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NORTHERN KURDISH AS A STRESS-ACCENT LANGUAGE

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ABSTRACT:
Languages vary in terms of whether they are stress or non-stress accent languages. Concerning whether Northern Kurdish is a stress or non-stress accent language, there is no experimental investigation which has ever examined the phonetic correlates of word-level prominence. This study aims to establish the acoustic correlates of word-level prominence in Northern Kurdish. It is based on the production of pairs of segmentally parallel syllables occurring in stressed vs. unstressed positions. The materials are produced by 30 native speakers. Measurements of F0, duration and intensity of the test syllables in each token were extracted. The hypothesis is that if Northern Kurdish is a stress-accent language, the values of all the variables will be higher in the stressed condition than in the unstressed condition, whereas if it is a non-stress-accent language, only F0 values are predicted to be higher in the stressed condition. The results indicate that Northern Kurdish is a stress-accent language in that it employs both tonal and non-tonal correlates, especially duration, cues to word-level prominence. Additionally, stress influences the durations of the segmental material of the stressed syllables, i.e. consonants and vowels.
KEYWORDS: Northern Kurdish, Stress-accent, Non-stress accent, Word-level prominence, Acoustic correlates.

1. INTRODUCTION

1.1 Instructions

According to the typology suggested by Beckman (1986), languages are classified into stress or non-stress accent languages according to which phonetic features correlate with word stress. In stress accent languages, like English, accent is regularly manifested by stress which is identified as a cluster of phonetic features that includes increased intensity, duration, spectral correlates as well as a major pitch movement. In non-stress accent languages like Japanese (Beckman, 1986), Hindi Urdu (Dyrud, 2001), on the other hand, accent is marked only by pitch movement. Beckman (1986) studied the acoustic correlates of word-level prominence in English and Japanese. In her production study, she compared the phonetic features of accented and unaccented syllables within a word, using accentual minimal pairs which differ only in the position or presence of lexical accent. In English, the mean measurements of duration, intensity and f0 in stressed vs. unstressed syllables were compared across minimal pairs such as <*'permit/per'mit*>. Similarly, in Japanese a comparison was made between pairs which differed in the position of lexical accent <*kamé/káme*> or in the presence vs. absence of accent <*ikén/iken*> (Beckman, 1986: 146-7). In English, Beckman found a significant difference in the amplitude and duration of stressed vs. unstressed syllables, as well as in pitch. In Japanese only f0 differed significantly across all speakers in stressed vs. unstressed syllables. Thus, she concluded that English is a stress-accent language because tonal and non-tonal features contribute to word-level prominence, whereas Japanese is a non-stress accent language because only tonal features contribute to word-level prominence.

Likewise, Hellmuth (2006), on her part, investigated the phonetic features of word-level prominence in Egyptian Arabic (EA). Hellmuth extracted pairs of segmentally parallel syllables, occurring in stressed and unstressed positions within the corpus of read speech material already collected in her study of the distribution of pitch accents in EA. She compared stressed and unstressed syllables in word non-final position to eliminate any overlap of durational effects in word final syllables. The test syllable /mu/ was word-initial as stressed in <*muna*> or unstressed in <*munamnim*> and occurred in the same test sentence <*bu?? muna munamnim xaaliS wa ša9riha Tawiil*> (Hellmuth, 2006: 109). She extracted measurements of f0, duration and intensity of the tested syllables. Her hypothesis, that EA is a stress-accent language, predicts that the values of f0, duration and intensity will be higher in stressed conditions than in unstressed conditions. An alternative hypothesis, that EA is a non-stress-accent language predicts that only the values of f0 will be higher in stressed condition and the values of duration and intensity are predicted not to vary between stressed and unstressed conditions. The results show that all the mean values of f0, duration and intensity are significantly higher in stressed condition than in unstressed condition. This indicates that EA is a stress-accent language.

Different studies examined the acoustic correlates of word level stress across different languages (for English see also Fry, 1955, 1958; Sluijter and van Heuven, 1996a; Sluijter, van Heuven, and Pacilly, 1997, for Dutch; Manolescu, Olson, and Ortega-Llebaria, 2009, for Romanian; Dogil and Williams, 1999, for German; Kastrikani, 2003, for Greek; Ortega-Llebaria, 2006, for Spanish). They found that that duration and f0 are the cross-linguistic correlates of stress.

As for Northern Kurdish (henceforth NK) to prove whether it is a stress or non-stress accent language, there is no experimental study which has ever examined the phonetic correlates of word-level prominence. There are different opinions in the literature about the features that constitute the main phonetic elements for word-level prominence, but these opinions are intuitive and not based on any instrumental investigation. For example, Fattah (1980) claims that a combination of features such as intensity, pitch, sound quality and quantity contributes to prominence, but auditorily relative loudness is the most relevant feature. Similarly, Ahmed (1986) defines stress as intensity or loudness, while Amedi (1987) characterises stressed syllables by duration and intensity. Hence we can conclude that Kurdish uses both tonal and non-tonal features to indicate word-level prominence. This suggests that Kurdish is a stress-accent language, however, it would be preferable to design and implement a full study to investigate the tonal and non-tonal correlates of word-level prominence in NK.

In this study, we conduct an experiment in order to establish the acoustic correlates of word-level prominence in NK. The paper is structured as follows: section 2 details the methodological issues used in the data collection and analysis. In section 3, we present the main results arrived at throughout the data analysis. The conclusions and implications of our analysis are discussed in section 4.

2. METHODOLOGY

To carry out the investigation, we adopted Hellmuth's (2006) methodology, we selected pairs of segmentally parallel syllables occurring in stressed vs. unstressed positions from a corpus of read speech materials already collected for a study on Kurdish intonation (Hasan, 2012). The test syllables chosen for investigation here were in stressed and unstressed positions within different words in different sentences (test syllables underlined and the stressed syllable is indicated by the IPA stress notation ['']):

1- a- 'nebe. (take/imp/neg/sing) (Don't take it.)
b- vî nexoşî saxke. (this-patient-treat/imp/sing) (Treat this patient.)

The test syllable here is <*ne*> in each case, occurring as a stressed syllable in the word <*nebe*> or unstressed in <*nexoşî*>.

2- a- vî darî 'bibe. (This-stick-take/imp/sing) (Take this stick.)

b- viyanê bilind dît. (Viyan-Bilind-see/past) (Viyan saw Bilind.).

The test syllable here is <*bi*> in each case, occurring as a stressed syllable in the word <*bibe*> or unstressed in <*bilind*>.

The sentences were produced by 30 educated native speakers of NK (15 females and 15 males). They were undergraduate students and staff at the University of Duhok, aged between 16-30 years. All the speakers had been born and brought up in Duhok and had lived there all their life with only a few of them having spent a year in a foreign country or another city. Thus, one can reasonably assume that they speak the same variety of NK.

The recordings were carried out in the phonetic lab at College of Arts, University of Duhok. They were carried out by using the PRAAT program (Boersma & Weenik, 2009), a Creative Headset HS-600 microphone and a Dell laptop. PRAAT, which is one of the pitch signal processing softwares, is used in the recording and labelling stages since it has been proven to be suitable for speech analysis and processing. The data is digitized at a sampling rate of 44 kHz in monoformat.

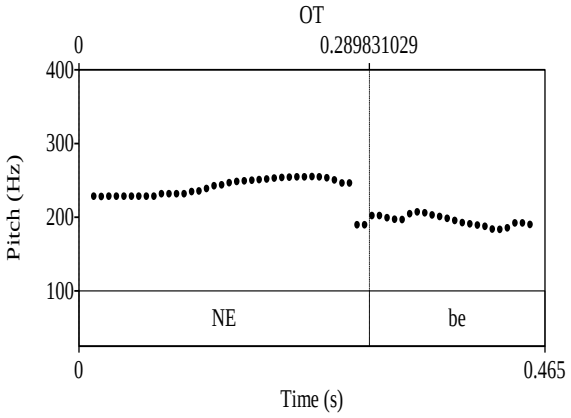
The material is typed in modified Arabic alphabet because it is the writing system which is used by the people living in Duhok and which all the subjects were familiar with. The subjects were recorded individually. They were given a few minutes to quietly read the text material before reading it out aloud. They were instructed to maintain a constant speech rate and a constant volume and to reread completely any misread sentence. No explicit instructions were given to the speakers about the purpose of the study.

The recordings are auditorily and acoustically analyzed. Auditorily, the data is transcribed using the IPA revised version (IPA93). The acoustic analysis is carried out using PRAAT and measurements of f0, duration and intensity of the test syllables in each token were extracted. The measurements are statistically processed using SPSS. The hypothesis is that if NK is a stress-accent language, the values of all the variables will be higher in the stressed condition than in the unstressed condition, whereas if it is a non-stress-accent language, only f0 values are predicted to be higher in the stressed condition.

3. RESULTS

The results indicate that the mean values for duration and f0 variables are higher in the stressed condition than in the unstressed condition, but for intensity no difference can be observed. The differences in duration and f0 between the stressed and unstressed <*ne*> are illustrated in figure (1) as produced by one of the speakers.

a) Stressed condition



b) Unstressed condition

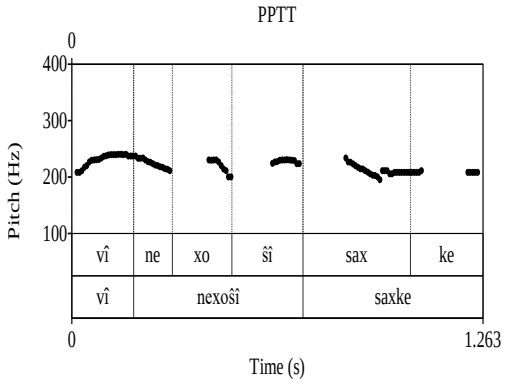


Figure 1. Differences in the duration and f0 of the syllable <*ne*> in (a) stressed condition <*nebe*> and b) unstressed condition <*nexoşî*> as produced by one of the speakers

Descriptive results of the three main variables (f0, duration and intensity) in stressed vs. unstressed conditions are shown in figures 2 below. One-way ANOVA comparing stressed and unstressed pairs within each variable confirms that the differences in duration are highly significant (p=.000), for f0 and intensity the difference is not significant (p=.671 for f0 and p= .973 for intensity).

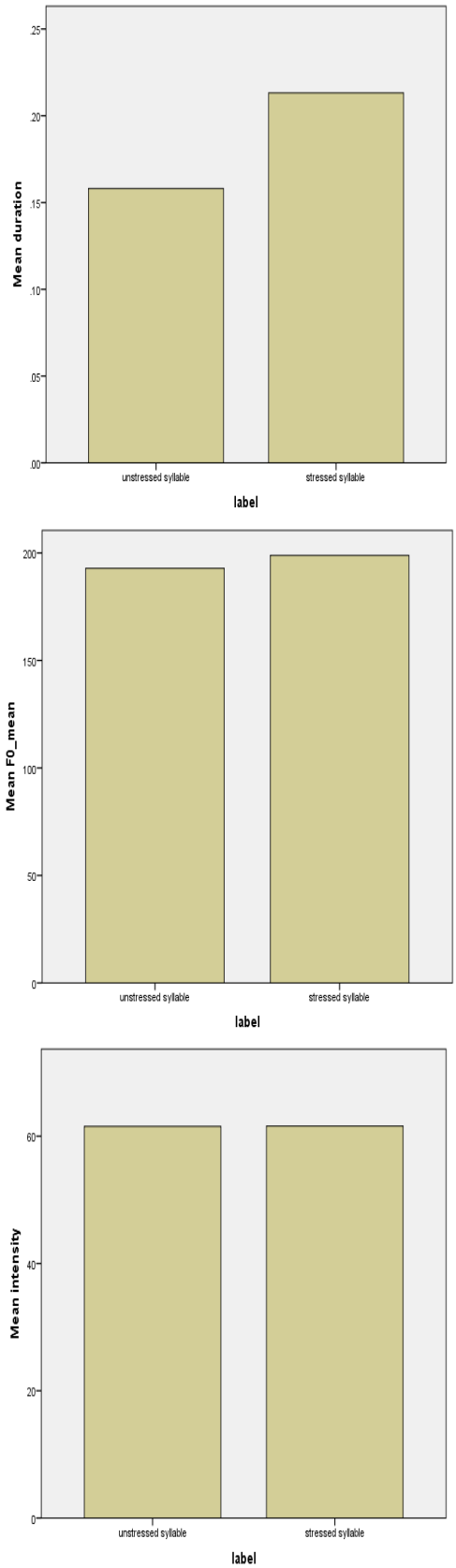


Figure 2. Bar chart: mean duration (in milliseconds), mean f0 (in hertz) and mean intensity (in decibels) in stressed vs. unstressed syllable.

These results suggest that NK employs both tonal and non-tonal, especially duration, cues to word-level prominence. These findings support the broad hypothesis established in the literature that Kurdish uses tonal and non-tonal features for word-level prominence (Fattah, 1980, Ahmed, 1986 & Amedi, 1987). However, they challenge the shared claim across these earlier studies that intensity is the relevant feature, showing instead that the widely relevant phonetic feature is duration. The results also agrees with the general literature on the phonetic correlates of stress that duration and f0 are the consistent correlates of stress (such as Ortega-Llebaria and Prieto, 2010 for Central Catalan and Castilian Spanish; Sluijter and van Heuven, 1996; Sluijter, van Heuven, and Pacilly, 1997, for Dutch; Manolescu, Olson, and Ortega-Llebaria, 2009, for Romanian; Dogil and Williams, 1999, for German; Kastrikani, 2003, for Greek; Ortega-Llebaria, 2006, for Spanish) and the claim that there is no general consensus on the role of intensity as a cross-linguistic correlate of word stress (Ortega-Llebaria and Prieto, 2010).

Thus, we conclude that NK, like English and Egyptian Arabic, is a stress-accent language in which both tonal and non-tonal correlates, such as duration, of the accentual prominence are used.

3.1 Stress and segmental duration

As shown above, there is a significant difference in duration between the stressed and unstressed syllables. We further examined the way stress patterns affects the duration of the segmental makeup of the syllables, i.e. consonants and vowels. There has been evidence in the literature on some languages and language varieties that stress patterns affect the duration of consonants and vowels in different ways. In an experimental investigation, Botinis, Fourakis and Bannert (2001) examin the effects of some prosodic variables such as stress, focus and tempo on segmental durations in Greek. The study is based on a set of nonsense words with a CVCV syllabic structure and constant segmental set up except for the first vowel which may be /i, e, a, o, u/. The words are put in a carrier sentence /to 'klab__ 'pezi ka'li musi'ki/ ‘the club__ plays good music’. The speech materials are produced by four female Standard Athenian speakers who produced the key words with alternative stress patterns (i.e. first or second syllable stress) at two tempi (i.e. normal and fast) and six times each. The results indicate a significant effect of the prosodic effect of stress on both consonants and vowels in that vowels and consonants are longer in stressed syllables than in unstressed ones.

A similar experiment conducted by Botinis et al. (2002) investigate the effects of the prosodic categories of stress, focus and tempo on segmental durations in American English, British English, Greek and Swedish. The same methodology adopted in Botinis, Fourakis and Bannert (2001) is used except that the key words have a constant CVCV structure where C consists of voiceless fricative /s/ and V of the low vowel /a/. The results show crosslinguistic differences in the effects of stress on consonant and vowel durations. Stress has a significant effect on the consonant duration in American English, British English and Greek, but not in Swedish, i.e. stressed consonants are longer than unstressed consonants. On the other hand, in all the attested languages stress significantly affects vowel duration, i.e. stressed vowels are longer than unstressed ones.

In this study, the durations of the consonant and vowel segments of the test syllables as a function of stress are examined. The duration measurements of the consonants and the vowels were taken separately in the stressed and unstressed syllables in milliseconds (ms.). The results indicated a significant effect of stress on the consonant and vowel durations in NK, i.e. both

consonants and vowels are longer in the stressed syllables than in the unstressed ones. The differences in the duration of the vowels and consonants in the stressed vs. unstressed condition are presented in the following figure.

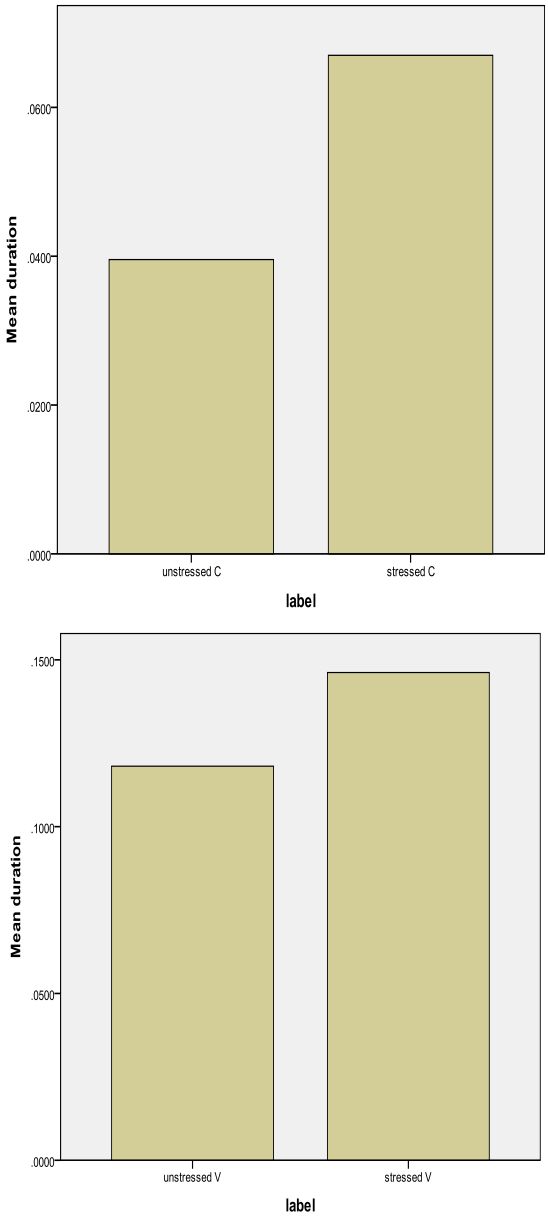


Figure 3. Consonant duration (left panel) and vowel duration (right panel) as a function of stress (stressed vs. unstressed)

The statistical analysis carried out by one-way ANOVA showed that the difference in vowel duration in stressed vs. unstressed conditions is significant (p=.000) and the difference in consonant duration is also significant (p=.000). Thus, NK is similar to American English, British English and Greek in that consonant and vowel durations are influenced by stress patterns.

4. CONCLUSION

This study indicates that NK employs both tonal and non-tonal, especially duration, cues to word-level prominence. The findings support the broad hypothesis established in the literature that Kurdish uses tonal and non-tonal features for word-level prominence (Fattah, 1980, Ahmed, 1986 & Amedi, 1987). However, they challenge the shared claim across these earlier studies that intensity is the relevant feature, showing instead that the widely relevant phonetic feature is duration. Additionally, the findings support the findings of other studies on the phonetic correlates of stress that duration and f0 are the consistent correlates of stress and that the role of intensity as a correlate of word stress is still controversial (such as Ortega-Llebaria and Prieto, 2010 for Central Catalan and Castilian Spanish; Sluijter and van Heuven, 1996; Sluijter, van Heuven, and Pacilly, 1997, for Dutch; Manolescu, Olson, and Ortega-Llebaria, 2009, for Romanian; Dogil and Williams, 1999, for German; Kastrikani, 2003, for Greek; Ortega-Llebaria, 2006, for Spanish).

Thus, NK, like English (Beckman, 1986) and Egyptian Arabic (Hellmuth, 2006), is a stress-accent language in which both tonal and non-tonal correlates, such as duration, of the accentual prominence are used. It is also shown that in NK, stress influences the duration of the stressed syllables and it also influences the durations of the segmental material of these syllables, i.e. consonants and vowels.

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دیالکتا کوردی یا باکۆر ژ جورێ زمانێن هێزیە یان نەهێزیە

پوختە:

زمانێن ژهانێ دهێنە دابەشکرن لسەر زمانێن هێزی و زمانێن نەهێزی. سەبارەت کا دیالکتا کوردی یا باکۆر ژ جورێ زمانێن هێزیە یان نەهێزیە چ ڤەکۆلینێن پراکتیکی نەهاتنە کرن بو تاقیکرنا تایبەندمەندیێن فۆنەتکی یەن هێزێ لسەر ئاستێ وشێ. لەورا ئارمانجا سەرەکی یا ڤێ ڤەکۆلینێ دەستنیشانکرنا تایبەندمەندیێن فۆنەتکی یەن هێزێ لسەر ئاستێ وشێ د دیالکتا کوردی یا باکۆر. ئەڤ ڤەکۆلینە هاتیە دامەزراندن لسەر شلۆڤەکرنا جوتێن برگێن هەوشێوە ژ لایە پێکهاتا دەنگیڤە کۆ دکەڤنە جهەن بهێز و نەبهێز. ئەڤ برگە هاتنە درگاندن ژلایێ 30 ئاخفتنکەرا. پاشی پیڤەرێن ف0 و درێژاهی و بلندییێن ڤان برگان هاتنە دەرهێنان. وادان ئەگەر دیالکتا کوردی یا باکۆر زمانەکە هێزیبیت دێ هەمی پیڤەر ل برگێن هێزکری دێ بلندتر بیت ژ برگێن بێهێز. بەلام ئەگەر زمانێ نەهێزی بیت بتنێ دە پیڤەرێ ف0 بلندتربیت ل برگێن هێزکری. ئانجاما دیارکر کۆ کوردی یا باکۆر زمانێ هێزیە لبەر کۆ ئەو تایبەندمەندییێن ئاوازی و نە ئاوازی بتایبەت درێژاهییێ بکاردهینیت بۆ دیارکرنا هێزێ لسەر ئاستێ وشێ. سەرباری ئەڤێ هێز کارتێکرنێ لسەر درێژاهیا پێکهاتا دەنگی یا برگا دکەت یانکۆ بزوێن و نەبزوێن.

پەیڤێن سەرەکی: کوردی یا باکۆر، زمانێن هێزی، زمانێن نە هێزی، پێکهاتا دەنگی.

اللهجة الكردية الشمالية هي لغة تشديدية أو لا تشديدية

الخلاصة:

اللغات تختلف من حيث ما إذا كانت لغات تشديدية أو لا تشديدية . وفيما يتعلق سواء اللهجة الكردية الشمالية هي لغة تشديدية أو لا تشديدية ليس هناك أي دراسة تجريبية لاختبارالميزات الصوتية للتشديد علي مستوي الكلمة. تهدف هذه الدراسة إلي تحديد الميزات الصوتية للتشديد علي مستوي الكلمة في اللهجة الكردية الشمالية. الدراسة تستند علي تحليل أزواج من المقاطع المتماثلة في التركيب الصوتي التي تقع في مواقع مشددة و أخري غير مشددة. و قد تم تسجيل هذه العينات كما نطقت من قبل 30 متحدث. تم استخراج قياسات F 0 والمدة والشدة للمقاطع في كل موقع . الفرضية هي أنه إذا كانت اللهجة الكردية الشمالية هي لغة تشديدية، فأن قيم جميع المتغيرات ستكون أعلي في حالة التشديد مما هي عليه في حالة عدم التشديد . في حين إذا كانت لا تشديدية فمن المتوقع أن تكون قيم F 0 فقط أعلي في حالة التشديد. وتشير النتائج إلي أن اللهجة الكردية الشمالية هي لغة تشديدية لأنها تستخدم كلا من الخصائص النغمية والغير النغمية، خصوصا المدة، لاضهارالتشديد علي مستوي الكلمة. بالإضافة إلي ذلك، التشديد يؤثرعلي فترات التركيب الصوتي للمقاطع المشددة ، أي الاصوات الساكنة والمتحركة.

الكلمات الدالة: اللهجة الكردية الشمالية، لغة تشديدية، لغة غير تشديدية، التركيب الصوتي.