

## Lexical stress in Chukchansi Yokuts

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Lexical stress in Chukchansi has never been studied in any detail. In the following paper, I illustrate Chukchansi stress as a weight-sensitive language. I explain stress in a simple, two-step hierarchy; first, if a long vowel is present, whether in penultimate or antepenultimate position, it is stressed. If no long vowel is present, stress by default falls on the penultimate syllable. A realignment of syllable weight to include CVV syllables as the only heavy syllables in Chukchansi, but not CVC or CV, explains the stress shift from the default penultimate position to the antepenultimate position. Finally, two native speaker intuition tests lend support for the aforementioned conclusion.

### 1 Background

#### 1.1 Phoneme inventory

Chukchansi is classified as a mutually intelligible dialect of Yokuts. In regards to phonetics a more accurate account of Chukchansi (which had the benefit of utilizing modern technology) is given in Martin (2011). The following phoneme inventories (Tables 1 and 2) are taken from that aforementioned study (albeit with slight modifications).

Table 1: Chukchansi consonant inventory

Phoneme	Bilabial	Dental	Alveo-palatal	Velar	Glottal
voiceless unaspirated	p	t	ɕ	k	ʔ
voiceless aspirated	p <sup>h</sup>	t <sup>h</sup>	ɕ <sup>h</sup>	k <sup>h</sup>	
ejective	p'	t'	ɕ <sup>h</sup> '	k'	
voiceless fricative		s		x	h
nasal	m	n			
glottalized nasal	m'	n'			
approximant	w	l	j		
glottalized approximant	w'	l'	j'		

Table 2: Chukchansi vowel inventory

short	ɪ	e	ɜ	o	u
long	i:	e:	ɜ:	o:	u:

The distinction between short and long vowels is important in regards to stress and will be discussed in further detail in the following sections. The high-front vowel has been traditionally transcribed as /i/, including in Martin (2011), however it is more accurately characterized as a near-front unrounded vowel /ɪ/.<sup>1</sup> The long version of this vowel, however, is undoubtedly a close-front unrounded vowel /i:/.

<sup>1</sup>/ɪ/ should be regarded as a phoneme, not a variant of /i/. In some environments, especially preceding a glottal stop, /ɪ/ appears to allophonize to [i].

The use of /ɜ/ is adopted from Martin (2011) to replace the less accurate low-vowel symbols /a/ or /ɑ/, although I retain [ɑ] in the /aw/ diphthong.

## 1.2 Speakers & data collection

Chukchansi is a moribund variety of Yokuts (similar to other Yokuts varieties). At the time of this study (2010–2012) only two native (i.e., first-language) speakers could be confirmed. Both speakers, who are sisters, were the language consultants for this study. Though only two speakers are immediately known, they both claim “a few more [Chukchansi speakers] exist.” This dearth of language consultants limits the current study, though this often is the nature of fieldwork with endangered languages.

Both sisters, named “Holly” [born 1941 in Coarsegold] and “Jane” [born 1943 in Madera] currently live in Fresno, California, about 35 miles south of Coarsegold at the Picayune Rancheria of the Chukchansi Indians. The sisters acquired Chukchansi as a first language while living with their grandmother during childhood. They then acquired English when they entered elementary school at the age of 5 or 6 (Martin 2011). Similar to other Native American communities, English is the dominant and de facto language of not only Holly and Jane, but virtually all Chukchansi Indians. The sisters primarily speak English with each other and with all others around them.

The entirety of the data used for this study is primary. I elicited the majority of the recorded data on numerous occasions at *California State University, Fresno* (CSUF) with the language consultants. A sizeable number of recordings used in this study came from Isaac Martin. The majority of the data is composed of lists of words recorded in isolation, three times. Most word classes (nouns, verb [paradigms], adjectives and adverbs) were recorded. A Chukchansi translation of Aesop’s fable *North Wind and the Sun* was also used as data.

The majority of the words used for this study are in citation form, with the exception of the recording of *North Wind and the Sun*. An attempt was made to record a narrative (i.e., more “naturalistic” data), spoken between the sisters, but this has proved incredibly difficult for various reasons (the personalities of the consultants, language fluency, comfort levels, etc.).

All the recordings, except the ones from Martin (2011), which were recorded at the Picayune Rancheria, were recorded at *California State University, Fresno*. The elicitations mentioned above, save the *North Wind and the Sun* recording, produced a corpus of 141 words. Once the words were recorded, they were then phonemically transcribed in IPA (*International Phonetic Alphabet*) format and analyzed. The recordings took place in a sound-proof booth at CSUF between the fall of 2010 and fall 2011. As mentioned earlier, the words used for elicitation were culled randomly from the *Bilingual English-Chukchansi* dictionary (3rd ed.). Subsequent elicitations, however, included words with certain phonological forms that were lacking in earlier elicitations. For example, an elicitation in the fall of 2011 focused primarily on words with the high-back vowel /u/ in the final syllable.

Aside from *North Wind and the Sun*, each of the 141 words recorded were recorded in isolation with three tokens being produced for each word. The reason for this was the emphasis on lexical stress. The recording of sounds in carrier sentences, it was felt, would add the extra and unwanted (possible) dimension of higher-level stress (i.e., phonological phrase and utterance level stress).

## 1.3 Literature review

Existing academic research on Chukchansi is slim; not much scholarly research has been done on Chukchansi Yokuts, much less stress in Chukchansi. The most systematic linguistic analysis of Chukchansi taken up thus far has been by T.L. Collord who wrote a general grammar of the language in 1968. Within the grammar, the only reference to stress is:

In a word uttered in isolation three intensities of stress can be detected. Primary stress is on the penultimate syllable and, as a rule, is accompanied by a higher pitch than preceding syllables. A secondary stress is found on the closed syllables (non-penult) with pitch if following

primary stress elsewhere. Non-penultimate open syllables are weakly stressed with pitch following primary stress and about the same pitch as surrounding syllables elsewhere. It must be borne in mind that these features characterize the isolated word of *two or more syllables*, and they do not necessarily hold true in longer utterances. (Collord 1968)

Stress has also been briefly investigated in other Yokuts languages. In Yawelmani (Yowlumne) Stanley Newman (1944) similarly concluded that stress is *mainly* on the penultimate syllable. The vast majority of scholarly research on Yokuts has been on the Yawelmani dialect. Since Stanley Newman's early research on Yawelmani in the early- and mid-20<sup>th</sup> century, virtually all research on Yokuts has been about the language's rich morphophonology. If stress is mentioned in any of these studies, it is only to give background to the language. However, no original research on stress is presented and it is "assumed" that stress is on the penultimate syllable, following both Newman and Collord.

The last couple of years have seen a proliferation of original data on the Chukchansi dialect. Two theses, Guekguezian (2011) and Martin (2011) are rich in original data, with the former about prosodic morphology and the latter a phonetic overview of the Chukchansi vowel space. Both theses follow the literature in assuming penultimate stress.

## 2 Explaining Chukchansi stress

### 2.1 Stress at the prosodic level

The prosodic, or phonological word in Chukchansi consists of strong and weak feet in which the head of the strong foot attracts primary stress. In a typical Chukchansi word, which can vary from one to five syllables, one primary stress is used while secondary and tertiary stress is presumable. However, the focus of this paper is on primary stress.

Stress in Chukchansi can be simply explained in a hierarchy in which syllables that contain a long vowel are automatically stressed over any other syllable. If no long vowel is present, the stress falls on the penultimate syllable. Though Chukchansi has a rich morphology, inflection has no effect on stress (i.e. stress is not sensitive to the language's morphology).

As mentioned above, Chukchansi distinguishes between long and short vowels. A large amount of Chukchansi words that are at least disyllabic contain one and only one long vowel. Of the words that have a long vowel, stress automatically falls on the long vowel syllable. Example (1a-c) illustrates this:

- (1) a. gosneeno'hiy            /gos.'ne:.noʔ.hij/  
       *kitchen*
- b. teesa'hi'                /'te:.fʒʔ.hiʔ/  
       *lizard*
- c. boyiida'                /bo.'ji:.dʒʔ/  
       *chick*

Long vowels will occur in the penultimate or antepenultimate syllables only. Of the recorded corpus, no long vowels have been found to occur in any other position outside of the penultimate or antepenultimate positions. The reasons surrounding the omission of long vowels in syllables outside the penultimate and antepenultimate will be explained below.

Following the primary ranking of long-vowel stress, penultimate stress follows. Many words in Chukchansi do not contain long vowels in which case stress automatically falls on the penultimate syllable. Example (2) below illustrates this:

- (2) kalwansa /k<sup>h</sup>ʒl.wʒn.sʒ/  
pumpkin

The fact that long vowels tend to already occur in penultimate position leads to primary stress overwhelmingly occurring on the penultimate syllable.

## 2.2 Antepenultimate stress

As the data in the preceding section show, primary stress is confined to mainly the penultimate syllable. So how is antepenultimate stress then accounted for? A simple explanation of Chukchansi as a quantity-sensitive language (see below) suffices. To resolve this issue, the main stress will shift to the antepenultimate, CVV syllable. Take the following, (3) and (4), as examples of antepenultimate stress:

- (3) shopeeyanaw /ʃo.'pe:je.naw/  
ʃo ('pe:) (je.naw)  
Wednesday

- (4) hihiina /hi.'hi:nʒ/  
hi ('hi:) (nʒ)  
owl

The first syllable in (3), /ʃo/, contains one mora ( $\mu$ ) while the second, antepenultimate contains a long vowel (CVV) and thus contains two morae. The last bracketed foot, /je.naw/ contains two morae as each syllable is light and contains one mora.<sup>2</sup> A moraic breakdown appears below in (5) and (6):

- (5) shopeeyanaw  $\mu(' \mu \mu)(\mu)(\mu)^3$
- (6) hihiina  $\mu(' \mu \mu)(\mu)$

Many APU-stressed words, however, contain penultimate and ultimate syllable structures that are CVC. Therefore it is important to briefly explain the Chukchansi syllable. According to Guekguezian (2011), CVC syllables are considered bimoraic and thus heavy. Therefore a word like *aapulkat* /'ʔʒ:pul.kʒt/, should moraicly break down as follows:

- (7) aapulkat  $*(' \mu \mu)(\mu \mu)(\mu \mu)$

However, if this were the case (that CVC syllables are indeed bimoraic and thus heavy), we would have stress clash, as the APU and PU syllables are both heavy. If this was the case (that all three syllables are indeed heavy), we would not be able to explain APU stress.

A more accurate analysis should be to consider CVV heavier than CVC since only a CVV syllable attracts stress off the penultimate syllable. This falls in line with the *Khalkha* criterion (Gordon 1999a) that states that CVV is heavy but CVC is not.<sup>4</sup> In languages like Khalkha, Telugu and Chickasaw there is a

<sup>2</sup>Though many languages (cp. Hawaiian, Fijian) treat a diphthong in a syllable as bimoraic, I suggest it be treated as monomoraic. Therefore, the only bimoraic syllable in Chukchansi is CVV (containing a long vowel). See following section.

<sup>3</sup>No extrametricality exists in Chukchansi as there appears to be no rule of consistently leaving the first (or last) syllable unfooted.

<sup>4</sup>According to Gordon 1999a, the Khalkha criterion is one of two main distinctions of weight in most languages. The other criterion, known as the Latin criterion, treats *both* CVV and CVC as bimoraic and heavy.

three-way hierarchy in which CVV is heaviest, followed by CVC and CV (Gordon 2002). By reexamining Chukchansi weight to make CVV heavier than CVC, we could explain the stress shift from the PU syllable to the long-vowel containing APU syllable. Therefore *aapulkat* more accurately breaks down as:

- (8)        *aapulkat*                    ('μμ)(μ)(μ)

The reanalysis of the Chukchansi syllable to consider CVV as the only heavy syllable explains the stress shift from the default, penultimate position to antepenultimate position. This makes Chukchansi a quantity-sensitive language.

### 2.3 Quantity-sensitive in Chukchansi

The data above naturally lead to the fact that Chukchansi is a quantity-sensitive language—a language in which every heavy syllable receives stress (Hayes 1985). Conversely, in this type of system, light syllables, or monomoraic syllables in Chukchansi, tend to resist stress. As noted above, no light syllable in the penultimate position is stressed if and only if a heavier (bimoraic) syllable is around.

Guekguezian lists the surface forms of Chukchansi syllables as CV(X) with “X” either being a long vowel in a CVV syllable or a coda in a CVC syllable (though not \*CVVC which violates \*SUPERHEAVY). Onsetless syllables and complex onsets and codas are not to be found. Onsets of course add no weight to the syllable. In stark opposition to Guekguezian (2011) I argue that codas do not add weight; in a CVC syllable the coda shares a mora with the preceding vowel.

Underlyingly, Chukchansi syllables can contain either long or short vowels. This phenomenon, as Guekguezian states, “must be shortening of an underlying long vowel to satisfy the CVX maximum, not lengthening of an underlying short vowel in an open syllable.” The violation of (or permitting of) \*SUPERHEAVY would result in a \*CVVC syllable and the possibility of having more than one long vowel per Chukchansi word. What logically follows is the possibility of two bimoraic, heavy CVV syllables (as a coda is not moraic)<sup>5</sup> in one word, which would then result in stress clash. This could be illustrated in a hypothetical (and ungrammatical) word like (9) below:

- (9)        \*goobkoolo                    \*/go:b.ko:.lo/  
              STRESS CLASH            → \*/μμ.μμ.μ/

Therefore, it can be argued that the shortening of underlying long vowels in closed syllables, as observed by Guekguezian, is (at least partly) due to the avoidance of \*SUPERHEAVY, which could lead to two bimoraic syllables in a single word and thus stress clash.<sup>6</sup>

Although it appears as if diphthongs exist in Chukchansi, /aj/ /ɪw/ /ɑw/ /ew/ /ej/ /ij/, these digraphs should be analyzed as having a short-vowel rhyme as they are more accurately characterized as a (short) vowel followed by a glide consonant (making them fit a CVC syllable structure). These Chukchansi digraphs do not appear to be restricted to any syllable and often tend to monophthongize in many environments. The fact that they do not attract stress from the penultimate syllable, unlike a long vowel, and that

<sup>5</sup>Though Guekguezian considers \*CVVC in Chukchansi as violating the bimoraic syllable maximum, I consider syllable nuclei and not codas as projecting morae. Though codas can project morae, it is only in cases where long vowels are *not* present. It is (controversially) claimed that certain dialects of Dutch ignore vowel length for weight purposes. However, it is also claimed that the long vowels in question are not actually long, but tensed (van Oostendorp 2000). Furthermore, Archangeli (1991) and Zoll (1993), both consider morae to dominate only vowels and not codas in Yawelmani, a much-studied Yokuts language.

<sup>6</sup>This claim is subjectively stated as it is possible that in this hypothetical situation, in which CVVC is permitted in Chukchansi, that a CVVC syllable surfaces in a word without another heavy (i.e. bimoraic) syllable, thus avoiding stress clash (cp. \*/go:b.lo/). In fact, a couple of words have been elicited that are indeed CVVC: [ʃi:f.wɪ.lɪt] “was embarrassed” and [mɜ:l.deʔ] “sticks tongue out” (Guekguezian 2011). Note that only one long vowel appears in each word, however.

they fit a typical CVC syllable structure are reasons to be considered oblivious to stress. Furthermore, many examples exist of words that contain both CVV syllables and CVC syllables (-VC being a diagraph) as in *shopeeyanaw* /ʃo.'pe:je.naw/, *sawaadanaw* /sɜ:.wɜ:.dɜ:.naw/ and *yuk'shuusha'hiy* /juk'.ʃu:.ʃɜʔ.hij/. In these words, stress is on the heavy, long-vowel syllable. Therefore, Chukchansi syllable weight can finally be summarized in the following table:

Table 3: Syllable weight

	Morae	Example	Moraic structure
CVV	μμ	<i>yaate</i> /'jɜ:.te/	/'μμ.μ/
CVC	μ	<i>yukshut</i> /'juk.ʃut/	/'μ.μ/
CV	μ	<i>k'ebesh</i> /'k'e.bes/	/'μ.μ/

The preceding table illustrates the moraic breakdown of each Chukchansi syllable. As mentioned above, diphthongs do not appear to exist in Chukchansi. The digraphs /aj/ /ɪw/ /aw/ /ew/ /ej/ /ij/ should be analyzed as -VC syllables and therefore light.

## 2.4 Native speaker intuition

Native speaker intuition is highly valuable in studies of stress. During two separate recording sessions, one of the two informants was asked about her intuition of stress placement. After she was given a fundamental definition of stress and how native speakers of a language “figure out” stress by way of a certain technique (i.e. pencil tapping), she proceeded to confirm the above findings. Out of a total of 21 common Chukchansi words tested (as opposed to “test words” discussed below), she correctly identified the stress in all 21 words.

Another native speaker intuition task involved the repetition of authentic Chukchansi words by a non-Chukchansi speaker (myself). The words were spoken with stress on different syllables and the native speaker was asked to determine which token sounded more “native” or “accurate.” The words in this task are listed in the Table 4:

Table 4: Authentic Chukchansi test words

Test word	Spoken Tokens	
aabula	/'ɜ:.bu.lɜ/	✓
	/ɜ:.'bu.lɜ/	
	/ɜ:.bu.'lɜ/	
baabas	/'bɜ:.bɜs/	✓
	/bɜ:.'bɜs/	
nopol	/'no.pop/	✓
	/no.'pop/	
sawaadanaw	/sɜ:.wɜ:.dɜ:.naw/	✓
	/sɜ:wɜ:.'dɜ:.naw/	
	/sɜ:wɜ:.dɜ:.'naw/	

The checkmarks (✓) represents the token selected by the native speaker as being the most “native” or “accurate” sounding. Each token selected by the native speaker was the token with correct stress (i.e. stress on the PU syllable or APU that contains a long vowel).

It is important to note that even though a non-Chukchansi speaker spoke each word, the phonology of each word was accurate (i.e. Chukchansi phonemes that conformed to Chukchansi syllable structures (CV, CVC, or CVV) see above). Furthermore each token of each word was produced (and thus heard) twice. When requested by the native speaker, the tokens were replayed.

However, the most concrete evidence comes from the “test words” utilized during the second session. Twelve words were created that either conformed to Chukchansi phonology or did not. The words that did not conform to Chukchansi phonology, which are marked by an asterisk, included long vowels in syllables outside the antepenultimate or penultimate syllables. The words are included in the following table:

Table 5: Fictional Chukchansi test words

Test word	Speaker approximation
*aabadoxbu	/ʔ3.b3.'dox.bu/
beebeshuto	/bi.bes.'hu.to/
shatoo	/'ʃ3:tu/
xooshutoshu	/xo:tu.so:fu/ <sup>7</sup>
kokoko	/ko.'ko.ko/
shashusha	/ʃ3.'ʃu.ʃ3/
sumsutu	/sum.'su.tu/
tatata	/t3.'t3.t3/
shufaadi	/su.'f3:di/
baababa	/b3.'b3.b3/ <sup>8</sup>
shafuda	/s3.'fu.d3/
shafida	/ʃ3.'fi.d3/

A quick look at the speaker approximations shows that the phonology in the test words, when in contrast to the speaker’s native phonology, was violated. The long vowels in the words \*aabadoxbu, \*beebeshuto and \*shatoo are all in violation as they exist outside the PU or APU syllables. When approximated, the long vowels were either shortened, as in /ʔ3.b3.'dox.bu/ and /bi.bes.'hu.to/, or metathesized as in /'ʃ3:tu/. These three approximations all conform to Chukchansi phonology discussed in this chapter. These three examples, plus the example of *xooshutoshu*, clearly illustrate the aforementioned violation of long vowels in any syllable outside of the PU or APU. Unsurprisingly, but extremely important for the current study, stress was either on the CVV syllables or the PU syllables for each approximation as the transcriptions show.

The non-asterisked words all conform to Chukchansi phonology. The reason for their inclusion is simple; to test which syllable would be stressed when the words were approximated. Again unsurprisingly the non-asterisked test words provide solid evidence of the two-step hierarchy of stress mentioned in this chapter. With a couple of minor (and unimportant) phonetic differences in *shufaadi* and *shafuda* (/s/ for /ʃ/), stress is either on the CVV or the PU syllable.

Also of note is the vowel lengthening of the PU /u/ in /s3.'fu.d3/. However it is important to show that the final vowel is not lengthened. This example could be indicative of the overwhelming tendency to stress a PU syllable (i.e. a stress “overextension”).

<sup>7</sup>The speaker had great difficulty with this word. It was effectively produced as two separate words, i.e. a large break was taken between the 2<sup>nd</sup> and 3<sup>rd</sup> syllables. This explains why the transcription above illustrates two long vowels in a word. A more accurate way to transcribe what was spoken by the speaker is: /'xo:tu/ /'so:fu/. In this formalism, which more accurately represents what was spoken, Chukchansi phonology is unsurprisingly not violated.

<sup>8</sup>Though *baababa* conforms to standard Chukchansi phonology, the word was produced three times as /b3.'b3.b3/. A likely reason for this may simply be a misreading of the test word.

### 3 Conclusion

In conclusion, stress in Chukchansi can be understood as occurring defaultly on the penultimate syllable, which in the majority of words is the heaviest syllable (as the majority of long vowels surface in the penultimate syllable). Long vowels sometimes surface in the antepenultimate syllable, which would cause stress clash if fixed penultimate stress occurred. To avoid stress clash however, stress shifts to the heavy, antepenultimate syllable. Languages that are averse to stress clash, like Chukchansi are languages that are sensitive to weight. Long vowels (i.e. heavy syllables) do not occur in every Chukchansi word, but when they do, they are always stressed. No heavy vowel in a Chukchansi word is unstressed. Further evidence comes from native speaker intuition. Three separate tasks further illustrate that stress indeed obeys the two-step hierarchy discussed above.

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