

# Vedic Post-lexical Retroflexion: Synchronic and Diachronic Perspectives

Chundra Aroor Cathcart  
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## Introduction

- Vedic Sanskrit has a well-known *n*-retroflexion rule
  - Lexeme-internally, this process is exceptionless
  - Post-lexical retroflexion (PLR) of Vedic Sanskrit 1pl clitics and other items is a variable and opaque phenomenon
- I show that a model sensitive to diachronic factors better predicts the distribution of retroflex clitics than a model which assumes phonetic naturalness in prosodic phonology
- The opacity created by diachronic change likely resulted in the under-generalization of this post-lexical rule by learners
- These results bear on phonological theory and Vedic studies

## (Vedic) Sanskrit *n*-Retroflexion: Lexeme-Internal

- Vedic Sanskrit has multiple sources of retroflex segments
- These include the following process (cf. Allen 1951, 1953, Zwicky 1965, Collinge 1965):

*n* → *n* / 



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(The change *n* → *n̥* is triggered by preceding *r* or *ṣ* if no coronal obstruent intervenes and no dental segment directly follows)

- Lexeme-internally, this process is virtually exceptionless:
  - Morpheme-internal: *rékṣas*- ‘wealth’, *páṛṇas*- ‘abundance’, *uṣṇihā*- ‘nape’
  - Morphophonemic: *pari-māṇa*- ‘circumference’

## Post-Lexical *n*-Retroflexion (PLR)

- The aforementioned retroflexion process operates across word boundaries as well
- This behavior is variable in Vedic Sanskrit:
  - indra no* ~ *indra no* ‘O Indra, [blank] us’
  - urú naḥ* ~ *urú naḥ* ‘[keep] us far away from...’
- It ceases to operate in Epic and Classical Sanskrit
- Items affected (cf. Wackernagel and Debrunner 1905, vol. I, 191):
  - naḥ* 1pl pronominal clitic
  - na* negative particle
  - na* simile particle
  - nu* emphatic particle
  - ena*- proximal pronoun
  - enas*- ‘anger’
- This study seeks to address the following questions:
  - To what extent does the retroflexion rule operate post-lexically?
  - Is it more likely to operate in close proximity or at a distance (can we pick up effects of speech rate, pausae, etc.)?

## Corpus Study I: Methods

- I generated a corpus consisting of tokens of dental and retroflex allomorphs of the affected items, found in the Ṛg and Atharva Vedas
- N* = 6553; dental = 6407, retroflex = 145
- For each token, the following factors were incorporated into a mixed-effects logistic regression models (one per fixed effect):
  - Fixed effects:
    - \* Presence of a VIABLE TRIGGER OF RETROFLEXION, and whether the trigger was
    - \* ADJACENT (-*r*), or
    - \* NON-ADJACENT (-*r*-, -*ṣ*-)
  - Random intercepts:
    - \* Type of word
    - \* Preceding word
    - \* Following word
    - \* Veda × book

## Corpus Study I: Results

	Trigger?		Adjacent?		Non-Adjacent?	
	N	Y	N	Y	N	Y
Dental	5350	1057	6056	351	5701	706
Retroflex	0	145	119	26	26	119

- The presence of a viable trigger is a highly significant predictor ( $\chi^2_{LR}(1) = 90.2, p < .001$ )
- The presence of a viable non-adjacent trigger is a highly significant predictor ( $\chi^2_{LR}(1) = 90.7, p < .001$ )
- However, the presence of a viable adjacent trigger is barely significant ( $\chi^2_{LR}(1) = 3.89, p = .05$ )

## Corpus Study I: Discussion

- The finding that viable adjacent triggers serve as a marginally significant factor is odd
  - Cross-linguistically, post-lexical processes are common at word boundaries (e.g., *gree*[m b]*ox*)
  - Vedic retroflexion can be triggered at any distance; hence, there seems to be *no a priori* reason that non-adjacent retroflexion should be better represented than adjacent retroflexion
- Further observation of the data shows another odd pattern
  - In certain contexts where a viable trigger is present, PLR is categorically blocked
  - RV 4.55.10c *índro no* ‘[may] Indra (nom.) [come] to us’, but never *\*índro no*
  - It is easy enough to envision a post-lexical grammar where PLR is generally disfavored and blocked (respectively) by final *-r* and *-o*
  - But these constraints are otherwise not well motivated, and certainly not phonetically so
  - A round back vowel like [o] should perceptually enhance retroflexion, not block it (cf. Hamann 2003:90–2)!
- Contexts in which viably triggered retroflexion is either under- or unrepresented involve the operation of external sandhi rules at the word edge
  - /as/ → -o / \_ [ +voi ]
  - /s/ → -r / [hi]\_ [ +voi ]
- Since both external sandhi and PLR are technically speaking post-lexical rules, this opacity can be modeled synchronically in a theory that allows ordered levels of post-lexical phonology (Kaisse and Shaw 1985:24), as follows:

	/indras nas/	/agnis nas/	
1. PLR	indras nas	agnis nas	(blocked)
2. sandhi	indro no	agnir no	

- However, this rule ordering seems at odds with the idea that within the phonological component, more abstract phonological rules tend to feed more low-level phonetic processes (cf. Coetzee and Pater 2011:402)
  - External sandhi of the type /as/ → [o] is a telescoped rule reflecting multiple layers of diachronic change
- There is an additional ordering problem:
  - Across word boundaries, PLR and external sandhi are in a counterfeeding relationship
  - Word-internally, the same sandhi rules regularly feed *n*-retroflexion
    - \* /nis-nij-am/ ‘robe’ acc. sg. → /nir-nij-am/ → *nirñjam*
    - \* /dus-nāmā/ ‘having a bad name’ nom. sg. → /dur-nāmā/ → *durñāmā*
    - \* /rakṣas-hanam/ ‘killing *rākṣasas*’ acc. sg. → /rakṣo-hanam/ → *rakṣoháṇam*
- In a cyclic model of lexical phonology and morphology, this would require lexical phonology to apply after post-lexical phonology
  - Post-Lexical Phonology: PLR counterfed by Sandhi
  - Lexical Phonology: Sandhi feeds retroflexion

## Corpus Study II: Methods

- I generated a second corpus that differed from the first in that HISTORICALLY VIABLE TRIGGERS were taken into account
- Tokens were recoded as lacking a trigger if preceded by forms of the following suffixes:
  - o* < Proto-Indo-Iranian *\*-az*
  - hi* (2pl imperative marker) < PIIr *\*-d<sup>hi</sup>*
  - i/ur* < PIIr *\*-i/uš* (vs. authentic PIE *l/r*-stems like *s<sub>u</sub>vár-* ‘sun’, etc., (cf. Hale 1990:91))

## Corpus Study II: Results

	Historical trigger?		Adjacent?		Non-Adjacent?	
	N	Y	N	Y	N	Y
Dental	5824	583	6392	15	5839	568
Retroflex	1	144	120	25	26	119

- The presence of a historically viable trigger is a highly significant predictor ( $\chi^2_{LR}(1) = 157.9, p < .001$ )
- The presence of a historically viable non-adjacent trigger is a highly significant predictor ( $\chi^2_{LR}(1) = 116, p < .001$ )
- The presence of a historically viable adjacent trigger is now highly significant as well ( $\chi^2_{LR}(1) = 195, p < .001$ )

## Phonological implications

- The above results are at considerable odds with models of LPM which see lexical rules (or “early phonology”) as exception-prone and opaque, and post-lexical rules (or “late phonology”) as exceptionless and low-level
- Retroflexion is unproductive, opaque and blocked by sandhi at the phrasal level, but productive, transparent and fed by sandhi lexeme-internally
- PLR is in fact confined to 23 inflected forms — well on its way to a lexically dependent phenomenon (but not all of these are liturgical collocations)
- Is this phenomenon a feature of natural language, or poetic grammar (cf. Gunkel and Ryan 2011)?
- If we can conceive of clitic-host pairs and other phrasal units evolving jointly (cf. Bybee 2003), then it seems feasible to expect diachronic phonological residue to accumulate across word boundaries

## Implications for Vedic Sanskrit

- 2 types of *r* in Vedic Sanskrit?
- Catford (2001) gives evidence for a “molar-type” *r* alongside an alveolar one
- The findings of this study may show that *r* resulting from sandhi rhotacism was “molar” in final position, since it systematically failed to trigger retroflexion across word boundaries (with one exception)
- Uvular *r* tends to be incompatible with rhotic retroflexion (cf. Svantesson 2000)
- This works if the rhotacistic development *\*-ṣ* > *-r* predates the context-free change *\*ṣ* > *ṣ*

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