

A voicing rule for non-continuant obstruents in Thebo Tibetan

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Voicing alternation and the function of Tibetan verbal prefixes are two problems that have attracted scholars of Tibetan and Sino-Tibetan linguistics for over a century. This article presents a voicing rule in Thebo Tibetan and systematically analyzes the verb paradigm to explain the constraints for this rule and its apparent exceptions. The latter part of this article analyzes the evolution of the verbal paradigm from Old Tibetan to Thebo, using a model based on exceptions, sound laws, and analogy, and proposes the derived direction of the irregular verbal alternations in Thebo. The main contribution of this study is to provide additional evidence in solving the enigma of directionality for voicing alternation in Tibetan.

Keywords: Tibetan, Thebo, G-yi.ba, verbal morphology

1. Introduction

Scholars of Tibetan and Sino-Tibetan linguistics have been attracted to the intricacies of Tibetan verbal morphology for over a century. Several articles have approached this topic (Uray 1953; Zhang 2009; Hill 2014; Jacques 2021). Among others, a point of disagreement between scholars is the directionality of voicing alternation. Shefts-Chang (1971) proposed that the derived direction of voicing alternation was from voiced to voiceless, while Jacques (2012b; 2021) argues that the direction of derivation is the opposite, using the Thebo Tibetan (hereafter Thebo) examples provided in Sangsrgyas Tshering (2020) for evidence. Bialek (2021), in a rejoinder to Jacques (2021), agrees with the directionality but has raised doubts, questioning the reliability of the voicing rule in Thebo. This rule was first presented in Sangsrgyas Tshering (2020), providing several examples of the voicing rule that supported Coblin's Law and shedding light on the directionality of voicing alternation in Tibetan. The present article provides a fuller account of phonetic conditioning to ascertain the reliability of this sound

law. Furthermore, we propose that analogy can explain exceptions to this voicing rule, which supports Jacques' argument that the diachronic directionality in Tibetan is from voiceless to voiced.

In modern Tibetic languages, the loss of the prefix consonant in Classical Tibetan (hereafter CT) tends to affect the initial consonant and tone of the syllable.¹ If the initial consonant is voiced and without a prefix, the initial consonant tends to change to a voiceless consonant; if the initial consonant is a voiced and with a prefix, the initial consonant tends to remain voiced (e.g. in Kami, Chirkova 2014; Cone, Jacques 2014; Ridang, Yang 2019, among others). Sangsrgyas Tshering was the first scholar to demonstrate the ability of *b- to voice non-continuant obstruents that follow it by showing the existence of this phenomenon in the Thebo language. He analyzes this voicing rule as a very early phonological change, probably occurring in Pre-Tibetan, supporting Coblin's (1976) internal reconstruction. Scholars (e.g. Jacques 2014; Hill 2019, etc.) have long held that all modern Tibetic languages have descended from the same protolanguage, which is Common Tibetan, and that the period of Common Tibetan is earlier than Old Tibetan. The existence of uvulars in Common Tibetan reflects pre-Old Tibetan phonological contrasts (Sun 2003; Huang 2012; Jacques 2014).² This voicing rule is the first discovered case of a sound change in a modern Tibetan dialect that is more archaic than Old Tibetan.

This article consists of seven sections. §2 introduces the phonology of Thebo. §3 exhaustively lists all examples of the voicing rule in Thebo. §4 specifies the constraints on this rule as a response to the doubts expressed by Bialek (2021). §5 lists some exceptions and provides possible explanations. §6 examines the irregular alternation of all verbs with a ⟨b-⟩ prefix in the past tense in Thebo, using analogy to infer the direction and order of derivation. The end of §6 also discusses unexplained forms. Finally, §7 presents a conclusion to this article. In comparison with Sangsrgyas Tshering (2020), this article provides more examples of the voicing rule and, for the first time, examines the irregularity of verb alternation in Thebo, and infers the relative chronology of some of the sound changes in Thebo.³

1. We have chosen to use the term *prefix consonant* over the term *preinitial* to emphasize the historical morphological properties of these consonants. Preinitial is also a valid term, but it emphasizes the synchronic phonological properties of these consonants.

2. Although Hill disagrees with the opinion that Common Tibetan is earlier than Old Tibetan, he agrees that Common Tibetan is the ancestor of all modern Tibetic languages.

3. The Thebo data in this article is from Thebo native speaker Sangsrgyas Tshering and includes data modified from Sangsrgyas Tshering (2020). If not otherwise stated, all the conjugations of Classical Tibetan verbs in this article are from Hill (2010a).

Throughout this article, the CT transliteration follows Wylie (1959) except for the substitution of ⟨ʻ⟩ with ⟨v⟩. We enclose CT transliterations in obtuse angle brackets ⟨ ⟩ to avoid ambiguity with acute angle brackets < >, which we use for indicating sound change directionality.⁴

2. Thebo phonology

The Thebo language is spoken in the Thebo (*Diěbù Xiàn* 迭部縣; also “Thewo”, Tournadre 2014) County of Kanlho Tibetan Autonomous Prefecture (*Gānnán Zàngzú Zìzhì Zhōu* 甘南藏族自治州) in Gansu Province (*Gānsù Shěng* 甘肅省) and the Thebo District (*Tiěbù Qū* 鐵布區) of Mdzod.dge County (*Ruòèr Gài* 若爾蓋) in the Rngaba Tibetan and Qiang Autonomous Prefecture of Sichuan Province. It is spoken along the Bailong River (*Báilóng Jiāng* 白龍江) and is divided into the Upper (⟨the.bo.stod⟩, *Shàngdié* 上迭) and Lower Thebo (⟨the.bo.smad⟩, *Xiàdié* 下迭). Thebo is an area of high linguistic diversity, and the intelligibility between Tibetic varieties spoken in this district, such as G-yi.ba (*Yīwā* 益哇) and Ridang (*Luòdà* 洛大), is very low. Apart from Sangsrgyas Tshering (2020), previous studies of the Thebo Tibetan languages include Lin (2014), which describes Thebo’s synchronic and diachronic phonology in detail. Renzeng Wangmu has also published several articles on several Tibetic languages spoken in Thebo (Renzeng Wangmu 2010; 2011; 2013). Of which Renzeng Wangmu (2013) provides data on three dialects spoken in Thebo County, namely Ltingka (also Stengka; *Diàngǎ* 電尕), Bangtshang (*Wàngzàng* 旺藏) and Ridang Townships.

Lin (2014) described two dialects of two communes in Upper Thebo, G-yi.ba and Tshong.ru (*Chóngěr* 崇爾鄉). The dialects of these two communes are similar, with a high rate of mutual intelligibility, differing only slightly, for which Lin has taken detailed note. The voicing rule occurs not only in Thebo but also in the majority of dialects in Upper Thebo. More specifically, a whole area where Tibetic languages are spoken undergoes the voicing rule: the dialects spoken from G-yi.ba Lting.ka up to Kha.pa (*Kǎbà* 卡壩鄉) in Thebo County; Tshong.ru, (*Tiěbù Township* 鐵布鎮) in Ruòèrgài for which Lin (2014) has made detail descriptions.

4. Many scholars (see Sun 1986:112–115; Hill 2005a, 2009; Jacques 2012a) have debated the phonetic value of the mysterious letter ʻ : Jacques (2012a) sorted out the related discussion and offered a new transliteration system. In his system ʻ is transliterated as ⟨ⁿ⟩ or ⟨^h⟩. We choose to use ⟨v⟩ since “v” is a letter of the Latin alphabet that is still available for transliteration purposes, as mentioned by Balk (2005), and does not reflect its phonetic value. We hope that our transliteration choice will avoid this controversy, which is irrelevant to this paper.



Figure 1. The dialects of Thebo

The phonological system of the Thebo variety discussed in this article is almost identical to Lin (2014).

2.1 Syllable canon

All the prenasals of complex initials are homorganic with the initial consonant (the second consonant). The only possible coda is the glottal stop /ʔ/. In a syllable, the only indispensable phoneme is the vowel; vowels are necessary for a syllable, but consonants can be present or absent. Since Thebo has contrastive short and long rhymes, we analyze the long rhymes as occupying two slots.⁵ Thus, the syllable structure can be summarized as $(^n)(C)V(V)(ʔ)$. The optional onset has a maximum of two consonantal slots, followed by two vowel slots. The farthest right-hand edge of the syllable only permits a glottal stop.

2.2 Initials

Thebo has forty-six initial phonemes, forty are simplex initials, and six are complex. There is only one type of complex initial, the prenasalized initial. Consonant phonemes in Thebo represent seven distinct places of articulation and six distinct manners of articulation. Table 1 lists Thebo consonant phonemes according to

5. *Slots* according to Gussenhoven & Jacobs (2017: 163), “are not immediately associated to their syllables, but are dominated by structural positions, known as (skeletal) slots, which encode segment duration.”

place and manner of articulation. Thebo stops and affricates contrast in voicing; voiceless consonants have aspiration contrast, and voiced stops and affricates have prenasalization contrast.⁶

Table 1. Thebo initials

| Bilabial | Labio-dental | Alveolar | Retroflex | Alveolo-palatal | Velar | Glottal |
|-------------------|--------------|-----------------------|---|-----------------------|-----------------------|---------|
| p, p ^h | | t, t ^h | | | k, k ^h | ʔ |
| b, ⁿ b | | d, ⁿ d | | | g, ⁿ g | |
| | | ts, ts ^h | tʂ, tʂ ^h | tɕ, tɕ ^h | | |
| | | dz, ⁿ dz | dʒ, ⁿ dʒ | dʒ, ⁿ dʒ | | |
| | | s, s ^h , z | (ʂ ^h ^a) ^b | ɕ, ɕ ^h , z | x, x ^h , ɣ | h |
| m | | n | | ŋ | ŋ | |
| w | ʋ | r | | j | | |
| | | l, ɭ | | | | |

a. /ʂ^h/ does not have its unaspirated counterpart. However, considering its aspirated phonetic realization and the symmetry of the initial system, we prefer this narrow transcription.

b. Parentheses indicate marginal phonemic status.

Lin (2014) does not include the phonemes /b/ and /ʂ^h/ in her phonological system, but we have found minimal pairs for these two phonemes in Thebo, as shown in Table 2.

Table 2. Minimal pairs of initials

| Thebo | Gloss | Thebo | Gloss |
|---|--------------------|---------------------|----------------|
| /b – p – ⁿ b/ | | | |
| /ba:/ | ‘stick’ (PST) | /buʔ/ | ‘pierce’ (PST) |
| /pa: ^H / | ‘photo’ | /puʔ/ | ‘a pair’ |
| / ⁿ ba:/ | ‘be on fire’ (PST) | / ⁿ buʔ/ | ‘a drill’ |
| /ʂ ^h – x ^h / & /ʂ ^h – ɕ/ | | | |
| /ʂ ^h a/ | ‘good’ | /ʂ ^h ɛʔ/ | ‘to dry’ (PST) |
| /x ^h a/ | ‘meat’ | /ɕɛ: ^H / | ‘speak’ (PST) |

Lin (2014) considers /h/ a marginal phoneme and provides the only two examples she has found. However, we found more examples of /h/, as shown in Table 3.

6. Except for the glottal stop /ʔ/. Since the articulation mechanism is the cyclic *closed-open-closed* movements of the glottis, it is impossible to have a voiced or aspirated glottal stop (Stevens 1998:42). Although Bickford & Floyd (2006:25) indicate the existence of aspirated glottal stops, they also write that “no known language uses an aspirated glottal stop word initially”.

Table 3. Examples of /h/

| CT ^a | Thebo | Gloss | Thebo | Gloss |
|-----------------|------------------------|--------------|------------------------|-----------------------------------|
| ⟨lung⟩ | /hũ/ | ‘drop’ (PRS) | /heʔ/ | ‘envy’ |
| ⟨lham⟩ | /hõ/ | ‘shoes’ | /ho i/ | ‘brass brazier’ |
| ⟨lhags.pa⟩ | /haʔ pa ^H / | ‘wind’ | /ho lə ^L / | ‘container for alcohol’ |
| ⟨ha.las⟩ | /ha le: ^L / | ‘surprise’ | /he ya/ | ‘breath’ |
| ⟨hur.rus⟩ | /hə ri: ^L / | ‘strive’ | /ha saʔ ^H / | ‘fabric similar to Tibetan serge’ |

a. We have yet to identify CT cognates for the examples in the right-hand column.

The fricatives in Thebo contrast in voicing; voiceless fricatives are further distinguished by aspiration. However, /ʂ^h/ and /h/ do not have a voiced counterpart. /h/ also does not have an aspirated counterpart, and /ʂ^h/ does not have an unaspirated counterpart. Since aspirated fricatives have higher markedness than unaspirated fricatives, it is typologically unusual that only the aspirated retroflex fricative /ʂ^h/ exists without its unaspirated counterpart. The phoneme /ʂ^h/ has marginal phonemic status since it occurs infrequently. In Amdo (Hua & Long 1993), ⟨sra⟩ ‘good’ is pronounced as /ʂa/ and has the same meaning and similar sound in Thebo. The word ⟨bsres⟩ ‘stir’ is pronounced as /ʂe/ in Amdo and has the same meaning and similar sound in Thebo. These two examples are evidence of the influence of Amdo on Thebo and the potential origin of the phoneme /ʂ^h/.

Table 4. Examples of /ʂ^h/

| CT | Thebo | Gloss | Thebo | Gloss |
|---------|---------------------|------------|---------------------------------------|-------------------------------------|
| ⟨sra⟩ | /ʂ ^h a/ | good | /ʂ ^h ε:/ | ‘big’ ^a |
| ⟨bsres⟩ | /ʂ ^h ε:/ | stir (PST) | /ʂ ^h aʔ ʂ ^h aʔ/ | ideophone: ‘the rustle of friction’ |

a. Only used to modify particulate matter nouns.

2.3 Rhymes

The analysis of the Thebo vowel system, presented in Table 5, differs from that of Lin (2014).

Table 5. Thebo rhymes

| Short | Long | Checked | Nasalized |
|-------|-------|---------|-----------|
| | i: u: | iʔ uʔ | ĩ ü |
| e ə o | e: u: | eʔ uʔ | ẽ õ |
| | ε: | εʔ oʔ | ẽ õ |
| a | a: | aʔ | ã |

Lin's (2014) analysis presents only a two-way contrast of nasalized back vowels, which are /ũ/ and /õ/, but we verify a three-way contrast in our present research, with minimal pairs shown below:

- (1) ⟨sgong⟩ /gũ/ 'make round'
 ⟨rgum⟩ /gõ/ 'birdseed'
 ⟨sgang⟩ /gã/ 'hummock'

The vowel /o/ has an allophone [uo] which only occurs in syllables with non-bilabial initials and rhymes with a glottal stop final, as illustrated below:

- (2) PST ⟨bkab⟩ /goʔ:[guoʔ] 'cover (wok)'
 IMP ⟨khob⟩ /k^hoʔ:[k^huoʔ]
 PST ⟨btab⟩ /doʔ:[duoʔ] 'sow'
 IMP ⟨thobs⟩ /t^hoʔ:[duoʔ]

When /ɛ:/ occurs after non-nasal consonants, the consonant is palatalized, and a /-j-/ is inserted before /ɛ:/, for instance:

- (3) PST ⟨bkal⟩ /gɛɛ:[gjɛɛ] 'load'

The regular reflex of ⟨-ong⟩ is /ũ/; but the reflex of the rhyme in ⟨song⟩ and ⟨yong⟩ is realized phonetically as a lower vowel /õ/.

- (4) ⟨song⟩ /s^hõ/ 'go'
 ⟨yong⟩ /jõ^L/ 'come'

2.4 A partial tone system: High versus low

Lin (2014) has reported that Thebo has a two-way register contrast, high versus low. The tones only contrast when the initial consonant is a sonorant or a voiceless unaspirated obstruent initial.⁷ The two tones are realized with different tone patterns depending on the word's rhyme type, as seen in Table 6.

7. Except for words descending from CT with the initials /h/ and ⟨lh⟩. The lack of tone for words with the initial /h/ is explainable since the mechanism of Tibetan tonal genesis is related to prefixes, and /h/ never takes a prefix; thus, there is no tonal contrast in Thebo for words with reflexes from the CT initial /h/. As for ⟨lh⟩, the actual phonetic value of the phoneme in Thebo is /l̥/, and thus, it is non-sonorant. In addition, the phoneme ⟨lh⟩ (/l̥/) does take a prefix (Hill 2019: 5).

Table 6. Thebo tones

| | Tone | High tone | Low tone |
|----------------|------|-----------|----------|
| Short/Checked | | 51 | 33 |
| Long/Nasalized | | 44 | 24 |

2.5 Conjunct forms

Jacques (2014) proposed the term *conjunct form* and defined it as a reflex occurring word-internally versus the *base form*, which occurs word-finally. In Cone Tibetan, some words have no coda in citation form, but a coda appears when followed by a suffix such as /-kə/. In Thebo, the opposite is the case. Stop finals directly descending from CT have become a glottal stop in Thebo. In Table 7, we can observe that the glottal stop final /-ʔ/, present word-finally, is lost word-medially. Stems whose vowels were the high vowels ⟨i⟩ or ⟨u⟩ in CT and whose codas were ⟨-g⟩ or ⟨-d⟩ lose their codas when followed by a syllable and the vowels are centralized, as seen in Table 7 and Table 8.

Table 7. Conjunct forms for words with stop codas

| CT | Thebo | Gloss |
|------------|---------------------------------------|-------------------------------|
| ⟨sdig⟩ | /diʔ/ | ‘sin’ |
| ⟨sdig.pa⟩ | /də pa ^H / | ‘sin’ |
| *⟨myid⟩ | /ŋi ^H / | ‘swallow’ (v.), ‘throat’ (n.) |
| *⟨myid.pa⟩ | /ŋə ^H ba/ | ‘throat’ |
| ⟨drug⟩ | /tʂu ^L / | ‘six’ |
| ⟨drug.cu⟩ | /tʂə ^L .təə ^H / | ‘sixty’ |
| ⟨khugs⟩ | /k ^b uʔ/ | ‘curve’ |
| ⟨khugs.pa⟩ | /k ^b ə pa ^H / | ‘curve’ |
| ⟨mdud⟩ | / ⁿ diʔ/ | ‘to knot’ |
| ⟨mdud.pa⟩ | / ⁿ də pa ^H / | ‘a knot’ |

Vowel centralization also occurs in the case of rhymes originating from stems with high vowels and nasal codas in CT. However, not all syllables of a CT source with nasal codas have such a conjunct form; only ⟨in⟩ and ⟨ung⟩ undergo this change. For instance, ⟨un⟩ does not have a conjunct form. Most verbs in the present tense with the environment of a high vowel following a coda ⟨-d⟩ or ⟨-g(s)⟩ undergo this

change. However, only several specific nouns can change in this manner; most of the nouns in the same environment remain unchanged.

Table 8. Conjunct form of words with nasal coda

| CT | Thebo | Gloss |
|--------------|---------------------------------------|------------------------------------|
| <drin> | /tʃi ^L / | ‘favour, kindness’ |
| <drin.chen> | /tʃə ^L tɕ ^b ɛ̃/ | ‘great favour, benefactor’ |
| <rdung> | /dõ/ | ‘hit, knock’ |
| <rdung.rgyu> | /də ^a dzə/ | ‘a thing used to strike something’ |

To avoid the influence of the conjunct form, we consider the verb at the end of a word or clause as its stem form. We consider the citation form or the form located at the end of a word to be the verb stem rather than the conjunct form as the original stem because the citation form corresponds more neatly to the CT form. At the same time, we can see from the examples in Tables 7 and 8 that the conjunct form has a specific pattern of sound change. Accordingly, we use the prohibitive form to extract the present verbal stem. For example, when a nominalizer is added to the verb /dõ/ ‘hit, knock’, it becomes /dẽ ndzə/ <rdung.rgyu> ‘a thing used to strike something’. Thus, we use the prohibitive form to extract the verb stem, as in /ma dõ/ ‘no hitting’, where the verb is in the final position, retaining the original form of the verbal stem.

3. The voicing rule for obstruents in Thebo

This section discusses Thebo verbal stems and the Thebo voicing rule.

3.1 Thebo verbal stems

Thebo verbs have at most three stems: past (PST), present (PRS), and imperative (IMP). Differing from CT, Thebo has lost the future stem. Furthermore, auxiliaries follow verbs at the end of a clause, and in those situations, the verb requires TAME auxiliaries to make it a complete verb.⁸ For this reason, before discussing the system of stem alternations, we begin by giving an introduction to predicate structure in Thebo Tibetan. Table 9 from Sangsrgyas Tshering (2023) shows a template for Thebo predicate structure.

8. Specifically for the imperative, which can occur as a conjugated stem without any imperative auxiliaries.

Table 9. Thebo auxiliaries

| Main part | | Final part | | |
|-----------|---------------------|-------------------------------------|--|--------------|
| main verb | perfect auxiliaries | progressive/ prospective markers | egophoric/ evidential/ modal markers | mood markers |
| V_m | (khə:)-V2 | (i)-V3 | E | M |

There are five slots in the predicate structure of a finite clause. V1 is filled by the semantic main verb of the predicate, and all types of verbs may fill this slot and cannot be left empty. V2 is the slot for perfect auxiliaries. The progressive marker or the prospective marker fills V3. E is filled by egophoric, evidential, and modal markers. Interrogative, exclamatory, and other mood markers (sentence final particle) occur in M. Example (5) illustrates the predicate structure of Thebo.

- (5) $\eta\epsilon^L$ te^L $dʒeʔ$ $t\ddot{u}^H=na^L$ k^ha na^H ja^H
 ISG.ERG DEM **spoil.PST** **PRF.NPST=PROS** **PROS.NEGO** **SFP**
 ‘Don’t blame me for breaking that.’ (Warning tone; literally: ‘I am about to break that.’)

3.2 The voicing rule

The voicing rule, which is the main focus of the present article, is illustrated by the examples in Table 10.⁹ When a preinitial ⟨b-⟩ is present in CT, the cluster ⟨bc-⟩ corresponds to a voiced stop initial in Thebo. Thus, the voiceless initial in CT becomes voiced in Thebo if a ⟨b-⟩ is present in CT, e.g. ⟨bk-⟩ > /g/. Sangsrgyas Tshering (2020) analyzed this robust correspondence as a voicing rule in Thebo.

Table 10. Voiced obstruents in Thebo

| CT | Thebo | CT | Thebo |
|--------------|-------|--------------------|-------|
| ⟨bk-⟩ | /g/ | ⟨bts-⟩ | /dz/ |
| ⟨bkr-⟩⟨bky-⟩ | /dz/ | ⟨ph-⟩ ^a | /b/ |
| ⟨bc-⟩ | /dz/ | ⟨phr-⟩ | /dz/ |
| ⟨bt-⟩ | /d/ | | |

a. We give details in §6 concerning irregularly aspirated consonants in the present tense.

9. This table only shows the correspondences that have undergone the voicing rule. For all correspondences, please check Appendix B, CT: Thebo correspondence.

This rule only applies to the phonemes that meet both [-continuant] and [-sonorant] features in Thebo.

Throughout Tables 11–16 (<bk->, <bkr->, <bky->, <bc->, <bt->, <bts->, <ph->, <phr->), the correlation between the preinitial consonant <b-> and the voicing of the initial consonant is clear.

Table 11. Correspondence for <bk->

| PRS | PST | FUT | IMP | Gloss |
|----------------------------|--------------|---------|---------------------------|---------------------|
| <! ^a vgog>/gaʔ/ | <bkag>/gaʔ/ | <dgag> | <khog>/k ^h uʔ/ | 'ward off' |
| <vgugs>/ ⁿ guʔ/ | <bkug>/guʔ/ | <dgug> | <khug>/k ^h uʔ/ | 'break off' |
| <vgog>/ ⁿ guʔ/ | <bkog>/guʔ/ | <dgog> | <khog>/k ^h uʔ/ | 'detach' |
| <!vgas>/ ⁿ ga/ | <bkas>/gɛ:/ | <dgas> | <khos>/k ^h e:/ | 'split (wood)' |
| <!vgengs>/gɔ̃/ | <bkang>/gɔ̃/ | <dgang> | <khong> – ^b | 'fill (water)' |
| <vgebs>/ ⁿ geʔ/ | <bkab>/goʔ/ | <dgab> | <khob>/k ^h oʔ/ | 'cover (wok)' |
| <!vgl>/ ⁿ ge:/ | <bkal>/gɛ:/ | <dgal> | <khoh>/k ^h e:/ | 'load' |
| <dgar>/ga:/ | <bkar>/ga:/ | <dgar> | <khor>/gu:/ | 'separate, isolate' |

a. The exclamation mark indicates that the CT stem does not correspond to the form in Thebo; § 5 and § 6 discuss the irregular correspondences of verbal alternations.

b. '–' refers to a word with no imperative form in Thebo. For the word 'fill (water)', the imperative is not expressed by a conjugated form but by the present form following an imperative auxiliary.

Table 12. Correspondence for <bkr-><bky->

| PRS | PST | FUT | IMP | Gloss |
|------------------------------|----------------|----------|-----------------------------|--|
| <vkhrud>/ts ^h iʔ/ | <bkrus>/dzi:/ | <bkru> | <khrus>/ts ^h iʔ/ | 'wash' |
| <!vgrel>/ts ^h i:/ | <bkral>/dze:/ | <dgrol> | <khrol>/ts ^h i:/ | 'unfasten' (TE) ^a 'explain' (CT) |
| <dgrong>/dzū/ | <bkrongs>/dzū/ | <dgrong> | <dgrongs> – | 'kill' (H) |
| <vgyog>/ ⁿ dzuʔ/ | <bkyags>/dzaʔ/ | <bkyag> | <khyog>/ts ^h uʔ/ | 'lift, raise' |

a. (TE) refers to the meaning of the word in Thebo.

In Table 13, the word /tɕ^huʔ/ <chogs> 'chop off' also can be pronounced as unaspirated /tɕuʔ/. The word <chod> 'chop off' also can be pronounced as /tɕeʔ/; pronounced as either aspirated or unaspirated.

Table 13. Correspondence for ⟨bc-⟩¹⁰

| PRS | PST | FUT | IMP | Gloss |
|---|---------------------------|-------------------------|--|---|
| ⟨gcog⟩/tɕu ^H / | ⟨bcag⟩/dzɑ [?] / | ⟨gcag⟩ | ⟨chogs⟩/tɕ ^h u [?] / | ‘smash’ |
| ⟨vjug⟩/ ⁿ dzɔ [?] / | ⟨bcug⟩/dzɔ [?] / | ⟨gzhug⟩ | ⟨chug⟩/tɕ ^h ɔ [?] / | ‘put in’ |
| ⟨gcod⟩/tɕe ^H / | ⟨bcad⟩/dze [?] / | ⟨gcad⟩ | ⟨chod⟩/tɕ ^h e [?] / | ‘chop off’ |
| ⟨vchos⟩/dze:/ | ⟨bcos⟩/dze:/ | ⟨bco⟩ | ⟨!chos⟩/dze:/ | ‘road building; road repairing’ (TE) ‘construct’ (CT) |
| ⟨vchu⟩/tɕ ^h ə/ | ⟨bcus⟩/dzi:/ | ⟨bcu⟩ | ⟨chus⟩/tɕ ^h i:/ | ‘scoop up’ |
| ⟨vching⟩/tɕ ^h ẽ/ | ⟨bcings⟩/dzẽ/ | ⟨bcing⟩ | ⟨chings⟩/tɕ ^h ẽ/ | ‘fasten (belt)’ |
| ⟨vchang⟩/tɕ ^h ɔ̃/ | ⟨bcangs⟩/dzɔ̃/ | ⟨bcang⟩ | ⟨chongs⟩/tɕ ^h ũ/ | ‘hold’ |
| ⟨vchol⟩/tɕ ^h i:/ | ⟨bcol⟩/dzi:/ | ⟨bcol⟩ | ⟨chol⟩/tɕ ^h i:/ | ‘deposit’ |
| ⟨!vjoms⟩/dzũ/ | ⟨bcom⟩/dzũ/ | ⟨gzhom⟩ | ⟨!choms⟩/dzũ/ | ‘rob’ (TE) ‘subdue’ (CT) |
| ⟨!vjums⟩/dzũ/ | ⟨bcums⟩/dzũ/ | ⟨bcum⟩ | ⟨!chums⟩/dzũ/ | ‘make sth shrink’ |
| Numeral | | | | |
| | ⟨bcu⟩ | /dzə/ | | ‘ten’ |
| | ⟨bcu.gcig⟩ | /dzə tsi ^H / | | ‘eleven’ |
| | ⟨bco.lnga⟩ | /dze ŋɛ ^H / | | ‘fifteen’ |

10. In Table 13, the word ⟨vchos⟩ has two meanings, unlike in CT, in Thebo, this verb can only occur with the noun ‘road’, which means either ‘to build a new road (to build a road where there is no road)’ or ‘to repair a road’. The verb cannot be used in the case of repairing a house, a bridge or a machine, etc. Example (i) shows the usage of this verb.

- (i) tə^L ŋi^L ŋə^L gə gi=yə, lɔ̃^L dze:=i da^L
 today people all=ERG road repair=PROG
 ‘Today, all the people are building roads (together).’
 (‘Building new roads’ or ‘repairing old ones’, both meanings are possible in this case.)

In Example (ii), the verb /dze:/ is reduplicated, and the vowel of the first syllable becomes /a/, indicating repeated action, such as ‘repeated washing’ /tsha tshĩ?/. The reduplicated word /dza.dze:/ has become a noun and is used with the light verb ‘to do’, meaning ‘to do the tidy work’.

- (ii) ŋɛ:^L k^hə ɔ̃ nɔ̃^L dza dze: je:^L=rɔ̃ je:^L
 1SG.ERG house inside tidy do=PST SFP
 ‘I cleaned up the house.’

Table 14. Correspondence for ⟨bt-⟩

| PRS | PST | FUT | IMP | Gloss |
|---------------------------|--------------|---------|---------------------------|---|
| ⟨vthag⟩/tʰaʔ/ | ⟨btags⟩/daʔ/ | ⟨btag⟩ | ⟨vthog⟩/tʰuʔ/ | ‘weave’ |
| ⟨vdogs⟩/nɗuʔ/ | ⟨btags⟩/daʔ/ | ⟨gdags⟩ | ⟨thogs⟩/tʰuʔ/ | ‘bind, wear’ |
| ⟨vdebs⟩/nɗeʔ/ | ⟨btab⟩/doʔ/ | ⟨gdab⟩ | ⟨thobs⟩/tʰoʔ/ | ‘sow’ |
| ⟨gtong⟩/tū ^H / | ⟨btang⟩/dɔ̃/ | ⟨gtang⟩ | ⟨thong⟩/tʰū/ ^a | ‘put’ (TE) ‘end off’ (CT) |
| ⟨!vding⟩/tʰē/ | ⟨bting⟩/dē/ | ⟨gting⟩ | ⟨things⟩/tʰē/ | ‘spread (carpet)’ |
| ⟨vthu⟩/tʰə/ | ⟨btus⟩/di:/ | ⟨btu⟩ | ⟨thus⟩/tʰi:/ | ‘pick up’ |
| ⟨!vdod⟩/tʰeʔ/ | ⟨btod⟩/deʔ/ | ⟨gdod⟩ | ⟨thod⟩/tʰeʔ/ | ‘open up’ (TE) ‘to newly establish’ (CT) |
| ⟨vthog⟩/tʰuʔ/ | ⟨btogs⟩/duʔ/ | ⟨btog⟩ | ⟨thogs⟩/tʰuʔ/ | ‘pick’ |
| ⟨vdon⟩/nɗē/ | ⟨bton⟩/nɗē/ | ⟨gdon⟩ | ⟨thon⟩/nɗē/ | ‘take out’ |

a. Also for /tū/, as in Table 13, there is an aspiration alternation.

Table 15. Correspondence for ⟨bts-⟩

| PRS | PST | FUT | IMP | Gloss |
|---------------------|-----------------|-------------------------|-----------------|----------------|
| ⟨vtshod⟩/tsʰeʔ/ | ⟨btsos⟩/dze:/ | ⟨btso⟩ | ⟨tshod⟩/tsʰeʔ/ | ‘boil’ |
| ⟨vdzugs⟩/nɗzʊʔ/ | ⟨btsugs⟩/dzʊʔ/ | ⟨gzugs⟩ | ⟨tshugs⟩/tsʰʊʔ/ | ‘plant (tree)’ |
| ⟨vtshol⟩/tsʰi:/ | ⟨btsal⟩/dze:/ | ⟨btsal⟩ | ⟨tshol⟩/tsʰi:/ | ‘look for’ |
| ⟨vtshag⟩/tsʰaʔ/ | ⟨btsags⟩/dzaʔ/ | ⟨btsag⟩ | ⟨tshags⟩/tsʰuʔ/ | ‘sieve’ |
| ⟨vtshong⟩/tsʰū/ | ⟨btsongs⟩/dzū/ | ⟨btsong⟩ | ⟨tshongs⟩/tsʰū/ | ‘sell’ |
| ⟨vchem⟩/tsʰē/ | ⟨btsems⟩/dzē/ | ⟨btsem⟩ | ⟨tshems⟩/tsʰē/ | ‘seam’ |
| ⟨vtshang⟩/tsʰɔ̃/ | ⟨btsangs⟩/dzɔ̃/ | ⟨btsang⟩ | ⟨tshangs⟩/tsʰū/ | ‘press into’ |
| ⟨!vtshum⟩/dzʊ̃/ | ⟨btsums⟩/dzʊ̃/ | ⟨btsum⟩ | ⟨!tshums⟩/dzʊ̃/ | ‘close, wink’ |
| Stative verb | | | | |
| | ⟨btsan⟩ | /dzē/ | | ‘severe’ |
| Noun | | | | |
| | ⟨btson khang⟩ | /dze kʰɔ̃/ ^a | | ‘prison’ |
| | ⟨btsav⟩ | /dza/ | | ‘rust’ |

a. /ʔdzē kʰɔ̃–dze kʰɔ̃/: One possible explanation for the irregularity of the vowel in the first syllable is that the vowel is a conjunct form. Its citation form should be regular. The citation form of this word only exists in CT, and not in Thebo.

The same is true in Table 15 with the word /tsʰɔ̃/ ⟨vtshang⟩ ‘press into (PRS)’ and /tsʰū/ ⟨tshongs⟩ ‘seam (IMP)’. Older people pronounce these words as aspirated, but the younger generation pronounces them as unaspirated; thus, the verbal conjugation is fading through generational change. This fading of the verbal

conjugation is also the case for the word /dzũ/ <tshangs> ‘press into (IMP)’. /ts^hũ/ is getting replaced by /dzũ/; young people tend to use /dzũ/, and older people tend to use /ts^hũ/. In the idiom (swear word) ‘stuff a corpse into someone’s eyes’, <mig.nang.ro.tshongs>, the verb <tshongs> is pronounced /ts^hũ/; however, there is a tendency for unaspirated consonants to replace aspirated consonants in Thebo.

Table 16. Correspondence for <ph-><phr->

| PRS | PST | FUT | IMP | Gloss |
|-------------------------------|---------------|---------|------------------------------|-----------------|
| <!vbubs>/p ^h ʊʔ/ | <phub>/bʊʔ/ | <dbub> | <!phub>/p ^h ʊʔ/ | ‘build (house)’ |
| <!vbugs>/p ^h ʊʔ/ | <phug>/bʊʔ/ | <dbug> | <!phug>/p ^h ʊʔ/ | ‘pierce’ |
| <!vbogs>/p ^h uʔ/ | <phog>/buʔ/ | <dbog> | <!phogs>/p ^h uʔ/ | ‘take down’ |
| <!vphral>/tʃi: ^H / | <phral>/dzɛ:/ | <dbral> | <!phrol>/tʃi: ^H / | ‘separate’ |

On its own or as part of compounds in the numbers 11 to 19, the morpheme ‘ten’ has undergone the voicing rule, as shown in Table 13. The morpheme ‘ten’ in words from twenty to ninety remains voiceless. This peculiarity in numerals is common in Tibeto-Burman languages (Ma 1980; Cilin Yangzhen 2021; Tournadre & Suzuki 2023). The morpheme ‘ten’ in CT has various written forms, primarily written as <bcu> but also written as <bco> in 15 and 18. In 30 to 90, ‘ten’ is written as <cu> when occurring after a closed syllable, <bcu> after an open syllable, and <shu> in the number 20. Given the specificity of ‘ten’ in the CT, it is unsurprising that this form also undergoes various sound changes in Thebo.

Li (1933) has stated that the perfect *b- dissimilates because of the labial initial. Coblin (1976) has assumed a dissimilatory loss of the prefix *b- before bilabial initials (called “Coblin’s Law” by Hill 2010b), demonstrated below:

*b-b(M)¹¹ – > Ø-b(M)-:

*b-b > b, e.g. √bya ‘do’, PST *b-byas > byas

*b-p > p, e.g. √pyag ‘bow’, PST *b-phyags > phyags

Based on the above, we can see that the voicing of the <ph-> group in Thebo is related to the prefix *b- in the Pre-Tibetan period. Therefore, the existence of the prefix *b- is a precondition for the voicing of the <ph-> group, and the loss of the prefix *b- in Old Tibetan due to Coblin’s Law leads us to infer that the voicing occurred before Coblin’s Law, so we can conclude a phonetic chain as follows:

*BV-p > *b-p > *bb > b.

11. “M” stands for *medials*, which are subscripted letters in Tibetan characters.

The voicing rule in Thebo (via verbal morphology) confirms Coblin's Law (Hill 2011: 446), a verification of the hypothesis that is rare in historical linguistics, similar to how Kuryłowicz (1927) verified the laryngeal hypothesis of de Saussure (1879).

4. Constraints on the voicing rule

Bialek (2021: xviii–xx) listed the verbs in this section and considered them exceptions to the voicing rule of Sangsrgyas Tshering (2020). These examples, which did not undergo the voicing rule, actually reveal systematic constraints on the voicing rule in Thebo, and this section discusses these constraints.

The voicing rule is blocked in words where historically the CT word had a consonant inserted between the preinitial consonant ⟨b-⟩ and the initial consonant. In other words, the voicing rule occurs in Thebo only if the preinitial consonant ⟨b-⟩ appears directly before the initial consonant in CT, which can be formalized as:

$$\begin{aligned} \left[\begin{array}{l} \text{[-voiced]} \\ \text{[-continuant]} \end{array} \right] &\rightarrow [+voiced] / \langle b- \rangle \\ \text{[-voiced]} &\rightarrow \text{[-voiced]} / \langle bC- \rangle \end{aligned}$$

See examples in Table 17.

Table 17. Constraints on inserted consonants

| PRS | PST | FUT | IMP | Gloss |
|-----------------------------|-------------------------------|-----------|------------------------------|-----------------------------------|
| ⟨rku⟩/kə ^H / | ⟨brkus⟩/ki: ^H / | ⟨brku⟩ | ⟨rkus⟩/ki: ^H / | 'steal' |
| ⟨rko⟩/ko ^H / | ⟨brkos⟩/ke: ^H / | ⟨brko⟩ | ⟨rkos⟩/ke: ^H / | 'carve, dig' |
| ⟨rkyong⟩/tsū ^H / | ⟨brkyangs⟩/tsō ^H / | ⟨brkyang⟩ | ⟨rkyongs⟩/tsū ^H / | 'stretch forth' |
| ⟨!skem⟩/kō ^H / | ⟨bskams⟩/kō ^H / | ⟨bskam⟩ | ⟨skoms⟩/kū ^H / | 'dry up' |
| ⟨skom⟩/kū ^H / | ⟨skom⟩/kū ^H / | ⟨skom⟩ | - ^a | 'desire to drink' |
| ⟨lta⟩/ta ^H / | ⟨bltas⟩/te: ^H / | ⟨blta⟩ | ⟨ltos⟩/te: ^H / | 'look at' |
| ⟨ston⟩/tē ^H / | ⟨bstan⟩/tē ^H / | ⟨bstan⟩ | ⟨ston⟩/tē ^H / | 'show' |
| ⟨rtsig⟩/tsi ^H / | ⟨brtsigs⟩/tsi ^H / | ⟨brtsig⟩ | ⟨rtsigs⟩/tsi ^H / | 'build' |
| ⟨rtseg⟩/tsa ^H / | ⟨brtsegs⟩/tsa ^H / | ⟨brtseg⟩ | ⟨!rtsegs⟩/tsu ^H / | 'amass, lay one thing on another' |
| ⟨rtsed⟩/tse ^H / | ⟨brtses⟩/tse: ^H / | ⟨brtse⟩ | ⟨rtses⟩/tse: ^H / | 'play' |
| ⟨slong⟩/tsū ^H / | ⟨bslang⟩/tsō ^H / | ⟨bslang⟩ | ⟨slongs⟩/tsū ^H / | 'to raise up' |

a. This word has no imperative form in CT.

Only some specific voiceless stops and affricates can be voiced, which we listed in the previous section. Voiceless fricatives remain unvoiced.¹² See examples in Tables 18 and 19.

Table 18. Constraints on fricatives ⟨bsh-⟩

| PRS | PST | FUT | IMP | Gloss |
|-----------------------------|------------------------------|----------|-----------------------------|----------------------------|
| ⟨!vchad⟩/çεɽ ^H / | ⟨!bshad⟩/çεɽ ^H / | ⟨bshad⟩ | ⟨!shod⟩/çεɽ ^H / | ‘say’ |
| ⟨!shad⟩/çεɽ ^H / | ⟨!bshad⟩/çεɽ ^H / | ⟨bshad⟩ | ⟨!shod⟩/çεɽ ^H / | ‘comb’ |
| ⟨!bshal⟩/çεɽ ^H / | ⟨!bshal⟩/çεɽ ^H / | ⟨bshal⟩ | ⟨!bshol⟩/çεɽ ^H / | ‘rinse’ |
| ⟨!vjig⟩/çɪɽ ^H / | ⟨!bshig⟩/çɪɽ ^H / | ⟨bshig⟩ | ⟨!shig⟩/çɪɽ ^H / | ‘break up’ |
| ⟨vchags⟩/çɑɽ ^H / | ⟨bshags⟩/çɑɽ ^H / | ⟨bshag⟩ | ⟨bshogs⟩/çɑɽ ^H / | ‘confess’ (C) ^a |
| ⟨gshog⟩/xɑɽ ^H / | ⟨bshag⟩/xɑɽ ^H / | ⟨gshag⟩ | ⟨shogs⟩/xuɽ ^H / | ‘tear’ |
| ⟨bshu⟩/xə ^H / | ⟨bshus⟩/xi ^H / | ⟨bshu⟩ | ⟨shus⟩/xi ^H / | ‘peel’ |
| ⟨bshav⟩/xɑ ^H / | ⟨bshas⟩/xε ^H / | ⟨bshav⟩ | ⟨bshos⟩/xε ^H / | ‘slaughter’ |
| ⟨gshar⟩/xɑ ^H / | ⟨bshar⟩/xɑ ^H / | ⟨gshar⟩ | ⟨gshor⟩/xu ^H / | ‘line up’ |
| ⟨gshom⟩/xɔ̃ ^H / | ⟨bshams⟩/xɔ̃ ^H / | ⟨bsham⟩ | ⟨shoms⟩/xü ^H / | ‘lay out’ |
| ⟨gshong⟩/xɔ̃ ^H / | ⟨bshangs⟩/xɔ̃ ^H / | ⟨bshang⟩ | ⟨shongs⟩/xü ^H / | ‘empty, remove’ |

a. Cultural word.

Table 19. Constraints on fricatives ⟨bs-⟩

| PRS | PST | FUT | IMP | Gloss |
|--|--|----------|--|-----------------|
| ⟨!sɛms⟩/sɔ̃ ^H / | ⟨bsams⟩/sɔ̃ ^H / | ⟨bsam⟩ | ⟨!soms⟩/sɔ̃ ^H / | ‘think’ |
| ⟨!sel⟩/si ^H / | ⟨bsal⟩/sε ^H / | ⟨bsal⟩ | ⟨!sol⟩/si ^H / | ‘eliminate’ |
| ⟨gsod⟩/sεɽ ^H / | ⟨bsad⟩/sεɽ ^H / | ⟨gsad⟩ | ⟨!sod⟩/sεɽ ^H / | ‘kill’ |
| ⟨!sub⟩/süɽ ^H / | ⟨bsubs⟩/süɽ ^H / | ⟨bsub⟩ | ⟨!subs⟩/süɽ ^H / | ‘erase’ |
| ⟨gsog⟩/suɽ ^H / | ⟨bsogs⟩/suɽ ^H / | ⟨bsog⟩ | ⟨!sog⟩/suɽ ^H / | ‘accumulate’ |
| ⟨!gsed⟩/s ^h eɽ [?] / | ⟨!bsed⟩/s ^h eɽ [?] / | ⟨gsed⟩ | ⟨sed⟩/s ^h eɽ [?] / | ‘split’ |
| ⟨sran⟩/çεɽ ^H / | ⟨bsran⟩/çεɽ ^H / | ⟨bsran⟩ | ⟨sron⟩- | ‘endure’ |
| ⟨!sri⟩/çɪɽ ^H / | ⟨!bsris⟩/çɪɽ ^H / | ⟨bsri⟩ | ⟨!sris⟩/çɪɽ ^H / | ‘economize’ |
| ⟨sring⟩/çεɽ ^H / | ⟨bsrings⟩/çεɽ ^H / | ⟨bsring⟩ | ⟨sring⟩/çεɽ ^H / | ‘elongate’ |
| ⟨srunɡ⟩/çö ^H / | ⟨bsrunɡ⟩/çö ^H / | ⟨bsrunɡ⟩ | ⟨srunɡ⟩/çö ^H / | ‘guard’ |
| ⟨!srub⟩/çɪɽ ^H / | ⟨!bsrubs⟩/çɪɽ ^H / | ⟨bsrub⟩ | ⟨!srubs⟩/çɪɽ ^H / | ‘stir (liquid)’ |
| ⟨sreg⟩/çɑɽ ^H / | ⟨bsregs⟩/çɑɽ ^H / | ⟨bsreg⟩ | ⟨!sregs⟩/çɑɽ ^H / | ‘burn’ |

12. There is only one exception, which we discussed in §3.

Table 19. (continued)

| PRS | PST | FUT | IMP | Gloss |
|------------------------------|------------------------------|---------------------|-----------------------------|--|
| ⟨sro⟩/ɕo ^H / | ⟨bsros⟩/ɕe: ^H / | ⟨bsro⟩ | ⟨sros⟩/ɕe: ^H / | ‘warm’ |
| ⟨srong⟩/ɕü ^H / | ⟨!bsrangs⟩/ɕü ^H / | ⟨bsrang⟩ | ⟨srong⟩/ɕü ^H / | ‘straighten’ |
| ⟨!sre⟩/ɕ ^h ez:/ | ⟨!bsres⟩/ɕ ^h ez:/ | ⟨bsre⟩ | ⟨!sres⟩/ɕ ^h ez:/ | ‘mix’ |
| Noun and stative verb | | | | |
| | ⟨bsang⟩ | /sɔ̃ ^H / | | ‘juniper fumigation ritual’ ^a |
| | ⟨bsil⟩ | /si: ^H / | | ‘cold’ |

a. A traditional ritual for worshiping a sacred mountain.

There is an exception for ⟨bs⟩; ⟨bs⟩ is not supposed to undergo the voicing rule, but it does for the word /zi:/ ‘chop (firewood)’ from CT ⟨bsil⟩, which has several meanings including ‘to cut hair’, ‘to shear, shave’, and ‘to cool’. The three forms for ⟨bsil⟩ in CT (PST, PRS, and IMP) have merged in Thebo, all pronounced as /zi:/. /si:/ ‘to cool’ also corresponds to the CT form ⟨bsil⟩, but the /s/ in Thebo is not voiced. There is no reasonable explanation yet for why the initial in /zi:/ ‘chop (firewood)’ has undergone the voicing rule.

⟨bsil⟩/zi:/ ⟨bsil⟩/zi:/ ⟨bsil⟩ ⟨bsil⟩/zi:/ ‘chop (firewood)’ (TE)
‘cut (hair), wash’ (H, CT)

When labial obstruents serve as the initial consonant, two conditions must be met simultaneously for the voicing rule to be triggered. Firstly, only aspirated obstruents that descend from ⟨ph⟩ and ⟨phr⟩ can be voiced.¹³ Secondly, the voicing rule is triggered when ⟨ph⟩ serves as an initial consonant and the stem has voicing alternation in CT, for instance, ⟨phub⟩, ⟨vbubs⟩, ⟨dbub⟩, ⟨phub⟩ ‘build(house)’. In other words, non-controllable verbs that do not have voicing alternation and do not have the controllable past prefix *b- cannot apply the voicing rule.¹⁴ For words that have voicing alternation, the initial consonant of past tense and imperative forms are voiceless; the present and future are voiced. The voicing rule is applied because the examples in Table 16 match the conditions for voicing alternation. The words in Table 20 do not meet the two conditions, so the voicing rule does not apply.

13. This is because the beginning of the syllable undergoes aspiration, and therefore, only verbs beginning with ⟨ph⟩ exist. Thus, ⟨p⟩ is not voiced.

14. Bielmeier (2004: 402) called *b- “controllable past prefix”, reminded by one of the anonymous reviewers, which did not apply to non-controllable verbs like ‘benefit’ ⟨phan⟩ in Table 20.

Table 20. Examples of constraints on the voicing rule with labial onsets

| PRS | PST | FUT | IMP | Gloss |
|-----------------------------|--|----------|-----------------------------|---|
| ⟨phan⟩/p ^h ɛ̃/ | ⟨phan⟩/p ^h ɛ̃/ | ⟨phan⟩ | ⟨phan⟩ - | ‘benefit’ |
| ⟨vphud⟩/p ^h iʔ/ | ⟨phud⟩/p ^h iʔ/ | ⟨phud⟩ | ⟨phud⟩/p ^h iʔ/ | ‘take off’ |
| ⟨vphung⟩ - | ⟨phung⟩/p ^h ũ/ | ⟨vphung⟩ | - | ‘fail’ (TE) ‘expel’ (CT) |
| ⟨vphur⟩/p ^h u:/ | ⟨phur⟩/p ^h u:/ | ⟨vphur⟩ | ⟨phur⟩/p ^h u:/ | ‘rub’ |
| ⟨phebs⟩/p ^h eʔ/ | ⟨phebs⟩/p ^h eʔ/ | ⟨phebs⟩ | ⟨phebs⟩/p ^h eʔ/ | ‘come’ (H, C) |
| ⟨vphyar⟩/s ^h a:/ | ⟨phyar⟩/s ^h a:/ | ⟨vphyar⟩ | ⟨phyor⟩/s ^h u:/ | ‘lift up’ |
| ⟨vbyid⟩/s ^h ə/ | ⟨phyis⟩/s ^h i:/ | ⟨dbyi⟩ | ⟨phyis⟩/s ^h i:/ | ‘wipe’ |
| ⟨vphyid⟩/s ^h iʔ/ | ⟨phyid⟩/s ^h iʔ/ | ⟨vphyid⟩ | - | ‘(limbs) frozen stiff’ (TE) ‘suffer in the limbs’ (CT) |
| ⟨vbyin⟩/n ^d zĩ/ | ⟨phyung⟩/s ^h ũ/ | ⟨dbyung⟩ | ⟨phyung⟩/s ^h ũ/ | ‘pull out’ |
| ⟨phyug⟩/s ^h uʔ/ | ⟨phyug⟩/s ^h uʔ/ | ⟨phyug⟩ | - | ‘rich’ |
| ⟨vbyed⟩/n ^d zeʔ/ | ⟨phye⟩/s ^h e/ | ⟨dbye⟩ | ⟨phye⟩/s ^h e/ | ‘open’ |
| ⟨vbri⟩/n ^d zə/ | ⟨bris⟩/tʂi: ^L / | ⟨bri⟩ | ⟨bris⟩/tʂi: ^L / | ‘write’ |
| ⟨vbreg⟩/n ^d zəʔ/ | ⟨bregs⟩/tʂaʔ ^L / | ⟨breg⟩ | ⟨bregs⟩/tʂuʔ ^L / | ‘scythe’ |
| ⟨len⟩/lɛ ^L / | ⟨(glu.)blangs⟩ ^a /lɔ ^L / | ⟨blang⟩ | ⟨longs⟩/lü ^L / | ‘sing’ |

a. This is a light verb used with ⟨glu⟩ ‘song’, ⟨glu.len⟩ means ‘to sing a song’.

The CT word ‘write’ in the table above has been discussed by Hill (2005b). He had claimed that the former prefix b- was reanalyzed to become part of the stem when ⟨dr⟩ and ⟨br⟩ both became retroflex consonants. Hill has given the verbal conjugations of ‘write’ in OT, which are *vdri *b-ris *bri *ris. In Thebo, the past tense and imperative form are both /tʂi:^L/ instead of /ri:^L/, which indicates that this word has undergone an analogical change in relation to other *Cr- clusters in OT. This analogical change also explains ‘shave, cut’ *vdreg *bregs *breg *regs.¹⁵

We mentioned in the previous section that ⟨ph⟩ and ⟨phr⟩ could be voiced due to the *b- prefix in OT, as pointed out by Li (1933). Since we can observe the regular presence of a *b- prefix in the conjugations of past and future tenses, the hypothesis of Coblin’s Law is confirmed. However, Coblin reached his law through an analysis of verbal morphology, so the voicing law is not applied to nouns with a bilabial consonant in Thebo. Table 21 shows the constraints on nouns.

15. These conjugations were argued for by Hill (2016) in Bergen and offered by one anonymous reviewer.

Table 21. Constraints on nouns

| CT | Thebo | Gloss |
|----------------|-------------------------------------|------------------|
| <pha> | /p ^h ɛ/ | ‘father’ |
| <phag> | /p ^h ɛʔ/ | ‘pig’ |
| <phan> | /p ^h ɛ̃/ | ‘benefit’ |
| <phyug.po> | /s ^h ə po ^L / | ‘the rich’ |
| <phrag> | /tʂ ^h ɛʔ/ | ‘shoulder’ |
| <vpbro> | /tʂ ^h o/ | ‘remainder’ |
| <brtsi.bkur> | /tsə ^H k ^h ə/ | ‘politeness’ (C) |
| <bzhi.bcu> | /zə.tɕə ^H / | ‘forty’ |
| <ltung.bshags> | /tõ ^H ɕa ^{ʔH} / | ‘confession’ (C) |

a. “(C)” represents a cultural word only used in a literary or religious context.

5. Irregularities and exceptions

Even with the constraints already mentioned in the previous section, there are still some exceptions and irregularities, which we discuss in this section. There are two primary sources for the exceptions: verbs that have undergone analogy; and nouns that are loanwords. See these exceptions in Table 22.

The conjugation pattern for verbs offers evidence regarding the source of the irregular forms. The word /tɕa:^H/ ‘put close by (PST)’ is the same as the rest of the verbs in the first group in Table 22, derived from the present tense. It is, therefore, reasonable to deduce that the past tense is derived from the present tense since there are no examples in which the past tense is derived from the imperative. Furthermore, there is positive evidence that the past tense has been derived from the present tense. The remaining verbs in the first group with /tɕa:^H/ ‘approach (PST)’ also derive their past tense forms from their present tense forms.

Concerning exceptions with reflexes of <bl-), since <l-) is already a voiced sound, <l-) cannot undergo the voicing rule, but in the past tense, the segmental phonemes /lɔ̃/ of the word /lɔ̃^L/ <blangs) ‘sing (PST)’ are regular, but the tone is irregular. Therefore, since there is no evidence of an imperative derived from the past tense, the tone is probably derived from the present tense. For the same reason that there is no evidence that the past tense comes from the imperative, the word /ɕũ/ <bsrangs) ‘straight (PST)’ is also likely to be from the present tense.

Thebo is an oral, non-literary language—all honorific-form, literary, cultural, and religious words are loanwords. The absence of voicing in the reflex of <bk-) from CT <bkav) ‘command; admonish’ resulting in the Thebo /ka^H/ ‘command;

admonish' is probably because this noun was borrowed from Amdo Tibetan, a likely hypothesis since this word is an honorific form. Likewise, there is an absence of voicing in the reflex of ⟨bc-⟩ from CT ⟨bcibs.pa⟩ 'carriage (H)'; a deverbal noun, resulting in the Thebo /tɕə^H pa^H/ 'carriage (H)'. The word /tɕə^H pa^H/ 'carriage' is an honorific form and, therefore, a cultural word, thus creating an exception to the rule.

Table 22. Exceptions (past derived from present)

| PRS | PST | FUT | IMP | Gloss |
|---|---|-------------------------------------|------------------------------|-----------------------|
| ⟨gcor⟩/tɕa: ^H / ^a | ⟨bcar⟩/† ^b dza:-tɕa: ^H / | ⟨gcar⟩ | ⟨gcor⟩/tɕu: ^H / | 'put close by' |
| ⟨gcur⟩/tɕu: ^H / | ⟨bcur⟩/† dzu:-tɕu ^H / | ⟨bcur⟩ | ⟨chur⟩/tɕu: ^H / | 'squeeze' |
| ⟨vthung⟩/tʰõ/ | ⟨btungs⟩/† dõ-tʰõ/ | ⟨btung⟩ | ⟨vthungs⟩/tʰõ/ | 'drink' |
| ⟨gtsab⟩/tsoɾ ^H / | ⟨btsabs⟩/† dzoɾ ^H -tsoɾ ^H / | ⟨btsab⟩ | ⟨gtsobs⟩/tsoɾ ^H / | 'mince' |
| ⟨vbabs⟩/pʰoʔ/ | ⟨phab⟩/† boʔ-pʰoʔ/ | ⟨dbab⟩ | ⟨phob⟩/pʰoʔ/ | 'let down' |
| ⟨vpfrog⟩/tɕʰuʔ/ | ⟨phrogs⟩/† dɕ uʔ-tɕʰuʔ/ | ⟨vpfrog⟩ | ⟨phrogs⟩/tɕʰuʔ/ | 'rob' |
| ⟨vbul⟩/ʰbu:/ | ⟨phul⟩/† bu:-ʰbu:/ | ⟨dbul⟩ | ⟨phul⟩/ʰbu:/ | 'offer (present)' (H) |
| ⟨vjol⟩/ʰdʒe:/ | ⟨bcal⟩/† dʒe:-ʰdʒe:/ | ⟨gzhal⟩ | ⟨vjol⟩/ʰdʒe:/ ^c | 'repay' |
| ⟨vdul⟩/† ʰdi:-tʰi:/ | ⟨btul⟩/† di:-tʰi:/ | ⟨gdul⟩ | ⟨thul⟩/tʰi:/ | 'subdue' ^d |
| ⟨srong⟩/ɕũ ^H / | ⟨bsrangs⟩/† ɕõ ^H -ɕũ ^H / | ⟨bsrang⟩ | ⟨srongs⟩/ɕũ ^H / | 'straighten' |
| ⟨len⟩/lẽ ^L / | ⟨blangs⟩/† lɔ ^H -lɔ ^L / | ⟨blang⟩ | ⟨longs⟩/lü ^L / | 'sing' ^e |
| Noun and stative verb | | | | |
| | ⟨bkav⟩ | /ka ^H / | | 'command, admonish' |
| | ⟨bcibs.pa⟩ | /tɕə ^H pa ^H / | | 'carriage' (H) |

a. The irregularity of the present tense /†tɕu:^H-tɕa:^H/ is explained in Table 30.

b. The dagger † refers to the expected form that conforms to the Thebo phonetic alternation rules. After the dagger comes the Thebo phonetic form, i.e. irregular form.

c. There are two pronunciations in free variation for the form of the word 'repay': /ʰdʒe:/ and /ʰdʒu:/.

d. It also has the meaning of 'crash'.

e. The word ⟨len⟩ also means 'take'.

6. The irregular correspondence of the verbal alternation

Verbal alternations result from applying regular phonological changes to what were originally non-alternating morphemes. Analogy can explain some irregular verbal alternations in Thebo. Analogy is:

[...] A process whereby one form of a language becomes more like another with which it is somehow associated; that is, analogical change involves a relation of similarity in which one piece of a language changes to become more like another pattern in that language when speakers perceive the changing part as similar to the pattern which it changes to become like. (Campbell & Mixco 2007: 91)

The irregularity of verbal alternation is present in the verbs that apply the voicing rule and is widespread in other Thebo verbs. In this section, analogical change explains all the irregular conjugations of Thebo verbs historically having the prefix ⟨b-⟩ in the past tense that we have listed so far.

In Table 23, the past tense is regular, but the present tense is irregular, and the present tense has the same form as the past tense, from which we can readily observe a “relation of similarity” between the past and present tense. It is thus reasonable to infer that the present tense has undergone analogical leveling based on analogy with the past tense. For the present tense of the word /ⁿgiɾ-ⁿgeɾ/ ‘bear’; only the vowel is derived from the past tense; the consonant maintains the regular sound change.

Table 23. Present derived from past

| PRS | PST | FUT | IMP | Gloss |
|---|------------------------------|----------|-----------------------------|-----------------|
| ⟨vgog⟩/† ⁿ guɾ-gaɾ/ | ⟨bkag⟩/gaɾ/ | ⟨dgag⟩ | ⟨khog⟩/k ^h uɾ/ | ‘ward off’ |
| ⟨vchad⟩/†tɕ ^h ɛɾ-ɕɛɾ ^H / | ⟨bshad⟩/ɕɛɾ ^H / | ⟨bshad⟩ | ⟨shod⟩/ɕɛɾ ^H / | ‘say’ |
| ⟨gshong⟩/†xū ^H -xɔ̃ ^H / | ⟨bshangs⟩/xɔ̃ ^H / | ⟨bshang⟩ | ⟨shongs⟩/xū ^H / | ‘empty, remove’ |
| ⟨vchags⟩/†tɕ ^h aɾ ^H -ɕaɾ ^H / | ⟨bshags⟩/ɕaɾ ^H / | ⟨bshag⟩ | ⟨bshogs⟩/ɕuɾ ^H / | ‘confess’ (C) |
| ⟨skem⟩/†kē ^H -kɔ̃ ^H / | ⟨bskams⟩/kɔ̃ ^H / | ⟨bskam⟩ | ⟨skoms⟩/kū ^H / | ‘dry up’ |
| ⟨vbebs⟩/† ⁿ bɛɾ-p ^h oɾ/ | ⟨phab⟩/p ^h oɾ/ | ⟨dbab⟩ | ⟨phobs⟩/p ^h oɾ/ | ‘let down’ |
| ⟨vgel⟩/† ⁿ giɾ- ⁿ geɾ/ | ⟨bkal⟩/geɾ/ | ⟨dgal⟩ | ⟨khol⟩/k ^h eɾ/ | ‘load’ |

a. Since this cultural word has a /ɕ/ initial followed by a low vowel; it is most likely a loanword since non-low vowels follow /ɕ/ in the local strata. (See the detailed correspondence in Table 33.)

As we can see in Table 24, the present tense is entirely irregular and identical to the imperative form from which the present tense is derived. The word ⟨vphral⟩ ‘separate’ has undergone two analogical changes. From Coblin’s law, we can deduce that there was a *b- in the past tense, and this prefix made the main consonant ⟨ph-⟩ become voiced. The imperative derived from the past tense first, thus changing from the aspirated /tɕ^h/ to the unaspirated /tɕ/. However, since there was no *b- before the imperative form, it is not voiced and stays as the voiceless /tɕ/. The second analogical change is the derivation of the entire syllable from the

imperative to the present tense. The derivation path of “separate” is past tense > imperative > present.¹⁶

Table 24. Present derived from imperative

| PRS | PST | FUT | IMP | Gloss |
|---|---------------------------|---------|---|---|
| <vgrɛl>/† ⁿ dzi:-ts ^h i:/ | <bkral>/dze:/ | <dgrol> | <khrol>/ts ^h i:/ | ‘unfasten’ (TE) ‘explain’ (CT) |
| <vdod>/† ⁿ dɛ? ² -t ^h e? ² / | <btod>/de? ² / | <gdod> | <thod>/t ^h e? ² / | ‘split open’ (TE) ‘newly establish’ (CT) |
| <vbubs>/† ⁿ bɔ? ² -p ^h ɔ? ² / | <phub>/bɔ? ² / | <dbub> | <phub>/p ^h ɔ? ² / | ‘build (house)’ |
| <vbugs>/† ⁿ bɔ? ² -p ^h ɔ? ² / | <phug>/bɔ? ² / | <dbug> | <phug>/p ^h ɔ? ² / | ‘bore’ |
| <vbogs>/† ⁿ bu? ² -p ^h u? ² / | <phog>/bu? ² / | <dbog> | <phogs>/p ^h u? ² / | ‘take down’ |
| <vphral> /†ts ^h ɛ: ^H -tsi: ^H / | <phral> /dze:/ | <dbral> | <phrol> /†ts ^h i: ^H -tsi: ^H / | ‘separate, tear’ |

An example of imperative derived from the present tense is attested in Thebo (Table 25), in which the derived direction is opposite to that of Table 24.

Table 25. Imperative derived from present

| PRS | PST | FUT | IMP | Gloss |
|--|---------------|--------|---|--------|
| <vkhrud>/ts ^h i? ² / | <bkrus>/dzi:/ | <bkru> | <khrus>/†ts ^h i:-ts ^h i? ² / | ‘wash’ |

Table 26. Imperative derived from past

| PRS | PST | FUT | IMP | Gloss |
|--|------------------------------|---------|---|---------------------|
| <vgebs>/ ⁿ ge? ² / | <bkab>/go? ² / | <dgab> | <khob>/†k ^h e? ² -k ^h o? ² / | ‘cover (wok)’ |
| <vdebs>/ ⁿ de? ² / | <btab>/do? ² / | <gdab> | <thobs>/†t ^h e? ² -t ^h o? ² / | ‘sow’ |
| <dgar>/ga:/ | <bkar>/ga:/ | <dgar> | <khor>/†k ^h u:-gu:/ | ‘separate, isolate’ |
| <srān>/ɛɛ ^H / | <bsran>/ɛɛ ^H / | <bsran> | <sron>/†ɛɛ ^H -ɛɛ ^H / | ‘endure’ |
| <vdon>/ ⁿ dē/ | <btōn>/†dē- ⁿ dē/ | <gdōn> | <thōn>/†t ^h ē- ⁿ dē/ | ‘take out’ |

Concerning the irregular forms in Table 27, there are three hypotheses: (1) imperative < present tense < past tense, (2) present tense < imperative < past tense, (3) present tense < past tense and imperative < past tense. The third hypothesis is the most likely, i.e., the present tense and imperative are derived from the past

16. “A > B” in this article refers to “A to B”, the direction of sound change or derivation.

tense separately. Contrary to the first hypothesis (imperative < present tense < past tense), in Table 25, we can find evidence that the imperative is derived from the past tense. Moreover, no examples prove that present tense > imperative is the most likely derivational path. In addition, in Table 23, we can find evidence that the present tense is derived from the past tense. Thus, the third derivational path is plausible for the words in Table 27. The vowel of the imperative for the two words in the second group ('tear', 'lay out') is from the /a-a-u/ analogical model, which we demonstrate in Table 30. Furthermore, the examples that can support the third hypothesis are more than those that support the second hypothesis (see Table 24). Considering Ockham's Razor, a two-step hypothesis (accepting both hypotheses 1 and 2 simultaneously) is not the best solution. Thus, the third hypothesis, the simplest one, is the most likely derivation path. From the examples in Table 27, we can also determine the sequence of the sound changes; the voicing rule happened earlier than the analogical leveling of the different tenses and aspects of the verb.

Table 27. Present < past & imperative < past

| PRS | PST | FUT | IMP | Gloss |
|--|--------------------------------|---------|---|-------------------|
| <vgengs> /† ⁿ gē-gō/ | <bkang> /gō/ | <dgang> | <khong> - | 'fill (water)' |
| <sems> /†s ^h ē ^H -sō ^H / | <bsams> /sō ^H / | <bsam> | <soms> /†s ^h ū ^H -sō ^H / | 'think' |
| <vjums> /† ⁿ dzū-dzū/ | <bcums> /dzū/ | <bcum> | <chums> /†t ^h ū-dzū/ | 'make sth shrink' |
| <vtshum> /†t ^h ō-dzō/ | <btsums> /dzō/ | <btsum> | <tshums> /†t ^h ō-dzō/ | 'close, wink' |
| <gshog> /xu ^ʔ -xa ^ʔ / | <bshag> /xa ^ʔ / | <gshag> | <shogs> /x ^h u ^ʔ -xu ^ʔ / | 'tear' |
| <shom> /†xū ^H -xō ^H / | <bshams> /xō ^H / | <bsham> | <shoms> /†x ^h ū ^H -xū ^H / | 'lay out' |

The first two words, 'offer (present)' and 'mix' in Table 28 reflect a borrowing-induced irregularity, and the third word, 'select', gives a clue for the starting point of the derivation. The first two words are probably loanwords. For one thing, we cannot find a starting point for their derivation from their conjugation. For another, Thebo is an oral, non-literary language—all honorific-form, literary, cultural, and religious words are loanwords, as mentioned in § 5. As the word 'offer' is pronounced as /ⁿbu/ in Amdo, the word /ⁿbō:/ <vbul> in Thebo is probably

from Amdo.¹⁷ The word ⟨sre⟩ ‘mix’ is pronounced as /s^he/ in Amdo, which is similar to the pronunciation /s^he:/ in Thebo. The initial consonant for the imperative in Thebo is /s^h/. This initial may have been borrowed from Amdo, but the vowel remains long. Later on, ⟨s⟩ changed into the initial consonant in Thebo. Since there are no prefixed consonants for the word ‘mix’, this led to the aspiration of the initial consonant. The imperative form of ‘select’ is regular, and the regular stem is always the starting point for the derivation. The previous tables have shown several examples where the present tense derives from the imperative form, but there are no examples where the past form comes from the imperative form. Thus the most likely analogous path should be imperative > present tense > past tense.

Table 28. Imperative > present > past

| PRS | PST | FUT | IMP | Gloss |
|--|---|--------|--|-----------------------|
| ⟨vbul⟩ /ʈ ⁿ bi:- ⁿ bʊ:/ | ⟨phul⟩ /ʈbi:- ⁿ bʊ:/ | ⟨dbul⟩ | ⟨phul⟩ /ʈbi:- ⁿ bʊ:/ | ‘offer (present)’ (H) |
| ⟨sre⟩ /ʈɕe-s ^h e:/ | ⟨bsres⟩ /ʈɕe: ^H -s ^h e:/ | ⟨bsre⟩ | ⟨sres⟩ /ʈɕe: ^H -s ^h e:/ | ‘mix’ |
| ⟨gsed⟩ /ʈseʔ-s ^h eʔ/ | ⟨bsed⟩ /ʈseʔ-s ^h eʔ/ | ⟨gsed⟩ | ⟨sed⟩ /s ^h eʔ/ | ‘split’ |

The verbal alternation in Table 29 is derived from the vowel paradigm /∅-ɛ:-e:/. We can illustrate this with a proportional formula $C\emptyset : C\varepsilon : C\varepsilon = /{}^ndz\varepsilon:/ : /{}^ndz\varepsilon:/ : /{}^ndz\varepsilon:/$ ‘repay’. This vowel paradigm can be found in many verbs in Thebo as an analogical model for the verbs which have undergone an irregular sound change. In Table 29, only the past tense and imperative have undergone analogical change according to the paradigm; no analogical change has occurred in the present tense. The word ‘to work’ has undergone a regular sound change, i.e., ⟨-as⟩ > /ɛ:/ for the past tense, and ⟨-os⟩ > /e:/ for the imperative form; the exact change has happened for the words ‘do’ and ‘look’. The words ‘repay’, ‘rinse’, and ‘slaughter’ have undergone irregular sound changes, respectively. The vowel for the imperative form of ‘repay’ and ‘rinse’ are supposed to undergo ⟨-ol⟩ > /i:/ but rather become /e:/. What causes this unexpected /e:/ is the large number of words which have an /ɛ:/ vowel in the past tense and at the same time have an /e:/ in the imperative form. Since ‘repay’ and ‘rinse’ have an /ɛ:/ in their past form, the /∅-ɛ:-e:/ vowel paradigm becomes an analogical model to make the regular /i:/ to become an irregular /e:/.

17. The Amdo words ⟨vbul⟩ ‘offer’ and ⟨sre⟩ ‘mix’ are from (Hua & Long 1993).

There are two possible explanations for the lack of the palatalization of ⟨sh⟩ before the high vowel in ⟨bshav⟩ ‘slaughter’ (Table 29): (1) The suffix ⟨-s⟩ leads to a palatalization of the consonant, and the shedding of ⟨-s⟩ occurs after the rule of palatalization; (2) the shedding of suffix ⟨-s⟩ leads to vowel heightening, and the high, front vowel leads to palatalization of the consonant. Since the present tense does not have the ⟨-s⟩, the vowel cannot be raised. Therefore the consonant cannot be palatalized. The consonants for the past tense and the imperative of ‘slaughter’ are derived from the consonant of the present tense. Therefore there is no palatalization. We prefer the second hypothesis.¹⁸

Table 29. /Ø-ε:-e:/ Analogical model

| PRS | PST | FUT | IMP | Gloss |
|---------------------------------------|---|---------|---|-------------|
| ⟨vjal⟩/ⁿdzε:/ | ⟨bcal⟩/ⁿdzε:/ | ⟨gzhal⟩ | ⟨vjol⟩/†ⁿdzi:-ⁿdze:/ | ‘repay’ |
| ⟨bshal⟩/εε: ^H / | ⟨bshal⟩/εε: ^H / | ⟨bshal⟩ | ⟨bshol⟩/†εi: ^H -εε: ^H / | ‘rinse’ |
| ⟨bshav⟩/xa ^H / | ⟨bshas⟩/†εε: ^H -xe: ^H / | ⟨bshav⟩ | ⟨bshos⟩/†εε: ^H -xe: ^H / | ‘slaughter’ |
| /Ø-ε:-e:/ Vowel paradigm ^a | | | | |
| ⟨las⟩/le: ^L / | ⟨las⟩/le: ^L / | ⟨las⟩ | ⟨los⟩/le: ^L / | ‘work’ |
| ⟨byed⟩/ja ^L / | ⟨byas⟩/je: ^L / | ⟨bya⟩ | ⟨byos⟩/je: ^L / | ‘do’ |
| ⟨lta⟩/ta ^H / | ⟨bltas⟩/t ^(ʰ) ε: ^H / | ⟨blta⟩ | ⟨ltos⟩/te: ^H / | ‘look’ |

a. The following regular verbal alternations are used as a template for the analogy of the irregular verbs above.

The verbal alternation in Table 30 is derived from the /a-a-u/ vowel paradigm, which can be formalized as Ca : Ca : Cu = /tɕa:^H/ : /tɕa:^H/ : /tɕu:^H/ ‘put close by’.

While using the idea of analogy, there are still some unexplained examples. In Table 31, the present tense forms of the two words in the first group, ⟨vbebs⟩ ‘let down’ and ⟨vbyid⟩ ‘wipe’, lose their glottal stop codas, yet both the past tense and the imperative retain the glottal stop coda, which we are unable to explain at present. In the second group, the word ⟨sri⟩ ‘save, reduce expenditure’ generates a glottal stop, and the source is unclear. The present tense of the word ⟨vgas⟩ ‘split (wood)’ is irregular, and we cannot determine the source.

18. These two hypotheses are the plausible explanation the authors offer for the absence of palatalization. However, we propose these sound changes only tentatively; they are not well-established yet.

Table 30. /a-a-u/ Analogical model

| PRS | PST | FUT | IMP | Gloss |
|---|-------------------------------|----------|--|-------------------------------|
| ⟨vbreg⟩/ᵐdzaʔ/ | ⟨bregs⟩/tʂaʔ ^L / | ⟨breg⟩ | ⟨brogs⟩/†tʂaʔ ^L -tʂuʔ ^L / | ‘scythe amass’ |
| ⟨rtseg⟩/tʂaʔ ^H / | ⟨brtsegs⟩/tʂaʔ ^H / | ⟨brtseg⟩ | ⟨rtsegs⟩/†tʂaʔ ^H -tʂuʔ ^H / | ‘lay one thing on another’ |
| ⟨sreg⟩/caʔ ^H / | ⟨bsregs⟩/caʔ ^H / | ⟨bsreg⟩ | ⟨sregs⟩/†caʔ ^H -cuʔ ^H / | ‘burn’ |
| ⟨gcor⟩ /†tɕu:ʰ-tɕa:ʰ/ | ⟨bcar⟩/tɕa:ʰ/ | ⟨gcar⟩ | ⟨gcor⟩/tɕu:ʰ/ | ‘put close by’ |
| ⟨gshog⟩ /†xuʔ ^H -xaʔ ^H / | ⟨bshag⟩/xaʔ ^H / | ⟨gshag⟩ | ⟨shogs⟩/xuʔ ^H / | ‘tear’ |
| /a-a-u/ Vowel paradigm | | | | |
| ⟨vthag⟩/tʰaʔ/ | ⟨btags⟩/daʔ/ | ⟨btag⟩ | ⟨vthog⟩/tʰuʔ/ | ‘weave’ |
| ⟨vtshag⟩/tsʰaʔ/ | ⟨btsags⟩/dzaʔ/ | ⟨btsag⟩ | ⟨tshogs⟩/tsʰuʔ/ | ‘sieve’ |
| ⟨gshar⟩/xa:ʰ/ | ⟨bshar⟩/xa:ʰ/ | ⟨gshar⟩ | ⟨gshor⟩/xu:ʰ/ | ‘line up’ |

One possible interpretation for the irregularity of the consonant in ‘take down’ and ‘split (wood)’ is that the voicing rule precedes the analogy of PST > PRS. For the word ‘let down’, the present tense undergoes the analogy of PST > PRS because the voicing rule had yet to occur, and thus the voiced consonant is aspirated. On the other hand, in the word ‘split (wood)’, the analogy of PST > PRS is prevented because the voicing rule has been applied. The vowel of this word is, therefore, regular in the present tense. However, we still do not have a good explanation for the irregularity of the rhymes in the present tense for these two words.

Table 31. Source unknown

| PRS | PST | FUT | IMP | Gloss |
|------------------------------------|--------------------------------------|--------|---------------------------------|----------------|
| ⟨vgas⟩/†ᵐge:~ᵐga/ | ⟨bkas⟩/ge:/ | ⟨dgas⟩ | ⟨khos⟩/kʰe:/ | ‘split (wood)’ |
| ⟨vbyid⟩/†ᵐdziʔ~sʰə/ | ⟨phyis⟩/sʰi:/ | ⟨dbyi⟩ | ⟨phyis⟩/sʰi:/ | ‘wipe’ |
| ⟨sri⟩ /†ɕi:ʰ-ɕiʔ ^H / | ⟨bsris⟩ /†ɕi:ʰ-ɕiʔ ^H / | ⟨bsri⟩ | ⟨sris⟩/†ɕi:ʰ-ɕiʔ ^H / | ‘economize’ |

7. Conclusion

The question of the directionality of voicing alternations in Sino-Tibetan languages has interested many scholars. Sino-Tibetanists have addressed this topic in various ways; e.g. Gates et al. (2022) for the sigmatic prefix. Jacques (2021) uses Thebo data as supporting evidence of a voiceless to voiced sound change, rejecting the proposal by Zemp (2016) that the past prefix *b-* was a devoicing element. However, Bialek (2021) questioned the reliability of the Thebo voicing rule by listing examples that did not undergo the voicing rule. We specified the application range of the voicing rule and offered two formulas to explain the constraints on the voicing rule. §4 specified the application range of the Thebo voicing rule. Moreover, the differences between the correspondences we offer and those given in Lin (2014), which Bialek doubted, are pointed out in the Appendix.

There is no simple wholesale directionality to changes in voicing alternation; we need to take each sound change on its own terms. Presently, the voicing rule in Thebo (voiceless initials become voiced in words that diachronically have ⟨b-⟩ preinitials in CT) is a regular sound change that causes synchronic irregularity. This irregularity verifies Coblin's Law according to the internal evidence in Thebo. Analogical change points us to the source of irregular verbal alternation. A fundamental premise of the Neogrammarians was that "sound laws suffer no exceptions"; the potential exceptions should be explainable by analogy and borrowing.

In the present article, "constraints" are used to identify the limits of the conditions under which the voicing rule can be applied; that is, they specify the rule's range of application. "Exceptions" are when an example is within the scope of the rule's application, but the rule does not apply for some reason. We can identify borrowings among the exceptions and use **analogy** to explain the remaining exceptions. Analogical change is a process of generalization that is irregular but produces new regularity. Partial analogical leveling is widespread in the verbal morphology of Thebo. The derivation directions are versatile and are not conditioned by any grammatical categories. They all conform to one criterion: phonetic similarity. Therefore, it is a phonetically motivated analogy following the amenable postulate from the Neogrammarian tradition. In this article, the numerous cases in §5 and §6 verify the hypothesis of analogical leveling (Table 22 to 26) or proportional analogy-induced new regularity (Table 29 and 29).

We list below the historical derivations mentioned in this article:

1. PRS > PST (Table 22: Exceptions (past derived from present))
2. PST > PRS (Table 23: Present derived from past)
3. PST > IMP (Table 26: Imperative derived from past)

4. PST > PRS
PST > IMP (Table 27: Present < past & imperative < past)
5. IMP > PRS (Table 24: Present derived from imperative)
6. PRS > IMP (Table 25: Imperative derived from present)
7. IMP > PRS > PST (Table 28: Imperative > present > past)
8. /Ø-ε:-e:/ (Table 29: /Ø-ε:-e:/ Analogical verbal alternation)
9. /a-a-u/ (Table 30: /a-a-u/ Analogical verbal alternation)

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List of abbreviations

| | | | |
|-----|-------------------|------|-------------------------|
| 1 | first person | M | medial |
| C | Cultural word | OT | Old Tibetan |
| CT | Classical Tibetan | PRF | perfect |
| DEM | demonstrative | PROG | progressive |
| DUR | durative | PRS | present |
| ERG | ergative | PST | past |
| FUT | future | SECV | secondary verb |
| GB | G-yi.ba | SFP | sentence final particle |
| H | honorific form | SG | singular |
| h | humilific form | TB | Thebo |
| IMP | imperative | V | Verb |

Appendix A. Wylie transcription

Table 32. Wylie transcription

| Tibetan alphabet | Wylie | Tibetan alphabet | Wylie |
|------------------|-------|------------------|-------|
| ཀ | <k> | མ | <m> |
| ཁ | <kh> | ཅ | <ts> |
| ག | <g> | ཇ | <tsh> |
| ང | <ng> | ཚ | <dz> |
| ཅ | <c> | མ | <w> |
| ཇ | <ch> | ཉ | <zh> |
| ཉ | <j> | ཟ | <z> |
| ཏ | <ny> | འ | <v> |
| ཐ | <t> | ཡ | <y> |
| ཐ | <th> | ར | <r> |
| ད | <d> | ལ | <l> |
| ཏ | <n> | ག | <sh> |
| པ | <p> | ས | <s> |
| ཕ | <ph> | ཧ | <h> |
| བ | | ཨ | <-> |

Appendix B. CT: Thebo correspondence

In the footnotes, we point out the differences between the following correspondences and those given in Lin (2014).

Table 33. Thebo reflexes of simple consonant

| CT | GB | CT | GB | CT | GB | CT | GB |
|--------|----------------|---------|---------------------------------|--------|----------------|--------|----|
| ཀ<k-> | k | ཁ<kh-> | k ^h , ɣ ^a | ག<g-> | k, ɣ | ང<ng-> | ŋ |
| ཅ<c-> | tɕ | ཇ<ch-> | tɕ ^h | ཉ<j-> | tɕ | ཏ<ny-> | ɲ |
| ཐ<t-> | t | ཐ<th-> | t ^h | ད<d-> | t | ཏ<n-> | n |
| པ<p-> | p ^b | ཕ<ph-> | p ^h , b | བ<b-> | p, w | མ<m-> | m |
| ཅ<ts-> | ts | ཇ<tsh-> | ts ^h | ཚ<dz-> | - ^c | མ<w-> | w |

Table 33. (continued)

| CT | GB | CT | GB | CT | GB | CT | GB |
|---------|-------------------|--------|----|---------|---------------------------------|--------|----------------|
| ཞ'⟨zh-⟩ | x, ɛ ^d | ཟ'⟨z-⟩ | s | འ'⟨v-⟩ | w, Ø | ཡ'⟨y-⟩ | j |
| ར'⟨r-⟩ | r | ལ'⟨l-⟩ | l | ཤ'⟨sh-⟩ | x ^h , ɛ ^h | ས'⟨s-⟩ | s ^h |
| ཧ'⟨h-⟩ | h | ཨ'⟨Ø⟩ | Ø | | | | |

- a. /ɣ/ is the conditional variant of /k^h, k/, which only occurs at the beginning of the second syllable.
- b. The correspondence provided by Lin (2014) is /w/.
- c. A dash (-) in the correspondence table indicates that we cannot find a Thebo phoneme corresponding to the CT.
- d. /ɛ, ɛ^h/ are the conditional variants of /x, x^h/, which only occur in front of non-low front vowels.

Table 34. Thebo reflexes of prefixed consonants

| CT | GB | CT | GB | CT | GB |
|-------------|---------------------------------|-------------|-----------------|------------|--------|
| | -g- | | -d- | | -b- |
| གཅོ'⟨gc-⟩ | tɕ | དཀོ'⟨dk-⟩ | k | བཀོ'⟨bk-⟩ | g |
| གཏོ'⟨gt-⟩ | t | དཔོ'⟨dp-⟩ | p | བཙོ'⟨bc-⟩ | dz, tɕ |
| གཙོ'⟨gts-⟩ | ts | དགོ'⟨dg-⟩ | d, g | བཟོ'⟨bt-⟩ | d |
| གདོ'⟨gd-⟩ | d | དབོ'⟨db-⟩ | w | བཙོ'⟨bts-⟩ | dz |
| གཞོ'⟨gny-⟩ | ŋ | དངོ'⟨dng-⟩ | ŋ | བགོ'⟨bg-⟩ | g |
| གམོ'⟨gn-⟩ | n | དམོ'⟨dm-⟩ | m | བདོ'⟨bd-⟩ | d |
| གཡོ'⟨gy-⟩ | j | | | བཞོ'⟨bzh-⟩ | z, ɣ |
| གཞོ'⟨gzh-⟩ | z, ɣ | | | བཟོ'⟨bz-⟩ | z |
| གཟོ'⟨gz-⟩ | z | | | བགོ'⟨bsh-⟩ | x |
| གམོ'⟨gsh-⟩ | ɛ, x | | | བསོ'⟨bs-⟩ | s |
| གསོ'⟨gs-⟩ | s | | | | |
| | -m- | | -v- | | |
| མཁོ'⟨mkh-⟩ | k ^h , n ^k | འཁོ'⟨vkh-⟩ | k ^h | | |
| མཙོ'⟨mch-⟩ | tɕ ^h | འཙོ'⟨vch-⟩ | tɕ ^h | | |
| མཐོ'⟨mth-⟩ | t ^h | འཐོ'⟨vth-⟩ | t ^h | | |
| མཙོ'⟨mtsh-⟩ | ts ^h | འཙོ'⟨vph-⟩ | p ^h | | |
| མགོ'⟨mg-⟩ | ŋg | འཙོ'⟨vtsh-⟩ | ts ^h | | |

Table 34. (continued)

| CT | GB | CT | GB | CT | GB |
|--------------|-----------------|--------------|-----------------|----|----|
| -m- | | -v- | | | |
| མཛེའོ་⟨mj-⟩ | ⁿ dz | འགྲོ་⟨vg-⟩ | ⁿ g | | |
| མཛེའོ་⟨md-⟩ | ⁿ d | འཛེའོ་⟨vj-⟩ | ⁿ dz | | |
| མཛེའོ་⟨mdz-⟩ | ⁿ dz | འཛེའོ་⟨vd-⟩ | ⁿ d | | |
| མཛེའོ་⟨mng-⟩ | ŋ | འབོ་⟨vb-⟩ | ⁿ b | | |
| མཛེའོ་⟨mny-⟩ | ŋ | འཛེའོ་⟨vdz-⟩ | ⁿ dz | | |
| མཛེའོ་⟨mn-⟩ | n | | | | |

Table 35. Thebo reflexes of prefixed consonants (superscripts)

| CT | GB | CT | GB | CT | GB |
|------------|------|------------|-------------------|------------|----------------------|
| -r- | | -l- | | -s- | |
| རྩོ་⟨rk-⟩ | k | ལྩོ་⟨lk-⟩ | k | སྩོ་⟨sk-⟩ | k |
| རྩོ་⟨rt-⟩ | t | ལྩོ་⟨lc-⟩ | tɕ | སྩོ་⟨st-⟩ | t |
| རྩོ་⟨rg-⟩ | g | ལྩོ་⟨lt-⟩ | t | སྩོ་⟨sp-⟩ | p |
| རྩོ་⟨rts-⟩ | ts | ལྩོ་⟨lp-⟩ | p | སྩོ་⟨sts-⟩ | ts ^a |
| རྩོ་⟨rj-⟩ | dz | ལྩོ་⟨lg-⟩ | g | སྩོ་⟨sg-⟩ | g |
| རྩོ་⟨rd-⟩ | d | ལྩོ་⟨lj-⟩ | dz | སྩོ་⟨sd-⟩ | d |
| རྩོ་⟨rb-⟩ | b | ལྩོ་⟨ld-⟩ | d | སྩོ་⟨sb-⟩ | w, v, r ^b |
| རྩོ་⟨rdz-⟩ | dz | ལྩོ་⟨lb-⟩ | w, r ^c | སྩོ་⟨sng-⟩ | ŋ |
| རྩོ་⟨rng-⟩ | ŋ | ལྩོ་⟨lng-⟩ | ŋ | སྩོ་⟨sny-⟩ | ŋ |
| རྩོ་⟨rny-⟩ | ŋ | ལྩོ་⟨lh-⟩ | h, l ^d | སྩོ་⟨sn-⟩ | n |
| རྩོ་⟨rn-⟩ | n | | | སྩོ་⟨sm-⟩ | m |
| རྩོ་⟨rm-⟩ | m, ŋ | | | | |

a. This item is the correspondence between OT and Thebo, not CT and Thebo. There are syllables like <stsangs> in Dunhuang texts, which corresponds to /ts/ in Thebo.

b. A possible explanation of “lb:r” is that there may be a consonant cluster such as *lbr- in Pre-Tibetan, and words with medial *-r- may correspond to the /r/ phoneme in Thebo. Such correspondences have disappeared from CT but have been preserved in Thebo. As in the case of “lb:r” correspondence, one can also see *sbr > ⟨sb-⟩:[TE]/r/. In (Hill 2005b) we find the case of ⟨br⟩ and ⟨r⟩ in verbal alternation.

c. The same explanation as Footnote b under this table.

d. “lh:l” is a correspondence of loanword.

Table 36. Thebo reflexes of consonants with medials

| CT | GB | CT | GB | CT | GB | CT | GB |
|-----------|-----------------|-----------|-----------------------------------|----------|--------------------|------------|-----------------|
| | -y- | | -r- | | -l- | | -w- |
| ལྷ'⟨ky-⟩ | - | ལྷ'⟨kr-⟩ | - | ལྷ'⟨kl-⟩ | l | ལྷ'⟨kw-⟩ | - |
| ཁྱ'⟨khy-⟩ | ts ^h | ཁྱ'⟨khr-⟩ | ts ^h , tɕ ^h | ལྷ'⟨gl-⟩ | l | ཁྱ'⟨khw-⟩ | k ^h |
| གྷ'⟨gy-⟩ | ts, dz | གྷ'⟨gr-⟩ | ts, tɕ | ལྷ'⟨bl-⟩ | l | གྷ'⟨gw-⟩ | - |
| པྱ'⟨py-⟩ | - | པྱ'⟨tr-⟩ | tɕ ^a | ལྷ'⟨rl-⟩ | l | པྱ'⟨cw-⟩ | - |
| ལྷ'⟨phy-⟩ | s ^h | ལྷ'⟨thr-⟩ | - | ལྷ'⟨sl-⟩ | ts, l ^b | ལྷ'⟨nyw-⟩ | ŋ |
| ལྷ'⟨by-⟩ | s, j, ɕ | ལྷ'⟨dr-⟩ | tɕ, r | ལྷ'⟨zl-⟩ | dz | ལྷ'⟨tw-⟩ | - |
| ལྷ'⟨my-⟩ | ŋ | ལྷ'⟨pr-⟩ | tɕ | | | ལྷ'⟨dw-⟩ | t |
| | | ལྷ'⟨phr-⟩ | tɕ ^h , dz | | | ལྷ'⟨tsw-⟩ | - |
| | | ལྷ'⟨br-⟩ | tɕ, dz, r | | | ལྷ'⟨tshw-⟩ | ts ^h |
| | | ལྷ'⟨mr-⟩ | - | | | ལྷ'⟨zhw-⟩ | x |
| | | ལྷ'⟨shr-⟩ | - | | | ལྷ'⟨zw-⟩ | s |
| | | ལྷ'⟨sr-⟩ | ɕ | | | ལྷ'⟨rw-⟩ | r |
| | | ལྷ'⟨hr-⟩ | - | | | ལྷ'⟨lw-⟩ | - |
| | | ལྷ'⟨grw-⟩ | tɕ | | | ལྷ'⟨shw-⟩ | x ^h |
| | | | | | | ལྷ'⟨sw-⟩ | - |
| | | | | | | ལྷ'⟨hw-⟩ | - |

a. This correspondence is from a cultural word ལྷ'ལྷ'⟨pa.tra⟩ 'kind of picture, figure design'.

b. "sl:l" is a correspondence of loanword.

Table 37. Thebo reflexes of complex consonants

| rCC- | | | | | |
|-------------|-----------------|-------------|--------------------|-------------|---------|
| ཤྱ'⟨rky-⟩ | ts, tɕ | ཤྱ'⟨rgy-⟩ | dz, dz | ཤྱ'⟨rmy-⟩ | - |
| ཤྱ'⟨rtsw-⟩ | ts | | | | |
| sCC- | | | | | |
| ཤྱ'⟨spy-⟩ | s, p | ཤྱ'⟨sby-⟩ | b, ?z, ?ɣ | ཤྱ'⟨smy-⟩ | ŋ |
| ཤྱ'⟨spr-⟩ | ɕ | ཤྱ'⟨sbr-⟩ | r, v | ཤྱ'⟨smr-⟩ | |
| ཤྱ'⟨sky-⟩ | s, tɕ | ཤྱ'⟨sgy-⟩ | z | | |
| ཤྱ'⟨skr-⟩ | s | ཤྱ'⟨sgr-⟩ | z, dz ^a | | |
| dCC- | | | | | |
| དཤྱ'⟨dky-⟩ | ts | དཤྱ'⟨dgy-⟩ | - | | |
| དཤྱ'⟨dpy-⟩ | s | དཤྱ'⟨dby-⟩ | j ^b | དཤྱ'⟨dmy-⟩ | ŋ |
| དཤྱ'⟨dkr-⟩ | s, ts, ?tɕ | དཤྱ'⟨dgr-⟩ | dz _ɕ | | |
| དཤྱ'⟨dpr-⟩ | - | དཤྱ'⟨dbr-⟩ | - | | |
| bCC- | | | | | |
| བཤྱ'⟨brk-⟩ | k | བཤྱ'⟨brg-⟩ | g | བཤྱ'⟨brng-⟩ | ŋ |
| བཤྱ'⟨brj-⟩ | dz | བཤྱ'⟨brny-⟩ | ŋ | བཤྱ'⟨brt-⟩ | t |
| བཤྱ'⟨brd-⟩ | d | བཤྱ'⟨brn-⟩ | n | བཤྱ'⟨brdz-⟩ | dz, ?dz |
| བཤྱ'⟨bsk-⟩ | k | བཤྱ'⟨bsg-⟩ | g | བཤྱ'⟨bsng-⟩ | ŋ |
| བཤྱ'⟨bsny-⟩ | ŋ | བཤྱ'⟨bst-⟩ | t | བཤྱ'⟨bsd-⟩ | d |
| བཤྱ'⟨bsn-⟩ | n | བཤྱ'⟨bsts-⟩ | ts | བཤྱ'⟨bld-⟩ | d |
| བཤྱ'⟨bky-⟩ | dz | བཤྱ'⟨bgy-⟩ | - | བཤྱ'⟨brt-⟩ | t |
| བཤྱ'⟨bkr-⟩ | dz _ɕ | བཤྱ'⟨bgr-⟩ | - | བཤྱ'⟨bsr-⟩ | ɕ |
| བཤྱ'⟨bkl-⟩ | - | བཤྱ'⟨bgl-⟩ | - | བཤྱ'⟨brl-⟩ | l |
| བཤྱ'⟨bsl-⟩ | ts | བཤྱ'⟨bzl-⟩ | dz | | |
| བཤྱ'⟨bsky-⟩ | s | བཤྱ'⟨bsgy-⟩ | - | བཤྱ'⟨brky-⟩ | ts |
| བཤྱ'⟨bskr-⟩ | s | བཤྱ'⟨bsgr-⟩ | z, dz _ɕ | བཤྱ'⟨brgy-⟩ | dz |

Table 37. (continued)

| mCC- | | | | | |
|-------------------|--|-------------------|---|------------------|------------------------------|
| མཁྱེ་མཁྱེ་(mkhy-) | ts ^h , tɕ ^h ^c | མཁྱེ་མཁྱེ་(mggy-) | ⁿ dz | | |
| མཁྱེ་མཁྱེ་(mkhr-) | ts ^h | མཁྱེ་མཁྱེ་(mgr-) | ⁿ dz _ɿ | | |
| vCC- | | | | | |
| འཁྱེ་འཁྱེ་(vkhy-) | ts ^h | འཁྱེ་འཁྱེ་(vgy-) | ⁿ dz, ⁿ dz _ɿ | | |
| འཁྱེ་འཁྱེ་(vphy-) | ts ^h , s ^h | འཁྱེ་འཁྱེ་(vby-) | ⁿ dz | | |
| འཁྱེ་འཁྱེ་(vkhr-) | ts ^h , tɕ ^h | འཁྱེ་འཁྱེ་(vgr-) | ⁿ dz, ⁿ dz _ɿ | འཁྱེ་འཁྱེ་(vdr-) | ⁿ dz _ɿ |
| འཁྱེ་འཁྱེ་(vphr-) | tɕ ^h | འཁྱེ་འཁྱེ་(vbr) | ⁿ dz _ɿ | | |

- a. Correspondence of loanword.
- b. The correspondence /y/ provided by Lin (2014) is the correspondence of Tshong.ru. The correspondence provided in this article is the one of Thebo.
- c. The correspondence of honorific form.

Table 38. Rhyme correspondences between Thebo and CT

| | འ | བ | ད | ག | མ | ན | ང | ས | ལ | ར |
|------|-----------------------|----------------------|---------|---------|-----|-----|------|-----|---------------------|-----|
| | Ø, ⟨'⟩ | ⟨b⟩ | ⟨d⟩ | ⟨g⟩ | ⟨m⟩ | ⟨n⟩ | ⟨ng⟩ | ⟨s⟩ | ⟨l⟩ | ⟨r⟩ |
| ཨ⟨a⟩ | a | oɽ | ɛɽ | aɽ | ɔ̃ | ẽ | õ | ɛ: | ɛ: | a: |
| ཨ⟨i⟩ | ə | iɽ ə ^a | iɽ ə | iɽ ə | ĩ | ĩ | ẽ | i: | i: | u: |
| ཨ⟨u⟩ | ə | uɽ ə | iɽ ə | uɽ ə | ũ | ũ | õ | i: | i:, u: ^b | u: |
| ཨ⟨e⟩ | e | eɽ | eɽ | aɽ | ẽ | ẽ | ẽ | e: | i: | e: |
| ཨ⟨o⟩ | Ø (e) ^c | oɽ | eɽ | uɽ | ũ | ũ | ũ | e: | i: | u: |

- a. When there are two correspondences for one rhyme, the correspondence in the first line is the citation form, and the correspondence in the second line is the sandhi form in the first syllable of a polysyllabic word.
- b. There are two correspondences of ⟨ul⟩; the first is more common, the second with fewer examples. The second correspondence may be from an earlier-stage borrowing. ⟨ul⟩ lost the ⟨-l⟩ first, then leaving a long vowel /u:/.
- c. This correspondence only occurs in the word ‘fifteenth’, but ‘fifteenth’ is often irregular in Tibetan, so this phoneme in Thebo may not correspond to the CT.

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