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A lexical and phonological reconstruction of Highland East Cushitic including a comparative East Cushitic database

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3 Alternations at Morpheme Boundaries

This chapter examines the phonological changes that occur specifically at morpheme boundaries in Highland East Cushitic. These are phonological processes, but unlike the sound patterns documented in Chapter 2, they are triggered by morphological operations, such as the addition of suffixes, the concatenation of stems and affixes, and the interaction of roots with derivational morphology. Because these phenomena require reference to phonological processes and, in some cases, to morphological contexts.

Transcription symbols and data presentation/referencing conventions follow Chapter 1 (§1.5.3), including the use of in-text or footnoted citations for examples drawn directly from grammars rather than from database entries.

This chapter serves a dual purpose. First, it documents and compares the sandhi processes that have shaped HEC word forms across different stages. These include assimilation, palatalization, fusion, elision, metathesis, and various epenthetic strategies. Some of these processes are inherited from PHEC, as evidenced by their attestation in both Burji and the NHEC languages; others are innovations at the PNHEC level or within individual HEC languages. Second, and perhaps more importantly, the chapter demonstrates how recognition of derivational history expands the set of identifiable cognates. Lexemes that appear irregular or unrelated at first glance often prove to be regular once the morphological history of their reflexes is taken into account. A Sidaama lexeme showing a glottalized consonant, for example, may correspond regularly to a pulmonic consonant in sister languages once the fusion of a stem-final obstruent with the derivation suffix **-ʔ** is recognized.

The chapter is organized by the consonants undergoing morpheme boundary alternations. Section 3.1 treats the pulmonic alveolars (**t**, **n**, **s**, **ʃ**), documenting assimilation of the pronominal suffixes **-t** and **-n** to preceding consonants, partial assimilation of stem-final **m** to the following alveolars, as well as palatalization patterns in different contexts. Section 3.2 examines the velars (**k**, **g**), covering palatalization (particularly in Burji) and intervocalic lenition. Section 3.3 addresses processes involving the glottal stop, including fusion with preceding obstruents (yielding glottalized consonants), metathesis with preceding sonorants, and hiatus repair. Section 3.4 documents sonorant epenthesis (of, e.g., **-y-**, **-i-**, and other sonorants) used to repair phonotactically illicit sequences. Finally, Section 3.5 synthesizes the evidence, summarizing which processes can be reconstructed to PHEC, and

which represent PNHEC innovations. Accordingly, the discussion tracks a broad division between obstruent-driven alternations (Sections 3.1–3.3) and sonorant-driven repairs (Section 3.4), culminating in a comparative synthesis in Section 3.5.

3.1 Pulmonic Alveolars

The pulmonic alveolars **t**, **n**, **s**, and **ʃ** are frequently involved in morpheme boundary alternations across HEC. These consonants occur in key grammatical morphemes: **-t** and **-n** mark pronominals (2nd/3rd person), **-s** indicates causative derivation, and **-ʃ** functions as a singulative and deverbative. Their alveolar place of articulation makes them susceptible to assimilation, palatalization, and fusion processes at morpheme boundaries. This section documents these alternations by process type, beginning with assimilation (§3.1.1), then palatalization (§3.1.2).

3.1.1 Assimilation

This section examines assimilation processes affecting alveolar consonants at morpheme boundaries. Five main processes are documented: the full assimilation of pronominal **-t** to stem-final consonants (§3.1.1.1), a process restricted to the NHEC languages; the assimilation of plurative nasal **-n** after sonorant-final stems (§3.1.1.2), reconstructable to PHEC; the assimilation to the verbal suffix **-s** (§3.1.1.3) in Burji and Kambaata; the partial assimilation of stem-final nasal **-m** before alveolar suffixes (§3.1.1.4); and the affrication and allomorphic variation of the nominal derivational suffix ***-ʃ** (§3.1.1.5). These processes are critical for understanding surface forms in daughter languages and reconstructing underlying morpheme shapes.

3.1.1.1 Pronominal t

In the NHEC languages, the second and third-person suffix **-t** fully assimilates to the final consonant of the stem.⁹⁴

Had	d + t → dd	<i>sid-titto</i> → <i>sidditto</i> ‘you (sg) saw’
Kam	k + t → kk	<i>sok-tenta</i> → <i>sokkenta</i> ‘you (pl) sent’
Sid	g + t → gg	<i>ag-tú</i> → <i>aggú</i> ‘she drank’
Ged	s + t → ss	<i>has-tee</i> → <i>hassee</i> ‘she, seeking’

⁹⁴ Data source: Hudson (1976).

In Gedeo, only partial voicing assimilation occurs (Hudson, 1976, p. 250). A similar process has been attested in Burji (Tesfaye Baye, 2015, p. 69) as shown in the following examples:

Ged	n + t → nd	<i>egen-teeni</i> → <i>egendeeni</i> 'she knows'
Ged	l + t → ld	<i>ofol-toot't'e</i> → <i>ofoldoot't'e</i> 'don't sit'
Burji	n + t → nd	<i>k'un-</i> 'pound', <i>-tooni</i> (3sg.f.jussive) → <i>k'undoónj</i> 'let her pound'

The difference between the two processes in Gedeo is that the full assimilation takes place when the stem-final consonant is an obstruent, while the partial assimilation occurs after sonorants.

Gedeo presents another notable pattern with the **d'** variant of the reflexive suffix. Eyob Kelemework (2015, p. 71) notes that Gedeo **l** and **r** undergo total assimilation to **d'** across all persons, numbers, and genders, e.g.:

Ged	r + d' → d'd'	<i>hir-</i> 'buy' → <i>hir-d'-</i> → <i>hid'd'-</i>
Ged	l + d' → d'd'	<i>kul-</i> 'tell' → <i>kul-d'-</i> → <i>kud'd'-</i>

The total assimilation of pronominal **-t** is reconstructable to PNHEC, as it is systematically attested in all four NHEC languages but absent from Burji.

3.1.1.2 Nominal n

Nasal assimilation is widespread across the HEC languages, affecting the plurative pronominal suffix **-n**. This suffix fully assimilates to the stem-final sonorant (nasal, lateral, or tap). This process applies across all HEC languages with the exception of Kambaata (Hudson, 1976, p. 250).

Burji	r + n → rr	<i>mar-na</i> → <i>marra</i> 'we will go'
Had	r + n → rr	<i>mar-nummo</i> → <i>mallummo</i> (*r → Had l) 'we went'
Sid	m + n → mm	<i>um-noomo</i> → <i>ummoommo</i> 'we have dug'
Ged	l + n → ll	<i>ofol-neeni</i> → <i>ofolleen</i> 'they sat'

There is one instance of full assimilation of the plurative ***-n** to a stem-final obstruent **s**.

PHEC	*s + *n	[318] <i>*is-n-ʔ-</i> ‘their’ (3pl.poss)
Had	s + n → ss	<i>ʔissúwwi</i> ‘their’
Kam	s + n → ss	<i>issoʔóo</i> ‘their’
Ged	s + n → ns	<i>insaʔnneke, insaʔnnet’t’e</i> ‘their’
Sid	s + n → ns	<i>-nsa</i> ‘their’
Burji	s + n → s-i-n	<i>ʔisiná-</i> ‘their’

In this instance, ***sn** becomes Hadiyya and Kambaata **ss**, while it is retained with metathesis as **ns** in Gedeo and Sidaama. Notably, Burji deviates from the two NHEC patterns by inserting a vowel **-i-** in **is-n* → *ʔisiná-* ‘their’ above (§3.4.1.1), suggesting a different strategy for resolving the consonant cluster.

Again, the difference in sonority between the stem-final and suffix consonant is what distinguishes the two processes across HEC. The stem-final sonorant plus sonorant **-n** yields full assimilation in four HEC languages, while the stem-final obstruent plus the sonorant **-n** results in various processes (assimilation, metathesis, and epenthesis). The regularity of full assimilation of sonorant + pronominal ***-n** is attested in Burji and in Hadiyya, Kambaata, and Sidaama. This distribution beyond the NHEC branch establishes the process as reconstructable to PHEC. The two processes applied to the pronominal suffixes in §3.1.1.1 and §3.1.1.2 can be formalized as: **-C** → **C_i** / **C_i+_—**, if they belong to the same class of sonority.

3.1.1.3 Verbal s

Verbal derivation **-s** includes the causative (§4.2.2) and reduced variants of the extended denominative (§4.2.5.7), but its surface realizations frequently reflect morphophonological interaction at morpheme boundaries. In several languages (e.g., Kambaata and Sidaama), suffixation of **-s** triggers full regressive assimilation of a preceding stem-final consonant, yielding a geminate **ss**, as illustrated below.⁹⁵

Kam	b + s → ss	<i>beeb-</i> ‘be covered’ → <i>bees-s-</i> ‘cover’
	z + s → ss	<i>zaaz-</i> ‘flow’ → <i>zaas-s-</i> ‘make flow’
Sid	b + s → ss	<i>bub-</i> ‘to burn’ → <i>buf-f-</i> ‘cause to burn’
	d + ʃ → ʃʃ	<i>godoodo</i> ‘the shout of cattle’ → <i>godooʃf-</i> ‘to cause to shout’
Burji	b + s → ss	<i>jib-</i> ‘run’ → <i>jiss-</i>
	d + s → ss	<i>sood-</i> ‘stay up all night’ → <i>sooss-</i> ‘make/cause stay on duty the whole night’

⁹⁵ Data sources: Kambaata (Treis, 2022) and Burji (Tesfaye Baye, 2015), Sidaama (Indrias Xa’miso et al., 2007; Kawachi, 2007). Glossing is only provided when found in the source.

Burji shows metathesis rather than full assimilation when the stem-final obstruent is a velar, e.g., [701] *jig-* ‘to demolish/destroy’ → *jisk-*. Therefore, metathesis is the logical intermediate stage for all the obstruents + **s** in Burji, i.e., it is retained with the velars but followed by subsequent full assimilation with the labials and alveolars. Burji does not participate in the full assimilation of the obstruents discussed in §3.1.1 either. Therefore, the full assimilation process of the stem-final single obstruent + verbal ***-s** is inherited from PNHEC in Kambaata and Sidaama and innovated independently in Burji in a more restricted environment (§3.1.2.2).

The sonorants **r/l** + verbal **s** display diverse patterns of retained **rs/l**s and innovated assimilation and epenthesis.⁹⁶

Had	r + s → ss	<i>mar-</i> ‘to go’ → <i>mas-s-</i> ‘to take, to let go’
	l + s → ls	<i>t'allal-</i> ‘to slip’ → <i>t'allal-s-</i> ‘to let slip’
Kam	r + s → ss	<i>mar-</i> ‘go’ → <i>mas-s-</i> ‘take (somewhere)’
	l + ʃ → ʃʃ	<i>mool-</i> (intr) ‘dry’ → <i>mooʃʃ-</i> ‘to become dry’
Sid	r + s → ss	<i>mar-</i> ‘go’ → <i>mas-s-</i> ‘to take away’
	l + ʃ → ʃʃ	<i>mool-</i> (intr) ‘dry’ → <i>mooʃʃ-</i> ‘to become dry’
Burji	r + s → rs	<i>mar-</i> ‘to go’ → <i>mar-s-</i> ‘make (someone) go’
	l + s → ls	<i>ilal-</i> ‘to open eyes’ → <i>ilaal-s-</i> ‘to display’
Ged	r + s → ris	<i>mar-</i> ‘go’ → <i>mar-is-</i> ‘cause to go, accompany’
	l + ʃ → lc	<i>mal-</i> ‘find a way out’ → <i>mal-c</i>

In the above examples, Hadiyya, Kambaata, and Sidaama assimilate the **rs** sequence fully into **ss**. However, such a full assimilation of the sonorant **r** and **s** does not apply to Burji and Gedeo, because Burji retains the sequence and Gedeo inserts **-i-** between the segments. For the sequence **ls**, Burji and Hadiyya retained the sequence. There is palatalization of **s** to **ʃ** (§3.1.2.2) in the other three languages, but only Sidaama and Kambaata show full assimilation of **l+ʃ** into **ʃʃ**. Gedeo affricated the **ʃ** into **c** without full assimilation. Unlike the obstruents + **s** above, the reflexes of the sonorants + **s** present various manifestations; therefore, they are classified as independent developments in each daughter language. This conclusion also complies with the allomorphs of the verbal **-s** and their environments established in §3.1.2.2.

⁹⁶ Data sources: Hadiyya (Ritter, 2007), Kambaata (Treis, 2022), Sidaama (Indrias Xa'miso et al., 2007), Burji (Getahun Addo, 2017, pp. 649, 651), Gedeo (Eyob Kelemework, 2015, p. 214).

3.1.1.4 Stem-final **m**

Several alveolar-initial suffixes have contributed to the partial assimilation of the stem-final ***m** to **n** in HEC.

$$*m + *t, *s, *c', *ʃ \rightarrow n$$

The following examples show the reconstructed words with stem-final ***m** in the first column, retained **m** in the second column, and assimilated **n** in the third column:

[198]	m	→ n	Gloss	[142]	*m	→ n	Gloss
PHEC	*tum-am-f- , *tum-t- , *tum-t-i-ff-	-	'blacksmith'		*tam-n-	-	'ten'
Burji	-	tuntoo	'blacksmith'			tanna	'ten'
PNHEC	*tum-am-f- , *tum-t- , *tum-t-i-ff-		'blacksmith'		*tom-n-	-	'ten'
Had	tumaanco		'blacksmith'		tommo	-	'ten'
Kam	tumaan-cu		'blacksmith'		-	tonn-a	'ten'
Sid	-	tunto	'blacksmith'		-	tonne	'ten'
Ged	-	tunto	'blacksmith'		tomme	-	'ten'

Unassimilated **m** is also found in Oromo *tumtuu* 'smith'. In [142], only Sidaama and probably Kambaata have an instance of assimilated **m** before **n**, whereas Hadiyya and Gedeo assimilated **n** to the preceding **m**, stimulated by the matching sonority. Kambaata *tonn-a* is found only in Sasse (1982, p. 176), while other sources have *torduma* 'ten'. According to Treis (p.c.), the correct transcription is *too-na*, and the translation should be 'ten + X', as it is only used in '11, ... 19', but not in '10'.

[675]	*m	→ n	Gloss	[170]	*m	→ n	Gloss
PHEC	*k'oom-	-	'calabash'		*sum ?		'urinate'
Burji	k'oomoo	-	'calabash'		-	sin?-	'urinate'
PNHEC	*k'oom-	-	'calabash'		*jum ?		'urinate'
Had	k'ooma	-	'calabash'		jum-e?-		'urinate'
Kam	k'oomu	-	'calabash'		jum-a?-		'urinate'
Sid	-	k'oon-co	'calabash'		jumi	finc'i	'urinate'
Ged	k'omma	k'oon-jo	'calabash'			ji?n-	'urinate'

In [170], Oromo *finc'-eessa* 'urinate' is likely the source of the second Sidaama variant *finc'i*. Burji and Gedeo **n** is likely due to analogy with the Oromo form, which also explains the irregular vowel reflex **i**.

[363]	*m	→ n	Gloss	[607]	m	→ n	Gloss
PHEC	*om-t-	-	'five'		*huɣ ʔ-s-		'to fill'
Burji	umutta	-	'five'		-	(huuss)	'fill'
PNHEC	-	*ont-	'five'		*huym-s-	-	'to fill'
Had	-	onto	'five'		-	wanɸ-	'fill'
Kam	-	ontu	'five'		-	wiinɸ	'fill'
Sid	-	onte	'five'		woʔm-is-	wonɸ-	'fill'
Ged	-	onde	'five'			wonɸ-	'fill'

The partial assimilation ***m** → **n** is conditioned by alveolar-initial morphemes: ***-t** ([675], [198], possibly [363]), **-ɸ** ([607]), **-n** ([142]), and **-c'** ([170]). For example, in Burji, **mt** became **nc** in *gama-* 'bite' → *gáncɿ*, where the **c** is from the consonant **-t** of the subject agreement marker, which palatalizes in such a post-consonantal context (Teskaye Baye, 2015, p. 72) before **-i** (§3.1.1.5). Kawachi (2007, pp. 49–50) documents a synchronic assimilation of stem-final **m** to **n** before **t** in Sidaama. Although it is not applied to the reconstructed PHEC above, such a widespread partial assimilation process also dates back to PHEC.

3.1.1.5 Nominal ɸ

Hudson (1989, pp. 11–12) reconstructs PHEC ***c** [tʃ], describing its variants as "c is [č:] between vowels and (single) [č] elsewhere, except in Burji and Gedeo, which seem to have intervocalically a marginal contrast of length between c and cc". However, the affricate **c** shows a defective distribution across HEC languages, including Burji (Teskaye Baye, 2015, p. 32), Sidaama (Anbessa Teferra, 2000, p. 13), Kambaata (Treis, 2008, p. 25), and other HEC languages (Wedekind, 1990, p. 51). The affricate is restricted to the context of derivational morphemes (singulative §4.1.1.1 and deverbative §4.1.2). It has two more allomorphs, **ɸ** and **j**, and only the post-alveolar **ɸ** is a phoneme. Consequently, the affricates (**c** and **j**, representing [tʃ] and [dʒ]) are not reconstructed as independent PHEC phonemes; rather, they are analyzed as recent developments from ***ɸ**.

The shape and attestational evidence of the singulative (§4.1.1.1–4.1.2) overlaps substantially with that of the deverbative suffix discussed in §4.1.2. Both suffixes exhibit the same reflexes, and in many lexical items, it remains

unclear whether such a suffix has a singular or deverbalizing function. This overlap suggests a possible shared origin or early merger of the two morphemes. Therefore, they are discussed together in this section.

The following sections discuss two hypotheses for the origin of the (singulative/deverbative) derivation suffixes: The first hypothesis reconstructs an original **t* by proposing an expressive palatalization to explain the affricate *c* allomorph, while the second hypothesis argues for an original post-alveolar **ʃ* affricated into *c* and assigns multiple sources for the instances of assumed fossilized **t*. The second hypothesis is more plausible, as demonstrated by the discussion and supporting evidence.

Affricated *c*

The first hypothesis relies on comparative evidence, such as [215] Gedeo *manj-icco* ‘woman’ with Hadiyya *meent-icco* and Kambaata *meent-iccu-ta* ‘woman’, which suggests that a PHEC derivational suffix, in this case the singulative suffix **-t* underwent palatalization to **-c* rather than affrication from an older **ʃ*. Palatalization of the singulative has an expressive purpose (e.g., when the singulative is used as a diminutive in Kambaata (Treis, 2008, p. 141)).⁹⁷ According to the first hypothesis, the singulative morpheme **-t* has two expressive allomorphs **-i-cc* and **-c*; their selection depends on the stem-final sound.

Context	Morpheme	Allomorph
everywhere	<i>*-t</i> →	
after obstruents/clusters		<i>*-i-cc</i>
after sonorant		<i>*-c</i>

After stem-final sonorants, the allomorph of the singulative suffix attached is **-c*; elsewhere, it is **-i-cc* (Anbessa Teferra, 2000, p. 27; Tadesse Sibamo, 2015, p. 48; Treis, 2008, p. 132), which might have been the case since early stages. The geminated allomorph *-cc* appears preceded by an epenthetic vowel *-i-* (see Hudson, 2006, p. 296; Hudson, 1989, pp. 11–12; Anbessa, 2000, p. 13), and both *-cc* and *-c* are always followed by the terminal vowel -

⁹⁷ A hypothesis sound symbolic or expressive gemination might also account for discrepancies like the irregular gemination correspondences in Gedeo [367] *mic’c’iir-* ‘twist’, *mic’c’-* ‘squeeze’ vs. Burji *mic’ir-* ‘wring out’ and Burji *hat’t’if-ee-d’-* (cf. *hattifeed’-*, *hattifeys-* (Roba Dame & Wedekind, 2008, p. 37)), Hadiyya *hat’t’ef-* vs. Burji *hat’if-*, Hadiyya *hat’iffuy-*, Kambaata *hant’ifa?*, Sidaama *hant’iff-ir’-*, *hant’iffo* ‘to sneeze’.

o in the singulative. Further palatalization patterns (ʃ, j) still prevail when the non-geminate allomorph **-c** meets other stem-final consonants.

Evidence of the proposed derivation of ***t** could be observed in instances of fossilized ***t** corresponding to palatalized **c** or unmarked **Ø**.

[215]	Unmarked	-t	-c/-cc	Gloss
PHEC	-	*meen-t-	-	'woman, girl'
Burji	meena	mandeyi	-	'people', 'man, person'
Had	-	meent-iccø	meent-iccø	'woman'
Kam	-	meent-iccu-ta	meent-iccu-ta	'woman'
Sid	-	-	manco	'man, woman'
Ged	-	-	manj-icco	'woman'

Example [215] includes the fossilized ***t** and later derived forms.

[175]	-t	-c/-cc	Gloss
PHEC	*kalt-	-	'axe, hoe'
Burji	kaltee		'axe'
Had		kalceʔe	'certain part of the plow'
Kam	kalta		'hoe'

Only Hadiyya has a palatalized **c** in the above example [175].

The cognate relationship of the lexemes with **t** is less certain in the following example:

[121]	Unmarked	-t	Gloss
PHEC	*gol-		'wall'
Burji	gola	godoo	'supporting wall', 'wall'
Had	-	gorteʔe, gole-ta	'wall'
Kam	gola		'horse stable'
Sid	golo	gaata	'firewood-place, fence', 'wall'
Ged	golo		'light wall/curtain'

The weaknesses of the first hypothesis include (a) non-phonetic conditions (expressive palatalization); (b) the limited fossilized evidence, and a possible alternative explanation for the limited examples; (c) the reconstruction of proto-forms with the affricate **c**, introducing a defectively distributed and isolated sound, and a new isolated PHEC/PNHEC consonant class (§2.5.1); and (d) the fact that the two environments (stem-final after sonorants (***-c**) and elsewhere (***-i-cc**)) leave no room to accommodate a third widely attested variant ʃ, with apparent overlap in distribution.

Post-alveolar ʃ

The second hypothesis posits **-ʃ* as the proto-nominal derivation morpheme. Despite its limited attestation compared to *-c*, **-ʃ* has reflexes in all HEC languages. Therefore, it must have merged with the innovated affricate *-c*.

Singulative *-ʃʃo* is found in some nouns in Sidaama. Anbessa Teferra (2000, p. 27) argues that it is a product of a process by which the stem-final consonant *s* or *d* plus *-co* became *-ʃʃo*. Likewise, in Kambaata, Treis (2008, p. 133) describes the singulative *ʃʃ* as a result of the stem-final single consonant merging with the initial consonant *c* (*ʃ* in this study) of the singulative suffix, hence sometimes the result is full assimilation into *cc*, e.g., *b + c → cc* in *ibiib-i-ta → ibiicc-u-ta* ‘louse’.

Had	<i>b + ʃ → ʃʃ</i>	<i>bagado → bagaʃʃo</i> ‘spear, lance’
Kam	<i>b + ʃ → ʃʃ</i>	<i>zagib-a → zagifʃ-u</i> ‘cedar tree’
Sid	<i>d + ʃ → ʃʃ</i>	<i>galad-o → galaʃʃ-o</i> ‘monkey’
Ged	<i>r + ʃ → rʃ, cc</i>	<i>moor- ‘steal’ → mod’arf-o, mod’acc-o</i> ‘the thief’
Burji	<i>r + ʃ → rʃ</i>	<i>d’oor-oó → d’oor-foó</i> ‘fig tree’

Gedeo *-c* in the above example serves a deverbalizing function, not a singulative as Eyob Kelemework (2015, p. 103) claims.

Burji has very few nouns where the singulative is marked by *-ʃaa* or *-ʃoo* (Tesfaye Baye, 2015, p. 95). In Gedeo, the allomorph *-ʃo* is attached after stems ending in the trill *r* (Eyob Kelemework, 2015, p. 103). Apparently, the same environment, i.e., stem-final *-r*, is where the Gedeo and Burji allomorph *-ʃo(o)* occurs in the above examples. Hadiyya is the only language that has not been reported to have the post-alveolar *ʃ* variant of the singulative. However, the available data, such as the example listed above, and the deverbative examples in Tadesse Sibamo (2015, pp. 40–41) (see §3.1.2.1), prove that there are at least traces of the post-alveolar *ʃ*.

The PHEC nominal derivational suffix **-ʃ* has various allomorphs: **-ʃ*, **ʃ-ʃ*, **-i-ʃʃ*, and **-c*, highlighting the dependence of the surface form on phonological processes. Therefore, the conditioning environment where each PHEC allomorph occurs provides solid ground for the interpretation of the various reflexes (see §§4.1.1.1, 4.1.2 for details on each suffix):

Stem-final	PHEC	PHEC allomorph	Process
C _[+son]	*ɸ	→ *ɸ	retention
C _[+fricative]	*ɸ	→ *ɸɸ	fusion/assimilation
C _[stop]	*ɸ	→ *-c	affrication
CC, cC	*ɸ	→ *-i-ɸɸ	epenthesis & gemination

The above allomorphs are found in the following contexts: *ɸ is retained after sonorants, becomes *ɸɸ after fricatives via fusion or assimilation, becomes *-i-ɸɸ with epenthetic -i- after geminates (CC)/clusters (cC),⁹⁸ or becomes affricated into *-c after stops. Synchronically, there is extensive merger of *ɸ with the affricated variant -c, driven by the unstable history of post-alveolar *ɸ (§2.1.1.2) and generalization pressure of the affrication variant c, which was restricted to the environment after stem-final stops. Within the established methodological contact/inheritance continuum (§1.5), areal pressure has contributed further to the generalization of the affricate -c (found in Oromo (Andrzejewski, 1960, p. 63; Stroemer, 1987, p. 83)) and even -t (found in Oromo (Andrzejewski, 1960, p. 63; Stroemer, 1987, p. 83), Konso (Zaborski, 1986, p. 145; Ongaye Oda, 2013, p. 87), and Diraytata (Zaborski, 1986, pp. 159–160)).

The comparative evidence supporting the reconstruction of nominal derivational *ɸ includes the following deverbative [329] and singulative [190], [65] sets:

	[329]		[190]		[65]	
Burji	reesi	'corpse'	-	-	-	-
Had	leeɸa, leeɸɸa	'corpse'	ellin-co	'sun'	faraffo	'horse'
Kam	re(e)ɸa	'corpse'	arr-iccu-ta	'sun'	faaɸɸu	'horse'
Sid	reeɸɸa, reeɸa	'corpse'	arriɸɸo	'sun'	faraffo	'horse'
Ged	reenɸa, renɸa	'corpse'	ariɸɸo	'sun'	faracco	'horse'

The easiest explanation for the Burji reflex **s** is that it continues an earlier post-alveolar ɸ, rather than deriving directly from the affricate c (e.g., [329]). Across HEC, the comparative evidence points to a post-alveolar base: NHEC languages retain ɸ as such in the relevant sets, whereas Burji reflects this segment as **s** (see §4.1.2). The affricated allomorph -c/-cc is seen in languages such as Gedeo (e.g., [65]) and Hadiyya/Kambaata (e.g., [190]).

⁹⁸ Some synchronic geminates (ɸɸ/cc) after the epenthetic -i- or -V might be (a) fusion with a preceding consonant in concatenated suffixes, (b) a phonotactic reason to create a coda for the preceding syllable and an onset for the terminal vowel, (c) lack of quantity contrast between c and cc (Hudson, 1989, pp. 11–12), or (d) sound symbolic (expressive), especially in singulative.

All the HEC languages retained **j** in the three cognate sets, except for Gedeo in [65] and Hadiyya and Kambaata in [190], which show the affricated **-c** and **-cc**.

From the perspective adopted here, the alleged fossilized derivational morpheme ***t** (central to the first hypothesis) remains difficult to establish. The clearest case is [215], but the additional support ([175], [121]) is limited, and comparable **t** segments also occur in some deverbative formations (see §4.1.2). Given this distribution, ***t** is best treated as ambiguous at present: depending on the lexeme, it may reflect stem material (e.g., [121]), a distinct derivational element (e.g., [215]), or an assimilatory outcome within the same suffix complex (e.g., alveolar-triggered restructuring of ***j**, as in [307]),⁹⁹ or contact influence. Crucially, the presence of occasional **t** does not require the reconstruction of an affricate-only proto-suffix.

The second hypothesis is preferable for three reasons. First, it reconstructs a post-alveolar ***j** at the PHEC level, which is more parsimonious than positing an inherently restricted proto-affricate ***-c**. Second, it derives the widespread **-c** outcomes from independently motivated conditioning (after stops) and from later analogical/areal generalization, rather than treating **-c** as primary. Third, it can incorporate the core observations behind the first hypothesis without contradiction: where **t** is involved, it can be analyzed as an input to palatalization/affrication pathways (cf. §3.1.2.1) that ultimately converge on the same suffix complex.

Affricated **j**

The voiced affricate **dʒ** (represented as **j**) is infrequent in HEC and is often associated with loanwords. In Gedeo, however, **j** also appears morphologically as **-jo**, which corresponds to the singulative allomorph **-co** found elsewhere in HEC specifically after **n**. Synchronically, this is best understood as voicing of the affricated allomorph (i.e., **n + co** → **n + jo**), rather than evidence for an independent suffix. The same voiced outcome is also

⁹⁹ In PHEC [307] ***mit-** ‘one’ → *Burji micca*; PNHE ***mat-**, ***mit-** → Had *mato*, Kam *matu*, Sid *mitte*, motto, Ged *mitte*, the derivation suffix is transparent in Burji, but the geminate **tt** in Gedeo and Sidaama could be due to full assimilation to the stem final **t**. Hadiyya and Kambaata cognates show no traces of the derivation suffix and also exhibit a different corresponding vowel, as expected with the numerals.

compatible with the Gedeo deverbative pattern **-an-jo** in §4.1.2. Consider the following Gedeo examples:¹⁰⁰

	n+c	Gloss
[675]	k'oon-jo	'gourd, vessel'
[602]	kin-jo	'stone, rock'
[138]	man-jo	'man, person, woman'
[59]	agen-jo	'month, moon' ¹⁰¹

The correspondences in other HEC languages exhibit the affricated **-c**:

Sid	[675]	<i>k'oon-co</i>	'calabash, skull'
Sid	[602]	<i>kin-co</i> , Kam <i>kin-cu</i> , Had <i>kin-c</i>	'stone, rock'
Sid	[138]	<i>man-co</i> , Kam <i>man-cu</i>	'man', Had <i>man-co</i> 'man, person'
Had	[59]	<i>agan-co</i> , Burji <i>agun-coo</i>	'month'

The affricated singulative allomorph **c** is voiced to **j** in Gedeo in all the above examples.

Compare the deverbalized stems with a suffix **-c** and their plural counterparts in [198].

	Verbalized	Plural	Gloss
Burji	tunt-icca	tunto	'smith', 'clan of smiths'
Had	tumaan-co	tumaano	'blacksmith'
Kam	tumaan-cu	tumaannu	'blacksmith'
Sid	tumaan-co, tunt-icca	tunto	'blacksmith'
Ged	tunt-icca	tunto	'blacksmith'

This comparative set is derived from [48] **tum-* 'to pound', so it includes deverbative affricated **-c**, which is formally identical to the singulative allomorph **-c/-cc**. However, the two functions are not identical in distribution: in deverbatives, allomorph choice is often more transparently conditioned by preceding concatenated suffixes (see §4.1.2).

¹⁰⁰ Gedeo loans from Oromo show initial and non-initial **j**: [38] *jaane* 'six' ← Oromo *jaʔa*, [155] *jaal-at* 'love, like' ← Oromo *jaall-ad'd'a*, [15] *urje* 'star(s)' ← Oromo *urjii*, [265] Gedeo, Burji, Kambaata *huj-* 'work' ← Oromo *hojii*. Another loan in HEC is Burji *jinjibili*, Had *jinjibila*, Kam *jaanjibeelu*, Sid *janjibeelo* (Treis, p.c.), Ged *gaanjibelo* ← Amharic *zənjəbel* (Leslau, 1976, p. 357); Oromo *jinjibila* 'ginger' (Hudson, 1989, p. 70).

¹⁰¹ Example [59] *agen-jo* is noted as an Omotic loanword (Sasse, 1982, p. 24), found in Zala, Gofa, Gamu, and Dac'e as *agina* 'moon, month' (Lamberti & Sottile, 1997, p. 281). Additionally, Gedeo [173] *billaanca* 'butterfly' is an exception, having **nc** instead of **nj**, so it might be a recent loan.

3.1.2 Palatalization

Palatalization in the HEC languages affects alveolars in both stems and suffixes under specific structural conditions. The process targets **t** and **s** primarily, and more marginally **n**, yielding palatalized reflexes that are central to the alternations surveyed in §3.1. Because the diachronic history of alveolar fricatives is not transparent in all environments (see §2.1.1.2), palatalized outcomes involving **ʃ** should be interpreted together with other morphophonological processes. This is particularly relevant for causatives, where a palatalized causative **-ʃ** is analyzed in Chapter 4 as an innovation of Kambaata, Sidaama, and Gedeo.

3.1.2.1 Stem-final and Pronominal **t**

Burji exhibits palatalized reflexes of ***t** as the affricated **c** and the fricative **ʃ** in certain environments. The distinctive palatalization **t** → **c** pattern occurs before the high front vowel **i** (or an older Nominative ***y** §4.1.5.2). Additionally, there are traces of what Sasse (1982, p. 18) describes as an older rule where **t** → **ʃ** intervocalically before **i**.

t + i → **ci**
Vt + i → **ʃi**

The palatalization of **t** → **c** occurs in pronominals followed by the feminine nominative suffix **-i**.

	PHEC	t+i	Nominative	t+a	Accusative	Gloss
[135]	*ʔy	ʔiccɨ	(1sg.poss.f)	ʔittə	(1sg.poss.f)	'my'
[188]	*ni-ʔ-	ninci	(1pl.poss.f)	ninta	(3pl.poss.f)	'our'
[318]	*isn-ʔ-	ʔisináccɨ	(3pl.poss.f)	ʔisináttə	(3pl.poss.f)	'their'
[366]	*ise-ʔ-	ʔijeéccɨ	(3sg.poss.f)	ʔijeéttə	(3sg.poss.f)	'her'
[281]	*t-	cin(d)'i-ʃi	(pl.f.dem.pron)	-	-	'these'
[418]	*ti	ci	(sg.f.det)	ta	(sg.f.det)	'this'

Intervocalic palatalization of ***t** to **ʃ** is attested in a limited set of pronominals, especially before the high front vowel **i**.

	PHEC	Vt+i	Nominative	Gloss
[27]	*at-i	ʔáʃi	(2sg.nom)	'you (sg)'
[104]	*ati-n-	ʔaʃinu	(2pl.nom)	'you (pl)'
[418]	*ti	-ʃi	(def.f)	'the'

Burji **-fi** (def.f) (Getahun Addo, 2017, p. 788) is likely from the same stem as **ci** (sg.f.det) above, but has **f** in the suffix before a vowel, e.g., *ama-fi* ‘the woman’.

Both Hadiyya and Burji show palatalization adjacent to obstruents. Tadesse Sibamo (2015, pp. 40–41, 76) describes a process of unconditional palatalization and gemination in Hadiyya where stem-final alveolars **t**, **d**, and **s** palatalize and geminate to **cc**, **jj**, and **ff**, respectively. While no added suffix is explicitly mentioned, the morphological process clearly involves nominal formation from verb stems, e.g.:¹⁰²

Stem	Gloss	C _[-son] +f	Gloss
?it-	‘eat’	?icca	‘meal’
?it-is-	‘to feed’	?itijfa	‘causing to eat’
?ed	‘add’	?ejja	‘addition’
fiink’ees-	‘whistle’	fiink’eéffa	‘whistling’

The gemination and palatalization suggest that the stem-final **-s** fused with the following nominal derivation (deverbative) suffix ***-f** (§3.1.1.5), yielding geminated **cc**, **ff**, or **jj**, depending on the quality of the stem-final consonant. Unlike the nominal causative *?itijfa* ‘causing to eat’, in the nominal, there is direct attachment of the suffix **-f** to the root final **-t** in *?icca* ‘meal’ above and Kambaata *icca-ta* ‘food’ (compare with *it-* ‘eat, rip off’ → *it-is-* (caus1) ‘feed, offer (food)’ → *it-siis-* (caus2) ‘cause to be ripped off’ (Treis, 2008, pp. 9, 432)). Therefore, **-is+f** yielded geminated **ff**, and **t+f** fused into an affricated **c**.

Burji displays unique patterns in the palatalization and subsequent assimilation of the subject agreement suffixes **-t-** (2sg/3sg.f) and **-t-ng-** (2pl) when attached to a stem ending in obstruents.

tt	→ cc, ff	<i>k’ot-</i> ‘dig’ → <i>k’óccj</i>	<i>?it-</i> ‘eat’ → <i>?iffj</i>
d’t	→ cc, ff	<i>had’ad’-</i> ‘throw’ → <i>had’áccj</i>	<i>god’-</i> ‘weed’ <i>gojj</i>
?t	→ ff	<i>fo?-</i> ‘select’ → <i>fóffj</i>	-
bt, dt, gt	→ jj	<i>hab-</i> ‘forget’ → <i>hájjj, hajjǝngj</i>	-

While Tesfaye Baye (2015, p. 70, fn. 16) follows Wedekind (1985, p. 127) in describing changes like **tt** to **ff** as dissimilation, their analysis fails to account for other patterns, such as **?t** to **ff**. The conditioning factors for **cc** and **ff** are puzzling. The front vowel **-i** should theoretically produce **c**, not **f**, in such a context as discussed above in this section. Therefore, contra Tesfaye Baye (2015, p. 70), one tentative scenario proposes a regular palatalization before

¹⁰² Data source: Tadesse Sibamo (2015, p. 40).

the high front vowel $*-t-i \rightarrow *-c-i$.¹⁰³ The subsequent changes that the palatalized $-c$ undergoes are conditioned by different stem-final consonants and could be summarized as follows: c following sonorants $*C_{[+son]}ci$, otherwise yielded an impermissible sequence $*C_{[-son]}ci$ resolved as (a) fused voiceless geminate cc following pulmonic voiceless obstruents (except ʔ), (b) fused voiced geminate jj following voiced stops, (c) fused glottalized geminate $c'c'$ following glottalized consonants, (d) free variants cc and jj following voiceless alveolar stops (including d'), and (e) geminate jj following the glottal stop ʔ .

Tesfaye Baye (2015, pp. 278–283) analyzes the vowel $-i$ in Burji as a converb marker, as in the following examples of the verb ‘say’.

ʔiy-i	$\text{ʔiy-}\emptyset\text{-i}$	ʔif-i	ʔiy-i-ng-i
say-i	say-3sg.m-i	say-3sg.f-i	say-i-3pl-i

The palatalized single j of the third-person feminine $-t$ is the regular reflex in this intervocalic environment, as discussed above. In the third-person plural, the $-i-$ is epenthetic (§3.4.1).

3.1.2.2 Stem-final and Verbal s

The verbal derivational suffix $*-s$ has several reflexes in the HEC languages, including a palatalized $-j$ in Kambaata, Sidaama, and Gedeo and an affricated $-c$ in Gedeo. This subsection outlines the morpheme boundary alternation processes that can yield these reflexes, with particular attention to palatalized outcomes and to stem-final s palatalization through fusion with the singulative suffix $*-j$.

Like the nominal derivational $*-j$, the causative (§§4.2.2, 4.1.2) and the reduced variants of the causative denominative (§4.2.5.7) $*-s$ markers show overlap in form and distribution. In some lexical items, the two markers are formally identical, which makes it difficult to distinguish causative from grammaticalized denominative derivation on phonological grounds alone. This overlap suggests generalization of the denominative, even though the two were originally distinct; for this reason, I discuss them together here as verbal derivation morphemes.

¹⁰³ Supported further by lack of palatalization before vowels other than the high front vowel, such as $-tooni$ (3sg.f.jussive), e.g., $k'ot-$ ‘dig’ $\rightarrow k'ottoóni$, $duk-$ ‘mix’ $\rightarrow dut't'oóni$. Both show fusion and gemination with the stem-final consonant only.

Alveolar s

The PHEC verbal derivational suffix ***-s** has allomorphs: ***-s** and ***-is** in addition to PNHEC ***s-s**. Therefore, the conditioning environment of each PHEC allomorph provides insights into the current diverse reflexes and environments (see §§4.2.2, 4.2.5.7 for further details):

Stem-final	PHEC	PHEC allomorph	PNHEC allomorph	Process
C _[+son]	+*s	→ *-s	→ *-s	retention
C _[-son]	+*s	→ *-s	→ *s-s	fusion & gemin.
CC, cC	+*s	→ *-i-s	→ *-i-s	epenthesis

The above allomorphs are found in the following contexts: ***-s** is retained after sonorants and receives an epenthetic **-i-** after geminates (CC)/clusters (cC) to surface as ***-i-s**. It becomes ***s-s** after obstruents via fusion and gemination in PNHEC and occurs in Burji with the labials and alveolars only (§3.1.1.3).

The PHEC pattern of **-s** suffixation directly to a stem-final singleton is preserved at least in Burji, Kambaata, and Sidaama, as seen in §3.1.1.3. For remnants of evidence in the rest of HEC, see the reflexes of the PHEC verb [425] ***ʔ** ‘to do’ and its derived causative ***ass-** (caus) ‘to do’ (← ***ʔ-s**) and PHEC [388] ***y** ‘to say, do, be’ and its derived causative ***is-** (← ***y-s**). The epenthetic **-i-** occurs between the stem-final geminates and clusters, as in the following examples:¹⁰⁴

Burji	gg + s → ggis	<i>ugga</i> ‘to make somebody haste’ → <i>uggisa</i> ‘to make somebody make someone to haste’
Had	ll + s → llis	<i>dill-</i> ‘to descend’ → <i>dill-is-</i> ‘to move something down’
Kam	nʃ + s → nʃis	<i>ganf-</i> ‘cough’ → <i>ganf-is-</i> ‘make cough’
Sid	ʔm + s → ʔmis	<i>tʕʔm-</i> ‘to become beautiful/handsome’ → <i>tʕʔm-i-s-</i>
Ged	rr + s → rris	<i>dirr-</i> ‘go down, descend’ → <i>dirr-i-s-</i> ‘unload, put down’

Although it is more prominent in Hadiyya and Gedeo, there is frequent ***-is** across all environments, particularly after obstruents, even in Burji, Kambaata, and Sidaama. Therefore, the verbal allomorph **-is** is the most widespread and attested in all the HEC languages, including Gedeo, which has no retained allomorph **-s**. The source of instances of **-is** in environments other than those specified above is attributed to the identical form and function of the causative ***-i-s** and the derived PHEC verb ***is-** meaning ‘to make’ (from the verb ***y-** ‘to

¹⁰⁴ Data sources: Burji (Getahun Addo, 2017, p. 835), Hadiyya (Tadesse Sibamo, 2015, p. 127), Kambaata (Treis, 2022, p. 9), Sidaama (Kawachi, 2007, p. 55), Gedeo (Eyob Kelemework, 2015, p. 183).

say, do, be'). Therefore, not every *i* preceding the allomorph **-s** is epenthetic, because *i* has also historically developed from the support verb **y* 'to say, do, be', when it receives the verbal **-s* (i.e., **-ys* → **-is*, see §§4.2.5.7, 4.2.4.1). In other words, when **-is** is found after geminates/clusters, it historically goes back to causative **-i-s* with epenthesis; otherwise, it is a reflex of the derived verb **is-* 'to make'. Still, the verb **is-* 'to make' may occur even in the environment of **-i-s*. Leveling of the two is likely within individual languages, and non-transparent stem-final consonants may blur the distinction. Such a precaution is necessary because it is sometimes unclear whether some underlying stems comprise complex stem-final consonants (**CC*, **cC*). For example, is PHEC [496] **raʔ-i-s-* 'to cook' derived from [431] **raʔ-* 'ripen, be ripe' with a single *ʔ* or does it include an underlying stem-final geminate *ʔʔ*?¹⁰⁵

On the other hand, there are cases where only **-s** surfaces instead of the expected **-is** (or **-ees**) because the support verb has been deleted or fused as part of morpheme boundary alternation processes (§3.4.1.2). For instance, after a vowel-final stem, the support verb surfaces as *y* in Burji *battee* (adj) 'dirty, filthy' and it is retained in the denominalized *batte-ys-* 'to make dirty', but in *c'eejiy-* 'to bleed' the support verb becomes *i* in *c'eejis-* 'to bleed, make bleed' with a **-s** as a causative denominative following the historical pattern (or dropped and the current *i* is the stem final vowel, see §3.4.1). Such an unstable synchronic reality does not undermine the established historical scenario.¹⁰⁶

Palatalized and Affricated *f/c*

A palatalized causative **-f** is found in three NHEC languages: Kambaata, Sidaama, and Gedeo. More than one scenario might have led to the innovation of the palatalized variant in these three languages. First, the palatalized **-f** is driven by the unstable history of the post-alveolar **ʃ* (§2.1.1.2)¹⁰⁷ as witnessed in individual language-internal and dialectal variation between the palatalized *ʃ* and alveolar *s* in verbal derivation – i.e., it is optional in Sidaama (*ʃ* ~ *s*) (Kawachi, 2007, pp. 52–53) and dialectal in Gedeo (highlanders prefer *ʃ* over *s*) (Eyob Kelemework, 2015, p. 182). Second, the palatalized **-f** might have emerged as an allomorph in specific contexts: (a) following a stem-final *l* where its reflexes are mainly found in

¹⁰⁵ It remains to be determined how **-is* (caus) and **is* 'to make' were functionally distinguished (if at all) at the proto-level.

¹⁰⁶ Data source: Burji (Getahun Addo, 2017; Tesfaye Baye, 2015).

¹⁰⁷ For example, the stem final alveolar **-s** in Hadiyya and Kambaata *gos-* and the palatalized stem-final **-f** in Gedeo and Sidaama *goʃ-* 'uproot'.

Kambaata (Treis, 2022, p. 12) and Gedeo (Eyob Kelemework, 2015, p. 94) (§3.1.1.3) and (b) as a result of an exceptional fusion process of the support verb *y* ‘say, do’ and **-s**. Instead of leaning towards a single scenario, a combination of such internal factors and contact has contributed to the diffusion of the palatalized **j**, since it is also found in languages like Oromo.

Sometimes the palatalized **jj** of Kambaata, Sidaama, and Gedeo corresponds to geminated **-ss** in the remaining two HEC languages, i.e., Hadiyya and Burji, supporting the fusion interpretation, for example, Hadiyya [701] *giggiss*- ‘to shake off’ in comparison to Kambaata *giggijj*- ‘shake off, let fall down’ and Sidaama *giggijj*- ‘tear down part of a house in order to renew it, snatch, kick off’.¹⁰⁸

Similar to the nominal ***j**, Gedeo affricates the palatalized verbal **j** into **c** after stem-final **l**, as in *ful*- ‘exit, get out’ → *ful-c*- ‘take out’ (Eyob Kelemework, 2015, p. 189) in comparison to Sidaama *ful*- ‘to exit’ *fuff*- ‘to move sth out, take off clothes’ (Kawachi, 2007, pp. 55, 117).

Kambaata, Gedeo, and Sidaama apply the same distribution of the PHEC allomorphs to the recent palatalized **j** variant. Thus, the same stem might receive either **-s** or **-j**, depending on the language and sometimes in the same language (i.e., Sidaama or Gedeo).¹⁰⁹

¹⁰⁸ The reflexes of the other two languages show completely different processes: metathesis of **-s** in Burji *jisk*-, *jig*- ‘to demolish/destroy’, and epenthesis or change of **y** to **i** in Gedeo *giggis*- ‘stutter’.

¹⁰⁹ Data source: Hudson (1989).

	Verbal -s	Gloss	Verbal -j	Gloss
Burji	huus-	'fill'	-	-
Had	-	-	wanj- ¹¹⁰	'fill'
Kam	-	-	wiinj-, yiinj-	'fill'
Sid	woʔm-is-	'fill'	wonj-	'fill'
Ged	-	-	wanj-	'fill'
Had	iibb-is-	'to heat'	-	-
Kam	iibb-iis-	'to heat'	-	-
Sid	-	-	iibb-ij-	'to heat'
Ged	-	-	eebb-ij-	'to heat'
Had	haraass- ← haraar-s-	'widen'	-	-
Kam	haraars-	'widen'	-	-
Sid	-	-	halaʔl-ij-	'widen'
Sid	-	-	dur-ij-	'fry, roast'
Ged	duʔris-	'fry, roast'	-	-

Such varied patterns prove the recent suffixation of the palatalized **j** as an independent verbal derivation suffix in Kambaata, Sidaama, and Gedeo, competing with the older **s**.

Alveolar **s** and Palatalized **j**

In the double causative formation caus1-caus2, caus2 always follows the **y** of the support verb, regardless of the number of preceding causatives; i.e., caus2 requires a support verb.¹¹¹ Therefore, the common HEC double causative **-siis** is composed of ***-s** (caus1) followed by an epenthetic vowel **-i-** to separate it from the following ***ys** sequence of caus2, i.e., ***-s-i-y-s** → **-siis**. This hypothesis explains the double vowel of the double causative **-siis** via the fusion of the **y** and the following epenthetic **i**.¹¹²

¹¹⁰ The presence of **j** in Hadiyya **wanj-** (tr) 'fill' is an exception, as Hadiyya does not generally exhibit **j**.

¹¹¹ The reason caus2 of the double causative requires the support verb **y** is that it is obligatorily attached to a verb root. This is supported by the need of the denominatives for a support verb (**y** or **ʔ**) to receive the suffix **-s** or any denominative (§4.2.5).

¹¹² Epenthesis as a sole hypothesis fails to account for the reason the single epenthetic vowel becomes double **-ii-** in the double causative **-siis** found in all HEC languages.

There is a variant of the double causative **-fiis** with palatalized **-f-** in caus1 and alveolar **-s** in caus2 in the three languages where the palatalized causative is attested, i.e., Kambaata, Sidaama, and Gedeo. Therefore, **-fiis** is analyzed as a palatalized caus1 **f** followed by an alveolar **s** in caus2 ***ys** → **is**, i.e., **-f-i-y-s-** yielding **-fiis-**. The palatalized **-f** is always the first member (caus1), probably because it was conditioned by the stem-final consonant, so it remains closer to the stem. Then a later **y** and a following causative **-s** were added, triggering **-i-** epenthesis before the **ys** sequence with a subsequent fusion of **-iy-** into double **-ii-**. The epenthesis in this case is motivated by the following **ys** sequence to avoid three consonant sequences in the double causative.¹¹³

Additionally, there is an optional palatalization of caus2 in double causative, but restricted to double causative where caus1 is a palatalized **f**. Therefore, Sidaama and Gedeo allomorphs **-fiis** ~ **-fiif** can be explained by arguing that **-fiif** includes an optional obstruent harmony of the **-s** of caus2 to the palatalized **f-** of caus1 in the allomorph **-fiis** (fn. 36). It must be the assimilation of caus2 **s** to caus1 **f** because there is ***-fiis** (← ***-f-i-y-s**) but no attestation of **f** in caus2, i.e., there is no ***-siif-**.

Contrary to the regular ***is**, the **ys** sequence can yield geminate **ss** in Burji and Hadiyya. Therefore, the double causative **-siss** is only attested in those two languages, suggesting a fused caus2 **-ss** composed of **y** and **s**. The variant **-siss** is a recent innovation in the two languages, because it is likely ***-s** followed by the support verb [388] ***y** 'to say, do, be', and another causative ***-s**, which makes **-siss** different from the old double causative form ***-siis**, although the components are the same.

In summary, the verbal derivation ***-s** is historically realized as **-s** except after geminates and clusters, where it is preceded by epenthesis and becomes ***-is**. The derived verb form ***is** 'to make' is one of the realizations of the support verb ***y** 'to say, do, be' followed by the verbal **-s** after the change of **y** into **-i**, and is also used in verbal derivation. Kambaata, Sidaama, and Gedeo innovated a palatalized variant **f**, which is affricated to **c** in Gedeo after **I**. Both the palatalized and alveolar geminates **ff/ss** involve a fusion process with a preceding consonant, including fusion with the **y** of a preceding support verb. The HEC double causative comprises either an alveolar **-s** or a palatalized **-f**,

¹¹³ There are instances of multiple causative suffixes, e.g., Gedeo, Kambaata, Burji **-sisiis** and Gedeo, Sidaama and Kambaata **-fisiis** where there is a single **-i-** before caus2, so there may be no epenthesis inserted.

followed by epenthetic **-i-** and a complex form **-is/-ys**, yielding either **-siis/-siss** or **-fiis**.

Stem-final **s**

Other than the verbal **s**, the stem-final **s** is also palatalized to **ʃ** in NHEC through a fusion process triggered by the addition of the derivation suffix ***-ʃ** (§§4.1.1.1, 4.1.2). For example:

PNHEC [406] **wees-*, **wees-f-* (sgv) ‘ensete tree (*Ensete ventricosum*)’ yields Kam *weesi-ta*, *weeffu*, and Sid *weese*, *weeffo*,

PHEC [174] **hamas-* ‘snake’ → Burji *hamasi*, and PNHEC **hamas-*, **hamas-f-* (sgv) ‘snake’ → Had *hamafficco*, *hamaffa*, Kam *hamasu* ‘roundworm (*askarias*)’, Sid *hamaffo*.

In [406], both the ***s** and palatalized **ʃ** are preserved. However, in the second example [174], only Burji and Kambaata retained the stem-final **s**, which has changed into **ʃ** in Hadiyya and Sidaama. The derivational morpheme ***-ʃ** is the source of the palatalization and gemination (***s+ʃ** → **ʃʃ**) in [406] **wees-f-* (sgv) ‘ensete tree (*Ensete ventricosum*)’, and [174] **hamas-f-* (sgv) ‘snake’.

3.1.2.3 Stem-final **n**

The alveo-palatal nasal **ɲ** is rare in the HEC languages (Bender, 2020, pp. 116–117). It typically occurs in loanwords (e.g., Burji; Sasse, 1982, p. 16), in onomatopoeic forms (e.g., Sidaama; Indrias Xamiso et al., 2007, p. 632; Anbessa Teferra, 2000, p. 13), or as an allophone before palatals (e.g., Burji; Hudson, 1976, p. 248). Tesfaye Baye (2015, p. 39) provides an example of the latter in Burji:

k’un- ‘pound’ → *k’un-t-ng* → *k’uɲcingi* ‘they pounded (and)’

However, Tesfaye Baye (2015) provides examples of non-palatalized **n** before a palatal **c** in the third-person feminine agreement for the same word *kúnci*. Another non-palatalized **n** is found within the deverbative suffix **-aanco** in *k’un-aanco* ‘grinding stone’. If these are free variants, they constitute a counterexample to Hudson’s rule. Of course, other (non-palatal) suffixes also have no impact on the stem-final **-n** of *k’un-* ‘pound’, e.g., the third-person feminine jussive suffix **-toonɪ** (3sg.f.jussive) → *k’undoóni* ‘let her pound’ and nominal derivation suffixes *k’un-toó* ‘pounder’.

In summary, alveolar consonants undergo productive changes at stem/suffix boundaries throughout HEC. Full assimilation of the pronominal suffix **-t** to a preceding consonant is an NHEC innovation, systematically attested in Hadiyya, Kambaata, Sidaama, and Gedeo, but not in Burji. The affrication of the nominal derivational suffix ***-ʃ** is found in all HEC languages, and the reflexes of post-alveolar ***-ʃ** in both Burji and NHEC support its reconstruction to PHEC. Palatalization of **t** → **c/ʃ**, and more marginally **n** → **ɲ**, is attested in multiple contexts. These palatalization patterns provide evidence for reconstructing the causative suffix ***-s**; by contrast, the palatalized Kambaata, Sidaama, and Gedeo variant **-ʃ** is likely a later innovation for which the conditioning still requires further investigation. Taken together, these boundary processes refine the cognate-identification framework established in §1.5, as superficially irregular forms become transparent once their derivational history is recognized.

3.2 Velars

Three morpheme boundary alternation processes affect the velars **k** (and **g**): palatalization, lenition, and glottalization. This section treats palatalization and lenition. Glottalization, which results from fusion with a following glottal stop, is discussed in §3.3.1.

3.2.1 Palatalization

In addition to the palatalization of the alveolar **t** to **c, ʃ** (§3.1.2.1), Burji palatalizes the velar ***k** to **ʃ** before the high front vowel **i** (or older Nominative ***y** §4.1.5.2), including in pronominal morphology.

k + i → ʃi

	PHEC	k+i	Nominative	t+a	Accusative	Gloss
[253]	<i>*ki-ʔ-</i>	<i>ʃiccj</i>	(2sg.poss.f)	<i>ʃittə</i>	(2sg.poss.f)	'your' (2sg.poss)
[187]	<i>*kin-ʔ-</i>	<i>ʃincj</i>	(2pl.poss.f)	<i>ʃintə</i>	(2pl.poss.f)	'your' (2pl.poss)

A marginal case of possible palatalization **g** → **j** is found in two examples in Burji. The following comparative sets list examples from Burji, Hadiyya, Kambaata, and Oromo:

[18]	g	j	Gloss
Burji	-	c'eeji	'blood'
Had	t'iiga	-	'blood'
Kam	k'egu/k'egi	-	'blood'
Oro	d'iiga	-	'blood'

It is possible that the palatalized **j** triggered the obstruent harmony, hence the initial ***t'** became **c'** in Burji. The same harmony process is responsible for changing **t'** to **k'** in Kambaata, but via assimilation to the velar **g** (fn. 36).

[708]	g	j	Gloss
Burji	moorga	moorjoo	'thief'
Kam	mogaʔ-aancu	-	'thief'

The Burji variant with **j** might have been followed by **i** before the current terminal **oo**. The two apparently differ in number and gender: *moorga* 'thieves' (f) and *moorjoo* 'thief'(m) (Getahun Addo, 2017, p. 677).

The distribution of the palatalized alveolars and velars in Burji can be summarized as:

		initial	non-initial	
*t	→	c	-	#_i, C_i
*t	→	-	ʃ	V_i
*k	→	ʃ	-	_i
*g	→	-	j	_i

Palatalization underscores Burji's innovative phonological trajectory in a small set of lexemes. The absence of comparable developments in the other HEC languages highlights Burji's divergence and raises questions about possible areal influences (Oromo and EOT palatalization).

3.2.2 Lenition

Intervocalic or non-initial single ***k** → **h** occurs in Burji (Sasse, 1982, p. 18), Sidaama (Kawachi, 2007, p. 47; Anbessa Teferra, 2000, p. 26; Hudson, 1989, p. 7), and Kambaata (Treis, 2008, p. 32, 63). This lenition is also relevant for alternations involving **h**, including the Kambaata denominative **-eeh** discussed in §4.2.5.4. Historically, the instances of corresponding **k**, **h**, **ø** reflexes must be attributed to a lenition process similar to Sidaama *duk*- 'carry' → *duhi* (perf) 'he carried' in comparison to Gedeo *duk*- 'carry'.

$$V\mathbf{k} + V \rightarrow \mathbf{h}$$

If there are any uniform cases of an older ***k** → **h**, they must have been mostly within shared HEC stems and, thus, eliminated via the subsequent loss of non-initial post-vocalic/intervocalic ***h**, e.g., PEC [299] **zakn-*, **zakan-*

‘elephant’ via **zahan-* → PNHEC **zaan-* ‘elephant’. Here are examples of corresponding **k**, **h**, **ø** reflexes:

[125]	k	Lenited h	Gloss
PHEC	*buk-	-	‘dust’
Burji	-	buhoo	‘dust’
PNHEC	*buk-	-	‘dust’
Kam	-	buhu-ta	‘dust’
Sid	buko	-	‘dust’
Ged	buko	-	‘dust’

Hadiyya has *bucca* ‘dust, soil, ground’, with a possible assimilation of stem-final **h** and singulative **c**.

[673]	k	Lenited h	Gloss
PHEC	*ik-	-	‘to be(come), happen’
Burji	-	ih-	‘to be; become’
PNHEC	*ik-, *ikk-	-	‘to be(come), happen’
Had	ikkoʔo	ih-	‘to be, become, be enough’
Kam	ikk	ih-	‘be, suffice’
Sid	ʔikk-	-	‘become, be, happen’

It is unclear if Gedeo *kada* ‘become, be, happen’ (with a puzzling **d**) is related to the rest of set [673].

[466]	k	Lenited h	Lost ø	Gloss
PHEC	*diwk-	*diwh-		‘empty’
Burji	-	-	duww-	‘empty and deserted house’
PNHEC	*diwk-	*diwh-	-	‘empty’
Had	-	diiha	-	‘empty’
Kam	-	diiha	-	‘empty’
Sid				
Ged	duwwika	-	duww-	‘empty, bare, naked’

See Omoro *duwwaa* ‘empty’.

[118]	k	Lenited h	Lost ø	Gloss
PHEC	*zaak-	-	-	'to swim, to spil'
Burji	daak-	daaha	-	'swim'
PNHEC	*zaaz-, *zaak-	-	-	'to swim, to spil'
Had	-	-	(daad-)	'spill, flow'
Kam	-	-	(zaaz-)	'spill, flow'
Sid	daak-i	daah-i	-	'swim'
Ged	daak-	-	-	'swim'

The glosses of Kambaata and Hadiyya parallels make them doubtful cognates. See Oromo *daaka* 'swim'.

Overall, there is a tendency for Gedeo and Sidaama to retain the ***k** while lenition is more prevalent in Burji, Hadiyya, and Kambaata.

Additional examples include: PHEC [445] **bork-* 'to be impure', PHEC [723] **sek-* → **seh-* 'adorn, decorate', [15] **bezz-k-* 'star(s)', [258] **maak-*, **ma~mmaak-* → PNHEC **maak-* 'say in a proverb, tell a story'.

Same words are sometimes transcribed with **h**, **k**, and **ø** depending on the source, e.g., Gedeo *duwwi* (Wedekind, 2008, p. 45), *duwwika* (Hudson, 1989, p. 56), and Sidaama [15] *beeddahe* (Yri & Pepper, 2019), *beddakko* (Hudson, 1989, p. 142) 'star(s)'. The geminated **kk** might have been triggered by vowel-initial morphemes but also morphemes with an underlying initial consonant that only manifests in the geminated stem-final **k** via the regular morpheme boundary alternation rule of assimilation, e.g., Sidaama *beddahe* (pl.f) and *beeddakko* (f) 'star' (§3.1.1). Older gemination is attested in PHEC [51] **lokk-*, **lekk-* 'foot, leg' (see Sasse, 1982, p. 136), which otherwise has a single final **k** in the rest of EC. However, it is difficult to specify the quality of such a fully assimilated underlying consonant.

In a cluster/gemination, the distinction between **k** and **h** is neutralized in favor of **k**, at least in Sidaama (Yri & Pepper, 2019) and Kambaata (Treis, 2008, p. 32). In Hadiyya, Tadesse Sibamo (2015, p. 48) claims "...an alternation of the voiceless velar consonant /k/ with the glottal stop /ʔ/. Such alternation takes place when the glottal stop, /ʔ/, occurs as a final consonant of the noun stem", e.g.:

biimbé?e (citation form), *biimbekk-icc* (sg) ‘a/the fly’¹¹⁴

However, there is comparative evidence for $*k \rightarrow h$ but not $*k \rightarrow ?$. Thus, Hadiyya **k** might be part of the stem but eliminated via the lenition of $*k$ intervocalically and the loss of single non-initial $*h$, then replaced by an epenthetic **-ʔ-** in the citation form: $*Vk_iV \rightarrow *Vh_iV \rightarrow V\emptyset_iV \rightarrow V?V$ (§3.3.4). Based on the historical evidence, the derived form has an underlying $*k$ which surfaces when geminated $*VkV \rightarrow *VkkV$ in Hadiyya, Kambaata, and Sidaama.

According to the HEC grammars, the stem-final fricative **h** is dropped (see Wedekind, 1980, p. 137). In Sidaama, **h** is elided when preceded by a vowel (Anbessa Teferra, 2000, p. 27). Similarly, Gedeo deletes stem-final **h**, which sometimes results in a compensatory doubling of the preceding vowel, e.g., Gedeo *doh-* ‘rotate’ $\rightarrow$ *doo-t-e* (3sg.f-sg.perf), *doo-n-e* (3pl-sg.perf) (Eyob Kelemework, 2015, pp. 83–85). By contrast, in Burji and Hadiyya, **h** is banned in syllable codas (Tefaye Baye, 2015, p. 61; Tadesse Sibamo, 2015, p. 34).

However, historically, the reflexes of PHEC $*h$ have been lost post-vocally. Thus, the remaining attestations of post-vocalic **h** are either later lenited $*k \rightarrow h$ or reflexes of PHEC $*h$ (§2.1.5.3).

The processes of **k** and **g** variation (e.g., in Burji (Tefaye Baye, 2015, p. 79; Sasse, 1982, p. 18)), lenition of the voiceless velar **k**, loss of lenited **h**, and insertion of **-y/-w-** (§3.4.1.2) should be analyzed as interrelated processes that feed into one another. For instance, Burji’s alternation of **g** and **w** (Tefaye Baye, 2015, pp. 78–79) before **u** (Sasse, 1982, p. 18) in some words could be interpreted as going back to an older $*k$, which is lenited and dropped in non-initial contexts, after which **-w-** is inserted. Burji alternations are due to dialectal variations.

The velar consonants **k** and **g** exhibit two distinct alternation patterns. Palatalization of $k \rightarrow j$ before front vowels is restricted to Burji, reflecting a Burji-specific innovation. Intervocalic lenition ($k \rightarrow h (\rightarrow \emptyset)$) is attested across HEC, though with variable degrees of lenition in different daughter languages. The interaction of these patterns with nominal and verbal morphology (Ch. 4) provides additional diagnostic evidence for identifying cognate sets where surface forms have diverged significantly.

¹¹⁴ cf. *?asseʔ-* ‘send’ $\rightarrow$ *?assé-cc* ‘message’ (Tadesse Sibamo, 2015, p. 48).

The next section turns to the glottal stop itself, showing how suffixal ʔ drives regular fusion outcomes and how it interacts with hiatus repair.

3.3 Glottal Stop

The glottal stop ʔ occupies a central role in HEC verbal and nominal morphology. As a derivational suffix, it marks reflexive/middle voice, functions in denominative constructions, and serves as a support verb ʔ ‘to do’. All five HEC languages preserve the reflexive suffix ʔ (Burji (Teskaye Baye, 2015, p. 183), Hadiyya (Tadesse Sibamo, 2015, p. 77), Kambaata (Treis, 2008, p. 217), Sidaama (Kawachi, 2007, p. 335), and Gedeo (Eyob Kelemework, 2015, p. 190)). This regularity across the family provides secure evidence for the reconstruction of PHEC *-ʔ* as a derivational suffix. The morphological roles of ʔ are treated in Chapter 4: reflexive (§4.2.3.1), verbalizer (§4.2.5.1), and support verb (§4.2.4.2). The following examples illustrate how ʔ is utilized for diverse and often overlapping verbal derivations:

PHEC [36] **gam-* ‘to bite’ → Burji *gam-*; PNHEC **gam-ʔ-* → **gaʔm-* → Ged, Sid, Had, Kam *gaʔm-*;

PHEC [256] **ham ʔ* ‘to slander’ → Burji *ham-ad’-*; PNHEC **ham ʔ* ‘to slander’ → Kam and Sid *heʔm*, Had *ham* (cf. Ged *ham-at* ← Oromo *hammaat-* (adj) ‘bad off, unwell’);

PHEC [340] **gag~gal-* → **ga-n-gal-* ‘to roll’ → Burji *gaangiy-, gangald’-*; PNHEC **gog~gol-* → **go-n-gol-* ‘to roll’ → Had *gunguuʔl-*, Ged *goggoʔma*, Sid *gongoʔm-*, *gongomi*.

A fossilized nominal suffix *-ʔ* is proposed with strong evidence in Hadiyya and Gedeo, which is found replaced by other nominal suffixes and as potential remnants in the rest of HEC (§4.1.3). The second nominal ʔ is found as a genitive marker in Hadiyya (§4.1.4.1).

The present section addresses the morpheme boundary alternations of ʔ when it concatenates with stem-final consonants or another suffix. In NHEC, sequences involving the glottal stop trigger different resolution strategies depending on the preceding segment: fusion with obstruents (§3.3.1), metathesis with sonorants (§3.3.2), deletion in stem-final position (§3.3.3), and epenthetic insertion intervocalically (§3.3.4). Because fusion and metathesis are confined to NHEC, they constitute important evidence for NHEC as a subgroup (see Ch. 5).

3.3.1 Fusion

When the derivational suffix **ʔ** attaches to a stem ending in an obstruent, the two segments fuse, producing a glottalized (ejective) geminated consonant (**C'C'**). Stem-final sonorants behave differently in general (see §3.3.2 on sonorant + **ʔ** metathesis); however, an important Sidaama/Gedeo pattern suggests a distinct contact-conditioned outcome for stem-final **-r** (introduced in §3.3.1.5).

$$C_{[-son]} + ʔ \rightarrow C'C'$$

The resulting **C'C'** is phonetically distinct from inherited non-pulmonics (§1.5.2): fusion-derived glottalized consonants are always geminated post-vocalically and arise transparently from morpheme concatenation, whereas non-pulmonics are inherited and may occur as singletons post-vocalically and lack synchronic derivational conditioning.

Crucially, Burji does not exhibit such a fusion. The process is therefore reconstructed as a PNHEC innovation, providing morphophonological evidence for the NHEC subgroup. Burji instead shows the borrowed **-d'** reflexive variant assimilating to the stem-final consonant through a different pattern (§4.2.3.4). The subsections below detail the fusion outcomes by stem-final consonant: labial ***b** (§3.3.1.1), alveolars ***t**, ***d** (§3.3.1.2), velars ***k**, ***g** (§3.3.1.3), and post-alveolar ***j** and alveolar ***s** (§3.3.1.4).

All NHEC languages (Gedeo, Sidaama, Hadiyya, Kambaata) show the pattern **C_[-son] + ʔ → C'C'**, with the input obstruent devoicing and the output emerging as a glottalized geminated consonant.¹¹⁵

¹¹⁵ Data sources: Gedeo (Eyob Kelemework, 2015, pp. 190–191, 72–73), Sidaama (Kawachi, 2007, pp. 57–58, 35), Hadiyya (Tadesse Sibamo, 2015, p. 133), and Kambaata (Treis, 2008, pp. 243, 269, 242, 267; Treis, p.c.).

	Glottalization and gemination	Example
Ged	b, d, g, j + ? → p'p', t't', k'k', c'c'	<i>gub</i> - 'burn' → <i>gup'p'-e</i> <i>abid</i> - 'catch' → <i>abit't'</i> -
Sid	b, d/t, k/g, j + ? → p'p', t't', k'k', c'c'	<i>gob</i> - 'to sew' → <i>gop'p'</i> - <i>daak</i> - 'to grind' → <i>daak'k'</i> -
Had	b(b), d/t, f/j + ? → p'p', t't', c'c'	<i>gub</i> - 'to drink' → <i>gup'p'</i> - <i>?amad</i> - 'catch' → <i>?amat't'</i> - <i>?ijaaj</i> - 'to order' → <i>?ijaac'c'</i> -
Kam	b, d/t, k/g, f/z/s + ? → p'p', t't', k'k', c'c'	<i>k'orab</i> - 'wait' → <i>k'orap'p'</i> - <i>agud</i> - 'resemble' → <i>agut't'</i> - <i>dag</i> - 'find' → <i>dak'k'</i> - <i>kufu</i> - 'choke' → <i>kuc'c'u</i> <i>rab</i> - 'paint' → <i>rad'd'</i> - <i>faf</i> - 'carve' → <i>fad'd'</i> -
Burji	b, f + d' → d'd'	

Eyob Kelemework (2015, pp. 89–90) proposes that the **-d'** variant of the reflexive/middle suffix triggers fusion in Gedeo. However, phonetic and comparative evidence contradict this analysis. If the voiced implosive **d'** were the trigger, we would expect the output to retain voicing. Yet fusion consistently produces voiceless glottalized geminates (**C'C'**_[-voice]).¹¹⁶ The devoicing effect is better explained by the voiceless glottal stop **?** as the fusing segment, consistent with the pattern across NHEC. Gedeo, therefore, patterns with Sidaama, Hadiyya, and Kambaata in using **-?** for fusion, not **d'**. The current outcome suggests that the voiceless glottal stop **?** is the variant used in the fusion process, which helps to account for the devoicing effect along with other reasons listed in §4.2.3.1. Kawachi's (2007) analysis of Sidaama does not specify which variant of the suffix (**?** or **d'**) drives the glottalization and gemination process. In Kambaata, while Treis (2008) does not explicitly describe all instances of fused **C_i+?**, except **d + ?** → **t't'**, the pattern can be inferred from available examples.

Although not listed in the grammar, Hadiyya attested the process **k + ?** → **k'(k')** at least in fossilized forms. However, its scarcity reflects the historical loss of non-initial **-k** through lenition and subsequent deletion (§3.2.2). Hadiyya and Kambaata share a distinctive reflexive suffix **-k'k'** not found elsewhere in HEC. This form likely derives from ***-k-?** via fusion (**k + ?** → **k'k'**). The parallel with Omotic **-k'** (middle voice marker), attested in Bench (Rapold, p.c.), raises the question of whether this reflects an old areal feature or

¹¹⁶ That is, regardless of the fact that the phonetic realization of **d'** is debated in the East Cushitic literature (Hudson, 1976, p. 248; Bender, 2020, pp. 116–117; Treis, 2008, p. 27; Yri & Pepper, 2019). More generally, voicing is common but not defining for implosives.

independent development. In Hadiyya, the scarcity of $k + \text{ʔ} \rightarrow k'(k')$ examples reflects the historical lenition and loss of non-initial $-k$ (§3.2.2).

Burji does not show fusion of stem-final obstruents with a following ʔ , confirming that this process is a PNHEC innovation. Instead, Burji employs the borrowed $-d'$ variant of the reflexive suffix, which assimilates to the stem-final consonant in a distinct pattern, e.g., *rab-* ‘paint’ $\rightarrow$ *rad'd'*- ‘paint oneself’ (§4.2.3.4):

Burji: $C + d' \rightarrow d'd'$

Exceptions exist where $-d'$ attaches without assimilation, e.g., *gaaf-* ‘grind’ $\rightarrow$ *gaafd'* ‘grind for oneself’ (Tesfaye Baye, 2015, pp. 182–183). Glottalized consonants that do appear in Burji are either inherited non-pulmonics, loanwords, or morphologically exceptional forms. The absence of productive $C_{[-son]} + \text{ʔ} \rightarrow C'C'$ fusion in Burji supports the reconstruction of fusion as a shared innovation of PNHEC.

The following sections discuss how the glottal stop ʔ has contributed to the emergence of the glottalized consonants across the NHEC languages through fusion processes.

3.3.1.1 Stem-final b

Stem-final $*b$ undergoes two distinct processes depending on the following suffix: (a) glottalization (fusion) triggered by derivational $*\text{ʔ}$ (reflexive, denominative), (b) fricativization triggered by suffixes containing $*t$ or $*s$ (e.g., certain denominative and causative suffixes).¹¹⁷

$*b + *\text{ʔ} \rightarrow$ glottalized $p'(p')$

$*b + *-t, *-s \rightarrow *ff \rightarrow f$

The intermediate stages of fricativization may include geminate $*ff$, subsequently simplified to f .

¹¹⁷ The causative $*-s$ as a condition could be challenged by a synchronic morphophonemic process in which $b+s \rightarrow$ Burji, Kambaata, Gedeo ss . The denominative $*-t$ should also be preceded by a vowel (see §4.2.5.3) to prevent it from fusing with the stem-final $*b$. However, the vowels of the denominatives originate from the support verb, which can be lost between consonants, allowing the fusion.

For example, Kambaata has *huf*- ‘comb’ → *hup’p*’- ‘comb oneself’ and *t’oof*- ‘finish’, *t’oop’p*’- (Treis, 2022; Treis, p.c.). The following lists include more examples of the two processes:

[29]	b	Glottalized p’(p’)	Fricativized f	Gloss
PHEC	*k’ab-	-	-	‘to hold, seize’
Burji	-	-	k’af-	‘to have, possess’
PNHEC	*ab-	-	-	‘to hold, seize’
Kam	-	ap’p ’-	-	‘catch fire, hold’
Ged	abid-	-	-	‘hold, seize’

Many of the examples with such glottalized consonants count as fossilized evidence – they do not have a stem with a non-glottalized reflex, but the comparative evidence provides such evidence. Cognate set [29] is one of these examples, with a corresponding retained **b** in Gedeo and the EC cognates.

The Burji **f** reflex of ***b** in *k’af*- ‘have’ is described by Sasse (1982, p. 123) as irregular, although he notes cognate Dirayta *k’af-naad*’- as an extended stem of *k’ap*- ‘have’.¹¹⁸ The **f** reflex is not limited to Burji and is found in more than one example in all HEC languages. Its restricted occurrence on verbs proves the proposed morphophonological trigger of affrication.

[186]	b	Glottalized p’(p’)	Fricativized f	Gloss
PHEC	*c’ub-	-	-	‘dip in, immerse’
Burji	c’uub-	-	-	‘immerse, to dip’
PNHEC	*c’ub-	-	-	‘to rinse, immerse’
Had	-	-	c’ufc’ufaa?	‘to wash’
Kam	-	-	c’uf a?	‘rinse, immerse’
Ged	-	c’uup ’-	-	‘dip (in), immerse’

The Sidaama cognate *c’uu?*- ‘baptize, immerse’ has dropped the labial completely, which is expected in intervocalic position, hence Indrias Xa’miso et al. (2007, p. 97) transcribe it as *cuua* ‘to immerse, dip in water, baptize’. The additional **aa?**- in Hadiyya and **a?** in Kambaata are the reflexes of the support verb **?* ‘to do’ used to derive the denominal. Based on the above synchronic pattern, single **C**’ as in Gedeo *c’uup*’- ‘dip (in), immerse’ can be labeled as contact-influence on the basis of Oromo *c’uup*’- ‘dip, baptize’

¹¹⁸ Dirayta **p** is realized as **f** before any consonant: e.g., *k’ap*- ‘catch’ followed by **-te** is realized as *káf-té* ‘she caught’ (Black, 1974, p. 70).

because the expected result of the fused glottalized consonant is geminated **C'C'**. Otherwise, obstruent (glottalization) harmony of **b** with the initial **c'** (fn. 36) is an alternative plausible explanation.

[430]	b	Glottalized p'(p')	Fricativized f	Gloss
PHEC	*gilub ʔ, *gulib ʔ	-	-	'to kneel'
Burji	gilb-is-ad' -	-	-	'kneel'
PNHEC	*gulub ʔ	-	-	'to kneel'
Had	-	gurup'p' -	-	'kneel'
Kam	-	gulup'p' -	-	'kneel'
Sid	-	gulup'p' -	-	'kneel'
Ged	-	-	guluff-at-	'kneel'

This verb is derived from the noun [4] **gulib-*, **gilub-* 'knee' via the denominative suffixes. The one responsible for glottalization in Hadiyya, Kambaata, and Sidaama is **-ʔ** and the one responsible for the affrication in Gedeo is **-t**. Burji has more than one derivation suffix, namely **-is** and **-ad'**, but the latter is borrowed from Oromo.

Overall, glottalization is more common than fricativization. The cases of fricativized ***b** → **f** are confined to the verbs as seen in the above examples, proving that a verbal suffix has conditioned the change. The fusion of ***bt/*bs** is expected to produce a geminate **ff**, but no HEC language has retained ***ff**, so it is possible that an intermediate geminate ***ff** reduced to **f**.

On the nouns, the glottal stop that might have triggered the glottalization is problematic (§4.1.3), and there is no fricativization. Unlike the verbs, the glottalized consonants of the nouns are single.

[544]	b	Glottalized p'(p')	Gloss
PNHEC	*c'ub-	-	'dagger, knife'
Had	c'ubeʔe	-	'dagger'
Kam	-	c'up'i-ta	'dagger'
Sid	c'uube	-	'dagger'
Ged	-	c'uup'e	'knife'

Like [186], the single **p'** in the Kambaata and Gedeo reflexes in [544] can be a result of obstruent (glottalization) harmony of **b** with the initial **c'** (fn. 36). The parallels Amharic *c'ube* and Oromo *c'uubee* 'dagger' do not show a glottalized **p'**, which undermines the possibility of explaining this through contact, but does not preclude the possibility that the non-glottalized stems were borrowed

from these sources. However, the harmony analysis does not apply to the next two examples.

[180]	b	Glottalized p'(p')	Gloss
PHEC	*utub-	-	'pole, center-pole of house'
Burji	utubaa	-	'pole, center-pole of house'
PNHEC	*utub-	-	'pole, center-pole of house'
Had	utuba	-	'pole, center-pole of house'
Kam	utubu	-	'pole, center-pole of house'
Sid	?utuba	-	'private property'
Ged	utuba	utup'a	'pole, center-pole of house', 'support, e.g. forked stick'

[81]	b	Glottalized p'(p')	Gloss
PNHEC	*kob-ʔ-	-	'shoes'
Had	kobeʔe	-	'shoes'
Sid	-	kop'é	'sandal, shoe'
Ged	-	kop'e	'old type of shoes'

Oromo has both *kop'-ee* and *kob-ee* 'sandal'.¹¹⁹

Both the glottalization and fricativization result from the fusion process. Conforming with the current proposal, Sasse (1979, p. 14) assumes that most **p'** or **b'** reflexes can be explained by a hypothesis of secondary glottalization, unless they are due to borrowing. Sasse (1982, p. 16) also notes that **p** and **p'** occur only word-medially in Burji.¹²⁰ Hudson (1989, p. 12) describes Burji **b'** and **p'** as possibly idiolectal or dialectal variants, while Sasse (1979, p. 14) says they occur as irregular reflexes of ***b** in some languages.

According to Bender (2020, p. 121), the "...f for p" phenomenon is strong in Cushitic". Could the change ***b** → HEC **f**, **(p')p'** alternatively be analyzed via an intermediate ***p**? The restricted non-initial environment where this change is attested in HEC supports the proposed morphophonological interpretation.

¹¹⁹ The other common word for 'shoes' in NHEC is [81] *c'amma* 'shoes' from Amharic, found in all four languages.

¹²⁰ There is no attestation of **p**, while **p'** is only found in three loanwords in the Burji data used in this study.

3.3.1.2 Stem-final and Derivational t, d

The alveolar stops **t** and **d** are attested stem-finally and as derivational suffixes. When followed by the glottal stop, they undergo fusion in NHEC:

$$\mathbf{t, d + ? \rightarrow t't'}$$

The outcome is glottalized geminated **t't'**.

The following are the comparative data for the glottalization of stem-final and derivational **t**.

[605]	t	Glottalized t'(t')	Gloss
PHEC	*galat-	-	'thanks, praise'
Burji	galataa	-	'thanks'
PNHEC	*galat-	-	'thanks, praise'
Had	galata	galat't'-	'thanks', 'to thank, to praise'
Kam	galata	galat't'-	'thanks', 'to thank, to praise'
Sid	galata	-	'thanks'
Ged	galata	-	'thanks'

In cognate set [605], stem-final **t** undergoes fusion with **?**, yielding **t't'** in Hadiyya and Kambaata in the derived verb. The non-glottalized variants and the rest of the HEC parallels are nouns. The noun stem is from Oromo *galata* 'thanks'.

[623]	t	Glottalized t'(t')	Gloss
PHEC	*oot-	-	'fence'
Burji	oota	-	'enclosure, fence'
PNHEC	*oot-	-	'fence'
Had	oota	oot't'oro	'fence', 'enclosure'
Kam	oota-ta	-	'fence'
Sid	-	hut't'a	'fence'

According to Hudson (1989, p. 57), Hadiyya [623] *oot't'oro* 'enclosure' is a compound of *oota-warō* 'fence-interior'. The glottalization might have occurred during the verbal derivation process, as in the Sidaama cognate (which is a noun and a verb).

[120]	t, ø	Glottalized t'(t')	Gloss
PHEC	*fil-ʔ-	-	'to comb'
Burji	fil-, sil-	-	'to comb'
PNHEC	*fil-ʔ-	-	'to comb'
Had	-	fit'-	'to comb, split, scatter'
Kam	fiil-	-	'unravel'
Sid	-	fit't'-	'comb, to edit a text'
Ged	fil-	-	'comb'

Both the **t** and glottal stops are possible concatenated suffixes. The single **t'** in Hadiyya might be a mistranscription.

[47]	t, ø	Glottalized t'(t')	Gloss
PHEC	*k'uf-	-	'to cough'
Burji	k'ufey-	-	'to cough'
PNHEC	*kuf-	-	'to cough'
Had	-	kut't'	'cough'
Ged	k'ufa-aʔ-	-	'cough'

The Hadiyya form [47] *kut't'*- 'cough' reflects the expected fusion **t + ʔ → t't'** (§4.2.3.2). Oromo *k'ufaʔa-* 'cough' is formally identical to Gedeo; however, the glottal stop here likely reflects a verbalizer ***ʔ**, as Burji shows the corresponding verbalizer ***y** in the cognate. Kambaata diverges, showing *kuc'c'*- 'cough' with **c'c'** rather than **t't'**. This suggests a different historical pathway, i.e., an underlying sibilant that fused (**s/ʃ + ʔ → c'c'**, see §3.3.1.4).

One example of stem-final **d** glottalization is the Gedeo stem [29] *abid-* 'hold/seize', mentioned above, which has a derived reflexive *abit't'*- 'keep/hold to oneself'.

Additional examples show singleton **t'** rather than geminated **t't'**. This likely reflects phonotactic constraints against sequences of three consonants, apocope, loans, or exceptions: PHEC [23] **hiir-* 'to untie' → Had *hirit-* 'to shock', [362] **moor ʔ* 'to steal' → Had *maraat-*, [87] **k'ot-* 'to dig' → Kam *k'ut-* 'cut off, bite off', [94] **goraʔ-* 'to slaughter (cattle)' → Kam *gorat-* 'slaughter (cattle)'.

The morphological evidence for glottalized **t't'** as a derivational suffix in Hadiyya and Kambaata is further documented in Chapter 4 under the reflexive (§4.2.3.3) and reflexive denominative (§4.2.5.5).

3.3.1.3 Stem-final k, g

Stem-final velar stops **k** and **g** also participate in fusion when followed by the glottal stop. Evidence for this process is limited because non-initial ***k** is subject to lenition (§3.2.2) and elision (§3.2.1) in non-initial environments. The attested examples involve consonant clusters (**Ck**), geminate velars (**kk**), or remnants of **-k** suffixes (§§4.2.3.2, 4.2.5.4).

$$*k, g + ? \rightarrow k'(k')$$

As with other fusion processes, this is a PNHEC innovation; Burji does not show the fused outcome.

[445]	k/g	Glottalized k'(k')	Gloss
PHEC	*bork-	-	'to be impure'
Burji	borkaawa	-	'to become dirty'
PNHEC	*bork-	-	'to be impure'
Had	-	bork'-	'be impure'
Kam	-	bork'-	'be impure'
Ged	booro?-	-	'be impure'

In Set [445], the verb is likely derived from a nominal stem via the verbalizer **?**, as supported by the evidence of the noun stem in Burji *borkee* 'dirt, filth, stain', with an unfused velar.

[267]	k/g	Glottalized k'(k')	Gloss
PHEC	*t'ulak-	-	'claw, fingernail'
Burji	t'unga	-	'finger'
PNHEC	*t'ulak-	-	'claw, fingernail'
Had	-	t'urank'a	'claw, fingernail'
Kam	t'ulunga-ta	t'ulunk'a-ta	'claw, fingernail'
Sid	-	c'ulunk'a	'claw, fingernail'

The existence of both glottalized **k'** and non-glottalized **g** variants in Kambaata fits the obstruent (glottalization) harmony explanation (fn. 36) in this example in all three languages. In addition to *t'urank'a*, Hadiyya has *t'uraʔa* without the **k** or **k'**. This variant and Gedeo [445] *booro?-* 'be impure' above might be due to the lenition of velar **k** intervocalically (§3.2.2).

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[321]	k/g	Glottalized k'(k')	Gloss
PHEC	*bukk-	-	'to pluck'
Burji	bukka	-	'to cut into small pieces'
PNHEC	*bukk-, *bukk-ʔ-	-	'to pluck'
Kam	-	buk'k'-is-	'pick, uproot'
Sid	-	buk'k'-is-	'weed, pluck'
Ged	bukkassa	-	'gather, collect'

See the identical parallel in Oromo *buk'k'-is-* 'weed, pluck' in comparison to Kambaata and Hadiyya.

[222]	k/g	Glottalized k'(k')	Gloss
PHEC	*t'ok-	-	'to burst'
Burji	t'okk-	-	'to leak'
PNHEC	*t'ook-	-	'to burst'
Had	-	t'ook'-	'burst'
Kam	-	t'ook'-	'burst'
Sid	t'ook-, d'ook-	-	'burst, crack'

Again, the glottalization in Kambaata and Hadiyya could be due to the obstruent (glottalization) harmony explanation (fn. 36), which is more plausible in cases like this where both consonants are voiceless.

[39]	k/g	Glottalized k'(k')	Gloss
PHEC	*suk-ʔ-	-	'to spin'
Burji	sukk-	-	'to tie tightly, to knead'
PNHEC	*suk'k'-	-	'to spin'
Had	-	suk'k'-	'to spin'
Kam	-	suk'k'-	'spin (cotton)'
Sid	-	suk'k'-	'spin (cotton)'
Ged	-	suk'-	'spin (cotton)'

The PHEC [39] stem shows pulmonic **k**, which fuses with the following **k** and glottal stop to yield **k'k'** in Hadiyya, Kambaata, and Sidaama. Gedeo shows singleton **k'**, likely reflecting degemination. Burji *sukk-* 'tie tightly, knead' ends in a geminate but without glottalization, consistent with its non-participation in fusion.

A puzzling example is [46], where glottalized **k'** appears across HEC despite the absence of an obvious conditioning environment:

PHEC [46] **ik'k'-*, **ikk-* → 'tooth' → Burji *irk'a*; PNHEC **ink'-*, **ink-* → Had *ink'e*, Kam *ink'u-ta*, and Sid *hinko*.

Sidaama *hinko* shows the expected non-glottalized **k**, consistent with broader East Cushitic cognates. The epenthetic consonants (**-n-** in NHEC, **-r-** in Burji) are irregular; possible explanations are discussed in §3.4.3 (Epenthetic **-l-**). Given the variation, two proto-forms are proposed at both the PHEC and PNHEC levels.

Two phonotactic factors explain the patterning of fused velars: (a) degemination in clusters – when the input **k** occurs in a consonant cluster, fusion yields singleton **k'** rather than **k'k'**, avoiding impermissible triconsonantal sequences, and (b) scarcity of stem-final **k** – non-initial ***k** is subject to lenition (§3.2.2) and elision (§3.2.1) pos-tvocally, so fusible stem-final velars are rare except in protected environments: **Ck** clusters, **kk** geminates, and remnants of **-k** suffixes (§4.2.3).

3.3.1.4 Stem-final and Derivational **j**, **s**

Stem-final sibilants **j**, **s**, and **z** also undergo fusion with the glottal stop, yielding the palatal ejective **c'** (typically geminated as **c'c'**):

$$j, s, z + \text{ʔ} \rightarrow c'(c')$$

This process is less well-attested than labial and alveolar fusion, and some proposed reconstructions remain speculative. The label “provisional” reflects the need for additional comparative data.

[162]		j	Glottalized c'(c')	Gloss
PNHEC	-		*fi-n-c'-	'to scatter'
Had	-		finc'	'to scatter'
Kam	fijf aʔ-		finc'-	'scatter, sprinkle'
Sid	-		finc'-	'scatter, urinate'

Example [162] likely reflects the fusion of an earlier sibilant with **ʔ**. The epenthetic **-n-** is discussed in §3.4.2. This is a complicated case, and to avoid excessive abstraction, PNHEC **fi-n-c'-* is provisionally reconstructed. It is assumed that the fusion process has occurred at the PNHEC level via *fijf-ʔ-* and **fil-f-ʔ-*. The epenthetic **-n-** seems to have replaced an older fused **l**, evident in the geminated **jj** of the Kambaata variant and found in the rest of EC.

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[807]	ʃ	Glottalized c'(c')	Gloss
PHEC	*anj-	-	'to chew, twist'
Burji	annij-	-	'to chew'
PNHEC	-	*inc'-	'to chew, twist'
Had	-	inc'iic'-	'twist, spin (cotton)'
Kam	-	inc'iic'c'-	'twist, bend'
Sid	-	hiinc'i	'chew'
Ged	-	inc'a	'chew'

Again, the fusion occurred at the PNHEC via **inf-ʔ*. Hadiyya has *iic'e* 'chew', which aligns semantically better with the rest of the HEC cognates, except for Kambaata.

Further examples include PHEC [221] **c'inc'-* 'good smell', [377] **c'anc'-* 'to make noise', and PNHEC [671] **wad-* 'to shout' → Gedeo *woc'c'a* 'shout, make noise'.

Kambaata provides clear synchronic evidence for **z, s + ʔ → c'c'** in reflexive derivation:

saz- (tr) 'advice' → *sac'c'-* (refl) 'advise for oneself' (Treis, p.c.),

t'aaz- (tr) 'gather, assemble' → *t'aac'c'-* (refl) 'gather, come together',

has- 'seek, want' → *hac'c'-* 'seek, want for one's benefit' (Treis, 2022, p. 17)

This confirms the origin of **z** as a fricative when compared to the corresponding stop **d**, which would have yielded **t't'**. These synchronically transparent alternations support reconstructing the fusion rule for PNHEC.

This process appears in several derivational contexts: causative, reflexive, and denominative formations, borrowed forms, and complex morphological derivations. The development shows patterns across the HEC languages, though some forms present alternative analytical possibilities.

As with other fusion processes, Burji does not exhibit sibilant fusion (**ʃ, s + ʔ → c'c'**). Where glottalized consonants appear in Burji in comparable morphological contexts, they reflect either: (a) inherited non-pulmonics retained unchanged, (b) regressive assimilation of non-pulmonic consonants

to a following obstruent,¹²¹ or (c) loanwords with source-language non-pulmonics. The absence of productive sibilant fusion in Burji further supports the classification of fusion as a shared PNHEC innovation.

3.3.1.5 Stem-final -r

In Sidaama and Gedeo, suffixal **ʔ** shows a recurrent alternation between **ʔr** and **dʔ**. Kawachi notes for Sidaama that “r [ʔr] also almost always occurs as an allomorph of the middle suffix -*dʔ* [dʔ]” (2007, p. 33), and comparative descriptions report an alternation between implosive **dʔ** and a “preglottalized flap ‘r’” in Sidamo, with parallel behaviour noted for Gedeo (Dawit Tilahun, 2019, p. 35, citing earlier sources). A plausible contact-induced reinterpretation (cf. Oromo influence) is that, subsequent to sonorant+**ʔ** metathesis, **ʔr** fused and was resegmented as a glottalized coronal, yielding **dʔdʔ** and frequently surfacing as a single **dʔ**. This derived segment can then be generalized as an allomorph of the verbal suffix **-ʔ** (see §§4.2.3.1, 4.2.3.4).

***r + *ʔ → glottalized dʔ(dʔ)**

This outcome differs from the regular fusion pattern described above for obstruents (**C + ʔ → CʔCʔ**). It is restricted to a specific boundary sequence (**ʔr**) and to a limited set of languages, and it therefore behaves like a comparatively recent development rather than a PNHEC morphophonological process.

The glottalized **dʔ** attested in Gedeo, Sidaama, and in a borrowed parallel in Burji (including the reflexive allomorph **-dʔ**) is discussed separately in §4.2.3.4, where contact with Oromo is proposed as a conditioning factor.

[223]	r / ø	Glottalized dʔ(dʔ)	Gloss
PHEC	*eg-	-	‘to wait’
Burji	eeg-	-	‘to wait; watch’
PNHEC	*eger-	-	‘to wait’
Had	eger-	-	‘wait (for)’
Kam	eger-	-	‘wait (for)’
Sid	agar	agadʔ(dʔ)-	‘wait, watch’, ‘watch oneself’
Ged	egert-	egedʔ-	‘wait!; wait (for)’

¹²¹ Burji glottalizes non-pulmonics via assimilation to the following consonants: **tʔ**, **cʔ**, **kʔ** + **-t** (2sg, 3sg.f, 2pl) → **cʔcʔ**; **tʔ**, **kʔ** + **-t-ooni** (3sg.f jussive) → **tʔtʔ**; **cʔ** + **-t-ooni** (3sg.f jussive) → **cʔcʔ**.

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In this set, the Sidaama and Gedeo reflexes show a split between a form with **r** and a form with **d'**, consistent with the alternation being tied to the suffixal **ʔ** environment rather than to the inherited root consonant. The same distribution also matches the observed instability of quantity in this process (**d'd'** ~ **d'**).

[708], [362]	r / ø	Glottalized d'(d')	Gloss
PHEC	*moor ʔ	-	'to steal'
Burji	moorga, moorjoo	-	'thief'
PNHEC	*moor ʔ	-	'to steal'
Had	maraat'o	-	'thief'
Kam	moggaʔ-	-	'steal'
Sid	moor-	mood'-	'steal'
Ged	moor-	mood'aco, mooʔral-co	'steal', 'thief'

These alternations are compatible with a contact-supported resegmentation at the **ʔr** boundary, which would allow a glottalized coronal to spread as an allomorphic reflex once introduced. Based on the available evidence, the development remains restricted and does not motivate reconstructing **d'** to PNHEC as an inherited non-pulmonic phoneme.

[476]	r / ø	Glottalized d'(d')	Gloss
PHEC	*c'ir-	-	'to clear'
Burji	c'ir-	-	'to clear'
PNHEC	*c'ir-	-	'to clear'
Kam	c'ir-	-	'pluck, tug, pull out'
Sid	c'irati, c'ira	c'id'a	'clear one's throat', 'to pluck up', 'to pluck at one's hair'
Ged	c'aʔʔa	c'id'ata	'clear', 'clear one's throat'

The emergence of **d'** as an alternative reflexive allomorph in Burji, Sidaama, and Gedeo is addressed in §4.2.3.4 and likely induced by contact with Oromo.

Taken together, these patterns support treating **ʔr** ~ **d'** in Sidaama and Gedeo as a secondary development affecting stem-final **-r** in contact with suffixal **ʔ**, with frequent leveling from **d'd'** to **d'**. The next section turns to sonorant + **ʔ** metathesis more broadly and shows why **ʔr** is the expected input for this reanalysis.

3.3.2 Metathesis

In the NHEC languages, the suffixal glottal stop ʔ (notably the reflexive and related derivational morphemes; see §§4.2.3.1, 4.2.5.1) shows a regular sonorant + ʔ metathesis: When ʔ follows a stem-final sonorant, the surface order is typically reversed, yielding ʔ immediately before the sonorant. In Sidaama and Gedeo, the specific sequence ʔr may additionally alternate with a glottalized d' (often with unstable quantity), a pattern discussed under fusion in §3.3.1.5.

$$C_{[+son]}ʔ \rightarrow ʔC_{[+son]}$$

This is important for reconstruction because many surface strings of the form ʔC_[+son] are best analyzed as underlyingly suffixal ʔ plus a phonological rule, rather than as infixal or stem-internal ʔ.

Hudson (1976, p. 250) states that metathesis is common to all the HEC languages except Burji. Such a process is attested in Sidaama (Anbessa, 2000, p. 9), Alaaba (Schneider-Blum, 2007, p. 35), Kambaata (Treis, 2008, p. 63), Hadiyya (Tadesse Sibamo, 2015, p. 39), and Gedeo (Eyob Kelemework, 2015, p. 78).

From a comparative perspective, the restriction of this metathesis to a specific phonological environment (stem-final sonorant + suffixal ʔ) makes it a strong candidate for a shared innovation within NHEC (and thus a potential subgrouping diagnostic in Ch. 5), especially given that Burji lacks this particular sonorant + ʔ metathesis. At the same time, the rule strengthens the analysis of ʔ as an autonomous phoneme and morpheme in PHEC/PNHEC reconstruction.¹²²

Had	r+ʔ → ʔr	<i>mur-</i> ‘cut’ → <i>muʔl-</i> ‘cut for oneself’
Kam	r+ʔ → ʔr	<i>buur-</i> ‘anoint/smear’ → <i>buuʔr-</i> ‘anoint oneself’
Sid	l+ʔ → ʔl	<i>kul-</i> ‘tell’ → <i>kuʔl-</i> ‘tell for oneself’
Ged	n+ʔ → ʔn	<i>gan-</i> ‘hit’ → <i>gaʔn-</i> ‘hit oneself’

Unlike NHEC languages, Burji lacks such sonorant-glottal stop metathesis, e.g., *dan-* ‘able’ → *danʔ-* (Tesfaye Baye, 2015, p. 183) (compare also Burji [145] *finʔaa* against Gedeo *fiʔna* ‘urine’), but has unique metathesis of the derivational (causative) marker **-s** with the stem-final velar (see Wedekind,

¹²² Data sources: Kambaata (Treis, p.c.), Hadiyya (Tadesse Sibamo, 2015, p. 40), Sidaama (Anbessa Teferra, 2000, p. 22), Gedeo (Eyob Kelemework, 2015, p. 81).

1985, p. 134), e.g., *d'usk*- 'cause someone to drink', *d'ug*- 'drink' and *hiisk*- 'cause to be closed', *hiik*- 'close' (Tesfaye Baye, 2015, p. 76).

The evidence for **ʔ**r in Kambaata and Hadiyya is limited in the available data. In Hadiyya, **r** in a cluster becomes **l** as shown in the example above (rule i(c)). In Gedeo and Sidaama, it yields an additional process **ʔ + r → d'** as discussed in §3.3.1.5, e.g., compare the previous Hadiyya and Kambaata examples with Sidaama *mur*- 'to cut' → *mud*- 'to cut something for oneself' and *buur*- 'to apply anoint' → *buud*- 'to apply anointment' (Indrias Xa'miso et al., 2007, pp. 389, 394, 79).

Grammars of Gedeo (Eyob Kelemework, 2015, p. 71) and Sidaama (Kawachi, 2007, p. 46) claim that the **d'** variant of the reflexive (middle) is the basic form, which is changed into a glottal stop **ʔ** when it occurs after stem-final sonorants/nasals. Such an interpretation proves to be an unnecessary complication, as there is a reconstructable, well-attested allomorph **ʔ** (§4.2.3.1). The restriction of reduction and metathesis to **d'** among non-pulmonics is another challenge for positing an intermediate **d'**. While sonorants can precede other non-pulmonics without reduction to **ʔ** or metathesis (e.g., **nt'**, **nk'**, **nc'**) – e.g., Gedeo *t'int'a* 'heel (of foot)' and Sidaama *hank'afa* 'to hug',¹²³ representing inherited non-pulmonic ***C'** – the prohibition of the **d'** variant of the middle in such sequence (see Wedekind, 1980, pp. 141–142) could be attributed to its external (contact-induced) origin. That would explain why the allomorph ***ʔ** is less restricted in distribution than the contact-induced (co-morpheme) **d'**.

Additionally, the presence of **d'** in the reflexive/middle suffix should be deducible from the systematic change of root/stem-final ***m** to **n** across the HEC languages when followed by such an alveolar, as discussed under §3.1.1.4. This partial assimilation is conditioned by the presence of an alveolar (**t**, **d**, **t'**, or **c'**), so **d'** should be among them. Therefore, the distribution of alveolar implosive **d'** versus the glottal stop **ʔ** variants of the reflexive can be determined by examining assimilation patterns adjacent to the nasal **m**. The lack of the expected partial stem-final **m → n** assimilation suggests the **ʔ** variant rather than a reduced **d'** yields **m → ʔm** in Gedeo and Sidaama (§3.1.1.4).¹²⁴

¹²³ For an exhaustive list, see Gedeo (Eyob Kelemework, 2015, p. 196) and Sidaama (Kawachi, 2007, p. 32).

¹²⁴ Data sources: Sidaama (Kawachi, 2007, pp. 45, 33), Gedeo (Eyob Kelemework, 2015, pp. 54–55).

Sid	m+ʔ → ʔm	<i>waam-</i> 'to bury' → <i>waaʔm-</i>
	m+ʔ → ʔm	<i>tum-</i> 'to mix (honey) with water' → <i>tuʔm-</i>
Ged	m+ʔ → ʔm	<i>tum-</i> 'pound' → <i>tuʔm-a</i> 'to pound for oneself'
	m+ʔ → ʔm	<i>harum-</i> 'short' → <i>haruʔm-</i> 'become short'

There is no evidence that the metathesized suffix was **d'** in the above examples since none of them yield **ʔn**. Hence, the allomorph **ʔ** is the one attached, and there is no need to posit an intermediate **d'**.

Two examples with **ʔn**, corresponding to **ʔm**, look like they may challenge the lack of partial assimilation argued above:

[75]	ø/ʔ	ʔm	ʔn	Gloss
PNHEC	*t'eʔm-	-	-	'to taste good'
Had	t'eeʔ-	-	t'eʔna	'be sweet, taste good', 'taste, flavor'
Kam	t'eʔ-	-	t'eeʔna	'taste good, become sweet', 'taste, flavor'
Sid	-	t'uʔma	-	'to be good'
Ged	-	t'eʔme	-	'to be good'

In [75], the lack of **m** → **n** assimilation in Gedeo and Sidaama suggests **ʔ** in the stem **t'eʔm-*. However, Kambaata *t'eeʔna* involves a nominal derivation with **n** (Treis, p.c.) from the verb *t'eʔ-* 'taste good, be(come) sweet', which applies to the Hadiyya word as well since the verb is *t'eeʔ-* 'to be expensive, be sweet, taste good' (see Burji *d'ed'emm-* and Oromo *d'amd'ama*). Therefore, there is still no need to posit an intermediate **d'**.

[170]	ø/ʔ	ʔn	Gloss
PHEC	*sum ʔ		'urinate'
Burji		sinʔ-aaw-	'urinate'
PNHEC	*fum ʔ		'urinate'
Had	fum-eʔ-		'urinate'
Kam	fum-aʔ-		'urinate'
Sid	fumi, fumaa-ʔr-		'urinate'
Ged		fʃʔn-	'urinate'

In set [170], the **(V)ʔ** sequences are reflexes of the support verb **ʔ* 'to do' (§4.2.4.2), with an **a** inserted before it. However, Sidaama **ʔr** in *fumaa-ʔr-* is an allophone of the reflexive marker **d'** (§4.2.3.1), whereas the Sidaama reflex of the support verb **ʔ* 'to do' appears as an allomorph **aa** that then cliticizes to the stem. In addition to the irregular **n**, the irregular stem vowel **i** in Burji and Gedeo (vs. PNHEC **fum ʔ* 'urinate') motivates checking for contact

effects before treating the stem shape as inherited (cf. Oromo *finc'* → Sidaama *finc'i* 'urinate'). It is likely that Gedeo and Burji words with **n** have been influenced by the Oromo parallel. Thus, the PNHEC word is **fum ʔ* 'urinate', reconstructed with **m** (see also PHEC **sum-* [145] 'urine').¹²⁵

3.3.3 Elision

Across HEC, non-initial **ʔ** is frequently unstable, and its loss is often morphophonologically conditioned. In Burji, Sasse (1982, pp. 18, 112) describes compensatory vowel doubling when **ʔ** is lost before a consonant (e.g., a preconsonantal stem alternation such as *kaʔ-* vs *kaa-* 'get up'). Comparable deletion with compensatory doubling is also reported for Gedeo (Eyob Kelemework, 2015, p. 84), and Wedekind (1980, p. 132) notes striking elision of **ʔ** (and /h/) in Sidaama. These patterns mean that the absence of surface **ʔ** in the expected environments, vowel doubling, and other alternations can be the primary comparative cues for earlier **ʔ*.

In Burji, patterns beyond compensatory doubling include (a) assimilation of **ʔ** (or **y**) + **s** → **ss**, and (b) correspondences where Burji **y** matches NHEC **ʔ** in comparable morphological contexts. The first pattern is straightforwardly an alternation conditioned by full assimilation of stem-final and **s**; the second requires careful analysis, because a Burji **y** correspondence could reflect multiple diachronic sources (including the glide **y*, epenthesis, or morphologized allomorphy). The key comparative point is that all of these alternations can systematically mask underlying **ʔ**, and therefore must be controlled for when comparing reflexive/denominative morphology across HEC.

¹²⁵ Metathesis is not restricted to the glottal stop **ʔ**. In Gedeo, Eyob Kelemework (2015, pp. 79–80) lists the following additional kinds of stem-final obstruent and suffixed sonorant metatheses: stem-final stops/affricates/fricatives and a suffix-initial **n** and stem-final obstruents and suffix-initial **l**. Similarly, in Hadiyya, metathesis of the root-final obstruent, such as **t** and nasal **n**, e.g., *ʔit-* 'eat' *ʔint-úmmo* 'we ate' (Anbessa Teferra, 2014, p. 39).

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[269]	ʔ	y	Assimilated	Gloss
PHEC	*t'aʔ-, *t'eʔ-	-	-	'to extinguish, to diminish'
Burji	-	t'ay-, t'ey-	t'ass-	'extinguish, dry out' (intr), 'extinguish, dry up' (tr)
PNHEC	*t'aʔ-, *t'eʔ-	-	-	'to extinguish, to diminish'
Had	t'aʔ-	-	-	'be depleted, diminish'
Kam	t'aʔu, t'eʔ-	-	-	'extinguish, be depleted'
Sid	t'eʔ-	-	-	'be depleted, be insufficient'
Ged	t'eʔy-	-	-	'be incomplete'

Both the NHEC ʔ and Burji (and Gedeo) y are likely derivational suffixes (§4.2.5) or support verbs (§4.2.4) attached to a root that ends in a glottal stop, as evident in Gedeo with both ʔ and y. In Burji, the meaning of the intransitive t'ay- is 'to be dried, be emptied' according to Getahun Addo (2017, p. 823). The second variant t'ass- is transitive and segmented as t'as-s- 'extinguish, dry up, drain' in Lamberti & Sottile (1997, p. 539). The geminate **ss** is the derivational **s** assimilated to the stem-final ʔ or derivational y (§3.1.2.2).

[34]	ʔ	y	Assim./Lost	Gloss
PHEC	*baʔ-	-	-	'be lost'
Burji	-	bay-, bey-	ba-ss, be-	'be lost', 'get lost'
PNHEC	*baʔ-	-	-	'be lost'
Had	biʔ-	-	-	'to be lost'
Kam	baʔ-	-	-	'be lost'
Sid	baʔi	-	-	'perish, be destroyed'
Ged	baʔ-	-	-	'be lost'

The causative in Burji is *ba-ss*, and there is a variant without the epenthetic **-y-**, i.e., *be-* 'get lost' (Sasse, 1982, p. 34).

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[749]	?	Lost	Gloss
PHEC	*yaaʔ-	-	'assembly, meeting'
Burji	-	yaa	'assembly, meeting'
PNHEC	*yaaʔ-	-	'assembly, meeting'
Had	yaaʔa	-	'to call, to be gathered'
Kam	yaaʔa	-	'assembly of elders'
Sid	yaaʔa	-	'communal assembly that holds reconciliation of bloodshed'
Ged	yaaʔa	-	'crowd, moving crowd'

In Burji, the derived transitive verb *yaaʔis-* 'to come together and be accumulated and assembled' (Getahun Addo, 2017, p. 823) is separated from the glottal stop with *i*, which is likely a reflex of the derivational **y** (§3.1.2.2). The intransitive verb is *yaas-* 'to go or move in procession line without discontinuation', without the glottal stop or evidence of fusion, so it must have been dropped.

[117]	?	y	Lost	Gloss
PHEC	*saʔ-	-	-	'cow'
Burji	-	saa-yi	saa	'cow' (subj), 'cow'
PNHEC	*saʔ-	-	-	'cow'
Had	-	saáyya	-	'cow'
Kam	saʔa	-	-	'cow'
Sid	-	-	saa	'cow'
Ged	-	saayya	-	'cow'

The **-y-** in Burji, Hadiyya, and Gedeo is epenthetic. Therefore, it only occurs intervocalically in the subject in Burji *saa-yi* (subj) and plural *saa-yanna* (pl) (Sasse, 1982, p. 161).

Additional sets showing ***ʔ** elision include PHEC [440] **weeʔn-* 'Colobus monkey', PHEC [168] **heeʔ-* 'to exist, to live' → Burji *heettaa* (interj) 'Here it is!', PHEC [30] **kaʔ-* 'to get up, arise' → Burji *kaʔʔ-* (Roba Dame & Wedekind, 2008, p. 49), *kaʔ-* (Sasse, 1982, p. 112), *kaa-* (preconsonantal) 'get up, arise' (Sasse, 1982, p. 112), Sid *ka-i-s-* (agentive) 'to lift up' (Kawachi, 2007, p. 734), and [114] PHEC **debeʔ-* 'to belch' → Burji *demmees-* and *deemeys-*.¹²⁶

¹²⁶ The change from PHEC [114] **debeʔ-* 'to belch' to Burji *demmees-* and *deemeys-* involves multiple stages: ***-n-** epenthesis produces **denbeʔ-*, assimilation of ***nb** produces **demmeʔ-* (§3.4.3), then upon the addition of the derivational **-s** it became

Loss, assimilation, and epenthesis are evident in the Burji examples.¹²⁷ Some of the morphemes that trigger the insertion, assimilation, and loss include the subject or nominative suffix **-i** in Sidaama [117] and causative **-s** in Burji [34]. Historically, other morphemes might have had the same impact on the non-initial **ʔ**.

The section on the variation in the stem vowel in 2.2.2 provides further analysis of most of the above words. The epenthetic function of **ʔ** in the HEC languages is discussed in the next Section 3.3.4.

The loss of non-initial **ʔ** and similar outcomes may have arisen independently in multiple languages. The elision interacts with a specific morphological marker (e.g., the reflexive/denominative **ʔ** treated in §4.2.3.1 and §4.2.5.1, or the support verb ***ʔ** ‘to do’ in §4.2.4.2), where the conditioning environment and the type of compensatory effects provide structured evidence for the underlying ***ʔ**.

3.3.4 Epenthesis

Beyond the inherited segmental system, the HEC languages apply morphophonological repairs when morphology creates impermissible vowel sequences. This section examines intervocalic **-ʔ-** insertion as a hiatus-resolution strategy, most consistently attested in Hadiyya and Gedeo, and compares it with glide insertion and vowel coalescence in the remaining HEC languages. The discussion treats **-ʔ-** primarily as a repair operating across morpheme boundaries (especially in vowel-initial suffixation to vowel-final stems¹²⁸), though some cases may reflect earlier consonant loss and later reanalysis. Distinguishing inherited segments from later epenthesis is necessary for reconstructing stem shapes and for separating shared innovations from parallel developments.

demmee-s- and upon the addition of the support verb **y** it became *deemees* (§3.4.1.2), with puzzling *V₁* doubling.

¹²⁷ Hadiyya and Gedeo have *saayya* ‘cow’, but it might include a suffix (§4.1.1.2 (Collective ***-ey-e** (f))). A few exceptions in Sidaama include [30] *ka-i-s-* (agentive) ‘to lift up’ and [117] *saa* ‘cow’.

¹²⁸ The term “vowel-final stem” is used here to cover both terminal vowels (§2.2.3) and stems ending in a vowel but which potentially have an underlying consonant.

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[382]	P(N)HEC	-ʔ-	VV, V́, V	Gloss
PHEC	*oll-	-	-	'neighbour'
Burji	-	-	olla, ollá	'neighbour'
PNHEC	*oll-	-	-	'neighbour'
Had	-	ollaʔa	-	'neighbour'
Kam	-	-	olloo	'neighbour'
Sid	-	-	ollaa	'neighbour'
Ged	-	ollaʔa	-	'neighbour'

Burji has *óll-a*, *oll-ée* 'village' as well. Sasse (1982, p. 155) considers [382] to be from Oromo *ollaa* 'neighbor'.

[212]	P(N)HEC	-ʔ-	VV, V́, V	Gloss
PNHEC	*ar-	-	-	'husband'
Had	-	aroʔo	-	'husband'
Kam	-	-	aroo	'husband'
Sid	-	-	ʔaro, aroo, aró	'husband'
Ged	-	aroʔo	-	'husband'

The additional **o** is the case marker distinguishing PNHEC [212] *ar-o (m) 'husband' from [271] *ar-e (f) 'wife'.

[350]	P(N)HEC	-ʔ-	VV, V́, V	Gloss
PHEC	*sang-	-	-	'ox, bull'
Burji	-	-	sangaa	'bull'
PNHEC	*sang-	-	-	'ox, bull'
Had	-	sangaʔa	-	'ox for slaughter'
Kam	-	-	sanga	'ox (castrated)'
Sid	-	-	sanga	'stallion, bullock'
Ged	-	sangaʔa	sanga	'ox', 'ox for beef'

Set [350] has parallels in Amharic *sānga* and Oromo *sangaa* 'ox for beef'.

Other examples with epenthetic **-ʔ-** in Hadiyya only include: PHEC [478] *kott- 'hoof, foot' → Had *konteʔe* 'hoof, foot, foot print' and [91] *mooyy- 'mortar' → Had *mooyyeʔe*.¹²⁹

Variations in transcription, particularly vowel quantity and quality, exist across different sources for the above examples: Burji [382] *ollaa* (Roba Dame & Wedekind, 2008, p. 67), *óll-a*, *oll-ée* (Sasse, 1982, p. 154), *ollá* (Hudson,

¹²⁹ These also have parallels in Oromo: [478] *kottee* 'hoof' and [91] *mooyyee* 'mortar'.

1989, p. 104) ‘neighbor’; [350] *sangaa* ‘bull’ (Roba Dame & Wedekind, 2008, p. 70), *sanga* ‘ox for beef’ (Hudson, 1989, p. 109); [478] *kottee* ‘hoof’ (Roba Dame & Wedekind, 2008, p. 53), *kotte* ‘track’ (Hudson, 1989, p. 81); [91] *mooyyee* (Roba Dame & Wedekind, 2008, p. 63), *moyyé*, *mooyee* (Hudson, 1989, p. 101) ‘mortar’. The same applies to Sidaama [212] *ʔaro* (Yri & Pepper, 2019), *aroo* (Indrias Xa’miso et al., 2007, p. 31), *aroo*, *aró* (Hudson, 1989, p. 82) ‘husband’, Gedeo [350] *sangaʔa* ‘ox’ (Roba Dame & Wedekind, 2008, p. 8), *sanga* ‘ox for beef’ (Hudson, 1989, p. 109). As evident in some of the corresponding vowels in the languages without epenthesis, the vowel preceding the inserted glottal stop was either double or accented originally. Therefore, the variation in the transcription of the vowels potentially reflects dialectal differences or transcription choices.

The glottal stop *ʔ can only be confidently reconstructed in PHEC for monosyllabic stems (§2.1.5.2 (PHEC *ʔ)). Therefore, instances of intervocalic -ʔ- in potentially disyllabic or multisyllabic reconstructed stems might be attributable to later, language-specific epenthesis (e.g., PNHEC or later stages), rather than direct inheritance from PHEC, unless they can be shown to arise from earlier suffixation across a morpheme boundary.¹³⁰

3.3.4.1 Hiatus Repair -ʔ-

The most common environment for epenthetic -ʔ- is intervocalically, arising when a vowel-initial suffix is added to a vowel-final stem (**V-ʔ-V**). This process is particularly active in the nominal and pronominal morphology of Hadiyya and Gedeo.

The extended epenthesis environment can be further specified because it has been attested intervocalically between two to three (even four) vowels with different accentuation. Additionally, there are instances of an underlying consonant surfacing and reclaiming the epenthesis slot. Those three extended epenthesis environments are discussed in the following sections.

Two Vowels (V+V)

Intervocalic epenthesis between two vowels has already been demonstrated in all the examples above ([382], [212], and [350]). Below are additional

¹³⁰ Tadesse Sibamo (2015, p. 59) reports glottal stop epenthesis between the final vowel of disyllabic proper nouns but not trisyllabic nouns in Hadiyya.

examples based on synchronic morphological triggers, i.e., vowel-initial suffixes.

		Singular	Plurative/Collective	Gloss
Ged	[299]	daanalco	daanaʔe (pl.m), daanaʔo (coll.m) ¹³¹	'elephant'
Had		daaneecco	daaneʔe	'elephant'
Had	[628]	anna	annoʔo	'father'
Had	[547]	ama, umma	ammoʔo	'mother'
Had	[150]	baalleʔe	baalleʔuwwa	'feather'

The examples show that plurative or other suffixes trigger **-ʔ-** insertion in Hadiyya and Gedeo (e.g., [628] Hadiyya *anna* 'father', pl: *annoʔo*; Gedeo *daanalco* 'elephant', pl: *daanaʔe*) compared to vowel changes or **-w-** epenthesis (§3.4.1.2) in cognates (e.g., [299] Sidaama *daaniwo* 'elephants'). This highlights **-ʔ-** as a language-specific strategy for hiatus resolution in these contexts.¹³²

Here are the cognates of the above examples in the rest of HEC:

Kam [299] *zaneccu*, *zanooccu*, Sid *daaniicco* (sg), *daaniwo* (pl) 'elephant'.

Burji [628] *anaa* 'man, husband', Kam *anna* 'father, owner, parent', Sid *ʔanna* 'father, owner', Ged *anna* 'father'.

Burji [547] *ama* 'woman (wife)', *amá* 'mother', Kam *ama-ta* 'mother', Sid *ʔama* 'mother', Ged *ama* 'mother'.

Burji [150] *baallee*, *baalle*, *baalée*, Kam *baalli-ta*, Sid *baallicco*, *balle* (see Oro *baallee* 'feather', Wollega Oromo *baal-eʔ* 'feather').

The above examples prove that **-ʔ-** epenthesis is triggered by vowel-initial suffixation. It has also been observed that either the stem-final (terminal) vowel assimilates to the vowel of the suffix or the terminal vowel copies the quality of the preceding vowel.

Hayward (1997, pp. 111–112) proposed vowel doubling and **-ʔ-** epenthesis in Hadiyya, Kambaata, and Gedeo. He describes it as a process of

¹³¹ See *Gedeʔo* (coll.m) 'Gedeo people' (Wedekind, 2008, p. 88)

¹³² See also the accusative Gedeo *amaaʔa* (Eyob Kelemework, 2015, p. 245) of [547] *ama* 'mother' and *godobeeʔe* (acc) of *godoba* 'stomach'.

resyllabification of the two vowel morae, which are originally long terminal vowels, into two separate syllables. In this process, the inserted glottal stop represents an onset for the second syllable, in the form of what he calls “minimal consonantality”. In Hadiyya, this process has affected long terminal vowels with any of the three qualities available, i.e., **aa**, **oo**, and **ee**, e.g.:

aroʔo ‘husband’, *buraʔa* ‘straw’, *k’ureʔe* ‘jar’.

However, in Kambaata, the process operates in the case of earlier ***aa**, but does not appear to have affected ***ee** or ***oo**, which sometimes remain as double vowels, e.g.:

buraʔa ‘straw’ vs. *aroo* ‘husband’, *eloo* ‘well’, and *zanoo*, *zanee(-ccu)* ‘elephant’.

Gedeo, on the other hand, displays features intermediate to the preceding languages, splitting earlier long ***aa** and ***oo** terminal vowels into two syllables in many words while retaining unchanged reflexes of long ***aa** and ***oo**, as well as long ***ee**, in others.

Similar analysis of Hadiyya is found in Tadesse Sibamo (2015, p. 59), where he posits that “[d]isyllabic proper nouns (both masculine and feminine) duplicate their final vowel and insert the glottal stop to avoid vowel cluster in absolutive... The duplicated vowel of the masculine proper nouns is replaced by nominative case suffix... -i”, e.g.:

deéro → *deeróʔo* (Absolutive), *deeróʔo* (f.nom) and *lobe* → *lobéʔe* (absolutive) *lobéʔ-i* (nom.m),

buubaáme → *buubaáme* (absolutive), *buubaáme* (f.nom) (trisyllabic)

Hayward’s and Tadesse Sibamo’s insertion analysis is accepted here. However, the assumption of vowel duplication is a less parsimonious explanation than the proposal of epenthesis and suffixation (e.g., nominative **-i** in Hadiyya). Additionally, the vowels in the environment of the epenthesis vary in quality, quantity, and accentuation, which means the vowels around epenthetic **-ʔ-** are not always identical. Therefore, my analysis posits that the epenthesis operates within morphophonological processes triggered by

vowel-initial suffixes to explain the various qualities, quantities, and accentuation of the corresponding vowels, e.g.:¹³³

	-ʔ-	VV	Ų, V	Gloss
Burji	-	támboo	tambó	'tobacco'
Had	tambaʔa	-	-	'tobacco'
Kam	tumbeʔo	-	-	'tobacco'
Sid	-	-	tambo	'tobacco'
Ged	-	-	tambo	'tobacco'

See Oromo *tamboo*, *timboo* 'tobacco'.

	-ʔ-	VV	Gloss
Had	antabaʔa , antabaʔ-icco	-	'hen'
Kam	antabeeʔu	antabee-ccu-ta	'hen'

The examples show variation in the quality and quantity of the vowels preceding and following the epenthetic -ʔ-. For instance, the first example might be an Amharic loan *təmbaho* 'tobacco' (Leslau, 1976, p. 100). Therefore, upon the elision of the intervocalic -h- (§3.2.2), the resulting **a-o** vowel sequence coalesced into **-oo** in Burji, Sidaama, and Gedeo, while Hadiyya and Kambaata inserted epenthetic -ʔ-. The surrounding vowels show further assimilation effects in Hadiyya (**aʔa**) but none in Kambaata (**eʔo**). Ritter (2007, p. 9) transcribes the example from Hadiyya as follows: *antabaaʔa* (pl), *antabaakkicco* 'chicken, hen'. The surfacing of **kk** in the singulative is not an isolated case and is addressed below.

Sidaama has only a marginal instance of glottal epenthesis between the negative prefix and the verb stem *ag-* 'drink', for example, in *di-agoomm-o* → *diʔagoommo* 'I have not drunk' (Anbessa Teferra, 2000, p. 28). This is comparable to a rather optional epenthesis in Gedeo, where Eyob Kelemework (2015, p. 324) notes that speakers may use any of the variant forms *joʔokini*, *jookin*, *joʔokan*, or *jookan* 'or', so the glottal stop is either deleted or not inserted.

The above epenthesis was arguably originally to separate the accented and unaccented vowel **Ų_{TV}-ʔ-V** (shifting from ***V_{TV}-Ų**) sequence upon the addition of a vowel-initial suffix (§2.4).

¹³³ Data source: Hudson (1989, pp. 156, 39).

Three Vowels (V+VV, VV+V)

Epenthesis resolves more complex vowel hiatus (**VV-ʔ-V** or **V-ʔ-VV**), primarily documented in Gedeo and Kambaata pronominals and certain derived nominal forms, resolving potential triphthongs or sequences across morpheme boundaries created by suffixation.¹³⁴

	Nominative	Accusative		Gloss
Kam	naʔóo-t	-	(1pl)	'we'
	aʔnoʔóo-t	kiʔneʔée-ta	(2pl)	'you (pl)'
	issoʔóo-t	issoʔóo-ta	(3pl)	'they'
Ged	noʔo	noʔo-oʔo	(1pl)	'we'
	haʔnno	haʔnno-oʔo	(2pl)	'you (pl)'
	insaʔnne	insaʔnne-eʔe	(3pl)	'they'
	itti	ettene-eʔe	(f)	'that (f)'
	ikki	okkone-eʔe	(m)	'that (m)'
Sid	tiiʔi	teʔe, teʔenne	(f)	'over there'
	kuʔu	koʔo, koʔonne	(m)	'over there'

The examples illustrate **-ʔ-** insertion within complex pronominal forms in Kambaata (e.g., *naʔóo-t* (1pl.nom) 'we') and Gedeo (e.g., *noʔo-oʔo* (1pl.acc) 'we'), and potentially Sidaama demonstratives. The precise placement relative to accent and vowel quantity differs: **V-ʔVV** in Kambaata vs. **Ṽ-VʔV** in Gedeo plurals. However, the function of resolving vowel sequences introduced by suffixes (likely case/number markers) appears similar.

The **-ʔ-** epenthesis is common between 3–4 vowels and between accented and unaccented vowels in Kambaata and is not confined to the pronominals. Treis (2008, p. 189) identifies such cases of epenthetic glottals occurring before the accented/double vowels of the genitive and ablative forms as an unknown potential extension, e.g.:

ber-é (acc) 'yesterday', *ber-é* ~ *ber-e-ʔée* (gen), *ber-éecc* ~ *ber-e-ʔéecc* (ablative) (compare with the dative *ber-ée*),

t'on-íta (acc) 'before, recently', *t'on-é* ~ *t'on-e-ʔée* (gen).

Later, Treis identifies that glottal extension (at least for the genitive) as a remnant of the associative morpheme. Then, another comparable glottal stop

¹³⁴ Data sources: Gedeo (Eyob Kelemework, 2015, p. 112), Kambaata (Treis, 2008, pp. 330–335), Sidaama (Kawachi, 2007, pp. 189, 200).

has been described as inserted before derivational morphemes (Treis, 2008, p. 275), e.g.:

ceemm-í-ta (acc), *ceemm-é* (gen) 'laziness', *ceemm-eʔ-aam-ú* (m.adj),
ceemm-eʔ-aam-í-ta (f.adj) 'lazy'.

The latter analysis applies to most, if not all, of the other unknown instances, including the pronouns, and has comparative support.

In Gedeo, in addition to the above examples, all persons in the accusative show such a pattern of suffixation and epenthesis. Eyob Kelemework (2015, p. 112) describes the process as lengthening the final vowel with an intermittent glottal stop. He adds that, since the final citation vowels (**e** and **o**) in the accusative case carry high pitch, the following double vowel plus an intermittent glottal stop may optionally be dropped due to its unstressed nature. Thus, the above accusative forms may alternatively be *noʔó* (1pl), *haʔnnó* (2pl), and *insaʔnné* (3pl) with a high pitch on the final vowels. The same is true for demonstratives. Eyob Kelemework's analysis assumes the suffixation of the citation vowels **-e** and **-o** in the accusative, which contradicts the marked case (accusative vs. citation) and requires what he calls a change of the citation vowel before the alleged "lengthening," e.g., **-i** → **-e** in *itti* (f.nom), *ettene-eʔe* (f.acc) 'that' (f). Unless the accusative is equivalent to the citation form, it is more plausible to identify what he calls "citation vowels" as accusative vowels/suffixes or at least attribute the change of the nominative vowel to assimilation to the attached vowel. Contrary to Kambaata, such epenthesis is chiefly, if not exclusively, found in the pronominals in Gedeo.¹³⁵

Contrary to Hayward's (1997) analysis focusing solely on the splitting of terminal double vowels, the pronominal data in Gedeo and Kambaata appear to involve the suffixation of an additional accented double vowel (**ṼV**) following the terminal vowel of the stem. Additionally, the epenthesis is between the vowels of the suffix **-ṼV** in Gedeo (**Ṽ-VʔV**), but before them in Kambaata (**V-ʔṼV**) on the pronouns. That explains the assimilation of the terminal vowel to the vowel of the suffix in Gedeo. Such epenthesis resolves the impermissible **VVV** sequence introduced by a vowel-initial suffix.

¹³⁵ Wedekind (1980, pp. 140, 161) reports that such a process is present phonetically, i.e., it could be heard in fast speech even on common nouns and characterized with a unique laryngealization of the terminal vowel in Gedeo.

It is unclear if the Sidaama demonstrative examples involve an epenthetic or an independent suffix with a glottal stop. However, the pattern aligns well with the Gedeo and Kambaata epenthesis triggered by case vowel suffixation.

Underlying Consonant

In some cases, epenthetic **-ʔ-** in Hadiyya or Gedeo appears in positions where an underlying consonant surfaces in specific morphological contexts (e.g., before the Hadiyya singular suffix **-icco**) or where cognates in other HEC languages show a consonant (often **k** or **w**). This raises the question of whether **-ʔ-** is merely filling a hiatus created by the loss of an earlier consonant, or if it is directly inserted in a different intervocalic environment which has nothing to do with consonant replacement (see the first subsection: Epenthesis Between Two Vowels).¹³⁶

[795]	-ʔ-	C	Ø	Gloss
Had	fellaʔa	fellak-icco	-	'goat' (pl), (sg)
Kam	fellaaʔu	-	felleeccu	'goat', 'billy goat'

[273]	-ʔ-	C	Ø	Gloss
Burji	-	-	biinne	'mosquito, fly'
Had	biimbeʔe	biimbekicco, biimbekkícc	-	'mosquito, fly'
Kam	-	-	biimbi-ta	'mosquito, fly'
Sid	-	-	biinne	'mosquito, fly'
Ged	-	-	biiʔne	'mosquito, fly'

[382]	-ʔ-	C	Ø	Gloss
Burji	-	-	ollaa, oll-áccaa	'neighbour'
Had	ollaʔa	ollakkicco	-	'neighbour'
Kam	-	-	olloo, olleeccu	'neighbour', 'villager'
Sid	-	-	ollaa, ollicco	'neighbour'
Ged	ollaʔa	-	-	'neighbour'

¹³⁶ The intervocalic gemination of single **k** → **kk** /V_V is comparable to the intervocalic glide gemination ***w** → **ww**, ***y** → **yy** /V_V. They share the vulnerability to elision in intervocalic position (see §3.2.2 and iii). Additionally, most of the listed examples are nominals. The following might involve a verbal suffix **-ʔ** and **-eek**: Had *foof-eʔ-*, Kam *foof-eeʔ-*, *foof-eek-* 'breathe'. Treis (p.c.) corrects Hudson's transcription to *fooff-eeh-* 'breathe'.

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The Oromo parallel is *olla* ‘neighbor’.

[252]	-ʔ-	C	Gloss
Burji	-	hasaaw-	‘to talk’
Had	heesseʔ-	hasaaw-	‘to speak figuratively’, ‘chat’
Kam	-	haasaaww-	‘discuss’
Sid	-	hasaaw-	‘speak, chat, talk’
Ged	haasoʔ	-	‘speak, chat’

More examples are found in the following comparative sets:

Had [446] *boonkeʔe* ‘pig, wild pig’, *boonkekicco* (sg) ‘pig, wild pig’:
Burji *booyyee*, *booyyé*, Kam *bookki-ta*, *bookk-iccu* (sg), Ged
booyye ‘pig, wild pig’ (see Oro *boyyee* ‘pig, wild pig’)

Had [267] *t’uraʔa* ‘claw, finger-nail’: Burji *t’unga*, Had *t’urank’a*, Kam
t’ulunk’a-ta (Kam Geyyota), *t’ulunga-ta* (Kam Enano), Sid *c’ulunk’a*
‘claw, finger-nail’

Ged [1034] *akkaʔo* ‘grandfather’: Sid *ahaaho* ‘grandfather’, Burji *akki*
‘grandfather’ (see Oro *akaakayyu* ‘grandfather’)

Ged *lolaʔa* ‘flood, torrent’: Sid *lolahe*, *lolahá* ‘flood, torrent’, Burji *lolá*
‘flood, torrent’ (see Oro *olla* ‘flood, torrent’) (Hudson, 1989, p. 65)

These examples show Hadiyya and Gedeo -ʔ- corresponding to -k- in Hadiyya (before -icco) and to k/w/ø in other languages. For instance, Hadiyya *fellaʔa* (pl) vs. *fellak-icco* (sg) ‘goat’; Gedeo *akkaʔo* ‘grandfather’ vs. Burji *akki*; Gedeo *haasoʔ* ‘speak’ vs. Kambaata *haasaaww-* ‘discuss’. This pattern suggests that -ʔ- often occupies a slot where an underlying consonant (k or w) has been elided intervocalically.¹³⁷

The glottal stop in examples [795], [273], [382], and [446] corresponds to a consonant in Hadiyya. The underlying consonant surfacing before the singulative suffix -icco is mainly the velar k, which is susceptible to lenition (§3.2.2) in such a post-vocalic position; therefore, it sometimes surfaces as a geminate. In sets [1034], [252], and the last example, *lolaʔa* ‘flood, torrent’, Gedeo has a glottal stop corresponding to elided k and w in other HEC languages. The geminate nn in Burji and Sidaama might be due to the fusion

¹³⁷ The formal shape of ʔ and w in the reflexes of the cognate set [252] suggests an alternative analysis as derivational suffixes (§4.2.5).

of *ʔn in [273], where the glottal stop cannot be analyzed as epenthetic but rather as part of the stem. The correspondence with ø in languages other than Gedeo and Hadiyya involves mostly double or accented vowels, particularly in Burji.

Reflexes of the example [267] PHEC *t'ulak- 'claw, finger-nail', including epenthetic -ʔ-, could be explained via morphophonological processes:

Lenition (§3.2.2), and epenthesis: *t'uraha → Had t'uraʔa

Gemination (§3.1.1) and epenthesis (§3.4.2): *t'ulak~k- → Kam t'ulunga-ta Burji t'unga

Fusion (§3.3.1.3) and epenthesis (§3.4.2): *t'ulak-ʔ → *t'ulak'k'- → Had t'urank'a, Kam t'ulunk'a-ta, Sid c'ulunk'a

An alternative analysis would be to posit separate processes, i.e., instead of underlying **C** replaced by -ʔ, both the surfacing of the consonant and the insertion of the glottal stop are independent of each other (e.g., [252]). As discussed above, the glottal stop is inserted as part of the usual epenthesis process before a vowel-initial suffix. The consonants are from different sources, including stem-final (Gedeo [267], [1034], and [252]) and a suffix with a voiceless velar (Hadiyya [795], [273], [382], and [446]), e.g., -ga and -da in Burji duwwaaga (m.adj), duwwaada (f.adj) corresponding to an epenthetic glottal stop in Hadiyya daamaʔa 'red'. That means the latter is added as part of the suffixation process, e.g., singulative -k-icco in Hadiyya. However, such a hypothesis fails to account for cases where the elided consonant is part of the root/stem, as evident in the cognates, particularly in Gedeo (See [267]).

Additionally, in Hadiyya, Tadesse Sibamo (2015, pp. 100–102) reports additional subject markers occurring as geminated **mm** (1sg/1pl), **tt** (2sg), and **kk** (3sg.m/3pl). However, the slot of that additional subject marker is occupied by an epenthetic -ʔ- instead of the expected -tt- in 2pl and 3sg. The epenthetic -ʔ- is inserted in that slot between the two vowels, i.e., aspect -ó and terminal or indicative mood vowel -o, e.g.,

ʔuww-	'give'	+	2pl	ʔuww-i-t-akk-ó-ʔ-o
		+	3sg.f	ʔuww-i-t-ó-ʔ-o

Tadesse Sibamo (2015, pp. 103–104) refers to a different analysis by Crass (2013), who calls the terminal vowels and the preceding consonantal

morphemes “additional morphemes”. Since these vowels are identical in all verb forms, Crass does not consider them aspect markers. For Crass, the main verbs in the HEC languages consist of a lexical base, a paradigm of subject markers (see **-t** above), an aspect marker (see **-ó** above), and a paradigm of “additional morphemes” (see **-ʔ-o**). The **-akk-** in 2pl is a plurative marker (Tadesse Sibamo, 2015, p. 100).

There are numerous further examples from Hadiyya and Kambaata (Hudson, 1989, pp. 146, 36, 43, 119, 31).

-ʔ-	-k-/t-/ø-	
Had abbaʔa	Kam abba-ta	‘Sunday’
Had duhaʔa	Kam duuha-ta	‘condition’
Kam t’araʔa (pl)	Had t’arak-icco (sg)	‘python’
Kam gaamelaʔa , gaameela	Had gaamelak-icco (sg), gaamela	‘camel’

The above examples raise a question: Do these correspondences suggest that the overt feminine accusative **-ta** suffix in Kambaata might have had an older masculine counterpart **-k** (or **-h**), reflexes of which surface in Hadiyya **-(k)icco**? That would allow the reconstruction of earlier ***-t** and ***-k** for both, with each surviving in one language.¹³⁸

3.3.4.2 Triggers and Outcomes

The insertion of intervocalic **-ʔ-**, primarily observed in Hadiyya and Gedeo, functions as a key strategy for resolving vowel hiatus arising from (nominal) morphological processes (chiefly suffixation) or potentially from the historical elision of consonants. The specific environments and subsequent effects are synthesized in the following paragraphs.

Epenthesis **-ʔ-** is consistently triggered when two or more vowels become adjacent, i.e., across a morpheme boundary when a vowel-initial suffix is added to a vowel-final stem. First, simple **V+V** is found in numerous examples showing insertion between two vowels, such as Hadiyya *anno-ʔo* ← *anna* + **V** ‘father’ (pl), Gedeo *daana-ʔe* ← *daanalco* + **V** ‘elephant’ (pl), Hadiyya *aro-ʔo* ‘husband’, Gedeo *amaa-ʔa* ‘mother’ (acc). Second, complex vowel sequences

¹³⁸ See even the Sidaama parallels with as **-k** in Hadiyya *fuut’eʔe*, *fuut’ek-icco*, Kambaata *fuut’eccu*, and Sidaama *futakko*, *futaho*, *futahe* (pl) ‘mole (animal)’. The double **uu** in Hadiyya and Kambaata might be compensatory upon fusion of the **t** with a glottal stop of unknown origin (§4.1.3) and degemination **tʔ** → **t’t** → **t’**.

VV or **Ů** also trigger epenthesis, but the source of the relevant vowel sequence is not always recoverable (original double vowels vs. suffixation). Hayward (1997) suggested that **-ʔ-** splits original long terminal vowels (**VV** → **VʔV**), and Tadesse Sibamo (2015) proposed vowel duplication (**V** → **VʔV**) before case marking in Hadiyya proper nouns. However, the variation in vowel quality, quantity, and accent surrounding epenthetic **-ʔ-** suggests that simple duplication or splitting is insufficient. It is often triggered by suffixation onto a stem ending in **V**. Examples potentially involving underlying **VV** or **Ů** include Hadiyya *fellaʔa* (pl) ‘goat’, Gedeo *ollaʔa* ‘neighbour’ (cf. Burji *ollaa*), and Hadiyya *mooyyeʔe* ‘mortar’ (cf. Burji *mooyyee*).

In terms of the interaction with suffixation and stem vowels, the epenthesis process evidently involves adding vowel-initial suffixes (case, number, possibly derivational) to stems ending in a terminal vowel (TV) without necessarily deleting the TV. Assimilation often occurs between the TV and the suffix vowel, particularly progressive assimilation in Gedeo, where **V_{TV} + VV** suffix results in **V_{TV}-VʔV** (with the first **V** of the suffix assimilated to **V_{TV}**). The accent and syllable structure also play a role because epenthesis may be sensitive to accent placement, possibly serving to separate the accented suffix vowel from the unaccented terminal vowels (**V_{TV}-Ů**), which later shifts the accent to the first vowel of the heavy syllable (**Ů-ʔV**), i.e., the former TV. In Gedeo accusative pronominals, the **Ů-VʔV** structure can be reduced to **-Ů** by dropping the final unstressed **-VʔV** portion, with high pitch realized on the new final vowel. This suggests a connection between epenthesis, accent, and syllable weight/stress (§2.4).

Epenthesis also seems to resolve the hiatus created by consonant elision. Epenthetic **-ʔ-** frequently appears in Hadiyya/Gedeo where other languages show **k**, **w**, or **ø**. In Hadiyya, the underlying stem-final consonant (often **k**) surfaces before certain suffixes (e.g., singulative **-icco**), while **-ʔ-** appears before others. Example: Had *fellaʔa* (pl) vs. *fellak-icco* (sg). This suggests two possible analyses: (a) an underlying consonant (**k**, **w**) is elided intervocalically (**V_V**), and **-ʔ-** is subsequently inserted into the hiatus, or (b) the consonant and the epenthetic **-ʔ-** are independent; **-ʔ-** insertion is triggered by the vowel-initial suffix regardless of whether a consonant has been elided. The surfacing consonant comes from the stem or specific suffixes (like a velar suffix in Hadiyya). Hadiyya verbal morphology also shows **-ʔ-** occupying suffix slots where other consonants (like **-tt-**) are expected.

Therefore, **-ʔ-** epenthesis is primarily a hiatus-resolution strategy in Hadiyya and Gedeo (and in restricted cases in Kambaata/Sidaama), triggered by vowel

adjacency, especially across morpheme boundaries during suffixation. It interacts in complex ways with vowel quantity, accent, and assimilation, and potentially occupies slots created by historical consonant elision. The specific vowel sequences triggering it involve combinations of **VV** and **Ṽ**, leading to different insertion patterns (**V?V**, **V?VV**, **VV?V**).

While **-ʔ-** epenthesis represents a prominent strategy for resolving vowel hiatus, particularly in Hadiyya and Gedeo, it is crucial to acknowledge alternative outcomes observed elsewhere in HEC and even within the same languages in different contexts. When sequences of vowels arise, typically through suffixation onto vowel-final stems (**V_{TV} + V**), languages like Burji, Sidaama, and Kambaata often exhibit outcomes involving vowel coalescence, resulting in accented short vowels (**Ṽ**) or accented long vowels (**ṼV**).

This coalescence pathway might occur directly (**V_{TV} + V → Ṽ(V)**) or indirectly. An indirect route could involve an intermediate stage of epenthesis, not necessarily limited to **-ʔ-**. Given that glides and glottals are susceptible to lenition and elision in intervocalic positions (§3.3.3, rule ii), an earlier epenthetic glide (**-y-**) or glottal (**-ʔ-**) inserted to break hiatus could subsequently be lost. The loss of this intervening consonant could then trigger compensatory coalescence or accentuation on the remaining vowel(s). Evidence for such intermediate glide epenthesis resolving hiatus is indeed found in Burji, Sidaama, and Kambaata (§3.4.1.2).

Therefore, when analyzing instances of vowel hiatus across HEC, particularly those resulting from suffixation, both the conditioning context and the repair strategy may be language-specific. Three potential outcomes must be considered: (a) epenthesis of **-ʔ-** (predominant in Hadiyya, Gedeo), (b) epenthesis of **-y-** (common in Burji, Sidaama, Kambaata), and (c) vowel coalescence/accentuation (**Ṽ** or **ṼV**), potentially arising either directly from **V+V** or indirectly following the elision of an earlier epenthetic **-ʔ-**, or **-y-**.

In summary, vowel hiatus created by suffixation on vowel-final stems is resolved by means of different repair strategies across HEC. Hadiyya and Gedeo most consistently insert **-ʔ-**, while Burji, Sidaama, and Kambaata more often show glide epenthesis (**-y-**, **-w-**) or vowel coalescence with accent re-alignment. For reconstruction, the comparative pattern supports vowel-initial suffixation and stem-final (including terminal) vowels as the common conditioning context, but it does not require reconstructing **-ʔ-** as a proto-segment in longer stems. The distribution of **-ʔ-** epenthesis is therefore a

candidate for a shared innovation (subject to further testing against contact) and should be treated separately from inherited ʔ in monosyllabic stems.

Finally, the glottal stop participates in HEC morpheme boundary alternations in several distinct ways that should be kept distinct in reconstruction. As a derivational suffix, -ʔ is securely reconstructable for PHEC and remains productive across the family. In NHEC, the interaction of suffixal ʔ with stem-final consonants yields regular fusion patterns that motivate reconstructing a PNHEC morphophonological process of glottalization, even though Burji lacks the productive fusion outcomes. By contrast, intervocalic -ʔ- in longer stems is best treated as a later hiatus-repair strategy, concentrated in Hadiyya and Gedeo and competing with glide insertion and vowel coalescence elsewhere.

3.4 Sonorants

Sections 3.1-3.3 focused on processes affecting obstruents, with sonorants acting mostly as passive participants there (as targets or neighbors of obstruent alternations rather than the primary triggers). Their most active role in Chapter 3 is as epenthetic sounds. This section, therefore, focuses on sonorant insertion: epenthetic -y- (often realized as -i-) (§3.4.1), epenthetic -n- (§3.4.2), and epenthetic -l- (§3.4.3). The inserted segments adapt to their environments, with alternative realizations as -w-, -m-, and -r-, respectively.

3.4.1 Epenthetic -i-, -y-

The HEC languages insert epenthetic segments to resolve phonotactically illicit sequences. The most common strategy between consonants is -i- insertion, which breaks up impermissible clusters by creating an additional syllable. In intervocalic contexts, hiatus is often repaired by glide insertion (typically -y-), and surface -i- in some environments plausibly reflects this same repair strategy. These patterns are productive across HEC. In Hadiyya and Gedeo, intervocalic hiatus resolution is instead frequently realized as a glottal stop (§3.3.4).

3.4.1.1 Epenthetic -i-

Epenthetic -i- is the most common insertion strategy and is found throughout HEC. It occurs between (a) retained stem-final consonant(s) and a consonant-initial suffix ((C)C_i-i-C). Its primary function is phonotactic: It repairs impermissible consonant sequences, including clusters that are illicit because

of their segmental makeup (quality) or because they yield an impermissible consonant quantity (e.g., a three-consonant sequence).¹³⁹

$C_i + C \rightarrow C_i-i-C$

Below, segmentation shows only the stem-final consonant and the suffix to highlight the repair environment; the full lexical stem appears in the example.

Had	$f- + -títte \rightarrow f-i-títte$	$f-$ 'kill' $\rightarrow f-i-títte$ 'do not kill' (sg)
	$k' + -cc \rightarrow k'-i-cc$	$mík-$ 'bone', $mík'-i-cc-i-cco$ 'bone' (diminutive-sgv)
Kam	$f + -teen-óta$	$f-$ 'kill' $\rightarrow f-i-teen-óta$ 'in order to kill'
	$\rightarrow f-i-teen$	
	$t + -n-óommi \rightarrow t-i-n-$	$fint-$ 'list' $\rightarrow fint-i-n-óommi$ 'we listed'
Sid	$f + -tú \rightarrow f-i-tú$	$f-$ 'kill' $\rightarrow f-i-tú$ 'she/they kill'
	$b + -tú \rightarrow b-i-tú$	$sirb-$ 'sing' + $-tú$ $sirb-i-tú$ 'she/they sang'
Ged	$f + -siis \rightarrow f-i-siis$	$gof-$ 'uproot' $\rightarrow gof-i-siis$ 'uproot' (caus)
Burji	$l + -ngā \rightarrow l-i-ngā$	$k'al-coó$ 'goat' $\rightarrow k'al-i-ngā$ 'of goat' (gen) ¹⁴⁰

Sidaama inserts *-i-* before the reflexive suffix as in *af-* 'to find, get to know', *af-i-d'-* 'to have, get'; *has-* 'to look for' *has-i-d'-* 'to want'; *arg-i-d'-* 'to borrow (something that can be returned as it is)'; and *fooliff-i-d'-* 'to take a rest' (Kawachi, 2007, pp. 335–339, 324, 58). However, besides epenthesis, such *i* is a reflex of **y* 'say, do, be', e.g., in Gedeo *mar-* 'go' $\rightarrow$ *imar-* 'take' (lit. 'cause to go') and *dag-* 'come' $\rightarrow$ *idag-* 'bring' (lit. 'cause to come') (Eyob Kelemework, 2015, pp. 183–184).

3.4.1.2 Epenthetic *-y-*

Epenthetic *-y-* is less common than *-i-* and is found in Burji, Kambaata, and Sidaama.

$V_i + V \rightarrow V_i-y-V$

¹³⁹ Data sources and further discussion: Hadiyya (Tadesse Sibamo, 2015, pp. 43, 263), Kambaata (Treis, 2008, pp. 61–62), Gedeo (Eyob Kelemework, 2015, pp. 76–77), Sidaama (Anbessa Teferra, 2000, p. 17), and Burji (Tefaye Baye, 2015, p. 75).

¹⁴⁰ Compare the above with Gedeo *fij-* 'kill' $\rightarrow$ *fije* ~ *fie* 'he killed' (Eyob Kelemework, 2015, p. 36) and Burji *sey-* 'kill' $\rightarrow$ *sey-i-nnoó* 'killed' (perf) (kill.3SG-EP-PRV-TV) (Tefaye Baye, 2015, p. 88). These Burji and Gedeo stems may be cases of double epenthesis (*-i-* and *-y-* (§3.4.1.2)) or include a support verb **y* 'to say, do, be' and epenthetic/phonetic *i* because the root is just the consonant *f*. However, the vowel *e* of the Burji cognate remains puzzling.

As described by Tesfaye Baye (2015, p. 79) for Burji and Treis (2008, pp. 32–33) for Kambaata, it surfaces as **-y-** adjacent to the front vowel **i**, while adjacent to the back vowel **u** it surfaces as **-w-**. This alternation is best treated as assimilation, and comparable boundary-conditioned assimilation is widespread in HEC.¹⁴¹

	-y-	-w-
Kam	<i>k'ohi</i> → * <i>k'o</i> + <i>i</i> → <i>k'oyi</i> 'marrow'	<i>k'ahu</i> → * <i>k'a-</i> + <i>-u</i> → <i>k'a-w-u</i> 'small'
Sid	<i>dag-í</i> 'come' → * <i>da</i> + <i>í</i> → <i>da-y-i</i> 'he came'	<i>dag-ummo</i> → * <i>da-</i> + <i>-ummo</i> → <i>da-w-ummo</i> 'I came'
Burji	<i>saá</i> 'cow' → <i>se-y-igu</i> (def.m), <i>sé-y-i</i> (nom.m)	<i>d'ug-</i> 'drink' → * <i>d'u-</i> + <i>-ann-oó</i> → <i>d'u-w-ann-oó</i> 'drink (perf)'

Most, if not all, instances of epenthetic **-y-** occupy the position of a dropped consonant: **h** in Kambaata,¹⁴² **g** (← ***k**) in Burji and Sidaama, and ***ʔ** in Burji. It comes as no surprise that those consonants (mainly ***k**, ***h**, ***ʔ**, ***y**, ***w**) are dropped through the historical HEC rules and processes (see §§3.2, 3.3.3, and rule ii). Therefore, epenthetic **-y-** occurs after a stem-final vowel, i.e., **V₁V**, occupying the slot of a dropped consonant when attached to a vowel-initial suffix.¹⁴³

Concerning the **g** and **w** in Sidaama and Burji, Anbessa Teferra's (2014, p. 78) analysis of **g** loss and glide epenthesis in Sidaama aligns better with the epenthesis patterns than Sasse's (1982, p. 18) and Tesfaye Baye's (2015, p. 79) proposal of free variation between **g** and **w** in Burji. The velar **g** is a voiced variant of the voiceless **k**. Historically, ***k** has been lenited and lost in post-vocalic position in HEC (§3.2.2). Hence, similar to Sidaama, the loss of the velar is also posited as an intermediate stage for Burji before epenthesis *d'ug-* → *d'u-* (loss of **g**) → *d'u-w* (epenthesis of **-w-**) 'drink'. The same is proposed for Kambaata **h** and **w/y**.

¹⁴¹ Data sources and discussion: Kambaata (Treis, 2008, p. 39), Burji Tesfaye Baye (2015, pp. 79, 181), Sidaama (Anbessa Teferra, 2014, p. 78), Gedeo (Eyob Kelemework, 2015, p. 36)

¹⁴² See PNHEC [660] **k'oʔ-* 'marrow of bones' → Had *k'oʔo* 'marrow, bone marrow', Kam *k'o(o)ʔa* 'marrow, bone marrow' (Hudson, 1989, p. 96), Sid *k'oʔè* 'marrow, bone marrow', *k'ore* 'marrow of bones, cleverness'.

¹⁴³ Similar epenthesis is found in other Cushitic languages, e.g., Ehret (1987, p. 9) notes that "Agaw verbs with original stem final consonants which have been lost, normally pharyngeals and glottals, have often added *-w, occasionally *-y, in the place of the missing consonant, and these additions can be understood as the *w and *y extensions used as place holders rather than semantic modifiers".

Burji examples from Tesfaye Baye (2015, p. 79) show underlying ***V?** or ***VC** → ***V-y-V** → **VV** → /__# surfacing as **V-y** when followed by a **-CV** suffix, confirming the existence of an underlying (lost) ***C**, e.g., **saʔ-* ‘cow’, **waʔ-* ‘water’ → **we-y-igū* (def), *wé-y-i* (nom.m) (§3.3.3).¹⁴⁴

Hadiyya and Gedeo use different insertions. Hadiyya has no epenthetic **-y-**, and instead uses **-ʔ-** epenthesis productively between vowels. Gedeo also has a preference for epenthetic **-ʔ-** intervocalically (§3.3.4).

As discussed in §4.2.4, the HEC languages have what is known in the literature as compound or phrasal verbs (Hudson, 1976, p. 273; Crass, 2007, p. 30; Treis, 2024). One of the two support verbs used in such formations is **y* ‘to say, do, be’, which is identical to the epenthetic **-y-** and also follows the stem (see §4.2.4.1). In such formations, the glide **y** (intervocalic) and **i** (interconsonantal) are not epenthetic but rather support verbs, which may apply to verbal forms, such as, e.g., Gedeo *fiy-* ‘kill’ → *fiye* ~ *fie* ‘he killed’. However, a vulnerable sound like the glide **y** is often elided following the verb stem (rule ii) (e.g., in Hadiyya (Hudson, 1976, p. 273)) or fused with the preceding verb stem, becoming difficult to distinguish from other verbal constructions, e.g.:¹⁴⁵

Libido	k' + y → k'y/k'	<i>bak'imma</i> ‘accroach’ → <i>bak'(y)imma</i> ‘awaken’
	l + y → ly/l	<i>k'ullimma</i> ‘be bald’ → <i>k'ul(y)imma</i> ‘be afraid’
Burji	r + y → r	<i>gagari yed'a</i> → <i>gagared'a</i> ‘I have a cold’
	V + y → Vy	<i>k'ufaa</i> ‘cough’ → <i>k'ufey-</i> ‘to cough’
	y + s → ys	→ <i>k'ufeys-</i> ‘to cause to cough’

The same applies to K'abeena (Crass, 2005, p. 228) and Alaaba (Schneider-Blum, 2007, p. 277). In Kambaata, likewise, the root consonant of “*y-* ‘say’ is often hardly audible in non-careful speech” (Treis, 2024, p. 162).

The remaining epenthetic **-n-** (§3.4.2) and **-l-** (§3.4.3) do not occur intervocalically or interconsonantly. Rather, they occur as the first members of consonant clusters, consistent with their historical position in complex syllable codas (§2.3.3).

¹⁴⁴ One can alternatively interpret the **y** as a manifestation of the proposed older nominative suffix ***-y** (§4.2.4.1) with the **-i-** being epenthetic.

¹⁴⁵ Data sources: Libido (Crass, 2007, p. 30), Sidaama (Kawachi, 2007, p. 206), Burji (Hudson, 1976, p. 264).

3.4.2 Epenthetic -n-

The epenthesis of **-n-** is an intriguing pattern in the historical phonology of HEC. It involves inserting a nasal **-n-** immediately before non-sonorant consonants. Functionally, this insertion appears to be phonotactic: It repairs marked consonant sequences by supplying the medial consonant position (**C₂** slot) in **C₂C₃** clusters, including both heterorganic clusters and clusters created by gemination. The attestations are scattered across the HEC languages, concentrated especially in Gedeo and Hadiyya, and attested in the lowest numbers in Sidaama.

[329]	(C)C	-n-	Gloss
PNHEC	*reñ-f-	-	'corpse'
Had	leeja, leejfa	-	'corpse'
Kam	re(e)ja	-	'corpse'
Sid	reejfa, reeja	-	'corpse'
Ged	-	reenja	'corpse'

The lack of any other retained **n** in the rest of HEC supports the epenthesis analysis via gemination, as the correspondences show. Otherwise, since this is an example of a deverbalized stem, an alternative explanation would be to assume the **n** is part of the deverbative suffix as seen in §4.1.2.

[494]	(C)C	-n-	Gloss
PHEC	*k'ob-, *k'ok'~k'obb-	-	'to surround, to bend'
Burji	k'ok'obaa	-	'to prepare temporary shelter'
PNHEC	*k'ob-, *k'ok'~k'obb-	-	'to surround, to bend'
Had	k'ubb-	-	'to bend down'
Kam	k'ubb aʔ-	-	'to bend, be(come) circular'
Sid	k'ok'k'obi	-	'fence in'
Ged	-	k'ok'k'onba	'be surrounded'

This stem is partially reduplicated, and the final **b** has been geminated before the degemination and **-n-** epenthesis in Gedeo.

[190]	(C)C	-n-	Gloss
PNHEC	*arr-	-	'sun'
Had	-	ellinco	'sun'
Kam	arriiccu-ta	-	'sun'
Sid	arrijfo	-	'sun'
Ged	arijfo	-	'sun'

This is an instance of epenthetic **-n-** in Hadiyya corresponding to geminates in the rest of NHEC. The same applies to the following set [478]:

[478]	(C)C	-n-	Gloss
PHEC	*kott-	-	'hoof, foot'
Burji	kottee	-	'hoof, track'
PNHEC	*kott-	-	'hoof, foot'
Had	-	konteʔe	'hoof, foot'
Kam	kotti-ta	-	'foot step, track'
Sid	kotte	-	'hoof'
Ged	kotte	-	'hoof'

The gemination might have been the result of singular **kot-* receiving a reduplicated **t** in the plurative formation **kot~t-* 'pair of feet', with the latter form surviving except for Hadiyya, where ***tt** is degeminated and compensated for by **-n-** epenthesis.

[514]	(C)C	-n-	Gloss
PHEC	*ebb-	-	'to bring'
Burji	-	amb-	'bring'
PNHEC	*ebb-	-	'to bring'
Had	eeb-	-	'bring, marry'
Kam	eeb-	-	'bring, marry'
Sid	ʔabb-	-	'bring'

The epenthetic **-n-** became **-m-** via assimilation to the following labial in Burji. The adaptation of **nC** clusters shows variation. In Gedeo **nb** becomes **nb** [494] or **mb** [495] below. This variability suggests the process is not fully regular and may reflect multiple historical layers of phonotactic development.

Potentially, additional examples of **-n-** epenthesis demonstrate the complexity of this phenomenon, where sometimes there is no clear corresponding geminate to motivate the **-n-** insertion:

Hadiyya	[19] sadeento	‘eight’	← *sazzeett-
	[45] fiink’ees-	‘to whistle’	← *fiik’ ?
	[723] seenk-	‘to beautify’	← *sek-
Kambaata	[91] undulumma	‘mortar’	← *udulunm-a
	[390] iinc’a?-	‘stretch’	← *hiit’t’-
Gedeo	[495] lummo	‘big’	← *lumb-
	[113] dammara	‘to add’	← *dambar-
Sidaama	[29] ?amadi	‘hold, catch’	← *amb-
Burji	[351] t’uunt’-,	‘to absorb’	← *t’uuCt’-
	t’unt’-		
PNHEC	[46] *ink’-, *ink-	‘tooth’	← *ik’k’-, *ikk-

The sequence of epenthetic **-n-** and the following **C** usually corresponds to geminates (**jj** [329], **tt** [478], **t’t’** [390], **kk/k’k’** [46]) and complex clusters (***Ct’** [351]). The gemination itself is primarily a result of a morpheme boundary alternation process. For instance, a number of those stems with **-n-** epenthesis are followed by a glottalized consonant from an intermediate glottalization and gemination process discussed above (§3.3.1). Non-glottalized geminates, on the other hand, may have developed from the full assimilation of a stem-final obstruent with various suffixes, including, for instance, the nominal derivational ***-j** in [329] and [190], or similar fossilized suffixes (§§3.1.1, 3.3.1). Stem-final consonants are also geminated through other derivation processes, such as before the Plurative ***-uw-a** (§4.1.1.2) and in the comparative set [478] above.

Comparable **-n-** insertion has been reported for Gurage (Leslau, 1979, p. 1vi) and other Semitic languages. At present, however, it remains unclear whether contact has played any role in shaping the HEC pattern, and if so, at what stage(s) and in which subareas.

Some apparent cases of **-n-** epenthesis may instead reflect other historical developments, such as the metathesis of a suffix ***n** (Kawachi, 2007, p. 46; Eyob Kelemework, 2015, pp. 79–80). This possibility underscores the need to distinguish phonotactic repair from morphology-driven restructuring; broader comparison with other East Cushitic languages and neighboring non-Cushitic languages may help clarify the origin and trajectory of the pattern.

3.4.3 Epenthetic **-l-**

A further, less common epenthetic consonant, **-l-**, is proposed to account for puzzling cases of isolated **l/r** before stem-final consonants, primarily in Gedeo (and also reported for Gurage (Leslau, 1979)). The rarity of this pattern suggests that **-l-** epenthesis is relatively recent compared to other insertion

processes, and it appears to occur in the same structural environment as epenthetic **-n-** (§3.4.2).

[460]	(C)C	-l-	Gloss
PNHEC	*beet-	-	'son, child'
Had	beétə	-	'boy, son, child'
Kam	beetu	-	'child (son/daughter)'
Sid	beetto	-	'son, boy, child, daughter, girl'
Ged	-	belto, berto	'boy'

The corresponding geminate is attested only in the Sidaama cognate and is compensated for by epenthesis in Gedeo. Both **-l-** and **-r-** realizations of epenthetic **-l-** occur, without a clear conditioning environment.

Set [460] shares the same root with PNHEC [741] **beet-*, **beet-beet-* 'grandchild', which also continues with geminate in Sidaama as *beettu-beetto* and epenthetic **-l-** in Gedeo *beltim-belto* 'grandchild'. To explain the Gedeo reflexes, additional insertions need to be proposed: after **-l-** epenthesis **belt-belt-*, **-i-** epenthesis **belt-i-belt-*, and **-n-** epenthesis **belt-i-n-belt-* occurred, potentially in a different order.

[498]	(C)C	-l-	Gloss
Amharic	wəffa	-	'dog'
Burji	wacco, waffa, woccoo, woja, woŋfi	-	'dog'
Had	waficco, wificco, wufa	-	'dog'
Kam	wofa-ta, wof-iccu	-	'dog'
Sid	waf-icco, waffa, wof-icco, woja	-	'dog'
Ged	-	wolco, warfa	'dog'

This example might be a loan from Amharic, hence the variation in the root vowel.

[299]	(C)C	-l-	Gloss
PNHEC	*zaane-i-ff-	-	'elephant'
Had	daaneecc	-	'elephant'
Kam	zaneeccu	-	'elephant'
Sid	daaniicco	-	'elephant'
Ged	-	daanalco	'elephant'

Similar to [190] *ellinco* 'sun' in Hadiyya, with epenthetic **-n-**, the geminated singulative in the rest of NHEC corresponds to epenthetic **-l-** in Gedeo in [299]. This might reflect a placeholder of the old stop that triggered the original

affrication posited for $*-j \rightarrow -c / C_{[+stop]} _$ in §3.1.1.5. Another example is Gedeo [708] *mooʔralco*, *mood'aco* 'thief', with reflexes of the other verbal derivation suffix (deverbative) $*-j$ as seen in Kambaata *mogaʔ-aancu*, Sidaama *moor-aanco* from PHEC [362] $*moor \text{ } \text{ʔ}$ 'to steal'.¹⁴⁶

[111]	(C)C	-l-	Gloss
PHEC	*baʔ-is-	-	'to spoil, extinguish'
Burji	baas-	-	'to take out, bring out; extinguish fire'
PNHEC	*baʔ-is-	-	'to spoil, extinguish'
Had	baʔ-is-	-	'extinguish'
Kam	baʔ-is-	-	'spoil, waste; extinguish'
Sid	baʔi	-	'perish, extinguish, be misled'
Ged	-	ball-ess-	'extinguish'

The gemination of the epenthetic **-l-** in this example might be due to assimilation to the stem-final or attached suffix consonant.

Burji has two examples where **-r-** is suspected to be an epenthetic.

PHEC [46] $*ik'k'$ - ($\leftarrow *ilk-\text{ʔ}$), $*ikk$ - 'tooth' $\rightarrow$ Burji *irk'a*, PNHEC $*ink'$ -, $*ink$ - $\rightarrow$ Had *ink'e*, Kam *ink'u-ta*, Sid *hinko*

Burji **-r-** in [46] *irk'a* 'tooth' is analyzed as epenthetic rather than a change of **l** to **r** because the latter is not a regular change in Burji. This same stem shows epenthetic **-n-** in PNHEC $*ink'$ -, $*ink$ - 'tooth'. The loss of the earlier ***l**, Burji **-l-**, and PNHEC **-n-** insertion in this stem are triggered by morpheme boundary alternation processes to resolve the **CCC** cluster upon the stem-final ***k** fusion and gemination into **k'k'** (§3.3.1.3) and **kk** (§3.1.1).

PHEC [380] $*hik'k'$ -, $*hek'k'$ - 'have hiccups' $\rightarrow$ Burji *hirc'immeed'*-, PNHEC $*hik'k'$ -, $*hek'k'$ - $\rightarrow$ Had *hik'k'aʔ*-, Kam *hik'k' aʔ*-, Sid *hek'k'i yaa*, *hek'k'i-ass-is*-, Ged *hek'k'eʔmef-at*- ($\leftarrow$ Oromo), *hek'k'eʔm-is*- (see Oro *hirk'inf*- 'have hiccups')

The other instance of **-r-** in Burji [380] *hirc'immeed'*- 'have hiccups' might be due to Oromo *hirk'inf*- 'have hiccups', in which the same epenthesis hypothesis might apply when compared with Konso *hik'k'ota* 'hiccup'. The

¹⁴⁶ The **n** in the Sidaama and Kambaata cognates might be a concatenated suffix **-am** as discussed in §4.1.2. The PHEC reconstruction of [708] is $*moor-k$ - 'thief'. The **k** is probably an agentive or deverbative suffix equivalent to **t** in Hadiyya, but requires further inspection. See Burji *moor-g* (m) 'who steals' (Hudson, 1989, p. 152).

palatalized **c'** in Burji might be due to an independent morpheme boundary alternation process (see §§3.1.2 and 3.1.2.2).

With **-l-** epenthesis included, the full class of sonorants is attested as epenthetic material in HEC. However, Eyob Kelemework's (2015, p. 36) analysis of Gedeo **y**, **l/r**, and **n** treats them as assimilatory realizations of an underlying **y** before alveolar stops and alveolar nasals, respectively; i.e.:

$$y \begin{cases} l \text{ or } r / __ C_{[+alveolar \text{ stop}]} \\ n / __ C_{[+alveolar \text{ nasal}]} \\ y / __ V \end{cases}$$

That would rather mean the three are epenthetic, with **l/r** being the most recent, since it is not common outside of Gedeo. One could arguably assume the same for the free variation between **d'** and **r** intervocalically, e.g., *fad'acco* and *fararcco* 'horse', and **l** word-initially, e.g., *d'uğa* and *luga* 'truth', *d'ufo* and *lufo* 'fart' (Eyob Kelemework, 2015, pp. 37–38). The word *d'uğa*, *luga* is not attested in any comparanda in the current study, and *d'ufo*, *lufo* (with ***s** → **f**) is from Oromo, while **d'** in *fad'acco*, *faracco* is from an original ***r**. Such alternation has not been attested for inherited ***l** or ***r**. Therefore, it is possible to argue that the **-l-** is recent, and that it has become part of the **d'**, **ʔ**, and **ø** alternation group. Applied analogically to the **d'** in initial position and the original ***r**, e.g., *fad'acco* 'horse'.

Eyob Kelemework (2015, pp. 89, 192) also claims that the implosive **d'** of the middle suffix is optionally replaced by **ʔ** when the stem-final is a sonorant or glottal stop and **l** if the stem-final is an obstruent, with subsequent metathesis; e.g., the stem *af-* 'get, have' becomes *af-ed'* with the middle *-ed'*, *alf-* with the middle **-l**, and both could be found on the same root in *alf-ed'*. The same goes for *gof-* 'uproot', which becomes *gof-ed'*-, *golf-*, and *golf-ed'*-. That means the environments specified earlier, **d'** → **r** intervocalically and **l** initially, do not account for the claimed suffix **d'** change to **l**. Therefore, it is more efficient to assume that it is the common Gedeo **-l-** epenthesis. Another incentive for the alternation could be due to the origin of **d'** as a borrowed sound, which might pose pronunciation difficulty for speakers of some dialects. Hudson (1989, p. 7) links this dialectal Gedeo change to the change of Sidaama **d'** to **ʔr** in intervocalic position, e.g., *had'* 'go' → *haʔri* (perf) 'he went' (Anbessa Teferra, 2000, p. 26) and *afid'* 'to have' *afiʔra* (infinitive) 'he has' (Kawachi, 2007, p. 47). However, Sidaama **ʔr** is different from Gedeo **r**.

In summary, consonant insertion (sonorants and glottals) in these contexts serves syllable-structure requirements: It supplies a minimal consonantal margin intervocally and can also occupy the position left by (i) a weakened or lost consonant cluster (**cC**) or (ii) the first member of a degeminated (**CC**) sequence.

The various manifestations of the inserted sounds are summarized below (epenthetic **-ʔ-** is treated in detail in §3.3.4).

Epenthesis	Realizations	Input	Outcome
-y-	-i-	*C _i +C	→ C-i-C
	-y-	*V _[-back] C _i +V or *VC _i +V _[+back]	→ V-y-V
	-w-	*uC _i +V or *VC _i +u	→ *u-w-V or V-w-u
-n-	-n-	*CC _{i[-labial]}	→ -n-C
	-m-	*CC _{i[+labial]}	→ -m-C
-ʔ-	-ʔ-	*V _{i/TV} +V or *VC _{i/TV} +V	→ V _{i/TV} -ʔ-V
-l-	-l-, -r-	*CC _i	→ lC _i , rC _i (Gedeo)

The schematic summary list above abstracts away from language-specific surface details in order to highlight recurring repair strategies and their conditioning environments. Two structural domains are especially prominent. First, boundary-driven repairs in stem+suffix combinations create an additional syllable to break up impermissible consonant sequences, most commonly through vowel/glide material (e.g., interconsonantal **-i-**, here treated as compatible with analysis as an underlying glide). Second, hiatus repair in vowel sequences is resolved either by glide insertion (**-y-**, with **-w-** as a conditioned realization next to back vowel; both **-y-** and **-w-** are attested between (or adjacent to) **a**) or, in a more restricted subset of languages, by glottal stop insertion.

The distribution of these strategies is uneven across HEC and is therefore informative for the comparative discussion. Interconsonantal epenthesis is broadly productive and appears in multiple morphological contexts, but individual instances must be distinguished from support-verb morphology (*y ‘to say, do, be’ → i) where the surface segment i is not straightforwardly phonotactic. Intervocalic **-y-** (and **-w-** as its conditioned realization) is concentrated in Sidaama, Burji, and Kambaata, while intervocalic **-ʔ-** is concentrated in Hadiyya and Gedeo. The consonantal insertions **-n-** (with **-m-** as a labial-conditioned realization) and **-l-/r-** occur as cluster-initial material and are comparatively rarer, suggesting more limited diffusion or later innovation.

The input patterns preceded by an asterisk in the above list should not be read as direct proto-forms. They may represent intermediate stages that were subsequently remodeled by assimilation and other boundary processes. Based on the current comparative evidence presented in §3.4, only **-y-* (together with its conditioned realizations) is proposed as a secure PHEC epenthetic segment. The remaining insertions, such as *-ʔ-* in hiatus repair and *-l-* in cluster contexts, are better treated as later, language-specific (or contact-induced) developments unless future comparison establishes regular correspondences and consistent cognate-set behavior.

Interconsonantal *-i-* epenthesis is uncontroversial in most cases, except where there is uncertainty about whether the segment reflects the support verb **y* ‘to say, do, be’ (→ *i*). Intervocalic *-y-* and *-ʔ-* overlap in distribution across the HEC languages (*-y-* in Sidaama, Burji, and Kambaata; *-ʔ-* in Hadiyya and Gedeo). Analyses that avoid interpreting the non-intervocalic epenthetic *-C-* (*-n-*, *-l-*, *-ʔ-*) as insertion are difficult for two reasons. First, the relevant correspondences involve singletons (**C**), geminates (**CC**), and clusters (**cCC**). Second, the same cognate set typically does not show consistent epenthesis across languages (with only one or two exceptions). This distribution points to a recent, language-specific development, and it prevents establishing the regular correspondences required to reconstruct all such epenthetic consonants to the proto-level. Thus, based on the available evidence, only **-y-* and its different realizations are proposed for PHEC, and **-n-* is provisionally posited for PNHEC.

The following section (3.5) synthesizes these obstruent alternations and sonorant repairs into a comparative summary and a set of reconstruction-oriented conclusions.

3.5 Summary and Conclusions

This section synthesizes the morpheme boundary alternation processes documented in the preceding sections. It summarizes their distribution across the HEC languages and their reconstructability to PHEC or PNHEC. The summary table presents each major process with its attestation pattern; the numbered points below highlight key findings. Some interpretations remain tentative pending further investigation of the comparative data.

Notation in the table: * next to a numbered point indicates the process is reconstructable to PHEC; a subscript on a consonant or on C_i indicates stem/root-final position; + indicates concatenation of segments; / indicates

language-specific variants conditioned by environment; and - means the specific process is not attested for the language.

	Process	Input	Burji	PNHEC	Had	Kam	Sid	Ged
1.	Assimilation (pron) -t	C _i [-son]t	f/c/nd	*C _i C _i	C _i C _i	C _i C _i	C _i C _i	C _i C _i /nd/ld
2.*	Assimilation (pron, plv) -n	C _i [+son]n, s+n	C _i C _i , s+n → s-i-n	*C _i C _i , *ns	C _i C _i , s+n → ss	s+n → ss	C _i C _i , s+n → ns	C _i C _i , s+n → ns
3.	Assimilation (verbal) -s	C+s	ss	*ss	-	ss	ss/fj	-
4.*	Affrication (nominal) -f	*f	f/s/c/cc	*f	f/f/c/cc	f/f/c/cc	f/f/c/cc	f/c/cc/j
5.	Palat. (verbal) -s	C _i +*s	-s	-	-	-f	-f	-f/-c
6.	Palat. (pron) t _i	C _i t _i , Vt _i +i	c/f	-	-	-	-	-
7.	Palat. (pron) k _i	k _i +i	f	-	-	-	-	-
8.	Elision ʔ _i	Vʔ _i	VV/y	*ʔ	ʔ	ʔ	ʔ/ø	ʔ
9.*	Lenition b _i	Vb _i +V	β/w	*w	w	w	β/w	β/w
10.*	Lenition k _i	*Vk _i +V	h/(ø)	*k/'h	h/ø	h/ø	k/h/ø	k/h/ø
11.	Fusion	C _i [-son]t+ʔ	-	*C'C'	C', C'C'	C', C'C'	C', C'C'	C', C'C'
12.	Metathesis	C _i [+son]t+ʔ	-	*ʔC'[*son]	ʔC'[*son]	ʔC'[*son]	ʔC'[*son]	ʔC'[*son]
13.*	Epenthesis -ʔ-, -i-, *y-, -n-, -l-	V_V, C_C, CC	-i-, -y-, -n-C	*y-, *n-	-i-, -ʔ-, -n-C	-i-, -y-, -n-C (-ʔ-), -n-C	-i-, -y-, -n-C	-i-, -ʔ-, -n-C

Table 6: Summary of Morphophonological Processes

The morphophonology summarized above is supported by a small set of recurring boundary processes affecting stem-suffix combinations. Assimilation is especially clear in pronominal and derivational morphology. The 2nd/3rd-person suffix **-t* shows regular assimilation to a preceding obstruent, with partial voicing assimilation in Gedeo (e.g., *nt* → *nd*, *lt* → *ld*). In Burji, gemination can be accompanied by palatalization (e.g., *tt* → *cc/ff*) when followed by the high front vowel *i*. The plurative and pronominal suffix **n* likewise assimilates fully to a preceding sonorant (except in Kambaata). Assimilation of **n* to a stem-final **s* yields **sn* → *ss/ns*, and Burji resolves clusters by inserting an epenthetic vowel after the stem-final consonant. Stem-final obstruents may also assimilate to the causative suffix in language-specific ways, yielding *s-s* where the causative surfaces as *-s* (Burji, Kambaata, Sidaama) and *-f-f* where the causative surfaces as *-f* (Sidaama). Finally, the nominal derivational suffix is best reconstructed as PHEC **-f*, with an affricated allomorph **-c* conditioned (at least historically) after stops and later generalized; Burji reflects **-f* as *f* and *s*, while Gedeo additionally shows a voiced affricate *j* in restricted environments.

Palatalization interacts with several of these boundaries. Causative **-s* palatalizes to *-f* in Kambaata, Sidaama, and Gedeo. In Burji, stem-final **t* palatalizes to *c* before *i*, and to *f* intervocalically before *i*. Burji also shows palatalization of stem-final **k* to *f* before *i*.

Lenition targets intervocalic stops. Intervocalic **b* lenites to *w* (and to *β* in Burji, Sidaama, and Gedeo), and this *w* can subsequently be lost. Intervocalic **k* lenites to *h*, which can likewise be lost.

Other processes include elision, fusion, metathesis, and epenthesis. The loss of non-initial *ʔ* is widespread across HEC but more prevalent in Burji, where it is often accompanied by compensatory effects (especially vowel doubling and sometimes glide addition), so the absence of surface *ʔ* should be treated as weak negative evidence in comparative reconstruction. By contrast, two boundary processes involving suffixal *ʔ* are more restricted and therefore more informative for subgrouping: in NHEC, a stem-final obstruent can fuse with a following *ʔ* to produce a glottalized geminated consonant, and sonorant + *ʔ* metathesis (*C_[+son]ʔ* → *ʔC_[+son]*) is likewise restricted to NHEC. In Sidaama and Gedeo, the specific sequence *ʔr* may further alternate with a glottalized coronal *d'(d')*, plausibly reflecting a contact-induced reinterpretation of metathesized *ʔr* utilizing the fusion process. Finally, impermissible vowel and consonant sequences are commonly repaired by inserting *-y-* or *-n-* respectively, while Hadiyya and Gedeo sometimes use *-ʔ-* instead of *-y-*.

The major morpheme boundary alternation processes can be viewed as a chain of interrelated strategies of feature-changing (assimilation and fusion) that produce gemination and glottalization, segment loss (elision) that produces hiatus, segment insertion (epenthesis) that repairs vowel hiatus and fills consonant slots, and segment reordering (metathesis) that repairs impermissible sequences. For instance, the assimilation and fusion processes yield geminated (glottalized) consonants. These geminated consonants sometimes get degeminated and repaired by an epenthetic consonant, yielding consonant clusters, or compensated for by vowel doubling. The chain of actions and reactions across the different processes operates within the structural phonological constraints observed in the non-initial segments, as discussed in Chapter 2 (§2.3.3). This includes the preference for a simple (singleton) coda (which motivates occasional degemination), the fact that a complex coda (**cC**) must be a sequence of sonorant + obstruent (sequences of morphological obstruents call for full assimilation and resulting gemination (obstruent + obstruent) repaired by selecting a sonorant for epenthesis to settle on the preferred sonorant + obstruent sequence), and the ban on tripartites (**CCC** and **VVV**) and heterogeneous **VV** in addition to the recognition of underlying consonants (which trigger epenthesis or, rarely, reduction).¹⁴⁷

This chapter has shown that many generalizations about HEC phonotactics and non-initial segmental structure become most transparent at morpheme boundaries, where otherwise latent contrasts and constraints are forced into interaction. In this sense, Chapter 3 is a direct continuation of Chapter 2: It expands on the structural constraints on syllable boundaries and segment sequences. This chapter demonstrates how those constraints are actively negotiated by morphology through recurrent alternations such as assimilation, elision, epenthesis, fusion, and metathesis. Because these processes systematically reshape surface forms, they are not merely “post-lexical repairs”; rather, they constitute a primary locus where evidence for reconstructing non-initial consonants and consonant clusters can be recovered and interpreted.

At the same time, the patterns surveyed here provide an essential bridge to the subsequent chapters. Chapter 4 turns to morphological structure more directly, including the affixes and paradigmatic environments that trigger the

¹⁴⁷ Fusion/glottalization occurs in both roots ending in **C** and **CC**, and their patterns exhibit an interplay of various phonotactics strategies, e.g., the few stems ending in **CC** simply become glottalized **C'C'** when **ʔ** is attached to avoid an impermissible sequence of three segments. The same applies to instances of the derivational **y**, but without glottalization or even gemination.

alternations at morpheme boundaries documented in this chapter, while Chapter 5 evaluates the implications of shared innovations and distributions across the HEC languages on subgrouping. Taken together, Chapters 2–4 establish the phonological and morphological background needed to distinguish broadly inherited tendencies from branch-specific developments, allowing the historical narrative and subgrouping argument to be stated on firmer, cumulative evidence.