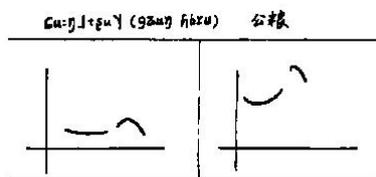




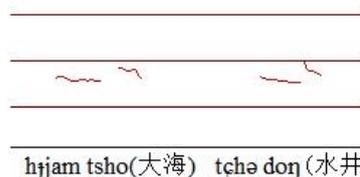
placement is a phenomenon that still needs to be accounted for using modern phonological methods. This paper represents an attempt to further this discussion by providing a more detailed exploration of the phonological properties of Tibetan stress systems.

## 2. A pitch-based system of second syllable stress in nominal words

In non-tonal Tibetan languages, relative pitch is used to express word-level prosody in disyllabic words. The distribution of stress is governed by different patterns for nominals (e.g., nouns, adjectives, numerals) and predicates (e.g., verbs, adverbs, verb object phrases). Disyllable nominals have a “low-high” pattern, in which initial syllables are produced with a lower pitch than second syllables. Disyllabic predicate words display the exact opposite pattern of “high-low”, in which the “musical stress”, or relative high pitch, occurs on the initial syllable, followed by a low pitch on the second syllable. Meanwhile, in tonal Tibetan languages tone sandhi patterns in disyllable nominal words follow a similar organizational principle as that which organizes the distribution of nominal musical stress in non-tonal languages: in the absence of conditions to trigger a low pitch, the default pitch of second syllables in disyllabic nominal is high. As a comparison between the results of phonetic experiments for Lhasa Tibetan (Hu et al. 1982:38) and Amdo Tibetan (2003/2004) makes clear, the tone sandhi pattern of tonal Tibetan languages and the musical stress pattern of non-tonal Tibetan languages follow identical principles. Caplow’s (2009) phonetic experiments demonstrated the same organizational symmetry of tonal and non-tonal languages’ respective nominal prosodic systems, consequently making it possible to reconstruct a second syllable stress system for nominal words in Proto-Tibetan.



Hu et al. (1982) Lhasa tone (male/female)



Atsok (2003) Pitch in Amdo Tibetan (‘ocean’/ ‘drinking well’)

Beginning with Liberman (1975) and Liberman and Prince (1977), stress has come to be commonly understood as a system of relative phonological prominence. From this perspective, both the second syllable musical stress of nominal disyllables in non-tonal Tibetan languages as well as tonal Tibetan languages’ pattern of “default” high pitch on the second syllable of nominal disyllables can be understood as a the expression of phonological prominence through relative pitch. In both systems, relative high pitch expresses prosodic prominence, or stress.

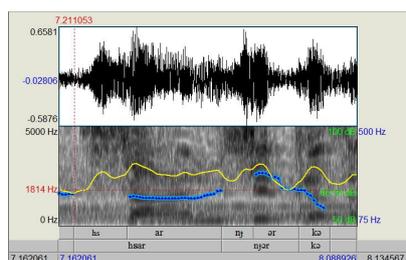
Nonetheless, the problem is not quite this simple. There is ample evidence suggesting that from Proto-Tibetan to the modern dialects, in addition to the well documented “high pitch second syllable” system, there also exists an “initial syllable stress” system that operates in disyllabic nominal words.

## 3. Some indicators of an independent initial syllable stress system in modern Tibetan languages

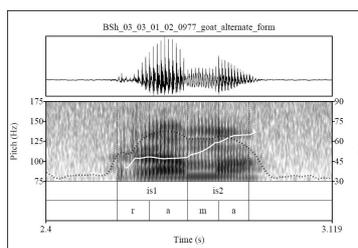
Using Amdo Tibetan as an example, there are many indicators to support an analysis of a second independent stress system operating in disyllabic nominals in which the initial syllable is stressed:

- 1) In addition to above-described second syllable musical stress system, the word-level prosody of disyllabic nominals is also characterized by the following pattern: initial syllables are always produced with greater duration and greater intensity, while final syllables are produced with shorter duration and less intensity. This property of long initials syllables and short second syllables was illustrated by the experimental result described in Hu et al. (1982) and Atsok (2003).
- 2) When nouns or pronouns bear emphatic stress or occur before a case marker or other modifier, then the difference in duration between long first syllables and short final syllables is even greater.

The spectrograms below illustrate the acoustic properties of both stress systems operating simultaneously.



Amdo Tibetan /hsar njər/ ‘news’



Caplow (2009:93) /ra ma/ ‘goat’

he left spectrogram is an excerpt from a recording of a Qinghai Tibetan Television Broadcast and shows that

the Amdo Tibetan word /hsar n̄ər-kə/, consisting of the noun /hsar n̄ər/ ‘news’ and the case marker /-kə/, comprises a single prosodic word with three syllables. The highest pitch, the accent, falls on the second syllable, which is also the final syllable of the word ‘news’. However, the duration of the initial syllable is twice that of the two following syllables. The intensity of the first syllable is also considerably greater: the magnitude (the average vibration amplitude multiplied by duration) of the first syllable is 2.1 times greater than that of the following syllables. In fact, Caplow (2009) provides similar examples, including the spectrogram on the right which illustrates the acoustic properties of the Balti word /ra ma/ ‘goat’: the pitch of the second syllable is also notably higher than on the first syllable, yet the first syllable is longer with an average intensity level that is considerably greater than that of the second syllable.

Furthermore, Amdo Tibetan exhibits the following features, which further support an analysis of initial syllable stress:

- 1) Final syllables of disyllabic nominals are highly prone to sound change and phonological weakening. Examples of this phonological tendency are abundant.
- 2) In nomad dialects of Amdo Tibetan, the phonetic correlates of emphatic focus are concentrated on the first syllable in nominal words to such an extent that the normal pattern of second syllable musical stress might be reversed, resulting in a relatively higher pitch on the first syllable.
- 3) The prosodic structure of disyllables includes “consonant harmony”, a pattern by which the onsets of second syllables assimilate with the consonant codas of initial syllables.
- 4) The final syllable position of disyllables is the location of affixes. Tibetan is a suffixing language, in which the majority of multimorphemic words—be they nouns, verbs or adjectives—are composed of lexical roots and suffixing grammatical morphemes. Of course, in many languages affixes and grammatical markers can bear stress, but in Tibetan, affixes and grammatical markers overwhelmingly tend to be phonologically weak. The combination of lexical root+suffix is naturally more conducive to a prosodic pattern of “strong-weak” rather than “weak-strong”.

#### 4. Evidence in support of a “strong initial” nominal stress system in Old Tibetan

As was described above, we agree with the analysis that nominals in Old/Proto-Tibetan had a musical stress prosodic structure in which second syllables had a higher pitch relative to initial syllables. At the same time, there is evidence that Old Tibetan also had a prosodic system of “strong initials” in disyllabic nominals.

- 1) Final syllables are especially prone to undergoing sound changes, a phenomenon that has been researched by numerous authors over the years.
- 2) Consonant harmony, especially in the case of disyllabic words formed by lexical roots and suffixes, occurs in which final syllable onsets assimilate to initial syllable codas.
- 3) Tibetan is characterized by strong suffixing typological features. Duola et al. (2015:83) performed statistical analysis on 1,200,000 syllables from dictionary sources and found that the five most frequent syllables were morphological suffixes, *-pa*, *-ba*, *-ma*, *-pai* and *-po*, which together compromised 11.77% of the entire syllable inventory. When we consider that Tibetan has a large number of case markers and other grammatical morphemes, we can see that proportion of affixes to independent words is relatively high. Even considering that the sources for the syllables in the inventory were all modern dictionaries, we are aware that standard literary language is closely derived from Old Tibetan.
- 4) Some other forms of evidence include traces of cognate Sino-Tibetan morphophonological structures, such as the way that abbreviations are formed, etc.
- 5) Even though musical stress follows a “low-high” alternation, stress is not necessarily incompatible with a non-high pitch. Logically, both low and high pitch can express phonological prominence. Both Atsok (2005) and Pema Lhundru (2007) both analyze Amdo Tibetan as having a strong initial stress pattern. Bing Li et al. (2010, 2011, 2012) analyze Mongolian, Oroqen and Sibe as all having a word-level stress system in which stress is expressed by a “stable low pitch”.

However, if we adopt the position presented by Atsok (2012), then we analyze Old Tibetan and modern Tibetan nominals as having both a “low-high” musical stress system and, at the same time, we also believe that Proto-Tibetan, Amdo Tibetan and other non-tonal Tibetan languages also have a “strong initial”, **dynamic stress** system. In other words, we are arguing that a language may have two independent word-level stress systems, which, furthermore, possess opposite patterns of distribution for prominent and non-prominent elements. This analysis is not easily explained.

Of course, there are previous reports of languages with multiple word-level stress systems. Remijse (2002) conducted phonetic experiments and phonological analysis to demonstrate that Ma’ya has this kind of prosodic structure. Similarly, Poppe (1965) proposed that a dual stress system (a **dynamic stress** and a **musical tone**) is a hallmark of Altaic languages. However, this kind of analysis continues to await a proper phonological explanation.

## 5. Conclusion and discussion

In order to account for the above-described phenomena, we propose a hypothesis that the two stress patterns are operating at two different levels of prosodic structure. The primary points of this argument are as follows:

- 1) The two stress patterns exhibited in Tibetan—“musical stress” and “dynamic stress”—operate on different levels of the prosodic hierarchy. The phonological properties of disyllabic musical stress indicate an underlying prosodic foot structure. The phonological properties of the dynamic stress pattern indicate an underlying prosodic word structure.
- 2) Not only do both stress systems operate on different levels of the prosodic hierarchy, but they also follow different distributional patterns, manifested in disyllables: in the “strong second” pattern, stress is assigned to the right-most element; in the “strong initial” pattern, stress is assigned to the left-most element.
- 3) Both stress systems make use of different phonetic correlates to express prosodic prominence: the “strong second” foot-level system employs relative pitch to express prominence, while the “strong initial” word-level system makes use of duration as a primary phonetic correlate and intensity as a secondary phonetic correlate. In other words, the systems differ as to whether or not they make use of relative pitch to express prominence.
- 4) Owing to the fact that the structures of the standard prosodic foot and the typical prosodic word are both disyllables, disyllabic nominals display both stress systems because a disyllabic nominal is both a prosodic foot and a prosodic word.
- 5) If a single disyllable displays both kinds of stress, but the location of prosodic prominence is different for each system (as is the case with nominals), then there is a stress clash, making it unclear which element of the disyllable is prominent. This problem is avoided in Tibetan, however, because the different stress systems make use of different phonetic correlates, allowing them to express slightly different functions (marking different prosodic units).
- 6) On one hand, because the two systems operate independently, during historical processes of change, they might possibly have driven change in different directions. On the other hand, because both stress systems can occur on the same element of a disyllable, it also seems likely that the two systems have influenced each other over the course of historical development.

Regardless of whether or not Tibetan stress can be analyzed as having a “strong final” pattern for nominals and a “strong initial” pattern for predicates, this kind of pitch-based prominence in Tibetan represents an important prosodic marker, indicating boundaries between feet. According to McCawley’s (1970) description of a basic rhythmic unit being a foot consisting of two syllables, one of which is prominent, the “low-high” alternation in Tibetan, especially non-tonal varieties, fits the definition of a classic rhythmic foot language.

In Tibetan, the rhythmic pitch property of prosodic feet is particularly apparent; while the dynamic stress system of prosodic words is less obvious, becoming most apparent in nominal constructions that involve emphatic focus or case markers. That the intensity system is the level at which emphatic focus is expressed conforms to our understanding of prosodic hierarchy in which prosodic words form intonational phrases. This is to say that, when an intonational phrase is subject to emphatic emphasis, the prominent elements within the phrase, i.e. the stressed elements of prosodic words, are made even more prominent. Because of this, we can say that the underlying “nuclear stress” of prosodic words is phonetically emphasized via intensity to express focus.

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