLY. WR8. W1315. MD. WG. MP. V34. P6). The recordings were studied one by one with the help of Praat 5.4.08. The main focus was on the tonic stress with special focus on the values of *Duration* and *Pitch* of tonic stress.

ANALYSIS

The section below deals with the Waveform analysis and Spectral Analysis of English stress as produced by the members of the study sample with Khowar speaking background. The main focus of the analysis is on the Pitch value and Duration value of the members of the study sample since the main aim of the present study is to find out these differences. The window on the top shows the wave form of the recorded word and the window below shows the spectrogram along some horizontally marked lines in different colors. The dotted lines in red color show the vowel formants of the recorded words. The blue line pictures the *pitch* of the given word and the yellow line in the form of peaks shows the *intensity* produced for each syllable (the present study does not focus on the issue of *intensity* since it is mainly concerned with *Pitch* and *Duration* only).The area at the bottom shows time duration in milliseconds whereas the vertical window shows the values of formants/ formant frequencies in Hertz (one cycle per second). The researchers randomly selected the following recordings by male and female members for the word 'cassette' for the presentation below. The first window below shows the pitch contour of one of the members of the study sample. The data for the other words has been analyzed with the help of pie charts at the end of the following analysis.

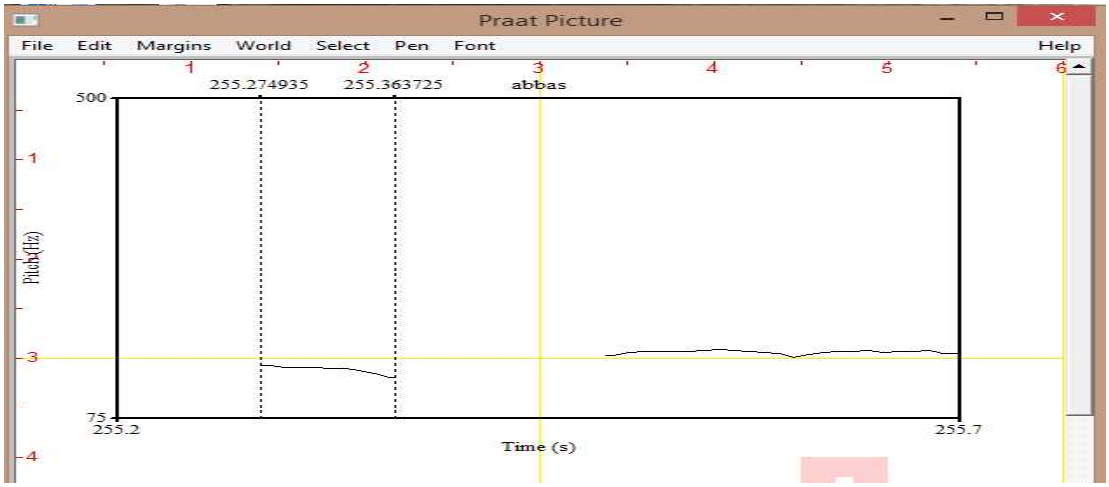

Figure 1: Pitch analysis of ‘cassette’ produced by a male speaker

The pitch window above shows the state of pitch as produced by the vocal cords for both the syllables of the word ‘cassette’. The first syllable ‘CA’ shows pitch going down whereas we find a far more diverse pitch contour for the second syllable ‘SETTE’ ,which is also supported by the pitch values given in the table below.

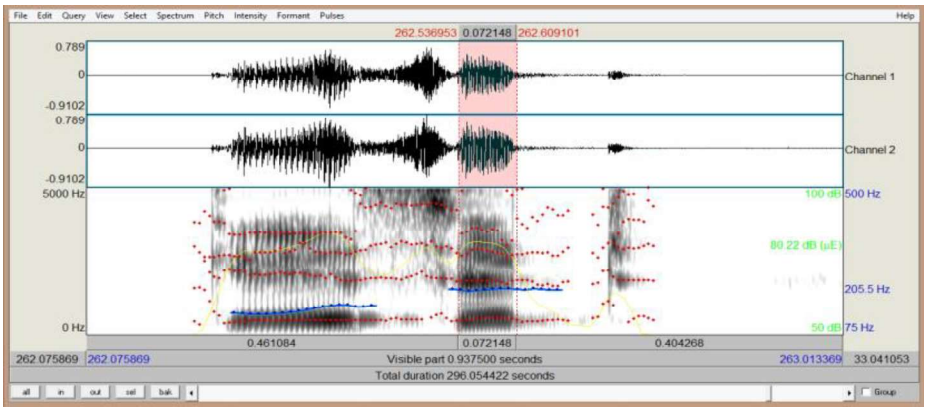

Figure2: Waveform and spectrographic analysis of ‘cassette’ produced by a male speaker

The figure above shows the waveform window on the top where we can easily compare the two syllables of the word ‘cassette’ produced by one of the male members of the study sample. This shows that the subject had no idea of tonic stress of this word. The blue lines show pitch of both the syllables where it can be observed that the second syllable was produced with higher pitch as compared with the first syllable. The second window shows the spectrographic analysis of the same word.

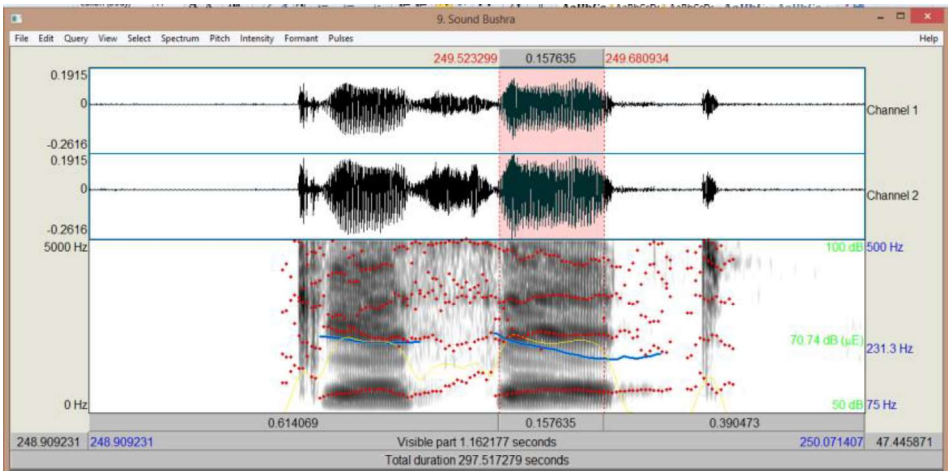

Figure3: Waveform and spectrographic analysis of 'cassette' produced by a female speaker

This figure shows waveform and the spectrographic analysis of the word 'cassettt' as produced by one of the female members of the study sample. The waveform shows longer duration consumed by the second syllable of the said word as compared with the first syllable. Looking at the pitch contour in the spectrographic analysis , one can notice that the first syllable takes higher pitch as compared with the second syllable that should have been produced with a higher pitch instead.

Table 1

Pitch and duration values of 'cassette' produced by male and female members of the sample

	pitch		**Duration**		**stress**
	Ca-part	**Ssette-part**	**Ca-part**	**Ssette-part**	
Female	260.868 Hz to247.238 Hz	259.512 Hz to208.093 Hz	0.1218 seconds	0.1576 seconds	Wrong
	235.337 Hz to229.985 Hz	265.103 Hz to 242.830 Hz	0.2146 seconds	0.1331 seconds	Wrong
	234.1328 Hz to230.2038 Hz	265.0252 Hz to252.7455 Hz	0.2173 seconds	0.1113 seconds	Wrong
Male	145.402 Hz to129.861 Hz	162.261 Hz to165.770 Hz	0.0855 seconds	0.0898 seconds	Wrong
	136.703 Hz to127.860 Hz	168.548 Hz to159.955 Hz	0.0860 seconds	0.0672 seconds	Wrong
	137.644 Hz to162.692 Hz	204.090 Hz to208.700 Hz	0.1460 seconds	0.0721 seconds	wrong

The table above shows production of the word 'cassette'by three female members and as many male members of the study sample. Looking at the table horizontally from the top,we find pitch values for both the syllables of the word in two different subcolumns. After that, there are two subcolumns for the durational values of both the syllables. The third column shows the state of lexical stress produced by the these subjects. The different pitch values given above clearly indicate that the female members of the study sample produced all the syllables with a higher pitch as compared with the pitch produced by their male counterparts. The maximum pitch value produced by one of the subjects is 265.103 Hz whereas the lowest pitch value is 208.093 Hz. On the whole, the pitch values produced by the female members are higher than 208.093 Hz showing higher F0 produced by the vocal cords of these subjects. Conversely, the highest pitch value produced by one of the male members is208.700 Hz and the lowest value is 127.860 Hz which shows the state of F0

produced by the vocal folds of these male subjects.As far as the duration is concerned, it was observed that the execution of both the syllables took longer when produced by the female members of the study sample, where the durational values range between 0.1113 seconds and 0.2173 seconds. Comparing these values with the ones produced by their male counterparts, we can see marked difference in the form of duration range between 0.0672 seconds and 0.1460 seconds. As regards lexical stress, almost all the members produced it wrongly; there was something wrong either with the Pitch or Duration which resulted in the wrong placement of the tonic stress.The analysis of the whole data shows that the female members of the study sample have produced the given words with higher pitch and longer duration.The following section presents the gender-based performance of the study sample in the form of a pie chart for each word.

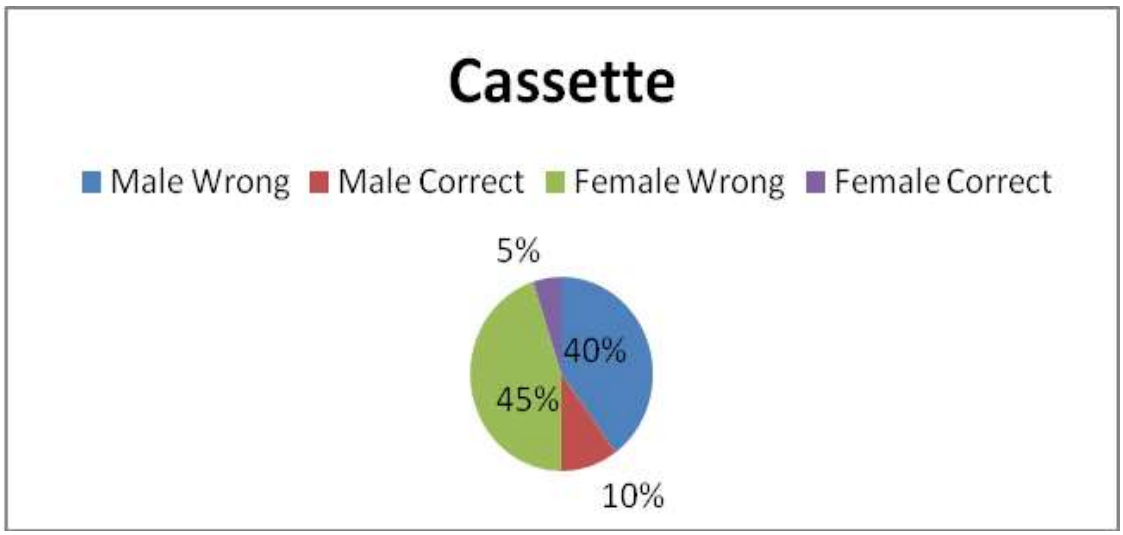

Figure 4: Pie chart of 'cassette' produced byKhowar speakers

The figure above shows the gender-based performance of the members of the study sample in articulation of the word 'cassette'. As the chart shows,40% male subjects pronounced the word with stress at the wrong place whereas 10% pronouced it with stress on the correct syllable. The performance by their female counterparts is not good either. As we can see,45% of them placed stress on the wrong part and only 5% of them did it correctly.

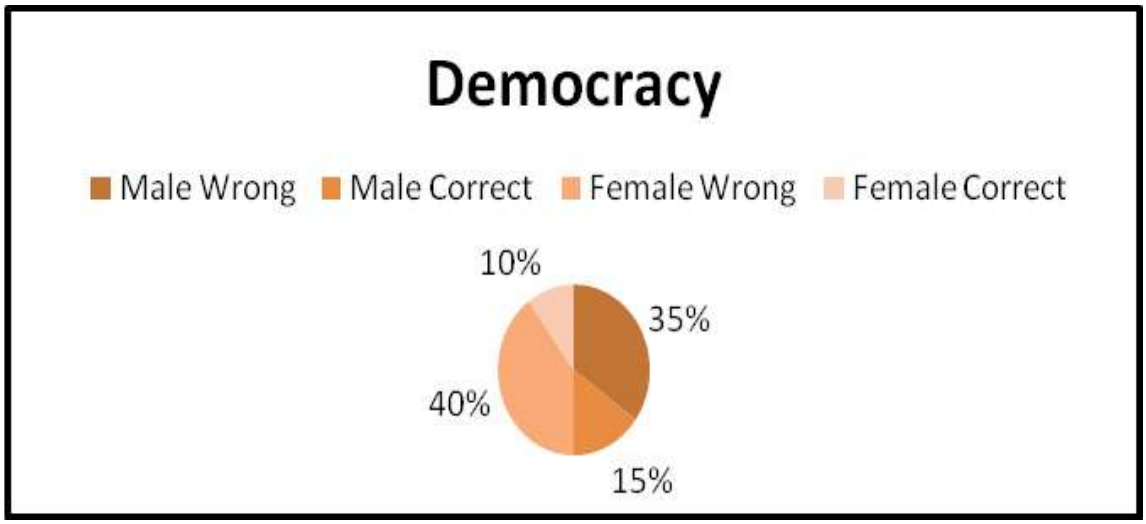

Figure 5: Pie chart of 'democracy' produced by Khowarspeakers

Figure 5 shows the pronunciation of the word 'democracry' by the members of the study sample. As the chart shows ,35% male subjects pronounced the word with stress on the wrong syllable whereas 15% of them pronouced it with stress on the right syllable. Similarly, only 10% of the female sample produced the stress correctly and the rest of them did the whole job wrongly.

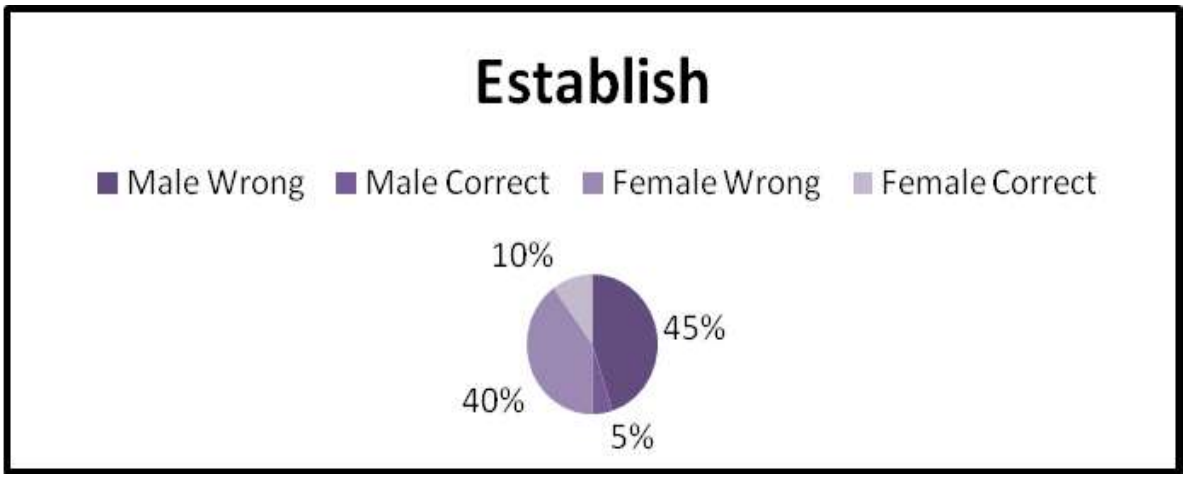

Figure 6: Pie chart of 'establish' produced byKhowar speakers

Figure 6 shows the pronunciation of the word 'establish' by the members of the study sample. The word has 3 syllables and most members of the study sample put lexical stress at the wrong place. As indicated above, only 5% males and 10% females prounced the word with stress on the right syllable.

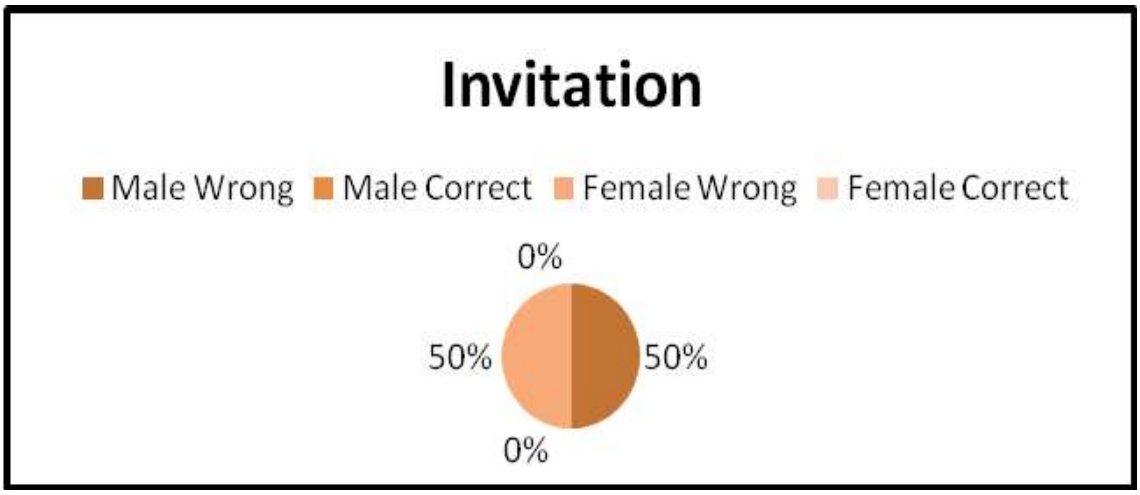

Figure 7: Pie chart of 'invitation' produced by Khowarspeakers

Figure 7 shows the pronunciation of the word 'invitation' by the members of the study sample. As the chart indicates , it is the worst performance shown by the study sample where none of the male or female members prounced the word with stress at the right place.

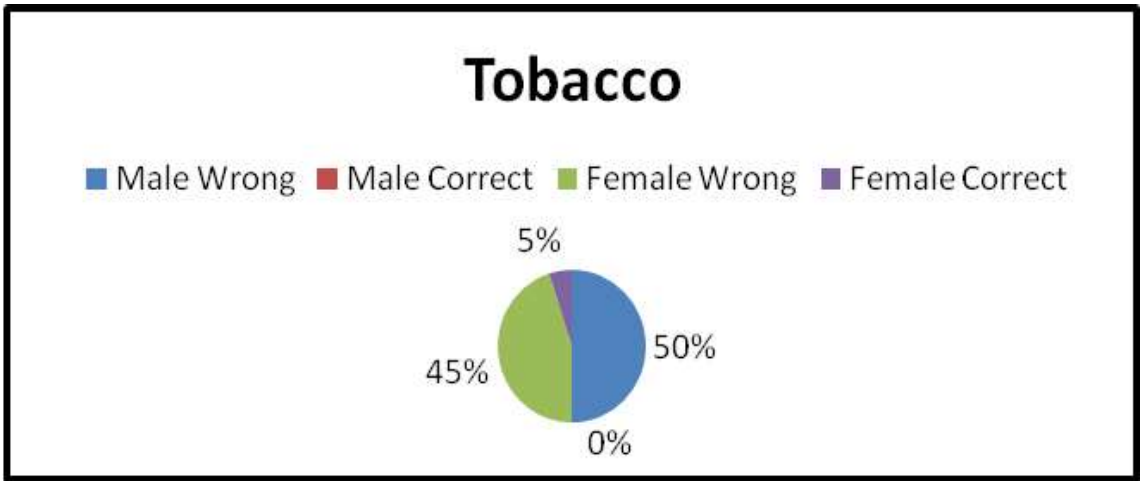

Figure 8: Pie chart of 'tobacco' produced by Khowar speakers

The figure above shows the performance of the members of the study sample in articulation of the word 'tobacco'. As the chart shows,only 5% female members of the study sample pronounced the word with stress at the right place and the male members put up even worse performance where none of them could pronounce the word with stress on the right syllable.

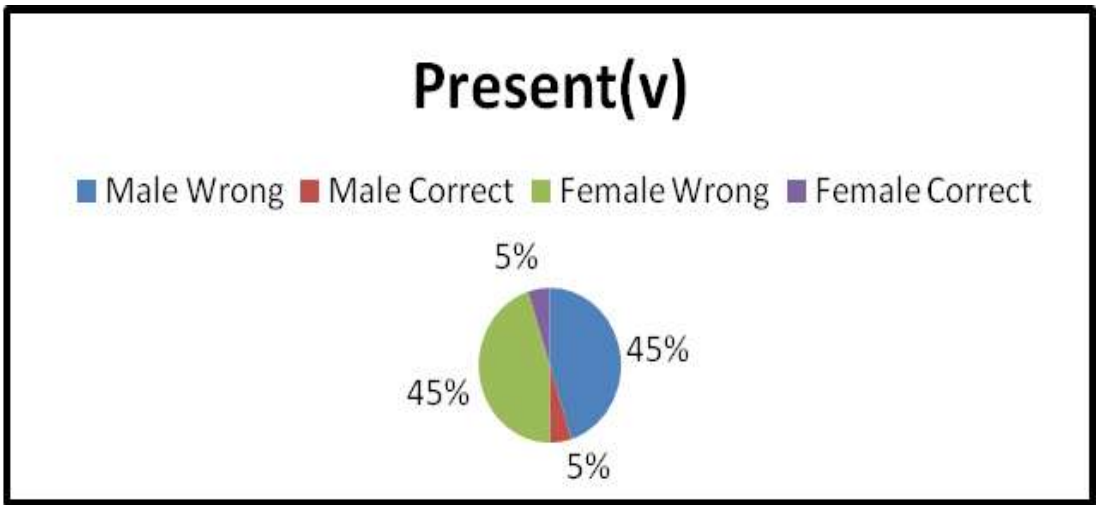

Figure 9: Pie chart of 'present' produced by Khowarspeakers

The figure above shows the performance of the members of the study sample in the articulation of the word 'present'. As the chart shows,only 5% male members and 5% female members of the study sample pronounced the word with stress at the right place.

FINDINGS

1. The analysis and interpretation of the data shows that Khowar speaking learners of English have no idea of lexical stress in English, though a few of them placed the stress on the given words correctly.
2. Looking at the analysis of data in terms of gender, it was found that the female members of the study sample produced the given words with a far higher pitch than their male counterparts.
3. The analysis of the data shows that male members of the study sample consumed lesser time in the execution of most of the syllable as compared with the female members.
4. Gender does not appear to be a crucial factor in terms of lexical stress.

CONCLUSION

The present study was conducted with the aim to find out how Pakistani learners of English with Khowar background deal with English lexical stress. The researchers studied the lexical stress as produced by the members of the study sample with special focus on *pitch* and *duration*. The analysis shows that the female members produced syllables of the 6 given words with higher pitch as compared with the male subjects which supports the study conducted by Elgin (1993). Similarly, their

production of different syllables of the given words consumed longer duration as compared with their male counterparts. The analysis of the data shows that *pitch* and *duration* are heavily gender dependent but production of correct tonic stress has got nothing to do with gender. The detail analysis of the data suggests that Khowar and English are two distinct languages in supra-segmental terms and this factor leads to wrong pronunciation of English words by the Khowar speakers.

RECOMMENDATIONS AND SUGGESTIONS

Based on the findings of the research, the researchers have put forward the following suggestions and recommendations:

1. English lexical stress is a difficult phenomenon for its foreign learners due to its unpredictable nature. Therefore, it should be taught more seriously by language teachers.
2. English lexical stress can be better taught and learned with the help of speech analyzers.
3. Similar research can be conducted to study ‘intensity’ with regard to lexical stress in English.

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