Stress on Mongolian Disyllabic Words

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ABSTRACT

In this paper I will discus acoustic patterns of disyllabic words in Mongolian. The phonetic parameters associated with stress have been measured: vowel duration, fundamental frequency (F0) and intensity. The stress placement regularities in disyllabic words and word stress characteristics in Mongolian are presented.

1. INTRODUCTION

Word stress is a continual problem in the study of Mongolian prosody. Although a great number of investigations have been devoted to the problem of Mongolian stress during a period of more than 100 years, no agreement about its placement or phonetic nature has yet been reached. There is, however, general agreement that stress is not distinctive in Mongolian, that is to say, no two words can be distinguished lexically or morphologically only by the placement of stress. There are two main opinions about placement: (1) Stress falls on the first syllable. This is a already common view, however this was mentioned about 170 years ago [1] and its influence has continued up to now. (2) Stress falls on the last syllable [2]. This is a minority opinion. Two main points on the nature of word stress have been presented: (3) Mongolian stress is a stress accent. Most researches agree on this point. (4) Others hold that besides stress accent, there is also pitch accent in Mongolian. Some writers mention that the phonetic parameters do not converge to form a unitary phenomenon of stress in Mongolian, so that stress is unstable [3] or that there are several kinds of stress [4, 5].

2. ACOUSTIC ANALYSIS

2.1 Method

According to the quantity pattern (there is *distinctive quantity* in Mongolian), I have categorised the disyllabic words into four types: short-short (S-S), short-long (S-L), long-long (L-L) and long-short (L-S). 139 disyllabic words were selected based on the four types mentioned above and considering the Mongolian phonemic system and vowel harmony rule. Each word was read in a carrier sentence [ən tʃʰin... βɛːn] 'This is… ' [ən tʃʰin mœrə̆ βɛːn] 'this is a horse', etc. The words were thus in a focused position in the carrier sentence. This material was read by three native speakers of Inner Mongolia, 40, 31 and 24 year- olds (two male speakers and one female speaker). They are from Chakhar, the Shuluun Höh Banner, two of them being announcers at the Inner Mongolian Radio Station. The recordings were made in a standard recording room of the Institute for Mongolian Language Studies at the University of Inner Mongolia using a SONY digital recorder system *(micro segment, tuning center, and DAT recorder),* and Hi-Fi quality was applied.

2.2 Results

The first speaker's material was analysed using the *LC-KAY model 3700 Multi-Speech*, and the second and third speakers' material was analysed using the *Praat 4.0.41*. The vowel and syllable duration *(ms)*, the syllable intensity (*dB*, the strongest value of a syllable). The F0 initial point *(Fi, Hz)*, the turning or the medial point *(Ft, Hz)*, and the final point *(Ff, Hz)* in every syllable were respectively measured. The results are presented in Figs 1-3. According to these I generalised the following three patterns, i.e. vowel duration, F0 contour and intensity.

2.2.1 Vowel durational ratio

Fig. 1 shows the vowel of the first syllable is longer than the second for the S-S and L-L type and their approximate durational ratio for vowels is 3:2. The long vowel is longer than the short one for the S-L and L-S type, and their approximate durational ratios are 2:3 for the S-L type and 4:1 for the L-S type.

2.2.2 F0 pattern

As seen in Fig. 2 there is a *'low-high pattern'* (L-H pattern) in disyllabic words mainly. But the F0 value difference between two syllables differs for different types. It is bigger in the S-S and S-L types and smaller in the L-L and L-S types, and M1's F0 patterns are different from the others: there are two kinds of F0 patterns in his material. One is the

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'L-H pattern' which occurs in the S-S and S-L type and the other pattern is the 'H-L pattern' which occurs in the L-L and L-S type. The semitone differences between first and second syllable for different types are given in Table 1.

2.2.3 Intensity Pattern

Fig. 3 shows that there are also two kinds of intensity pattern in disyllabic words, one of which is the *'weak-strong pattern'* (W-S pattern) which occurs in the S-S and S-L type, and the other the *'strong-weak pattern'* (S-W pattern) which occurs in the L-L and L-S type. But the differences in the L-L and S-S types (if a disyllabic word contains the same quantity, two short or two long) are small and the patterns differ in the material for different speakers'. For instance, M1's material shows that a word which belongs to the S-S type has an almost level pattern, and M2's material shows that a word which belongs to the L-L type has a 'W-S pattern.' This differs from the others.

3. PERCEPTION TEST

3.1 Definitions of Word Prominence and Word Stress

If *word-prominence* distinguishes meaning, we can call it *distinctive word stress* (for instance, English and Russian have *distinctive word stress*). If it does not distinguish meaning we can call it *non-distinctive word stress* (for instance, of the Altaic language family at least the Mongolian branch has *non-distinctive word stress*).

3.2 Experimental Subject

People's subjective judgment is inevitably influenced by their mother tongue and the degree of influence is different when people's educational level and special field of study are different. Altogether 30 subjects (their age is around 20-24), belonging to three groups, participated in the test: (1) Ten Mongolian under-graduate students from the Department of Mongolian Language and Literature, who were dominantly influenced by linguistic knowledge. (2) Ten Mongolian students, whose mother tongue is also Mongolian, but who were from the Department of Mathematics. (3) Ten Chinese students (from the Department of Chinese Language and Literature), who are illiterate in Mongolian (they do not speak Mongolian) but have Chinese linguistic knowledge. The first speaker's material was utilised for the perception test.

3.3 Results

Fig. 4 shows the results of the perception test: though the ratios of the stress judgements differ in the different groups, the following conclusion can be reached on the basis of the total ratio of the three groups and taking into account the acoustic parameters: the placement of the stress depends on the quantity pattern (word type): if a disyllabic word belongs to the S-S, S-L type, the second syllable is stressed, but if it belongs to the L-L, L-S type, the first syllable has been perceived stressed.

4. DISCUSSION

4.1 Why is the first speaker's F0 pattern in the L-L or L-S type contradicted by other speakers?

Table 1 shows semitone differences between two syllables in disyllabic words:

Tab.1 Semitone differences between first and second syllables

Word type	Speakers		
	First	Second	Third
S-S	-4.40	-4.52	-2.84
S-L	-4.47	-5.23	-3.25
L-L	1.04	-0.75	-1.72
L-S	1.36	-1.12	-1.25

The answer to this question is given in Table 1: the semitone differences between two syllables differ in different types. They are bigger in the S-S or S-L type and smaller in the L-L or L-S type. However, there is no lexically or morphologically distinctive stress in Mongolian.

4.2 What is the phonetic nature of Mongolian word stress?

The roles of the acoustic parameters in stress judgement differ in different types. It also depends on the quantity pattern: If a disyllabic word belongs to the S-S type, then duration cannot be used for indication of stress, but F0 can. The first speaker's semitone difference is –4.40. F0 might assume a more important role in stress judgement in the case above. If a disyllabic word belongs to the S-L type, then F0, duration and intensity can be used for indication of stress. The vowel duration difference is 58 ms (average), the intensity difference is 4.35 dB (average) and the semitone difference is –4.47 (first speaker's). It cannot be said which one might assume a more important role in stress judgement. If a word belongs to the L-L or L-S type, then the role of F0 in stress judgement is not evident. Because the semitone differences are 1.04 for L-L type and 1.36 for L-S type, they are smaller than in the S-S or S-L type, duration and intensity can be used for indication of stress. The duration differences are 59 ms for L-L type and 135 ms for L-S type and intensity differences 2.5 dB for L-L type and 7.77 dB for L-S type.

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4.3 What kind of stress does Mongolian have?

There is no lexical or morphological stress in Mongolian, rather it has *conventional stress.* In general, every polysyllabic word in spoken Mongolian has its own stress. The word stress is not only indicated as a special rhythm, but it has also formed the characteristic nature of spoken Mongolian.

5. CONCLUSIONS

Based on the acoustic analysis and perception test described above, the following conclusion can be reached. (1) the vowel of the first syllable is longer than the second for the S-S and L-L types and the approximate durational ratio for vowels being 3:2. The long vowel is longer than the short one for the S-L and L-S types and their durational ratios being 2:3 for the S-L type and 4:1 for the L-S type. (2) There is a *'low-high pattern'* (L-H pattern) in disyllabic words mainly. (3) There are two kinds of intensity pattern in disyllabic words, one of which is the *'weak-strong pattern'* (W-S pattern) which occurs in S-S and S-L types. The other is the *'strong-weak pattern'* (S-W pattern) which occurs in the L-L and L-S types. (4) The placement of stress depends on the quantity pattern: if a disyllabic word belongs to the S-S, S-L type, the second syllable is stressed and if it belongs to the L-L, L-S type, the first syllable is stressed. (5) The roles of the acoustic parameters in stress judgement differ in the different types. It also depends on the quantity pattern. (6) Mongolian belongs to the Altaic language family is a quantity language with a phonological distinction in vowels and therefore duration cannot be used freely for word stress correlate (as opposite to Russian). F0 and intensity can make the second syllable more prominent than the first. Intensity seems to be the most regular correlate of word stress. (7) Mongolian word stress is free (moveable), but it has no distinctive function. It is not free in the sense that a speaker could deliberately place it on any syllable randomly, but is conventionally fixed on certain syllables.

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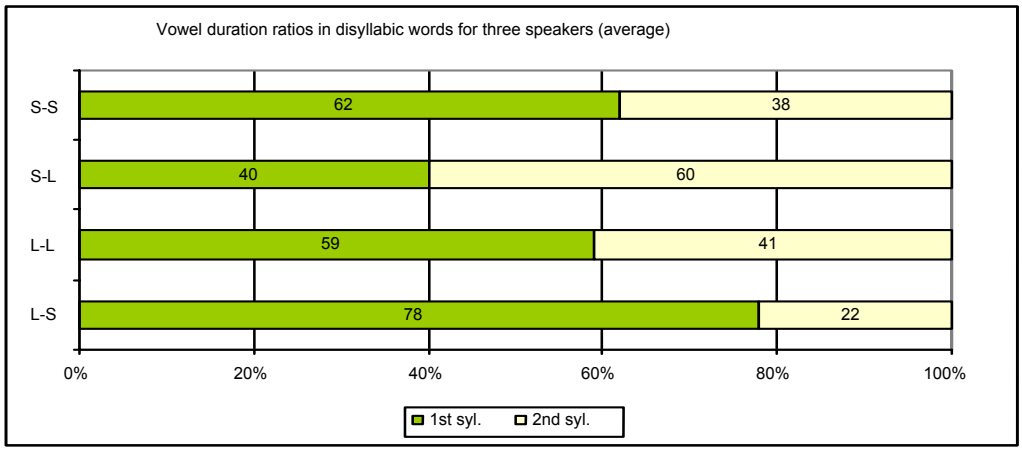

Figure 1 Vowel durational ratios of disyllabic words for three speakers

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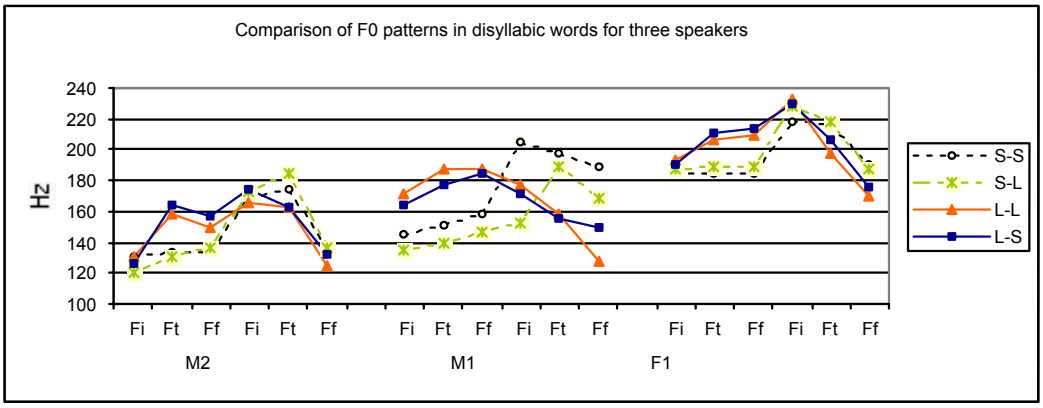
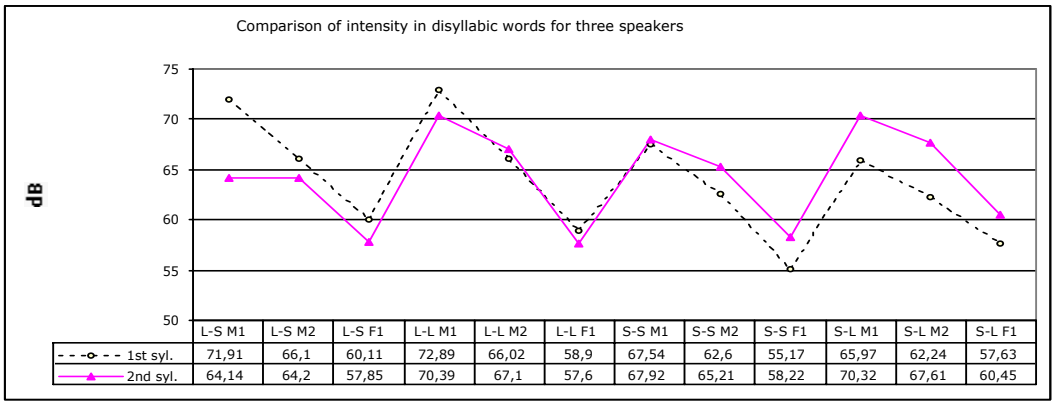
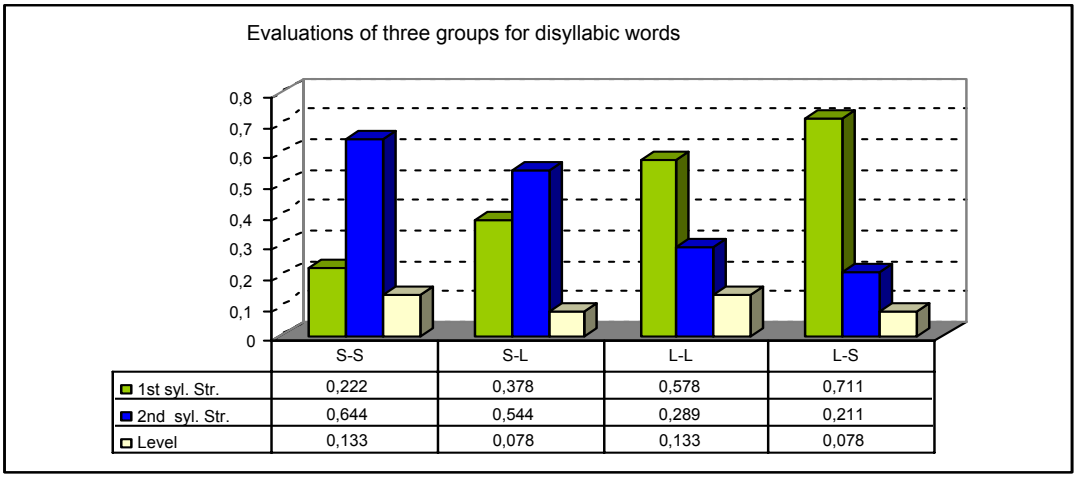


Figure 2 Comparison between F0 patterns of three speakers



	L-S M1	L-S M2	L-S F1	L-L M1	L-L M2	L-L F1	S-S M1	S-S M2	S-S F1	S-L M1	S-L M2	S-L F1
1st syl.	71,91	66,1	60,11	72,89	66,02	58,9	67,54	62,6	55,17	65,97	62,24	57,63
2nd syl.	64,14	64,2	57,85	70,39	67,1	57,6	67,92	65,21	58,22	70,32	67,61	60,45

Figure 3 Comparison between intensity patterns of three speakers



	S-S	S-L	L-L	L-S
1st syl. Str.	0,222	0,378	0,578	0,711
2nd syl. Str.	0,644	0,544	0,289	0,211
Level	0,133	0,078	0,133	0,078

Figure 4 Results of the perception test

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