



Stress on Mongolian Trisyllabic Words

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Abstract

The experimental analysis in the present study was based on an acoustic parametric database which contained prosodic measurements from 539 words, 66 phrases and 184 sentences spoken by a male speaker, M1. In addition, data gathered from two other speakers, M2, a male, and F1, a female, was analysed (the same number of words were used), in order to check the most striking results obtained from M1's utterances. The major part of the investigation concentrated on an acoustic analysis of word prosody, although a perception test was also conducted.

1. Introduction

Research on Mongolian prosody is in its early stages, having actually started only recently. The purpose of this investigation is to generalise the acoustical patterns of trisyllabic words and discuss the placement or phonetic nature of word-stress.

2. Acoustic analysis

2.1. Method

According to the position of quantity in trisyllabic words, I have categorised these words into eight types: short-short-short (S-S-S), short-short-long (S-S-L), short-long-short (S-L-S), short-long-long (S-L-L), long-long-long (L-L-L), long-long-short (L-L-S), long-short-long (L-S-L) and long-short-short (L-S-S). One hundred and eighty-eight trisyllabic words were selected based on these eight types, and taking the Mongolian phonemic system into account. Each word was read in a carrier sentence '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 that the vowel of the first syllable is longer than the second and third (the vowel duration of the second and third syllable is very close) for the S-S-S type, its durational ratio (the average for three speakers as a %) being 48:26:26. A long vowel is always longer than a short one for the S-S-L and S-L-S types and their durational ratios were 34:19:47 for the S-S-L type and 30:51:19 for S-L-S. The long vowel of the second syllable is longer than the third for the S-L-L type, the durational ratio being 26:40:34. The long vowels of the first syllables are always longer than the others for the L-L-L, L-L-S, L-S-L and L-S-S types, their average durational ratios being 46:28:26 for the L-L-L type, 55:30:15 for the L-L-S type, 55:12:33 for the L-S-L type and 66:18:16 for the L-S-S type.

2.2.2. F0 pattern

I have categorised the following two patterns for the position of the highest point: 1) the 'L-H-L pattern' (the second syllable is highest), which occurs in the S-L-S, S-L-L, L-L-L, L-L-S, L-S-L and L-S-S types; 2) the 'L-L-H pattern' (the third syllable is highest), which occurs in the S-S-S and S-S-L types; see Figure 2.

2.2.3. Intensity Pattern

The intensity patterns for trisyllabic words are somewhat complicated. According to Figs. 3a, 3b, and taking the position of the strongest point into account, I have categorised three patterns: 1) the 'S-W-W Pattern' (the first syllable is the strongest), which occurs in the L-L-L, L-S-L and L-S-S types; 2) the 'W-S-W Pattern' (the second syllable is the strongest), which occurs in the S-S-S, S-L-S and S-L-L types and 3) the 'W-W-S

Pattern' (the third syllable is the strongest), which occurs in the S-S-L type. It cannot be said which pattern the L-L-S type has, because the three speakers show three distinct patterns for this type.

3. Perception test

3.1. Experimental Subject

Altogether 30 subjects (aged about 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 primarily 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. I wanted to compare these three groups in order to observe stress judgement in listeners (a) with linguistic knowledge, (b) with no linguistic instruction and (c) with a different native language (Chinese, tone language).

3.2. 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 trisyllabic word belongs to the S-S-S, S-S-L, S-L-S or S-L-L type, the second syllable is stressed, but if it belongs to the L-L-L, L-L-S, L-S-L or L-S-S type, the first syllable has been perceived stressed.

4. Conclusions

The data for three speakers showed that: 1) the vowel in the first syllable is longer than the second and third for the S-S-S type, its durational ratio being 48:26:26. The long vowel is always longer than the short for the S-S-L and S-L-S types, their durational ratios being 34:19:47 for the S-S-L and 30:51:19 for the S-L-S type. The long vowel of the second syllable is longer than the third of the S-L-L type, its durational ratio being 26:40:34. The long vowels of the first syllables are always longer than the others for the L-L-L, L-L-S, L-S-L and L-S-S types, their durational ratios being 46:28:26 for the L-L-L type, 55:30:15 for the L-L-S type, 55:12:33 for the L-S-L and 66:18:16 for the L-S-S type. The three speakers show similar vowel durational ratios for trisyllabic words. 2) There are two kinds of F0 pattern: (a) the 'L-H-L pattern' (the second syllable is highest), which occurs in the S-L-S, S-L-L, L-L-L, L-L-S, L-S-L and L-S-S types, (b) the 'L-L-H pattern' (the third syllable is

highest), which occurs in the S-S-S and S-S-L types. 3) There are three kinds of intensity pattern: (a) the 'S-W-W Pattern' (the first syllable is strongest), which occurs in the L-L-L, L-S-S and L-S-L types, (b) the 'W-S-W Pattern' (the second syllable is strongest), which occurs in the S-S-S, S-L-S and S-L-L types and (c) the 'W-W-S Pattern' (the third syllable is strongest), which occurs in the S-S-L type. The pattern of the L-L-S type cannot be determined, because the three speakers show three different patterns for this type. 4) The evaluations of the three groups show that: (a) the placements of stress depend on the vowel quantity patterns in that if a trisyllabic word belongs to the S-S-S, S-S-L, S-L-S or S-L-L type, i.e., if it has a short vowel in the first syllable, the second syllable will be stressed, and if a trisyllabic word belongs to the L-L-L, L-L-S, L-S-L or L-S-S type, i.e., if it has a long vowel in the first syllable, the first syllable will be stressed. (b) If a word belongs to the S-S-S or S-S-L type, i.e., if it has short vowels in the first and second syllables, then duration will not be used to indicate stress, but F0 will. F0 might assume a more important role in stress judgement in the case above. (c) If a word belongs to the S-L-S or S-L-L type, then F0 and intensity can be used to indicate stress. Since Mongolian is a quantity language, duration cannot be used freely as word-stress correlates. It cannot be said which one might assume a more important role in stress judgement. (d) If a word belongs to the L-L-L or L-L-S type, i.e., if it has long vowels in the first and second syllables, then the role of F0 in stress judgement will not be apparent, although duration and intensity may be used to indicate stress. (e) If a word belongs to the L-S-L or L-S-S type, then duration cannot be used freely as word-stress correlates, although intensity may be used to indicate stress. 5) 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. 6) 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.

5. References

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- Harnud, H., 2003. *A Basic Study of Mongolian Prosody*. Publications of the Department of Phonetics, University of Helsinki, Series A, 45.

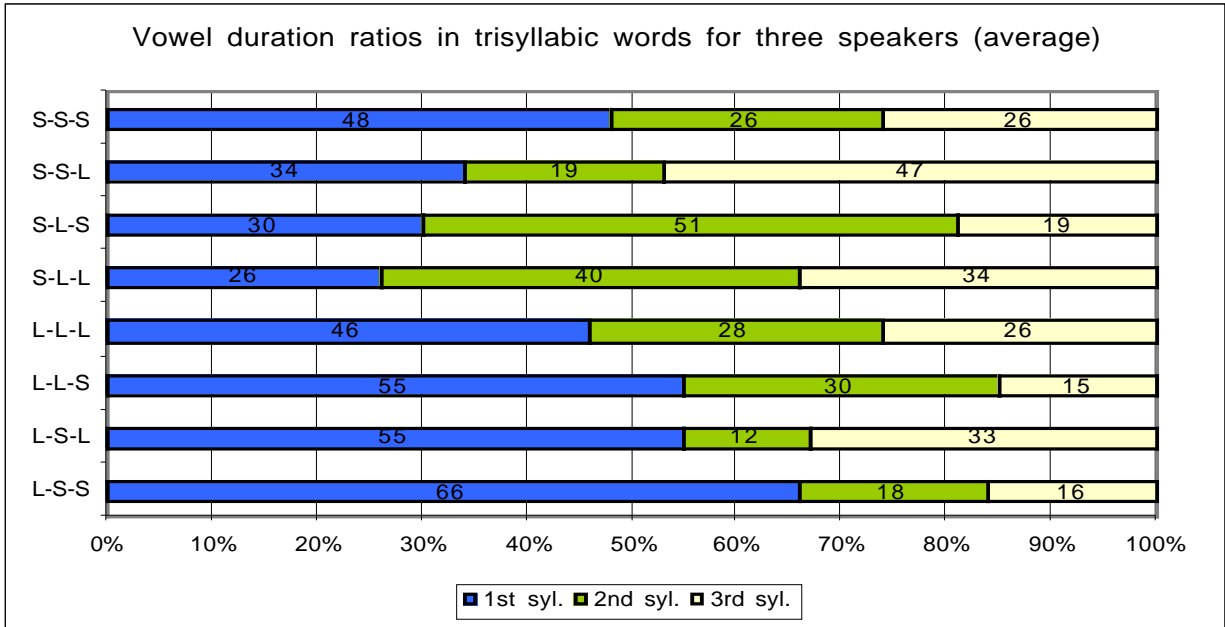


Figure 1. Vowel durational ratios of trisyllabic words for three speakers.

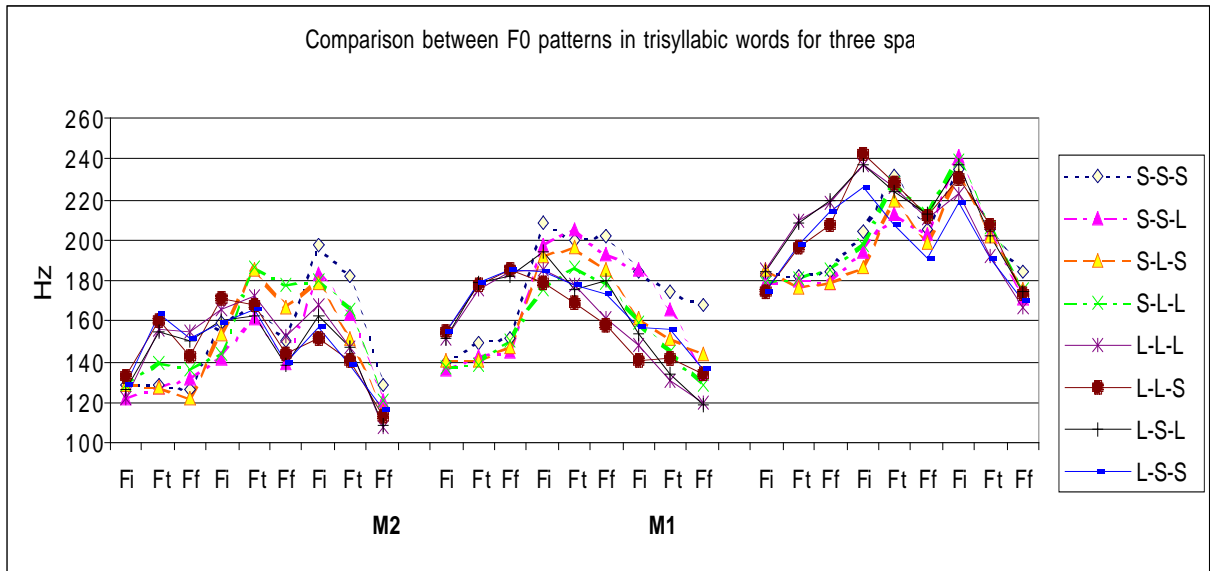


Figure 2. Comparison between F0 patterns of three speakers.

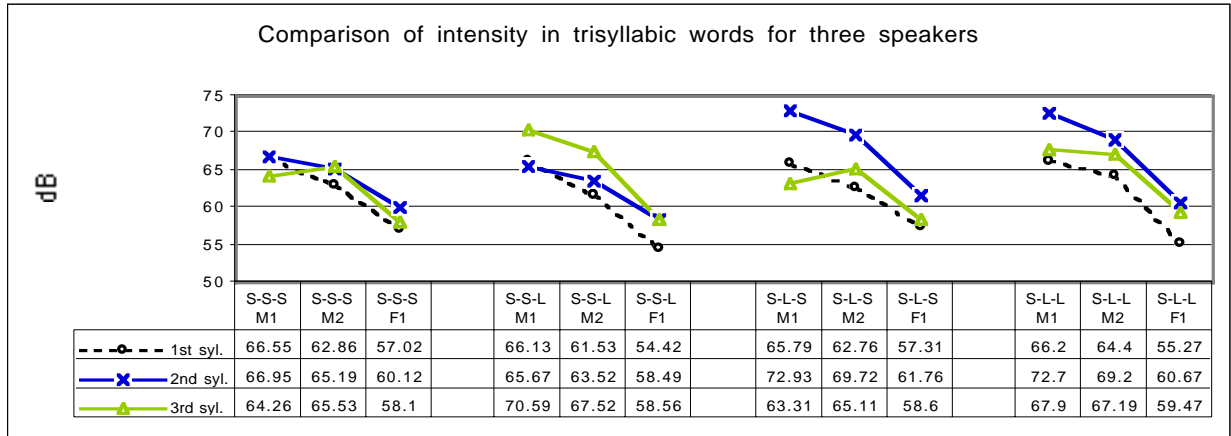


Figure 3a. Comparison between intensity patterns of three speakers.

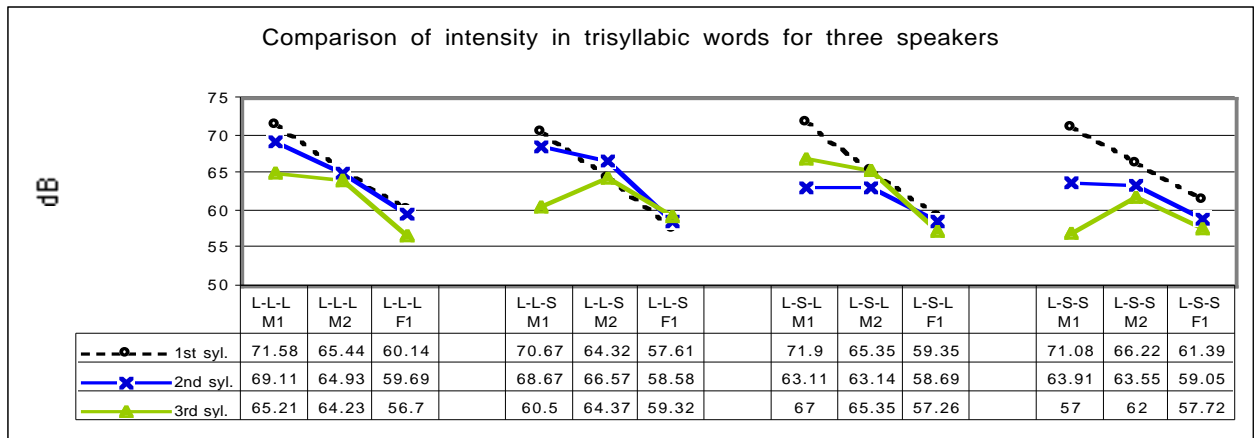


Figure 3b. Comparison between intensity patterns of three speakers.

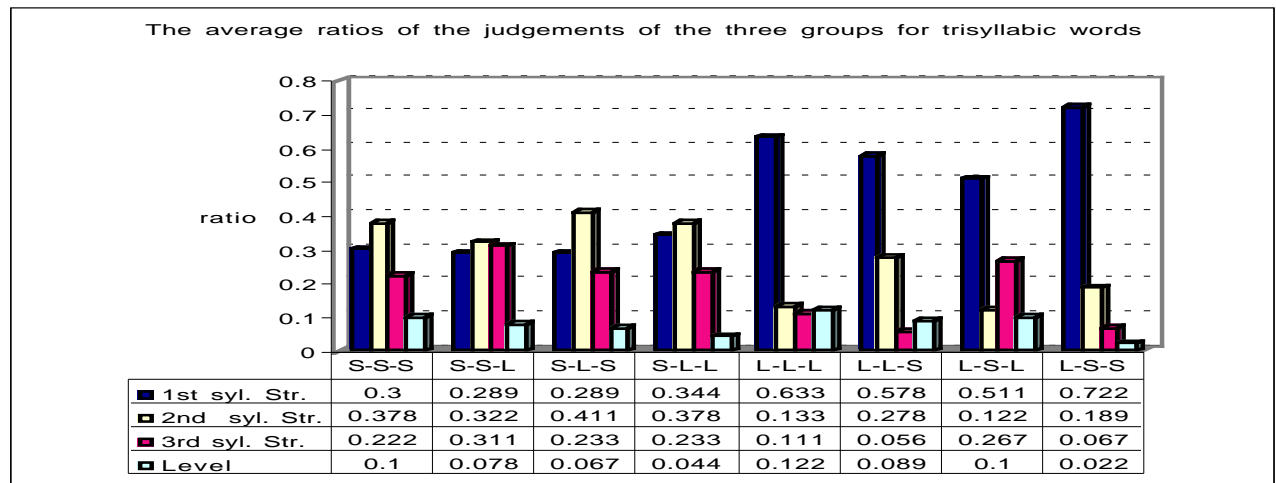


Figure 4. Results of the perception test.