

The phonetic value of Avestan <ā̊>

Muhammad Rehan
University of California, Los Angeles
rehanmuh@g.ucla.edu

April 24, 2026

Annual Meeting of the American Society for Premodern Asia, Los Angeles

Introduction: Four goals

1. To argue that Avestan <ā̇> encodes the outcome of a **real sound change** that took place before the Sasanian-period fixation of the text.

Introduction: Four goals

1. To argue that Avestan <ā̇> encodes the outcome of a **real sound change** that took place before the Sasanian-period fixation of the text.
2. To show that this sound change is unified under a single principle — **pre-nasal raising** — which affects all three environments in which <ā̇> is attested.

Introduction: Four goals

1. To argue that Avestan <ā̊> encodes the outcome of a **real sound change** that took place before the Sasanian-period fixation of the text.
2. To show that this sound change is unified under a single principle — **pre-nasal raising** — which affects all three environments in which <ā̊> is attested.
3. To argue against the claim of de Vaan (2003) that <ā̊> encodes a retracted vowel [ɑ:].

Introduction: Four goals

1. To argue that Avestan <ā̊> encodes the outcome of a **real sound change** that took place before the Sasanian-period fixation of the text.
2. To show that this sound change is unified under a single principle — **pre-nasal raising** — which affects all three environments in which <ā̊> is attested.
3. To argue against the claim of de Vaan (2003) that <ā̊> encodes a retracted vowel [ɑ:].
4. To add support to the claim of Clayton (2020, 90 n. 10) that Avestan <ā̊> most likely represents a rising diphthong [ā̊ə].

Roadmap

The data: where do we find <ā̇>?

Proposal: pre-nasal raising

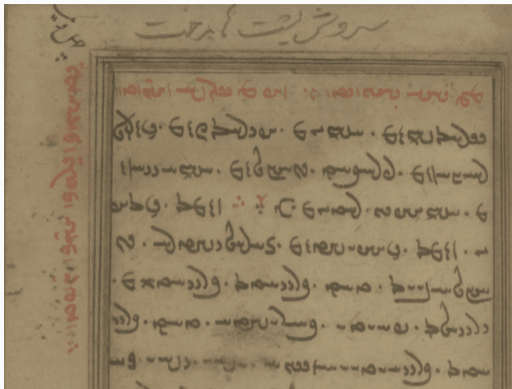
Problems with the retraction/backing hypothesis

Phonetic interpretation

Conclusions

The data: where do we find $\langle \ddot{a} \rangle$?

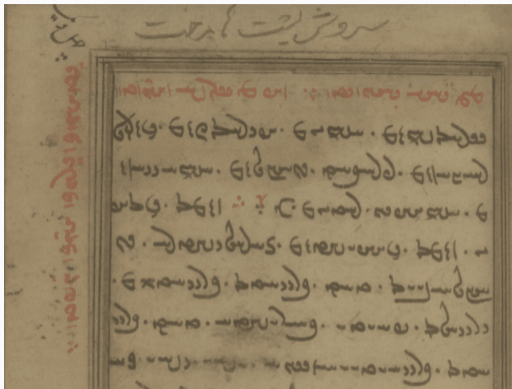
The Avestan manuscripts and script



Yašt Srōš Hadōxt (Ms 6135 x f 50r from ADA)

- Texts preserved only in manuscripts; oldest extant ms. dated 1288 CE (Hoffmann and Narten 1989, 15).

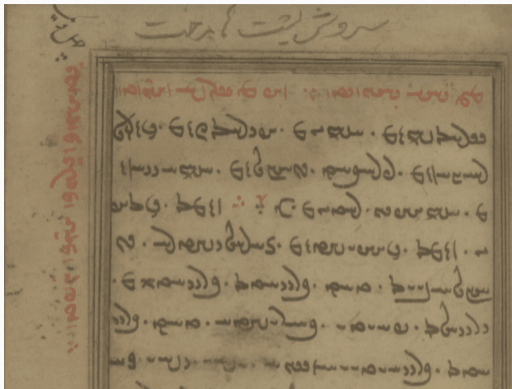
The Avestan manuscripts and script



Yašt Srōš Hadōxt (Ms 6135 x f 50r from ADA)

- Texts preserved only in manuscripts; oldest extant ms. dated 1288 CE (Hoffmann and Narten 1989, 15).
- Script devised in the late Sasanian period (likely reign of Šābuhr II, 309–379 CE) to fix a single canonised recitation (Kellens 1989, 33).

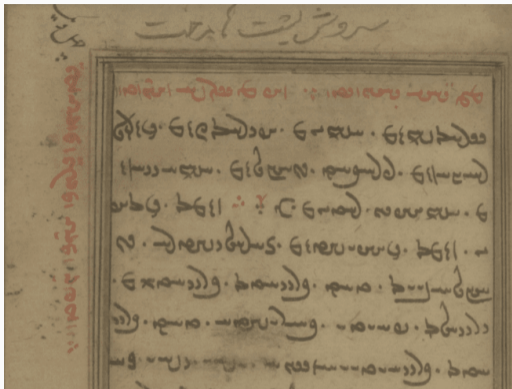
The Avestan manuscripts and script



Yašt *Srōš Hadōxt* (Ms 6135 x f 50r from ADA)

- Texts preserved only in manuscripts; oldest extant ms. dated 1288 CE (Hoffmann and Narten 1989, 15).
- Script devised in the late Sasanian period (likely reign of Šābuhr II, 309–379 CE) to fix a single canonised recitation (Kellens 1989, 33).
- Phonetically precise (allophones distinguished) – unlike e.g. Old Persian cuneiform.

The Avestan manuscripts and script



Yašt Srōš Hadōxt (Ms 6135 x f 50r from ADA)

- Texts preserved only in manuscripts; oldest extant ms. dated 1288 CE (Hoffmann and Narten 1989, 15).
- Script devised in the late Sasanian period (likely reign of Šābuhr II, 309–379 CE) to fix a single canonised recitation (Kellens 1989, 33).
- Phonetically precise (allophones distinguished) – unlike e.g. Old Persian cuneiform.
- Complication: distinguishing features of the **Sasanian base text** from post-Sasanian scribal practice (Peschl 2022, 71–73).

The Avestan vowel letters: <ā̇> is a distinct grapheme

𐬀	𐬁	𐬂	𐬃	𐬄	𐬅	𐬆	𐬇	𐬈	𐬉	𐬊	𐬋	𐬌	𐬍	𐬎	𐬏	𐬐	𐬑
a	ā	â	ã	ä	ê	ə	ē	e	ē	o	ō	i	ī	u	ū		
[a]	[a:]	[ɒ]	[ɔ:]	[ä]	[ä:]	[ə]	[ɛ]	[e]	[e:]	[o]	[o:]	[i]	[i:]	[u]	[u:]		
𐬒	𐬓	𐬔	𐬕	𐬖	𐬗	𐬘	𐬙	𐬚	𐬛	𐬜	𐬝	𐬞	𐬟	𐬠	𐬡	𐬢	𐬣
k	x	x̄	xʷ	g	ḡ	γ	c	j	t	θ/θ̄	d	ð	ɬ	p	f	b	
[k]	[x]	[x̄]	[xʷ]	[g]	[ḡ]	[γ]	[t]	[dʒ]	[t]	[θ]	[d]	[ð]	[t]	[p]	[f]	[b]	
𐬤	𐬥	𐬦	𐬧	𐬨	𐬩	𐬪	𐬫	𐬬	𐬭	𐬮	𐬯	𐬰	𐬱	𐬲	𐬳	𐬴	𐬵
β	η	η̄	ηʷ	n	n̄	ŋ	m	ɱ	ý	y	v	r	s	z	š		
[β]	[η]	[η̄]	[ηʷ]	[n]	[n̄]	[ŋ]	[m]	[ɱ]	[j]	[j]	[w]	[r]	[s]	[z]	[ʃ]		
𐬶	𐬷	𐬸	𐬹														
ž	š̄	ṧ	h														
[ʒ]	[ʃ̄]	[ʃ̇]	[h]														

- The Avestan script contrasts:
 - <a> [a] / <ā> [a:]
 - <â> (short, marginal; only in MS Pd)
 - <ã> (the letter under investigation)
 - <ə> [ə] / <ē> [ɛ:]
 - <ä> [ä(:)] / <ê> [ɛ(:)]

Where do we find <ā̄>?

Avestan <ā̄> is lautgesetzlich in three phonetic contexts:

- (1) a. PIIr. *-ā- *[a:] > Av. -<ā̄>- / __ {<ŋc>, <ŋk>, <ŋt>}
- b. PIIr. *-ā- *[a:] > Av. -<ā̄>- / __ {<ŋh>, <ŋ̄h>, <ŋ^uh>}
- c. PIIr. *ā̄ *[a:] > Av. ā̄ / __ */h/]ω

Where do we find <ā̄>?

Avestan <ā̄> is lautgesetzlich in three phonetic contexts:

- (1) a. PIIr. *-ā- *[a:] > Av. -<ā̄>- / __ {<ṇc>, <ṇk>, <ṇt>}
b. PIIr. *-ā- *[a:] > Av. -<ā̄>- / __ {<ṇh>, <ṇ̄h>, <ṇ^uh>}
c. PIIr. *-ā *[a:] > Av. ā̄ / __ */h/]ω

- Proposed phonetic values so far:
 - ao (Jackson 1892, xxxviii)

Where do we find <ā̄>?

Avestan <ā̄> is lautgesetzlich in three phonetic contexts:

- (1) a. PIIr. *-ā- *[a:] > Av. -<ā̄>- / __ {<ṇc>, <ṇk>, <ṇt>}
b. PIIr. *-ā- *[a:] > Av. -<ā̄>- / __ {<ṇh>, <ṇ̄h>, <ṇ^uh>}
c. PIIr. *ā̄ *[a:] > Av. ā̄ / __ */h/]_ω

- Proposed phonetic values so far:
 - ao (Jackson 1892, xxxviii)
 - wie english *aw* in *saw* (Reichert 1909, 29)

Where do we find <ā̊>?

Avestan <ā̊> is lautgesetzlich in three phonetic contexts:

- (1) a. PIIr. *-ā- *[a:] > Av. -<ā̊>- / __ {<ŋc>, <ŋk>, <ŋt>}
b. PIIr. *-ā- *[a:] > Av. -<ā̊>- / __ {<ŋh>, <ŋ̄h>, <ŋ^uh>}
c. PIIr. *ā *[a:] > Av. ā̊ / __ */h/]_ω

- **Proposed phonetic values so far:**

- ao (Jackson 1892, xxxviii)
- wie english *aw* in *saw* (Reichert 1909, 29)
- [ɑ:] (de Vaan 2003, 383); adopted by Hoffmann and Forssman (1996, 44), Hale (2008, 105), Beguš (2025, 383)

1a. Plr. *ā > YAv. ā̊ / __ <ṇc>, <ṇt>, <ṇk>

YAv. Form	Gloss	Etymology / Cognate
<niiā̊ṇc->	downward-ADV	< PIIr. *[ni-a:nfj]
<ā̊ṇti>	3.PL.ACT.SBJV ending of thematic verbs	< PIE *[-o-onti]
<f(r)ā̊ṇkauuō>	Mountain-NOM.PL	

1a. Plr. *ā > YAv. ā̊ / __ <ṇc>, <ṇt>, <ṇk>

YAv. Form	Gloss	Etymology / Cognate
<niiā̊ṇc->	downward-ADV	< PIIr. *[ni-a:nf̥j]
<ā̊ṇti>	3.PL.ACT.SBJV ending of thematic verbs	< PIE *[-o-onti]
<f(r)ā̊ṇkauuō>	Mountain-NOM.PL	

Under Ferrer Losilla (2016)'s revised interpretation of <ṇ> as a nasal homorganic with the following obstruent, the environment can be phonetically written:

1a. Plr. *ā̄ > YAv. ā̄ / __ <ŋc>, <nt>, <ŋk>

YAv. Form	Gloss	Etymology / Cognate
<niiā̄ŋc->	downward-ADV	< PIlr. *[ni-a:ntʃ]
<ā̄nti>	3.PL.ACT.SBJV ending of thematic verbs	< PIE *[-o-onti]
<f(r)ā̄ŋkauuō>	Mountain-NOM.PL	

Under Ferrer Losilla (2016)'s revised interpretation of <ŋ> as a nasal homorganic with the following obstruent, the environment can be phonetically written:

(2) a. *-ā̄- *[a:] > YAv. -<ā̄>- / __ [ŋk], [nt], [ŋc]

1b PIIr. *-ā- *[a:] > YAv. -<ā̎>- / __ <ŋh>, <ŋ̄h>, <ŋ^uh>

Avestan	Sanskrit	PIIr. Etym.	Gloss	Translation
<nā̎ḥābya>	['na:sa:b ^h ya:m]	*['na:sa:b ^h ya:m]	NOSTRIL-DU.INS	'with both nostrils'
<ā̎ ^u harəna>-	-	Plr. *[a:-hwar-ana-]	PFX-EAT-NMLZ	'for food'
-ā̎ḥe	-	-	2SG.MID.SBJV	Verbal ending

1b PIIr. *-ā- *[a:] > YAv. -<ā̎>- / __ <ŋh>, <ŋ̄h>, <ŋ^uh>

Avestan	Sanskrit	PIIr. Etym.	Gloss	Translation
<nā̎ḥābya>	[ˈna:sa:b ^h ya:m]	*[ˈna:sa:b ^h ya:m]	NOSTRIL-DU.INS	‘with both nostrils’
<ā̎ḥarəna>-	-	Plr. *[a:-hwar-ana-]	PFX-EAT-NMLZ	‘for food’
-ā̎ḥe	-	-	2SG.MID.SBJV	Verbal ending

Clayton (2020) has argued that <ŋ> represents a suprasegmental diacritic to mark nasalization on <h> that arose by the process of rhinoglottophilia:

1b PIIr. *-ā- *[a:] > YAv. -<ā̊>- / __ <ŋh>, <ŋ̄h>, <ŋ^uh>

Avestan	Sanskrit	PIIr. Etym.	Gloss	Translation
<nā̊ḥābya>	['na:sa:b ^h ya:m]	*['na:sa:b ^h ya:m]	NOSTRIL-DU.INS	'with both nostrils'
<ā̊ ^u harəna>-	-	Plr. *[a:-hwar-ana-]	PFX-EAT-NMLZ	'for food'
-ā̊ḥe	-	-	2SG.MID.SBJV	Verbal ending

Clayton (2020) has argued that <ŋ> represents a suprasegmental diacritic to mark nasalization on <h> that arose by the process of rhinoglottophilia:

(3) a. PIIr. *-ā- *[a:] > YAv. -<ā̊>- / __ [h̃], [h̃^j], and [h̃^w]

1c. PIIr. *ā *[a:] > YAv. <ā̇> / __<h>]ω

Avestan	Sanskrit	Etymology (PIIr.)	Translation	Gloss
<buyā̇>	[bʰuːyaːs]	*[bʰuːyaːs]	‘might you be’	BE-2SG.PRES.ACT.OPT
<haēnayā̇>	[ˈsenaːyːas]	*[ˈsaynaːyːas]	‘of an army’	ARMY-GEN.SG.FEM
<dā̇>	[ˈədʰaːs]	*[ˈadʰaːs]	‘you made’	MAKE.AOR.2SG.ACT.IND

Note: Before enclitics (ca, etc.), becomes -ā̇s

<haēnayā̇sca>	[ˈsenaːyːas=cə]	*[ˈsaynaːyːas=ca]	‘and of the army’	ARMY.GEN.SG=AND
<dā̇scā>	[ˈədʰaːs=cə]	*[ˈadʰaːs=ca]	‘and you made’	MAKE.AOR.2SG=AND

Secondary/analogical attestations of <ā̇>

Attestations of <ā̇> in non-nasal contexts are all secondary and readily explained by analogy (cf. de Vaan 2003, 384–6):

Secondary/analogical attestations of <ā̇>

Attestations of <ā̇> in non-nasal contexts are all secondary and readily explained by analogy (cf. de Vaan 2003, 384–6):

- *hudā̇biio* (Y 4.4), *hudā̇biiō* (Y 34.13): oblique cases of *hudāh-* ‘bountiful’. Oblique stem replaced under the influence of the nom. sg. *hudā̇* (2003, 384).

Secondary/analogical attestations of <ā̄>

Attestations of <ā̄> in non-nasal contexts are all secondary and readily explained by analogy (cf. de Vaan 2003, 384–6):

- *hudābiiō* (Y 4.4), *hudābiiō* (Y 34.13): oblique cases of *hudāh-* ‘bountiful’. Oblique stem replaced under the influence of the nom. sg. *hudā̄* (2003, 384).
- Parallel in Vedic: the *-bh-* cases of PIE animate *s-stems often take analogical outcomes from the nominative (Beguš 2025, 101; Sandell 2014, 197–8; Jamison 1991, 81–2).

Secondary/analogical attestations of <ā̄>

Attestations of <ā̄> in non-nasal contexts are all secondary and readily explained by analogy (cf. de Vaan 2003, 384–6):

- *hudā̄biio* (Y 4.4), *hudā̄biiō* (Y 34.13): oblique cases of *hudāh-* ‘bountiful’. Oblique stem replaced under the influence of the nom. sg. *hudā̄* (2003, 384).
- Parallel in Vedic: the *-bh-* cases of PIE animate *s-stems often take analogical outcomes from the nominative (Beguš 2025, 101; Sandell 2014, 197–8; Jamison 1991, 81–2).
- Locative singulars *xratā̄*, *pəratā̄* (Y 48.4, 51.12–13) are **scribal errors** for *xratāu*, *pəratāu* — <ā̄> and <āu> are graphically similar (Hoffmann and Narten 1989, 31 n. 33).

Secondary/analogical attestations of <ā̄>

Attestations of <ā̄> in non-nasal contexts are all secondary and readily explained by analogy (cf. de Vaan 2003, 384–6):

- *hudābiio* (Y 4.4), *hudābiiō* (Y 34.13): oblique cases of *hudāh-* ‘bountiful’. Oblique stem replaced under the influence of the nom. sg. *hudā* (2003, 384).
- Parallel in Vedic: the *-bh-* cases of PIE animate *s-stems often take analogical outcomes from the nominative (Beguš 2025, 101; Sandell 2014, 197–8; Jamison 1991, 81–2).
- Locative singulars *xratā̄*, *pəratā̄* (Y 48.4, 51.12–13) are **scribal errors** for *xratāu*, *pəratāu* — <ā̄> and <āu> are graphically similar (Hoffmann and Narten 1989, 31 n. 33).

The sole productive environment for <ā̄> is *before a tautosyllabic nasal or nasalized consonant*.

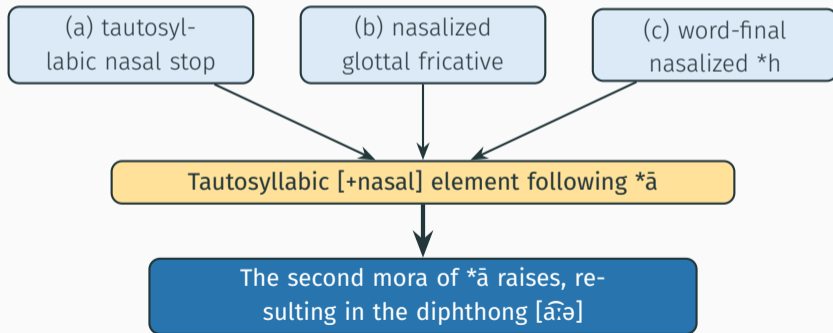
Proposal: pre-nasal raising

Unifying the three environments

- (4) a. Pllr. $*\bar{a}$ - > Av. $\langle \overset{\circ}{a} \rangle$ - / __ [ŋk], [nt], [ɲc]
b. Pllr. $*\bar{a}$ - > Av. $\langle \overset{\circ}{a} \rangle$ - / __ [h̃], [h̃ʲ], [h̃ʷ]
c. Pllr. $*\bar{a}$ > Av. $\langle \overset{\circ}{a} \rangle$ / __ $*/\tilde{h}/\omega$

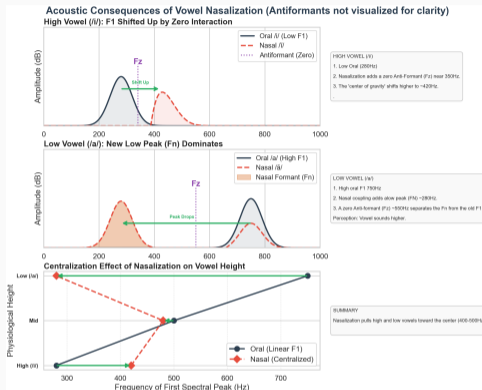
Unifying the three environments

- (4) a. Pllr. $*\bar{a}$ - > Av. $\langle\overset{\circ}{a}\rangle$ - / __ [ŋk], [nt], [ɲc]
b. Pllr. $*\bar{a}$ - > Av. $\langle\overset{\circ}{a}\rangle$ - / __ [h̃], [h̃ʲ], [h̃ʷ]
c. Pllr. $*\bar{a}$ > Av. $\langle\overset{\circ}{a}\rangle$ / __ $*/\tilde{h}/\omega$



Why nasalization raises low vowels from an acoustic perspective

Two mechanisms:

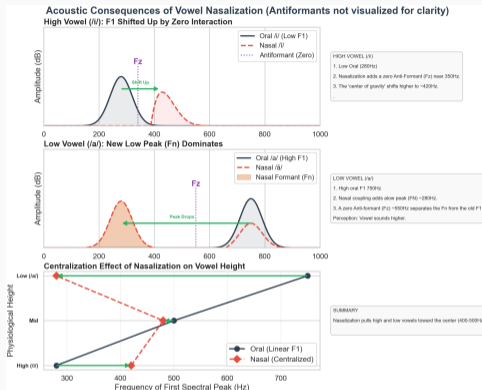


See Ohala (1974, 367) with references; cf. Hajek (1997).

Why nasalization raises low vowels from an acoustic perspective

Two mechanisms:

1. **Heavy coupling** (nasal stop present, strong velum lowering):

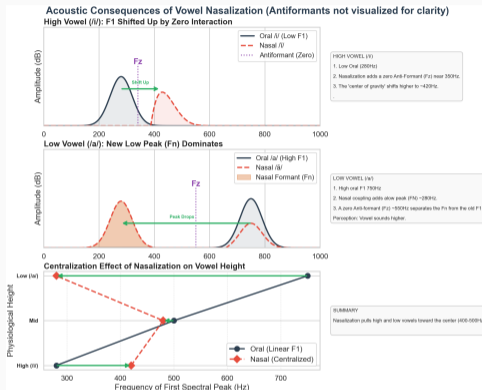


See Ohala (1974, 367) with references; cf. Hajek (1997).

Why nasalization raises low vowels from an acoustic perspective

Two mechanisms:

1. **Heavy coupling** (nasal stop present, strong velum lowering):
 - Nasal formant F_{N1} near 250–450 Hz reduces effective F1 of the oral low vowel.

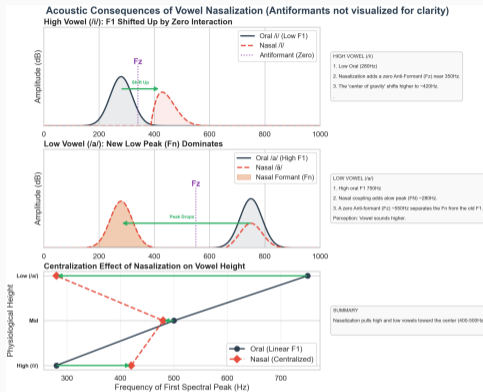


See Ohala (1974, 367) with references; cf. Hajek (1997).

Why nasalization raises low vowels from an acoustic perspective

Two mechanisms:

1. **Heavy coupling** (nasal stop present, strong velum lowering):
 - Nasal formant F_{N1} near 250–450 Hz reduces effective F_1 of the oral low vowel.
 - Listener reinterprets lowered F_1 as a higher vowel (Beddor, Krakow, and Goldstein 1986, 199; Mielke 2008, 333).

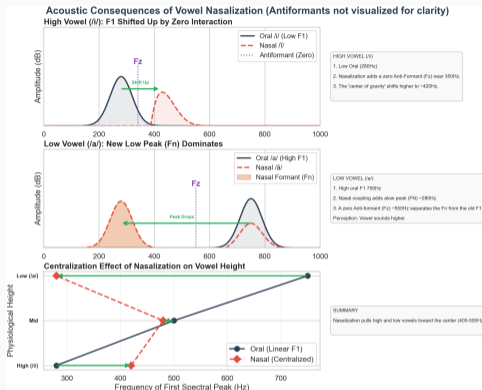


See Ohala (1974, 367) with references; cf. Hajek (1997).

Why nasalization raises low vowels from an acoustic perspective

Two mechanisms:

1. **Heavy coupling** (nasal stop present, strong velum lowering):
 - Nasal formant F_{N1} near 250–450 Hz reduces effective F_1 of the oral low vowel.
 - Listener reinterprets lowered F_1 as a higher vowel (Beddor, Krakow, and Goldstein 1986, 199; Mielke 2008, 333).
2. **Low coupling / rhinoglottophilia** (glottal fricative, weak nasalization):



See Ohala (1974, 367) with references; cf. Hajek (1997).

Why nasalization raises low vowels from an acoustic perspective

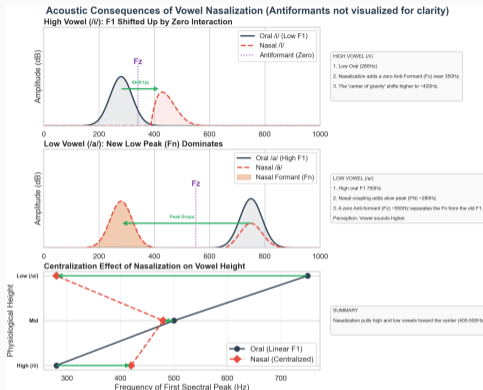
Two mechanisms:

1. Heavy coupling (nasal stop present, strong velum lowering):

- Nasal formant F_{N1} near 250–450 Hz reduces effective $F1$ of the oral low vowel.
- Listener reinterprets lowered $F1$ as a higher vowel (Beddor, Krakow, and Goldstein 1986, 199; Mielke 2008, 333).

2. Low coupling / rhinoglottophilia (glottal fricative, weak nasalization):

- Open glottis = side-branch resonator; lowers $F2$ amplitude, increases bandwidth (Ohala 1974, 367; Ohala 1993).



See Ohala (1974, 367) with references; cf. Hajek (1997).

Why nasalization raises low vowels from an acoustic perspective

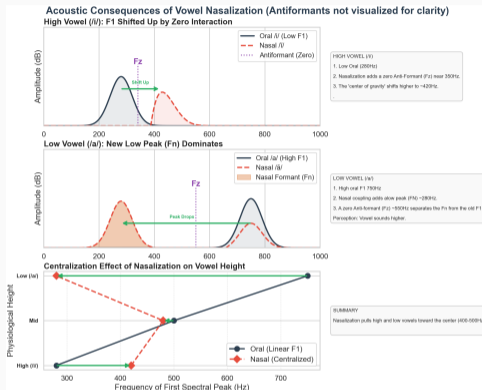
Two mechanisms:

1. Heavy coupling (nasal stop present, strong velum lowering):

- Nasal formant F_{N1} near 250–450 Hz reduces effective F_1 of the oral low vowel.
- Listener reinterprets lowered F_1 as a higher vowel (Beddor, Krakow, and Goldstein 1986, 199; Mielke 2008, 333).

2. Low coupling / rhinoglottophilia (glottal fricative, weak nasalization):

- Open glottis = side-branch resonator; lowers F_2 amplitude, increases bandwidth (Ohala 1974, 367; Ohala 1993).
- Listener *hypercorrects* for expected but weak coarticulation (Beddor, Krakow, and Goldstein 1986, 202).



See Ohala (1974, 367) with references; cf. Hajek (1997).

Pre-nasal raising is a robust cross-linguistic pattern

It is typologically one of the best-documented vowel shifts. Beddor, Krakow, and Goldstein (1986, 199) note low nasal vowels raise in Breton, Haida, Nama, Seneca, and Zapotec (cf. Hajek 1997).

Language	Input	Output / environment	Reference
Proto-Germanic	*e	*i / __ NC	Lass (1994, 24, 53)
Old English	WGmc *ā	ō / __ N (e.g. <i>mōna</i> ‘moon’)	Lass (1994, 38–42)
Old English	*a	o / __ N (variation <i>mann/monn</i>)	Lass (1994, 38–42)
Romanian	Latin *ā	î / __ N (<i>câmp</i> < <i>campus</i>)	Renwick (2012, 26, 31)
Gascon (dialects)	*ɛ	e / N__ or __N	Egurtzegi (2018, 174)
Bayonnais Gascon	*a	e / __ N (<i>sent</i> < <i>sanctum</i>)	Egurtzegi (2018)
Zuberoan Basque	*o	u / __ {n, m, ɲ, h̃}	Egurtzegi (2018, 178–9)
American English (NCS)	*æ, *a	raised / __ N (e.g. <i>man</i>)	Dinkin (2011)
Philadelphia English	*aw	raised / __ N	Fruehwald2016<empty citation>

Problems with the retraction/backing hypothesis

Problems with the retraction hypothesis before <ηc>, <ηk>, <ηt>

Feature Claim	Retraction Theory	Homorganic Interpretation
	<η> represents a uvular nasal [N] that triggered backing.	<η> represents a nasal homorganic with the consonant it precedes.
Phonetic Realization Implication	Invariably [N] Backing phonetically motivated by the uvular nasal	<ηk> = [ŋk], <ηt> = [nt], <ηc> = [ɲc] Retraction is phonetically unmotivated in <ηt> and <ηc> sequences.
Sources	de Vaan; Hoffmann and Forssman (1996, 44)	Clayton (2020, 80), Ferrer Losilla (2016) (contra e.g., Hoffmann and Forssman 1996, 88; Kümmel 2017, 11)

Problems with the retraction hypothesis before <ηc>, <ηk>, <ηt>

Feature Claim	Retraction Theory	Homorganic Interpretation
Phonetic Realization Implication	<p><η> represents a uvular nasal [N] that triggered backing.</p> <p>Invariably [N] Backing phonetically motivated by the uvular nasal</p>	<p><η> represents a nasal homorganic with the consonant it precedes.</p> <p><ηk> = [ŋk], <ηt> = [nt], <ηc> = [ɲc] Retraction is phonetically unmotivated in <ηt> and <ηc> sequences.</p>
Sources	de Vaan; Hoffmann and Forssman (1996, 44)	Clayton (2020, 80), Ferrer Losilla (2016) (contra e.g., Hoffmann and Forssman 1996, 88; Kümmel 2017, 11)

Problems with the retraction hypothesis before <ηc>, <ηk>, <ηt>

Feature Claim	Retraction Theory	Homorganic Interpretation
	<η> represents a uvular nasal [N] that triggered backing.	<η> represents a nasal homorganic with the consonant it precedes.
Phonetic Realization Implication	Invariably [N] Backing phonetically motivated by the uvular nasal	<ηk> = [ŋk], <ηt> = [nt], <ηc> = [ŋc] Retraction is phonetically unmotivated in <ηt> and <ηc> sequences.
Sources	de Vaan; Hoffmann and Forssman (1996, 44)	Clayton (2020, 80), Ferrer Losilla (2016) (contra e.g., Hoffmann and Forssman 1996, 88; Kümmel 2017, 11)

Problems with the retraction hypothesis before <ηc>, <ηk>, <ηt>

Feature Claim	Retraction Theory	Homorganic Interpretation
	<η> represents a uvular nasal [N] that triggered backing.	<η> represents a nasal homorganic with the consonant it precedes.
Phonetic Realization Implication	Invariably [N] Backing phonetically motivated by the uvular nasal	<ηk> = [ŋk], <ηt> = [nt], <ηc> = [ɲc] Retraction is phonetically unmotivated in <ηt> and <ηc> sequences.
Sources	de Vaan; Hoffmann and Forssman (1996, 44)	Clayton (2020, 80), Ferrer Losilla (2016) (contra e.g., Hoffmann and Forssman 1996, 88; Kümmel 2017, 11)

Problems with the retraction hypothesis before <ηc>, <ηk>, <ηt>

Feature Claim	Retraction Theory	Homorganic Interpretation
	<η> represents a uvular nasal [N] that triggered backing.	<η> represents a nasal homorganic with the consonant it precedes.
Phonetic Realization Implication	Invariably [N] Backing phonetically motivated by the uvular nasal	<ηk> = [ŋk], <ηt> = [nt], <ηc> = [ɲc] Retraction is phonetically unmotivated in <ηt> and <ηc> sequences.
Sources	de Vaan; Hoffmann and Forssman (1996, 44)	Clayton (2020, 80), Ferrer Losilla (2016) (contra e.g., Hoffmann and Forssman 1996, 88; Kümmel 2017, 11)

Problems with the retraction hypothesis before <ηc>, <ηk>, <ηt>

Feature Claim	Retraction Theory	Homorganic Interpretation
	<η> represents a uvular nasal [N] that triggered backing.	<η> represents a nasal homorganic with the consonant it precedes.
Phonetic Realization Implication	Invariably [N] Backing phonetically motivated by the uvular nasal	<ηk> = [ŋk], <ηt> = [nt], <ηc> = [ŋc] Retraction is phonetically unmotivated in <ηt> and <ηc> sequences.
Sources	de Vaan; Hoffmann and Forssman (1996, 44)	Clayton (2020, 80), Ferrer Losilla (2016) (contra e.g., Hoffmann and Forssman 1996, 88; Kümmel 2017, 11)

Problems with the retraction hypothesis before <ηc>, <ηk>, <ηt>

Feature Claim	Retraction Theory	Homorganic Interpretation
Phonetic Realization Implication	<η> represents a uvular nasal [N] that triggered backing. Invariably [N] Backing phonetically motivated by the uvular nasal	<η> represents a nasal homorganic with the consonant it precedes. <ηk> = [ηk], <ηt> = [nt], <ηc> = [ɲc] Retraction is phonetically unmotivated in <ηt> and <ηc> sequences.
Sources	de Vaan; Hoffmann and Forssman (1996, 44)	Clayton (2020, 80), Ferrer Losilla (2016) (contra e.g., Hoffmann and Forssman 1996, 88; Kümmel 2017, 11)

Revised interpretation of <ŋh>, <ŋ̥h>, <ŋ^uh> sequences

Context	Phonetic Reality	Phonetic motivation for *[a] > [a:]?
<ŋh>, <ŋ̥h>, <ŋ ^u h>	Articulatory: [h̃], [h̃ʲ], and [h̃ ^w] (Rhinoglottophilia; Clayton 2020)	No: /h/ lacks [+back] feature; no articulatory motivation for retraction.
	Acoustic: [h̃] (Beguš 2025)	Maybe: Breathiness lowers F2, creating <i>percept</i> of backing.
<ŋc>, <ŋt>	Nasal Stop: [ɲc], [nt]	No: Retraction occurs here too, but the <i>breathiness/F2</i> trigger is absent.

Revised interpretation of <ŋh>, <ŋ̃h>, <ŋ^uh> sequences

Context	Phonetic Reality	Phonetic motivation for *[a] > [a:]?
<ŋh>, <ŋ̃h>, <ŋ ^u h>	Articulatory: [h̃], [h̃ ^j], and [h̃ ^w] (Rhinoglottophilia; Clayton 2020)	No: /h/ lacks [+back] feature; no articulatory motivation for retraction.
	Acoustic: [h̃] (Beguš 2025)	Maybe: Breathiness lowers F2, creating <i>percept</i> of backing.
<ŋc>, <ŋt>	Nasal Stop: [ɲc], [nt]	No: Retraction occurs here too, but the <i>breathiness/F2</i> trigger is absent.

Revised interpretation of <ŋh>, <ŋ̃h>, <ŋ^uh> sequences

Context	Phonetic Reality	Phonetic motivation for *[a] > [a:]?
<ŋh>, <ŋ̃h>, <ŋ ^u h>	Articulatory: [h̃], [h̃j], and [h̃ ^w] (Rhinoglottophilia; Clayton 2020)	No: /h/ lacks [+back] feature; no articulatory motivation for retraction.
	Acoustic: [h̃] (Beguš 2025)	Maybe: Breathiness lowers F2, creating <i>percept</i> of backing.
<ŋc>, <ŋt>	Nasal Stop: [ɲc], [nt]	No: Retraction occurs here too, but the <i>breathiness/F2</i> trigger is absent.

Revised interpretation of <ŋh>, <ŋ̃h>, <ŋ^uh> sequences

Context	Phonetic Reality	Phonetic motivation for *[a] > [a:]?
<ŋh>, <ŋ̃h>, <ŋ ^u h>	Articulatory: [h̃], [h̃j], and [h̃ ^w] (Rhinoglottophilia; Clayton 2020)	No: /h/ lacks [+back] feature; no articulatory motivation for retraction.
	Acoustic: [h̃] (Beguš 2025)	Maybe: Breathiness lowers F2, creating <i>percept</i> of backing.
<ŋc>, <ŋt>	Nasal Stop: [ɲc], [nt]	No: Retraction occurs here too, but the <i>breathiness/F2</i> trigger is absent.

Revised interpretation of <ŋh>, <ŋ̥h>, <ŋ^uh> sequences

Context	Phonetic Reality	Phonetic motivation for *[a] > [a:]?
<ŋh>, <ŋ̥h>, <ŋ ^u h>	Articulatory: [h̃], [h̃ʲ], and [h̃ ^w] (Rhinoglottophilia; Clayton 2020)	No: /h/ lacks [+back] feature; no articulatory motivation for retraction.
	Acoustic: [h̃] (Beguš 2025)	Maybe: Breathiness lowers F2, creating <i>percept</i> of backing.
<ŋc>, <ŋt>	Nasal Stop: [ɲc], [nt]	No: Retraction occurs here too, but the <i>breathiness/F2</i> trigger is absent.

Revised interpretation of <ŋh>, <ŋ̃h>, <ŋ^uh> sequences

Context	Phonetic Reality	Phonetic motivation for *[a] > [a:]?
<ŋh>, <ŋ̃h>, <ŋ ^u h>	Articulatory: [h̃], [h̃j], and [h̃ ^w] (Rhinoglottophilia; Clayton 2020)	No: /h/ lacks [+back] feature; no articulatory motivation for retraction.
	Acoustic: [h̃] (Beguš 2025)	Maybe: Breathiness lowers F2, creating <i>percept</i> of backing.
<ŋc>, <ŋt>	Nasal Stop: [ɲc], [nt]	No: Retraction occurs here too, but the <i>breathiness/F2</i> trigger is absent.

The lack of symmetry in word-final development of *-as

Problem

Detail

Retraction

Putative Plr. **ā* retraction /_ #h contradicts Plr. **-ah* > OAv. *ā* [ə(:)] (contra Beguš 2025, 9–11)

Vowel Quality

Asymmetry in identical environment (/_ #h): Plr. **/ǎ/* **raises**, whereas **/ā/* **backs**.

Chronology

Changes likely **contemporaneous** (de Vaan 2003, 384); divergence of **-āh* > <*ā̊*> vs. **-ah* > <*ā*> difficult to explain.

The lack of symmetry in word-final development of *-as

Problem

Detail

Retraction

Putative Plr. $*\bar{a}$ retraction /_ #h contradicts Plr. $*-ah > OAv. \bar{a}$ [ə(:)] (contra Beguš 2025, 9–11)

Vowel Quality

Asymmetry in identical environment (/_ #h): Plr. $*/\check{a}/$ **raises**, whereas $*/\bar{a}/$ **backs**.

Chronology

Changes likely **contemporaneous** (de Vaan 2003, 384); divergence of $*-\bar{a}h > <\check{a}>$ vs. $*-ah > <\bar{a}>$ difficult to explain.

The lack of symmetry in word-final development of *-as

Problem

Detail

Retraction

Putative Plr. **ā* retraction /_ #h contradicts Plr. **-ah* > OAv. *ā* [ə(:)] (contra Beguš 2025, 9–11)

Vowel Quality

Asymmetry in identical environment (/_ #h): Plr. **/ǎ/* **raises**, whereas **/ā/* **backs**.

Chronology

Changes likely **contemporaneous** (de Vaan 2003, 384); divergence of **-āh* > <*ā̊*> vs. **-ah* > <*ā*> difficult to explain.

The <ā> ~ <ā̇> alternation pattern is strange for a backing claim

Prediction under [ɑ:] hypothesis: confusion with <ō> [o:] (acoustically adjacent).

Prediction under the raising hypothesis: confusion with <ā> [a:] (fronting only).

The <ā> ~ <ā̇> alternation pattern is strange for a backing claim

Prediction under [ɑ:] hypothesis: confusion with <ō> [o:] (acoustically adjacent).

Prediction under the raising hypothesis: confusion with <ā> [a:] (fronting only).

Manuscript variants of <ā̇> in de Vaan (2003, 376–78) and Peschl (2022, 53):

- <ā̇> ~ <ā>: extremely frequent (Peschl 2022, 53; Cantera 2014, 280)
- <ā̇> ~ <āu>: occasional, graphic similarity (Hoffmann and Narten 1989, 31 n.33)

The <ā> ~ <ā̇> alternation pattern is strange for a backing claim

Prediction under [ɑ:] hypothesis: confusion with <ō> [o:] (acoustically adjacent).

Prediction under the raising hypothesis: confusion with <ā> [a:] (fronting only).

Manuscript variants of <ā̇> in de Vaan (2003, 376–78) and Peschl (2022, 53):

- <ā̇> ~ <ā>: extremely frequent (Peschl 2022, 53; Cantera 2014, 280)
- <ā̇> ~ <āu>: occasional, graphic similarity (Hoffmann and Narten 1989, 31 n.33)

If <ā̇> were [ɑ:], we would expect scribes to occasionally write <ō> (acoustically similar).
That they do not is evidence against backing.

Non-raising before high vowels in following syllables

When *ā is followed by /h/ + {i/u(:), y, w}, we find *preserved* <ā>, not <ā̇>:

- (8) a. *māhiia-* (not **mā̇hiia-*)
b. *uruuarāhu* (not **uruuarā̇hu*)
c. *gaēθāhuua* (not **gaēθā̇huua*)
d. *āhūiriia* (not **ā̇hūiriia*)

Non-raising before high vowels in following syllables

When *ā is followed by /h/ + {i/u(:), y, w}, we find *preserved* <ā>, not <ā̆>:

- (8) a. *māhiia-* (not **mā̆hiia-*)
b. *uruuarāhu* (not **uruuarā̆hu*)
c. *gaēθāhuua* (not **gaēθā̆huua*)
d. *āhūiriia* (not **ā̆hūiriia*)

Under the backing hypothesis: unclear why {i, u, y, w} would block retraction.

Non-raising before high vowels in following syllables

When *ā is followed by /h/ + {i/u(:), y, w}, we find *preserved* <ā>, not <ā̄>:

- (8) a. *māhiia-* (not **mā̄hiia-*)
b. *uruuarāhu* (not **uruuarā̄hu*)
c. *gaēθāhuua* (not **gaēθā̄huua*)
d. *āhūiriia* (not **ā̄hūiriia*)

Under the backing hypothesis: unclear why {i, u, y, w} would block retraction.

Under pre-nasal raising: directly explained by **active velum closure** for high-vowel articulation (Lubker 1968; Ohala 1975). Following high vowels inhibit nasalization spread, so no raising trigger.

Phonetic interpretation

What was the phonetic value?

1. Rising diphthong [ā̃:ə] (Clayton 2020).
 - The ligature *is* the diphthong: <ā̃>+<ə>.

What was the phonetic value?

1. Rising diphthong [ā̃:ə] (Clayton 2020).

- The ligature is the diphthong: <ā̃>+<ə>.
- Matches the spelling variation <ā̃ə> for <ā̃> at line-breaks (e.g., Y 28.6.3 *duuašā̃ə* → *duuaēšā̃*; Peschl 2022, 120).

What was the phonetic value?

1. Rising diphthong [ā̃:ə] (Clayton 2020).

- The ligature is the diphthong: <ā̃>+<ə>.
- Matches the spelling variation <ā̃ə> for <ā̃> at line-breaks (e.g., Y 28.6.3 *duuašā̃ə* → *duuaēšā̃*; Peschl 2022, 120).
- Explains why the letter has *three* strokes (ā̃-component) rather than two (ā-component): its first target is long.

Conclusions

Summary of the argument

1. The traditional [ɑ:] value for <ā̎> does not survive scrutiny.

Summary of the argument

1. The traditional [ɑ:] value for <ā̎> does not survive scrutiny.
2. All productive occurrences of <ā̎> follow a single distributional rule: **tautosyllabic nasal or nasalized element**.

Summary of the argument

1. The traditional [ɑ:] value for <ā̄> does not survive scrutiny.
2. All productive occurrences of <ā̄> follow a single distributional rule: **tautosyllabic nasal or nasalized element**.
3. The change is one of **pre-nasal raising**, a typologically robust sound change documented in Germanic, Greek, Armenian, Romance, Basque, and English.

Summary of the argument

1. The traditional [ɑ:] value for <ā̊> does not survive scrutiny.
2. All productive occurrences of <ā̊> follow a single distributional rule: **tautosyllabic nasal or nasalized element**.
3. The change is one of **pre-nasal raising**, a typologically robust sound change documented in Germanic, Greek, Armenian, Romance, Basque, and English.
4. The phonetic value is most likely a rising diphthong [ā̊ə̯].

Thank you!

I am indebted to the members of the PIES Graduate Seminar and the UCLA Phonology Seminar for their help and support. Special thanks to John Clayton and Stephanie Jamison for saving me from numerous errors.

Comments and correspondence welcome: rehanmuh@g.ucla.edu

Appendix

Model A (branching)



Model B (linear)



Figure 1: Two views of the Avestan dialectology (de Vaan 2003, 8); the pre-nasal raising in question predates both.

Latin *ā > Romanian /ɨ/ before N (Renwick 2012, 26, 31):

- (9) a. Latin *campus* ‘field’ > Romanian *câmp* [kɨmp]
b. Latin *lāna* ‘wool’ > Romanian *lână* [lɨnə]
c. Latin *māne* ‘tomorrow’ > Romanian *mâine* [mɨjne]
d. Latin *ambulāre* > Romanian *umbla* [umbla]

Latin *ā > Romanian /ɨ/ before N (Renwick 2012, 26, 31):

- (9) a. Latin *campus* ‘field’ > Romanian *câmp* [kɨmp]
b. Latin *lāna* ‘wool’ > Romanian *lână* [lɨnə]
c. Latin *māne* ‘tomorrow’ > Romanian *mâine* [mɨjne]
d. Latin *ambulāre* > Romanian *umbla* [umbla]

- The Romanian reflex /ɨ/ is a close central unrounded vowel — a natural output of a raising trajectory from /a/.
- The environment is precisely the one proposed for Avestan: a *tautosyllabic nasal in the coda*.
- The outcome is *central/high*, not *back*.

Pre-/post-nasal raising of /ɛ/ to /e/ in Gascon, Lengadocian, Provençal (Egurtzegi 2018, 174):

Gascon	Provençal	Latin	Gloss
['bɛŋgo]	['vɛŋgo]	<i>veniō</i>	I come
[ben] / [be] / [bē]	[veŋ]	<i>venit</i>	he comes
[bent] / [ben] / [beŋ]	[vēŋ]	<i>ventum</i>	wind

Pre-/post-nasal raising of /ɛ/ to /e/ in Gascon, Lengadocian, Provençal (Egurtzegi 2018, 174):

Gascon	Provençal	Latin	Gloss
[ˈbɛŋgo]	[ˈvɛŋgo]	<i>veniō</i>	I come
[ben] / [be] / [bē]	[veŋ]	<i>venit</i>	he comes
[bent] / [ben] / [beŋ]	[vēŋ]	<i>ventum</i>	wind

Bayonnais Gascon: raising of /a/ before N

Bayonnais Gascon	(Late) Latin	Gloss
[enz]	<i>antius</i> [antius]	but
[ken]	<i>quantum</i> [k ^w antū]	how much
[ten]	<i>tantum</i> [tantū]	so much
[sen]	<i>sanguem</i> [saŋg ^w ē]	blood
[sent]	<i>sanctum</i> [saŋktū]	saint

Egurtzegi (2018, 178–179): /o/ raises to [u] contiguous to /n, m, ɲ, ñ/, including rhinoglottophilic /ñ/
– exactly the environment I am proposing for Avestan.

Standard Basque	Zuberoan	Transcription	Gloss
<i>ohore</i>	<i>uhure</i>	[u'ñure]	honor
<i>ohoin</i>	<i>uhuñ</i>	[u'ñuɲ]	thief
<i>inor</i>	<i>ihur</i>	[i'ñur]	nobody
<i>inon</i>	<i>ihun</i>	[i'ñun]	nowhere
<i>inoiz</i>	<i>ihuiz</i>	[i'ñuiʒ]	never
<i>laino</i>	<i>lanhú</i>	[lan'ñu]	cloud
<i>anoa</i>	<i>anhua</i>	[an'ñua]	food portion

Egurtzegi (2018, 178–179): /o/ raises to [u] contiguous to /n, m, ɲ, h̃/, including rhinoglottophilic /h̃/
– exactly the environment I am proposing for Avestan.

Standard Basque	Zuberoan	Transcription	Gloss
<i>ohore</i>	<i>uhure</i>	[u'h̃ure]	honor
<i>ohoin</i>	<i>uhuĩn</i>	[u'h̃uɲn]	thief
<i>inor</i>	<i>ihur</i>	[i'h̃ur]	nobody
<i>inon</i>	<i>ihun</i>	[i'h̃un]	nowhere
<i>inoiz</i>	<i>ihuiz</i>	[i'h̃uiʒ]	never
<i>laino</i>	<i>lanhú</i>	[lan'h̃u]	cloud
<i>anoa</i>	<i>anhua</i>	[an'h̃ua]	food portion

The Zuberoan Basque pattern is a typological match for the Avestan rhinoglottophilic case (rule 1b above): *V > raised V / __[h̃].

References



Beddor, Patrice S., Rena A. Krakow, and Louis M. Goldstein. 1986. “Perceptual constraints and phonological change: A study of nasal vowel height.” *Phonology Yearbook* 3:197–217.



Beguš, Gašper. 2025. “The Development of Indo-Iranian Voiced Fricatives.” *Transactions of the Philological Society* 123 (1): 97–115.



Cantera, Alberto. 2014. *Vers une édition de la liturgie longue zoroastrienne: pensées et travaux préliminaires*. Vol. 51. Cahier Studia Iranica. Paris: Association pour l’Avancement des Études Iraniennes.



Clayton, John. 2020. “Rhinoglottophilia in Avestan: *h > [h̃] and Its Orthographic and Phonological Consequences.” In *Proceedings of the 31st Annual UCLA Indo-European Conference*, edited by David M. Goldstein, Stephanie W. Jamison, and Brent Vine, 79–93. Hamburg: Buske.








de Vaan, Michiel. 2003. *The Avestan Vowels*. Vol. 12. Leiden Studies in Indo-European. Amsterdam & New York: Rodopi.













Dinkin, Aaron J. 2011. “Nasal short-a systems vs. the Northern Cities Shift.” *University of Pennsylvania Working Papers in Linguistics* 17 (2): 71–80.



Egurtzegi, Ander. 2018. “On the phonemic status of nasalized /h̃/ in Modern Zuberoan Basque.” *Linguistics* 56 (6): 1353–1367.

- 
- Ferrer Losilla, Juan José. 2016. “Preconsonantal Nasals in the Avestan Alphabet.” In
- Études de linguistique iranienne in memoriam Xavier Tremblay*
- , edited by Éric Pirart, 157–184. Leuven: Peeters.
-
- 
- Hajek, John. 1997.
- Universals of Sound Change in Nasalization*
- . Vol. 31. Publications of the Philological Society. Oxford: Blackwell.
-
- 
- Hale, Mark. 2008. “Avestan.” In
- The Ancient Languages of Asia and the Americas*
- , edited by Roger D. Woodard, 101–122. Cambridge University Press.
-
- 
- Hoffmann, Karl, and Bernhard Forssman. 1996.
- Avestische Laut- und Flexionslehre*
- . 2nd ed. 2004. Innsbruck: Institut für Sprachwissenschaft der Universität Innsbruck.
-
- 
- Hoffmann, Karl, and Johanna Narten. 1989.
- Der Sasanidische Archetypus: Untersuchungen zu Schreibung und Lautgestalt des Avestischen*
- . Wiesbaden: Dr. Ludwig Reichert Verlag.

- 
- Jackson, A. V. Williams. 1892.
- An Avesta Grammar in Comparison with Sanskrit. Part I: Phonology, Inflection, Word-Formation*
- . Stuttgart: Kohlhammer.
-
- 
- Jamison, Stephanie W. 1991. "A Cart, an Ox, and the Perfect Participle in Vedic."
- Münchener Studien zur Sprachwissenschaft*
- 52:77–100.
-
- 
- Kellens, Jean. 1989. "Avestique." In
- Compendium Linguarum Iranicarum*
- , edited by Rüdiger Schmitt, 32–55. Wiesbaden: Dr. Ludwig Reichert Verlag.
-
- 
- Kümmel, Martin Joachim. 2017. "Einführung ins Altiranische." Accessed 12 January 2020.
- https://www.academia.edu/30130367/Einf%C3%BChrung_ins_Altiranische_Introduction_to_Old_Iranian_
- .
-
- 
- Lass, Roger. 1994.
- Old English: A Historical Linguistic Companion*
- . Cambridge: Cambridge University Press.

- 
- Lubker, J. F. 1968. “An electromyographic-cinefluorographic investigation of velar function during normal speech production.” *Cleft Palate Journal* 5:1–18.
- 
- Mielke, Jeff. 2008. *The Emergence of Distinctive Features*. Oxford: Oxford University Press.
- 
- Ohala, John J. 1974. “Experimental Historical Phonology.” In *Historical Linguistics II: Theory and Description in Phonology*, edited by John M. Anderson and Charles Jones, 353–389. Amsterdam: North-Holland Publishing Co.
- 
- . 1975. “Phonetic explanations for nasal sound patterns.” In *Nasálfest*, edited by Charles A. Ferguson, Larry M. Hyman, and John J. Ohala, 289–316. Stanford: Language Universals Project, Stanford University.
- 
- . 1993. “Sound change as nature’s speech perception experiment.” *Speech Communication* 13 (1): 155–161. [https://doi.org/https://doi.org/10.1016/0167-6393\(93\)90067-U](https://doi.org/10.1016/0167-6393(93)90067-U).



Peschl, Benedikt. 2022. *The First Three Hymns of the Ahunauvaitī Gāθā: The Avestan Text of Yasna 28–30 and Its Tradition*. Vol. 4. Handbook of Oriental Studies, Section 2: South Asia / Corpus Avesticum. Leiden: Brill.



Reichelt, Hans. 1909. *Awestisches Elementarbuch*. Indogermanische Bibliothek. Heidelberg: Carl Winter's Universitätsbuchhandlung.



Renwick, Margaret E. L. 2012. "Vowels of Romanian: Historical, Phonological, and Phonetic Studies." Ph.D. dissertation, Cornell University.



Sandell, Ryan. 2014. "Compensatory Lengthening in Vedic and the Outcomes of Proto-Indo-Iranian *[az] and *[až]." In *Proceedings of the 25th UCLA Indo-European Conference*, edited by Stephanie W. Jamison, H. Craig Melchert, and Brent Vine, 183–201. Bremen: Hempen Verlag.