

Stress Shift Accompanying Verb Suffixation in Gujarati

Chenchen Wang

1 Introduction

Gujarati is an Indo-Aryan language primarily spoken in the state of Gujarat in Northwest India. It has approximately 45 million speakers as of the 2001 census. Stress in Gujarati has attracted much interest among linguists. Gujarati is a synthetic agglutinative language, which has a systematic and extensive suffixation system (UCLA Materials). Suffixes can be applied one after the other, with new suffixes affixing to previous ones. Examining Gujarati suffixation provides an opportunity to shed more light on Gujarati stress by allowing observation of how stress shifts during suffixation.

Type 1 Gujarati causatives and passives are derived by suffixation to the verb roots, which can be further suffixed to derive additional verb forms such as second causatives (Cardona 1965:114–118). The causative suffixes are *-av*, *-aḍ*, *-ḍav*, *-v*, and *-eḍ*. The passive suffix is *-a*. In these causatives and passives, three types of root alternations can occur (Cardona 1965:112): (i) *v*-epenthesis: *v*, which has two allophones [w] and [v], is inserted before the suffix if the word ends in a vowel or [h̃]; (ii) *α*-reduction: the [α] in the last syllable of the root is replaced by a [ə] if the suffix has an [α]; and (iii) *ə*-deletion: [ə] of the final syllable of the root is deleted if the suffix starts with a vowel.

This paper examines root alternations accompanying suffixation in Type 1 Gujarati causatives and passives and their relation to stress shift. It shows that in these causatives and passives, Gujarati maintains a well-defined stress pattern.

2 Data and Analysis

Data were collected from a fluent heritage speaker of standard Gujarati and were analyzed using Praat.

2.1 *v*-epenthesis

The following are examples of *v*-epenthesis observed in the data. For causatives, (1) shows the insertion of *v* after a root-final vowel, while (2) shows the insertion of *v* after a root-final [h̃]:

- (1) a. [ˈkʰɑ] (‘eat’) vs. [kʰəvˈdɑv] (‘feed’)
b. [ˈpi] (‘drink’) vs. [pivˈdɑv] (‘cause to drink’)

- (2) [ˈnɑh̃] (‘bathe’) vs. [nəh̃vˈdɑv] (‘bathe’ (transitive))

For passives, the word pairs in (3) show the insertion of *v* after a root-final vowel, while the word pair in (4) shows the insertion of *v* after a root-final [h̃]:

- (3) a. [ˈkʰɑ] (‘eat’) vs. [kʰəvˈɑ] (‘be eaten’)
b. [ˈpi] (‘drink’) vs. [piˈvɑ] (‘cause to drink’)

- (4) [ˈnɑh̃] (‘bathe’) vs. [nəh̃ˈvɑ] (‘be bathed’)

2.1 *α*-reduction

Examples of *α*-reduction in the data are shown in (5):

- (5) [ˈkɑp] (‘cut’) vs. [kəˈpɑv] (‘cause to cut’) vs. [kəˈpɑvḍɑv] (‘cause to cause to cut’) vs. [kəˈpɑ] (‘be cut’)

Table 1 below shows the F1 and F2 of the vowels of each syllable of words in (5). The formant values are extracted from the spectrograms shown in Fig. 1.

	['kɑp]	[kə'pɑv]	[kə'pɑvɔɑv]	[kə'pɑ]
1 st syllable	913 1438	568 1308	667 1231	660 1265
2 nd syllable		697 1248	785 1270	664 1268
3 rd syllable			747 1427	

Table 1: F1 (Hz) and F2 (Hz) of words in (5).

The spectrograms of these words are shown in Fig. 1(a-d) below:

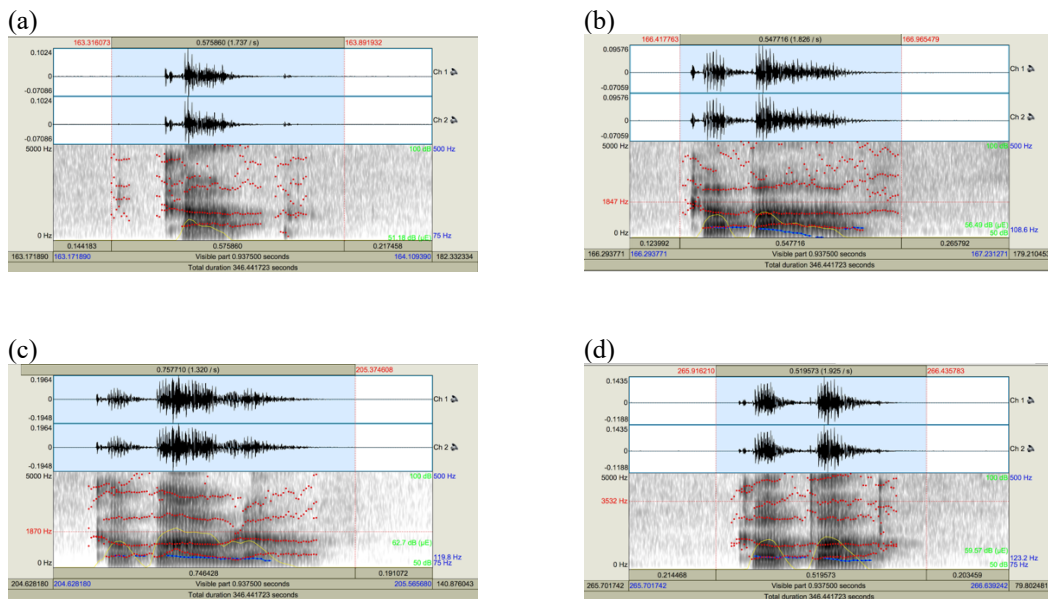


Fig. 1: Spectrograms of (a) ['kɑp] ('cut'); (b) [kə'pɑv] ('cause to cut'); (c) [kə'pɑvɔɑv] ('cause to cause to cut'), and (d) [kə'pɑ] ('be cut'). Red: formant contour; blue: pitch contour; yellow: intensity contour.

Although a majority of the causatives and passives in the dataset underwent α -reduction, the collected dataset contains one pair of words which are clearly inconsistent with the α -reduction rule: in (6) ['ɑv] ('come', F1=780Hz) vs. [ɑ'vɑ] ('be come', F1=1001Hz).

(6) ['ɑv] ('come') vs. [ɑ'vɑ] ('be come')

Table 2 shows the F1 and F2 values, vowel lengths, pitch, and intensity. Intensity and pitch are extracted in a region close to the peak intensity. This exception case will be further discussed in conjunction with stress.

		F1 (Hz)	F2 (Hz)	Vowel length (sec)	Intensity (dB)	Pitch (Hz)
[ʻav] ('come')		780	1354	0.27	67	120
[aʻva] ('be come')	1 st syllable	1001	1472	0.17	68	123
	2 nd syllable	707	1338	0.22	67	125

Table 2: F1 and F2 of words in (6).

2.2 ə-deletion

The deletion of ə in causatives is shown in (7):

- (7) a. [səʻmædʒ] ('understand') vs. [səmʻdʒav] ('explain')
 b. [sāʻbʰə] ('hear') vs. [səmʻbʰav] ('tell')

For passives, the deletion of ə is shown in (8):

- (8) [šiʻkʰəv] ('teach') vs. [šiʻkʰva] ('be taught')

The word pair in (9) shows that ə-deletion is not applied to monosyllabic roots:

- (9) [ʻləkʰ] ('write') vs. [ləkʰʻva] ('be written')

The spectrograms of words in (7a) are shown in Figs. 2(a-b) below.

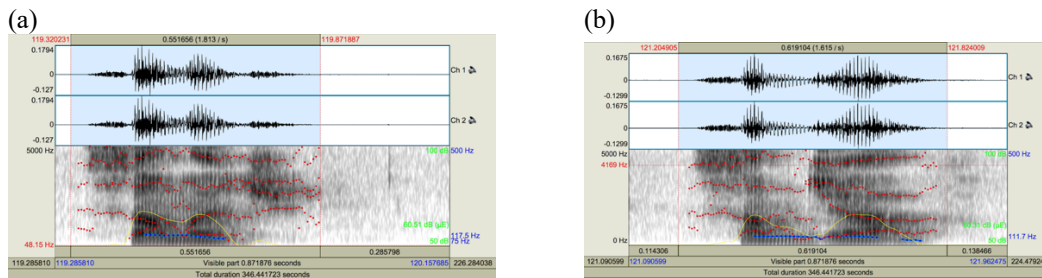


Fig. 2: Spectrograms of (a) [səʻmædʒ] ('understand'); and (b) [səmʻdʒav] ('explain').

2.4 Stress

The Type 1 causatives and passives of Gujarati provide an excellent opportunity to observe phonological processes accompanying the suffixation process. The data showed that suffixation causes the stress to shift to the suffixes in both causatives and passives. It is shown that in these causatives and passives, Gujarati maintains a well-defined stress pattern, i.e. the ultimate syllable in di-syllabic words and the penultimate syllable in tri-syllabic words, by shifting the stress to the suffix.

The stress pattern was also investigated in connection to the corresponding root alternations by examining parameters relating to stress, i.e., intensity, pitch, and vowel length (Ladefoged and Johnson 2011:111). Table 3 shows these parameters for words in (5).

	['kəp]	[kə'pəv]		[kə'pəvɖəv]			[kə'pə]	
		1 st syl	2 nd syl	1 st syl	2 nd syl	3 rd syl	1 st syl	2 nd syl
Intensity (dB)	61	62	63	64	68	55	65	67
Pitch (Hz)	undefined	120	113	128	121	und.	129	124
Vowel length (sec)	0.19	0.08	0.20	0.08	0.15	0.13	0.10	0.2

Table 3: Intensity, pitch, and vowel length of words in (5).

The data indicate that both α -reduction and ə -deletion correlate with stress shift to suffixes. This may be the motivation for these two of the root changes. For example, α -reduction is a well-known process to de-stress the syllable (Ladefoged and Johnson 2011:109-110, Crosswhite 2018).

This is further supported by the observation that although [a] is often somewhat reduced in many suffixes (see above section), i.e., having F1 close to [ə], the lengths of these vowels are usually longer than the root vowels. A longer vowel is known as the most reliable thing for a listener to detect a stressed syllable (Ladefoged and Johnson 2011:111). The stress shifts were achieved by both α -reduction of the roots and the longer suffix vowels. In this regard, the word pair that was inconsistent with the α -reduction rule, i.e., (6), may not be inconsistent with the stress pattern observed in Type 1 causatives and passives in that in [a'və], the second syllable has a longer vowel length (see Table 2).

ə -deletion is a common phonological process in Indo-Aryan languages. Previous studies show that ə -deletion is influenced by the stress environment (Ryu and Hong 2013). In the data collected here, ə -deletion seems to be motivated by the stress shift. For example, in [səm'dʒəv] (see (7a)), the deletion of the second schwa generates a disyllabic word with the stress on the second syllable. If the schwa is not deleted, the word becomes trisyllabic with stress falling on the ultimate syllable. Such a stress pattern is not common to Gujarati.

In order to examine if the stress continues to shift to the last syllable, addition of the second suffixes in second causatives and passives of causatives are also examined. As the examples in (13) show, the second suffixes do not further shift the stress.

- (13) a. [kə'pəvɖəv] ('cause to cause to cut')
 b. [kə'pəvə] ('be caused to cut')

These results further support the finding that in the context of verb alternations relating to the causative and passive suffixations, Gujarati maintains stress on the ultimate syllable in a 2-syllable word or on the penultimate syllable in a 3-syllable words.

Data on some disyllabic words that are not derived through verb suffixation show that the stress patterns observed in conjunction with causative and passive suffixation are not a universal stress pattern in Gujarati causatives and passives. For example, the data in (14) shows that stress is often on the first syllable:

- (14) a. ['mənki] ('swift mare')
 b. ['səyəm] ('control')
 c. ['səvəd] ('dialogue')
 d. [səŋ'kiə] ('numbers')

3 Summary

The results show that in the context of suffixation in causatives and passives, Gujarati, by shifting the stress to the suffixes, maintains a well-defined stress pattern, i.e., the ultimate syllable in disyllabic words and the penultimate syllable in tri-syllabic words. The corresponding root alternations are consistent with this observation.

References

- Cardona, George. 1965. *A Gujarati Reference Grammar*. Philadelphia: University of Pennsylvania Press.
- Crosswhite, Katherine. 2018. *Vowel Reduction*. Reading presented at Seminar in University of Chicago, Chicago. URL <http://washo.uchicago.edu/seminar/crosswhite-reduction.pdf>.
- Ladefoged, Peter, and Keith Johnson. 2011. *A Course in Phonetics* (6th ed). Belmont, CA: Wadsworth.
- Ryu, Na-Young, and Sung-Hoon Hong. 2013. Schwa deletion in the conversational speech of English: The role of linguistic factors. *Linguistic Research* 30(2):313–333.
- UCLA Language Materials Project. Profile of. URL <http://www.lmp.ucla.edu/Profile.aspx?LangID=85&menu=004>. Retrieved June 2, 2018.

Department of Linguistics
University of California, Los Angeles
Los Angeles, CA 90095-1543
acwang@ucla.edu