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Bartholomae's Law and root-suffix asymmetry in Sanskrit*

(1) BARTHOLOMAE'S LAW is an Indo-Iranian (e.g. OYÁV. *vr̥ṣṣáda-* : Ved. *vṛṣṣádhā-*). Possibly PIE) rule which spreads the features [voiced] and [spread glottis] from root-final voiced aspirate to a suffix-initial dental voiceless stop /t/,

√sudh (+s) + -tá- > *śudh^(h)dhā-* vbl.-ppl. 'purified'
√labh + -twā > *labh^(h)dhwā* grdv. 'having taken'
â + √rabh + -s + -ta > *a-rab^h-ta > *śrabh^(h)dhā* ao.3sg.

(The aspiration of the cluster-initial stop is suppressed. Pāṇini, Aṣṭ.8.4.53) and /t^h / (Pāṇini Aṣṭ.8.2.40 *ta^h o^h*, Schindler 1976:629):

â + √budh + -s + -t^hās > *a-budh^h-t^hās > *âbudh^(h)dhā* ao.2sg.

(2) General assimilation pattern of the laryngeal features:

Gk.	<i>é-lab^h-en</i> 'disable' ao.3pl.	<i>blāp-tō</i> pr.1sg.	<i>e-blāp^h-t^hen</i> p-ao.
Gk.	—	<i>gēgwp-tai</i> pf.3sg.	<i>gwp^h-ō</i> pr.1sg.
Lat.	<i>ag-ere</i> 'do' inf.	<i>āc-tus</i> vbl.adj.	—
Skt.	<i>aḍ-ānā-</i> 'eating' pr.-ppl.	<i>ā-t-ti</i> pr.-3sg.	<i>aḍ^(h)-t^h ipiv.</i>
Hitt.	<i>akku-/akku-</i> (/g/) 'drink'	<i>akkuske-</i> (/k/) (Melchert 1994:17)	—
Gk.	-K-G-	-K-G ^h -	-G-G ^h -
Gk.	—	-K ^h -K ^h -	-K ^h -K ^h -
Av.	—	-K-K-	-G-G-
Skt.	—	-K-K-	-G ^(h) -G ^h -

Unclear: Tocharian, Celtic, Armenian, Germanic (VERNER'S LAW).

Counterexamples: Gk. *lōmē^hphā* 'thou hast obtained' < *g^h-t- (Cowgill 1965:172)

(3) If the assimilation in (2) is Indo-European, Lombardi's LARYNGEAL CONSTRAINT "A Laryngeal node is only licensed in a consonant if it immediately precedes a [+son] segment in the same syllable", is active in Indo-European.

BARTHOLOMAE'S LAW, however, does not agree with what follows from LARYNGEAL CONSTRAINT.

(4) At least in Indo-Aryan, it is simpler to consider that root-suffix asymmetry is behind this rule than to stipulate a phonological rule for the context of BARTHOLOMAE'S LAW.
Cf. specification of "+ROOT" in Sag (1974:592). Lombardi (1995): Generic phonological constraints on laryngeal features only produce regressive voicing assimilation.

(5) Phonological constraints

IDENTIO(lar): The laryngeal configuration of an input has an identical correspondent in the output.

LICENSE(lar): No laryngeal node in coda position. See Lombardi (1995) and Zoll (1998) for more detailed analysis.

In the framework of positional faithfulness (Beckman 1998, Ch.4), root-suffix asymmetry is represented by the constraint

MAX-ROOT[sj]: Maximize the distinctive features, in this case the feature [spread glottis], of the root morpheme.

Ranking: LICENSE(lar) ≫ MAXROOT[sj] ≫ IDENTIO(lar)

/√lab ^h + tā-/	LICENSE(lar)	MAXROOT[sj]	IDENTIO(lar)
lab ^h tā-		*!	
▷ lab ^(h) q ^h â-			***
▷ lab ^(h) p ^h â-			***
lap ^{tā} -		*!	**

(6) Extending MAXROOT[sj] to MAXROOT(lar), which requires both [voiced] and [spread glottis] of the root to be maximized in the output, introduces overgeneration about voicing assimilation, for maximizing [voiced] in the input /ad-ti/ 'eats' would result in the wrong output *addi.

(7) MAXROOT[vc]: Maximize [voiced] of an input root morpheme in the output. Dominated by LICENSE(lar) and IDENTIO(lar).

Emergence of the Umlaut: McCarthy and Prince (1994:334) "Even in languages where C is crucially dominated and therefore violated, the effects of C can still be observed under conditions where the dominating constraint is not relevant. Thus, in the language as a whole, C may be roundly violated, but in a particular domain it is obeyed exactly."

LICENSE(lar) ≫ MAXROOT[sj] ≫ IDENTIO(lar) ≫ MAXROOT[vc]

/√lab ^h + tā-/	LICENSE(lar)	MAXROOT[sj]	IDENTIO(lar)	MAXROOT[vc]
▷ lab ^(h) q ^h â-			***	
lap ^(h) p ^h â-			***	*!

(8) MAXROOT[vc] is independently motivated in late Vedic.

Verbal adjective suffix -tā- : -nā-:

Avestan *parəna-* : Ved. *pārnā-* 'full' (Hoffmann and Forssman 1996:245)

prāthā- 'filled'

pārnā- 'gift' for √p^rś² 'give' (Kuiper 1938)

YAv. *stāra^hta-*

: Ved. *stārnā-*

-nā- occurs primarily after roots ending in {i/y; u/v; r/ṛ} + *H in Early Vedic. As the presence of the root-final laryngeals became ambiguous in the phonology of Vedic, the original context conditioning the alternation of -tā- and -nā- may well have become ambiguous. At this point, -nā- starts taking over -tā- after roots ending in /d/, possibly because the feature [voiced] in root-final /d/ is saved in the -nā- forms (Pāṇini Aṣṭ.8.2.42 *radāb^hgām*):

√*sad* 'sit' : RV *sathá-* : AV *sanád-*
 √*vid* 'find' : RV *vithá-* : AV *vindá-*
 √*nud* 'push' : RV *á-nutta-* : SV *numna-*

- (9) Aspiration Throwback takes place before
 i) 'Pada' case endings such as [_{vcd}-*b^hgām*], [_{vcd}-*b^his*], [_{vcd}-*b^hgas*]. Root noun
bád^h-: *b^hud-b^hgām*, *b^hud-b^his* and *b^hud-b^hgas* (Pāṇini Aṣṭ.8.2.37 *śá^hwoh*
 [29 *ante ca*]; not attested in Vedic, Lanman 478).

(Attributing this phenomenon to the word-boundary could incur circularity.)

- ii) Middle endings *-d^hwe* and *-d^huam*, e.g. *Āsvalyana-Śrauta-Sūtra*
d^huri(g)-d^huam < /*duḡ^h-d^hwam/*, *ab^hudd^huam* < /*a-bud^h-d^hwam/*.

No Throwback for the forms of BARTHOLOMAE'S LAW such as *budd^há-* or *duḡ^há-*, however.

- (10) Root morpheme as a featural domain (Cassinjee and Kisseberth 1999).

/*bud^h-tá-/* vb.adj. /*a-bud^h-s-d^hwam/* ao. /*a-bud^h-si/* ao.
 [*bud^(h)]-d^há- a-[*b^hud*]-*d^hwam* a-[*b^hud*]-*si*
 \ / ··*±* | ··*±* |
 [sg] [sg] [sg] [sg] [sg] [sg]
 → *budd^há-* → *á^hudd^huam* → *áb^husi**

- (11) BARTHOLOMAE'S LAW instead of OCP applies when the suffix-initial
 consonant is the voiceless aspirate /*t^h/*:

2sg. *á-bud-d^há^h* : 2pl. *á-b^hud-d^huam*.

It is strange that OCP is evoked only when the Laryngeal node of the suffix-
 initial stop has both [sg] and [vcd], while OCP blocking does not occur when
 the suffix-initial stop has just [sg].

- (12) Historical background:

Indo-Iranian	Indo-Aryan	/a-bud ^h -s-(H)ás/ ao.
* <i>t</i> : * <i>d</i> : * <i>d^h</i> (3-way) + *(^(h) H)	<i>t</i> : <i>t^h</i> : <i>d</i> : <i>d^h</i> (4-way)	a-[<i>bud^(h)]-d^hHás</i>
markedness of [sg]	markedness of [sg]	\ / [sg] [sg]
markedness of [vcd]	markedness of [vcd]	→ <i>á^hudd^há^h</i>

- (13) Exceptional cases:

- i) *á^hud^há* (Brāhmaṇa+) pf.2sg. of √*ah* 'say' < **ad^h-*; Schindler (1976:624f.) 'a
 relic form reflecting an earlier stage at which BL did not apply to /DHTH/.'²

root	class	UR	SR
ii) √ <i>dah</i>	II	/ <i>duḡ^h+ -té/</i>	<i>duḡ^hé</i>
√ <i>d^hā</i>	III	/ _{RED} <i>da-d^h(h₁) + té/</i>	<i>d^há^hé</i>

d^had- is an allomorph of the reduplicated stem *da^h-* (Pāṇini Aṣṭ.8.2.38,
 Schindler 1976:628).

- iii) *-hā* imperatives. *duḡ^há* and not **d^hig^há^h*.

- (14) Possible examples of featural correspondence of retroflexion:

RV⁴ *prc-[pač]* ao.inj. 'reached' : RV¹ *abhá-[nač]* ao.inj. 'reached'
pru [pač]yate pr.3sg. 'perishes' : *pru [nač]yati* fu.3sg. 'will perish'
 RV [*pač]á* pr.3sg. 'crushes' : RV [*pač]á* pr.inj.2.3sg.

²Wackernagel (1896:187) "Wegen der Schwesterformen mit Cerebral wollte man auch *pinák*
dasáti dahati cerebrialsch sprechen, tat es da aber nochedrungen auf einer früheren Silbe"

(15) Conclusion

- i) Proto-Indo-Iranian 3-way stop system → Indo-Aryan 4-way system →
 Modest markedness of stop voicing (Indo-Aryan innovation)
 ii) Treating verbal roots as featural domain (Indo-Aryan innovation)

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Reference

Beckman, Jill. 1998. *Positional Faithfulness*. Dissertation, UMass.
 Cassinjee, F. and C. Kisseberth. 1998. "Tonal Variation Across Emakhuwa Di-
 alects", ROA-289.
 Cowgill, Warren. 1965. "Evidence in Greek," in Winter, W. ed., *Evidence for*
Laryngeals. The Hague.
 Hoffmann, Karl and Bernhard Forssman. 1996. *Avestische Laut- und Flexion-*
slehre. Innsbruck.
 Kiparsky, Paul. 1973. "On comparative linguistics: The case of Grassmann's
 Law", *Current Trends* 11.
 Lombardi, Linda. 1991. *Laryngeal Features and Laryngeal Neutralization*. Disser-
 tation, UMass.
 Lombardi, Linda. 1995a. "Laryngeal neutralization and syllable wellformedness",
Natural Language and Linguistic Theory 13.
 Lombardi, Linda. 1995b. "Restrictions on direction of voicing assimilation: an
 OT account", *University of Maryland Working Papers in Linguistics*.
 Mayrhofer, Manfred. 1986. *Indogermanische Grammatik: I-2 Lautlehre*. Heidel-
 berg.
 Mالدhert, H. Craig. 1994. *Anatolian Historical Phonology*. Amsterdam and Ar-
 lanta.
 Phelps, E. 1975. "Sanskrit Diaspirates", *LI* 6. 447-464.
 Rhee, Seok-Chae. 1998. *Aspects of Release and Nonrelease in Phonology*. Disser-
 tation, UTUC.
 Sag, Ivan A. 1974. "The Grassmann's Law Ordering Pseudoparadox", *LI* 5. 591-
 607.
 Sag, Ivan A. 1976. "Pseudosolutions to the Pseudoparadox: Sanskrit Diaspirates
 Revisited", *LI* 7. 609-622.
 Schindler, Jochem. 1976. "Diachronic and Synchronic Remarks on Bartholomae's
 and Grassmann's Laws", *LI* 7. 622-637.
 Wackernagel, Jacob. 1896. *Altindische Grammatik. I Lautlehre*. Göttingen.
 Zoll, Cheryl. 1998. "Positional asymmetries and licensing", ROA-282.

