*Fiat Lingua*

Title: Some aspects of the phonology of Ajitorujan

Author: And Rosta

MS Date: 05-16-2016

FL Date: 07-01-2016

FL Number: FL-00003A-00

Citation: Rosta, And. 2016. "Absolutive Descriptives." FL-00003A-00, *Fiat Lingua*, <http://fiatlingua.org>. Web. 01 July 2016.

# Some aspects of the phonology of Ajitorujan

And Rosta (2016 [1987])

Published here as a historical curio is a facsimile of a first-year undergraduate assignment I wrote in early 1987 on the phonology of a friend's invented language. For the module *Introduction to phonetics & phonology B*, taught by Michael Ashby (at ucl), the student had to do three essays. I did mine on 'A cross-linguistic survey of the cooccurrence of approximants and fricatives at the same place of articulation', 'Current innovations in the vowel system of RP and the future effects of l-vocalization' and 'Some aspects of the phonology of Ajitorujan', the last of these being the one presented here. I suspect there must have been prescribed word-limits of about 1600 words per essay: this would account for the highly compressed character of the essay, its complete lack of any exemplification whatever and its consequent impenetrability. As far as I recall, we had completely free choice of topic, though it may have been that, as I often did, I negotiated topics of my own choice regardless of what had officially been set. Michael Ashby, renowned as a gifted teacher of phonetics, and a man of much mansuetude and temperateness, was considerably nonplussed by the essay, a perplexity that any reader of it surely cannot help but share; for the module, he awarded me a bare pass grade, which, when I, myself perplexed at how the essays' manifest excellence could have escaped recognition, approached him about it, he explained as a compromise between a first and a fail, a judgement that I now find myself rather in full agreement with, though if a student of mine had produced such work I would have tried to avoid grading it and to instead invite the student to redo it to mitigate some of its defects.

The invented language whose phonology the essay is about was at that time called *Ajitolujan*, in its romanization of that period, *Ajitorujan* in the romanization used in the essay, [æjɪt̪ɔɹʊˈjɑn]. The discrepant romanization was due to my failure to apprehend that a primary allophone of this ⟨l~r⟩, described in the essay as [ɰ~ʁ~ɣ̞][1] (i.e. [ɰ~ʁ~ð̞ˠ] in 2016 symbols), was in fact a velar lateral approximant, [ʟ], the symbol for which was not incorporated into the ipa until 1989 (though it appears in Wells (1982: 551), a work which I had come into possession of by the time of the composition of the essay). Subsequently the name of the language transmogrified, through the accelerated diachrony that it enjoyed in its singleton speech community, to *Ʒaitolujan* [jæθɔˈɥæ], which is mentioned, re-romanized by me as *Yathoyua*, in an early post by me to Conlang list (25 July 1991),[2] and then latterly to *Namjuan* ['ðɐb jə], under which name it has occasionally been mentioned by me on that list in more recent decades.

Ajitolujan's author, or 'glossatect', as I termed him in the essay, in a term that I promptly forgot I'd ever used, and which Google finds no evidence of any other use of, was Leo Marshall (1965–). I first met Leo in 1980; meeting again next in 1982, we discovered, among many other affinities, our shared interest in inventing our own personal language, and formed a very close friendship that lasts to the present day, though nowadays Namjuan has for many a year been dormant.

reference Wells, J.C. (1982) *Accents of English*, Vol 3: *Beyond the British Isles*. London: Longman.

1 It looks as though [ʁ̞] or [ɣ̞] was written, rather than [ɣ̞], to signify a uvular approximant, but I don't recall any then-current value for [ʁ̞] or [ɣ̞] that would have made it a plausible notation for that.

2 "For the **sui-generis** **gratia-artis** language fans (**_glossapoeicists_?**): the Dhamiathua text promised before the offical [*sic*] inception of CONLANG" it begins…

# Some Aspects of the Phonology of Ajitorujan

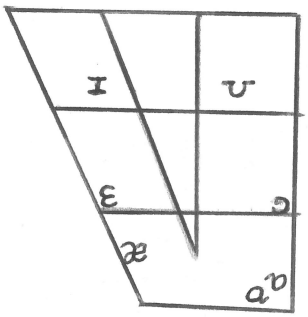
Ajitorujan is a non-natural language. It has been invented with as much purpose as any other art, and has only one speaker. These facts do not, however, deprive this essay of phonological interest. Since the interest of the genitor and speaker of this language has always been lexical-semantic, the syntax is of an Indo-European character and the phonology is a purely incidental byproduct of the glossatectural process. The phonology has not hitherto been investigated, described or formalized. Although the language has been invented, the phonology has evolved. The phonology, as in a natural language, is in a diachronically fluid state (this study is strictly synchronic). The speaker has competence but no understanding of the phonology. Nor does he have any knowledge of phonetics or phonology in general. Interestingly, he has a formal understanding only of the spelling, which only reveals the pronunciation after the application of complex spelling rules and then the application of the sandhi rules on the morpheme in isolation. It is remarkable that these rules have been unconsciously constructed. For example, all phonemes with a velar component in their articulation undergo metathesis with a preceding /x/ (rule 18). The speaker and glossatect did not know that all these sounds shared this common velarity: he was unaware that a generalization existed that unified these various metathetical rules. In addition, Ajitorujan has some very unEnglish phones, e.g. [ɳ], whose unpronounceability to the English tongue is attested by newsreaders' pronunciations of the name of the president of Libya; [ɯ̟~ʁ̞~ʁ̟] (which for historical reasons the speaker conceptualizes as a liquid L-sound); and [ɔ], which has the quality of Italian /ɔ/.

The pattern of phonemes (fig. 1) seems to be one that

might well be found in a natural language, particularly the pattern of plosives. The consonant inventory is closer to the archetype proposed in Patterns of Sounds (Maddieson, 1984) than, for example, English or French.

fig. 1

| | | | |
|---|---|---|---|
| $p^h$ | $t^h$ | | $k^h$ |
| | | | q |
| b | d | | |
| m | n | | |
| f | s | | x |
| | z | | |
| | j | ɰ | w |




In giving binary features for each phoneme one could either give as full a phonetic description of the primary allophone as possible, specifying + or - for every feature that can be found in the literature, or one could simply list the features necessary to distinguish one phoneme from another. By the latter method phonetic specifications of the primary allophones would have to be got elsewhere. I have limited the features to the minimum necessary for the sandhi rules. The number of features used overall is inversely proportional to the number of features that need to be specified for a particular segment or set of segments. I have opted for economy of overall features, so, for example, sonorant/obstruent has been subsumed by ± consonantal, ± nasal, and ± continuant. In the sandhi rules the minimum number of features necessary to define a segment or set of segments

are used. In listing features for the inventory all negative features that are nonredundant and serve to distinguish the phoneme from other phonemes, and all positive features are given.[1] Therefore all unspecified features will either be implied by those specified, or otherwise be negative. An example of redundant features is [+cons, +cont] when [±strid] is specified. An example of a specified nondistinctive feature is [±asp], which is subject to sandhi rules. (Aspiration is used as a phonetic distinction between /k/, which is aspirated, and /q/. which is unaspirated: cf fig. 1.)

I have followed the amendments in Lass (1984) to the features for consonants proposed in The Sound Pattern of English (Chomsky and Halle, 1968), but have retained SPE's binarity for vowels. I have adopted ± oral (and the treatment of [h] and [ʔ]) proposed by Lass, and have retained SPE's ± vocalic in preference to ± syllabic, since syllabicity is very indeterminate in Ajitorujan.

The following features are used:

1. ± consonantal
2. ± vocalic
3. ± oral
4. ± coronal
5. ± high
6. ± back
7. ± low
8. ± round
9. ± nasal
10. ± continuant
11. ± voice
12. ± strident
13. ± aspirated

The Phoneme Inventory

/b/ [+oral, -cor, -nas, -cont, +voice]

/p/ [+oral, -cor, -back, -nas, -cont, -voice, -asp]

/d/ [d̪] [+cor, -nas, -cont, +voice]

/t/ [t̪] [+cor, -nas, -cont, -voice, +asp]

/k/ [+high, +back, -cont, +asp]

/q/ [-high, +back, -cont, -asp]

/m/ [-cor, +nas, -cont, +voice]

/n/ [n̪] [+cor, +nas, -cont]

/f/ [+cons, +oral, -cor, -back, +cont, +strid] /s/ [+cons, +cor, +cont, -voice, +strid] /z/ [+cons, +cor, +cont, +voice, +strid] /x/ [+cons, +high, +back, +cont, -strid]

/j/ [-cons, -voc, +high, -back, +cont, +voice] /w/ [-cons, -voc, +high, +back, +round, +cont, +voice] /r/ [ɰ] [-cons, -voc, +high, +back, -round, +cont, +voice]

I have used /r/ to represent /ɰ/ because of the similarity of its allophones to the uvular continuants used for /r/ in many accents of French and German, and to a velarized alveolar approximant, and also because roman letters can be typed. After the sandhi rules have operated on /r/ it has freely varying allophones: [-cons, -voc, +high, +back, +cor, -round, +voice]

/i/ [ɪ] [+voc, +high, -back, -round] /e/ [ɛ] [+voc, -high, -low, -back, -round] /a/ [æ] |+voc, +low, -back, -round|

/ɑ/ [ɑ] [+voc, +low, +back, -round] /ɒ/ [ɒ] [+voc, +low, +back, +round] /o/ [ɔ] |+voc, -high, -low, +back, +round|

/u/ [ʊ] [+voc, +high, +back, +round]

These phonemes and their allophones violate both biuniqueness and the assumptions of Joseph Greenberg:

> In some cases, a particular allophone of a phoneme may be looked upon as basic compared to one or more others. I believe that it will always turn out that the basic variant is the most frequent, but since frequency counts are always made in terms of phonemes rather than allophones, there are not available data. An alternative method for accounting for this choice is that the non-basic allophone occurs in environments which share specific features with

the allophone, i.e. are assimilative, while the basic allophone is independent of its environment.[2]

The realization of both /pq/ and /px/ as [ph] illustrates both these violations: [q] for /q/ only occurs intervocalically (or utterance initial or final); one of its allophones, [h], is much more frequent, but the phoneme realized by [h] cannot be recovered by phonological inference alone. Greenberg could dismiss the evidence of a non-natural language, but violating biuniqueness is not an unnatural phenomenon; cf German [t]#, which can be the realization of /t/ or /d/. Greenberg's alternative method does not account for all non-basic allophones in Ajitorujan (e.g. [ʔ] for /q/).

Secondary allophones are motivated by the adjoining phonemes. The rules that determine this operate firstly morpheme internally and then at the adjunction of morphemes and of words. Therefore the sandhi rules also cover the realizations of underlying forms. The rules are formulated with the aim of minimizing their number, aiming at one rule per affected segment, or set of segments. The formalization is functional and descriptive rather than analytic. However, I shall list the phonological processes involved in the rules. 'i-iv' indicates position in the vertical sequence of processes combined in square brackets.

Progressive assimilation: 6, 9ii, 25, 2 (because $\begin{bmatrix}+\text{cor}\\-\text{cont}\end{bmatrix}$ phonemes are dental)

Regressive assimilation: 1i, 7, 8, 10, 12ii, 13ii, 14ii,iii, 26ii

Progressive dissimilation: 5

Regressive dissimilation: 13i

Fortition (unmotivated by assimilation or dissimilation)

by desonorization: 19

by closing: 23

Lenition[3] (unmotivated by assimilation or dissimilation)

by opening: 12iv, 16ii, 21

Deletion: 1ii, 3, 4, 9i, 11, 12i, 14i, 16i, 17, 20, 22, 24, 26i

Metathesis: 18

Apart from deletion or reordering, the rules have the form

A: /X/→[Y](allophony) or B: /X/→/Y/.
A: 2, 7, 8, 10, 12iii,iv, 13i,ii, 14iii, 16ii, 21, 23
B: 1, 5, 6, 9, 12ii, 14ii, 19, 26ii

Phonotactics

The parameters of the underlying phonemic representation of a syllable are $/C/_0^\infty$ V $/C/_0^\infty$, because the sandhi rules will delete segments until they conform to realizable sequences. The phonetic parameters are $[C]_0^2$ V $[C]_0^3$. Permissible clusters are expressed by their simplest phonemic representations. All nonvocalic phonemes may begin or end a syllable alone.

Initial clusters:

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | sk | | | |
| pq | bq | tq | dq | | | | sq | | | |
| px | bx | tx | dx | kx | | | sx | | wx | rx |
| pj | bj | | | | nj | fj | | | | |
| pw | bw | | | qw | | fw | sw | | | |
| pr | | | | kr | qr | | fr | xr | | |

Final clusters: ts kx qq ns sk wt mps

Vowels

The syllabicity of vowel sequences is indeterminate. Below are the possible sequences.

| $+^4$/V/~/V/+~/C//V//C/ | | | | +/V/~/C//V//C/ | | | | /C//V//C/ |
|---|---|---|---|---|---|---|---|---|
| i | ii | iei | eeia | e | ie | eia | eeia | ai |
| a | ia | eii | eeio | a | ia | eiɒ | eeiɒ | |
| o | io | eia | eeei | ɒ | iɒ | aie | | |
| u | iu | eio | oiei | | ae | aiɒ | | |
| | ei | eiu | uiei | | aɒ | oie | | |
| | ee | aii | | | oe | oia | | |
| | ao | aia | | | oa | uie | | |
| | oi | aio | | | oɒ | uia | | |
| | oa | aiu | | | ue | | | |
| | oo | aei | | | ua | | | |
| | ou | oia | | | uɒ | | | |
| | ui | oio | | | | | | |
| | ua | oei | | | | | | |
| | uo | uia | | | | | | |
| | uu | uei | | | | | | |

There are three allophonic rules for vowels, which don't operate over morpheme boundaries. Phonetic symbols are used to avoid having to introduce ± front and to avoid the methodological problems of a 4-height vowel system (see Lass 5.3.2.3, 6.2). Rule A operates before B.

A: $\alpha[+\text{voc}] \longrightarrow [\text{ə}] / \alpha[+\text{voc}] \_\_\_\_ \left\{ \begin{matrix} [-\text{voc}] \\ + \end{matrix} \right\}$

B: /i/ ⟶ Ø//o/___/o/

C: /i/ ⟶ [e] / ___ [+voc, +low, -round]

In a formulation of a group of processes such as sandhi, the number of rules, the complexity of a rule and the restrictions on the sequencing of rules will all be inversely proportional to each other. The principle I have followed is that if increasing the complexity of a rule has the result that a rule can be unordered then greater complexity is preferred, but increasing complexity is not preferred if it has the result only of reducing the restrictions on the rule's position in the operating sequence. I have aimed for the minimum number of rules.

The sandhi rules are in five groups. The rules in group A are not sequenced with respect to other rules. The rules in group B must apply before the rules in group C. Groups C and D must operate before E.

$$\left.\begin{matrix} B \\ \begin{matrix} C \\ D \end{matrix} \end{matrix}\right\} > E$$

Sandhi rules

A

1. /t/ ⟶ [/d/, Ø] / ____ [[+cor, +cont, -strid, +voice], [+cor, +cont, -strid, -voice]]

2. [+cor, +strid, αvoice] ⟶ [+cor, +cont, -strid, αvoice] / [+cor, -cont] ____

3. α[+cor, +cont, -strid, -voice] ⟶ Ø / α ____ /k/

4. [+cor, -cont, -nas] ⟶ Ø / ____ /r/

5. $\alpha\begin{bmatrix}-\text{back}\\-\text{nas}\\-\text{cont}\end{bmatrix} \longrightarrow \alpha[\pm\text{voice}] \;/\; /f/\;\_\_\_\_$

6. $\alpha\begin{bmatrix}-\text{cor}\\-\text{back}\\-\text{nas}\\-\text{cont}\end{bmatrix} \longrightarrow \alpha[\beta\text{voice}] \;/\; \begin{bmatrix}+\text{cor}\\+\text{strid}\\\beta\text{voice}\end{bmatrix}\;\_\_\_\_$

7. $[\pm\text{voc}] \longrightarrow \begin{bmatrix}+\text{voc}\\+\text{nas}\end{bmatrix} / \_\_\_\_ \left(\begin{bmatrix}+\text{voc}\\+\text{nas}\end{bmatrix}\right) (/n/) \left\{\begin{matrix}/k/\\/f/\end{matrix}\right\}$

8. $[\pm\text{voc}] \xrightarrow{\text{OPT}} \begin{bmatrix}+\text{voc}\\+\text{nas}\end{bmatrix} / \_\_\_\_ \left(\begin{bmatrix}+\text{voc}\\+\text{nas}\end{bmatrix}\right) (/n/) \begin{bmatrix}+\text{cor}\\+\text{cont}\\-\text{strid}\\-\text{voice}\end{bmatrix}$

9. $/n/ \longrightarrow \begin{bmatrix}\emptyset\\/m/\end{bmatrix} / \left[\begin{matrix}\left\{\begin{matrix}\_\_\_\_\; /m/\\ \begin{bmatrix}+\text{voc}\\+\text{nas}\end{bmatrix}\;\_\_\_\_\end{matrix}\right\}\\ \begin{bmatrix}-\text{cor}\\-\text{back}\\-\text{cont}\\-\text{nas}\end{bmatrix}\;\_\_\_\_\end{matrix}\right]$

10. $/f/ \longrightarrow \begin{bmatrix}+\text{strid}\\-\text{cor}\\+\text{voice}\end{bmatrix} / \_\_\_\_ /z/$

11. $\begin{bmatrix}-\text{oral}\\+\text{cont}\end{bmatrix} \longrightarrow \emptyset \;/\; [-\text{voc}]\;\_\_\_\_\;[-\text{voc}]$

B

12. $/q/ \longrightarrow \begin{bmatrix}\emptyset\\/x/\\\begin{bmatrix}-\text{oral}\\-\text{cont}\end{bmatrix}\\\begin{bmatrix}-\text{oral}\\+\text{cont}\end{bmatrix}\end{bmatrix} / \_\_\_\_ \left[\begin{matrix}/k/\\/x/\\\left\{\begin{matrix}\begin{bmatrix}+\text{cons}\\+\text{oral}\\-\text{high}\end{bmatrix}\\\begin{bmatrix}-\text{oral}\\-\text{cont}\end{bmatrix}\end{matrix}\right\}\\\left[\begin{matrix}\begin{bmatrix}-\text{cons}\\-\text{voc}\end{bmatrix}\\\left\{\begin{matrix}-\text{back}\\+\text{low}\end{matrix}\right\}\end{matrix}\right]\end{matrix}\right]$

13. $/x/ \longrightarrow \left[\begin{matrix}\begin{bmatrix}-\text{oral}\\+\text{cont}\end{bmatrix}\\\begin{bmatrix}+\text{cor}\\+\text{cont}\\-\text{voice}\\-\text{strid}\end{bmatrix}\end{matrix}\right] / \_\_\_\_ \begin{bmatrix}/k/\\\begin{bmatrix}+\text{cor}\\-\text{nas}\\-\text{cont}\end{bmatrix}\end{bmatrix}$

14. /d/ ⟶ [ Ø, /t/, ∝ ] / ____ [ /f/, [ +cons, +back, {[+cont], [-high]} ], ∝ [ +cor, +cont, -strid, -voice ] ]

15. /dd/ ⟶ /t/

C

16. /q/ ⟶ [ Ø, [-oral, +cont] ] / [ [-oral, -cont], [ -voc, {[-back], [+high]} ] ] ____

17. ∝ [-voc] ⟶ Ø / ____ ∝

18.

| | 1 | 2 |
|---|---|---|
| SD: | [-voc, +high, +back] | /x/ |
| SC: | 2 | 1 |

D

19. /b/ ⟶ /p/ / ____ [+cons, +oral, -cor, +cont]

20. [+cor, +strid] ⟶ Ø / ____ [+cor, +strid] /k/

E

21. /x/ ⟶ [-oral, +cont] / [+cons] ____

22. /k/ ⟶ Ø / [+cor, +strid] ____ {[-cont], [+strid]}

23. ∝ [-back, -cont] ⟶ ∝ [-asp] / ____ [-cont]

24. [+cor, -nas, -cont] ⟶ (OPT) Ø / ____ [-cont]

25. $[+cor] \longrightarrow \begin{bmatrix} +cor \\ +strid \\ \alpha voice \end{bmatrix} / \begin{bmatrix} +cor \\ -strid \\ \alpha voice \end{bmatrix} \_\_\_\_$

26. $/r/ \longrightarrow \begin{bmatrix} \emptyset \\ \alpha \end{bmatrix} / \left[ \left\{ \_\_\_\_ \begin{bmatrix} -nas \\ +cor \\ -cont \end{bmatrix} \right. \right.$

$\left. \left. \begin{bmatrix} +cor \\ +strid \end{bmatrix} ( [+voc] ) \_\_\_\_ \right\}$

$\_\_\_\_ \alpha \left\{ \begin{bmatrix} +cons \\ +nas \end{bmatrix} \right.$

$\left. \begin{bmatrix} +cor \\ +strid \end{bmatrix} \right\} \Big]$

Considering the complexity of Ajitorujan sandhi it is interesting to compare it to other languages noted for complex phonological processes of variation, Welsh and Sanskrit. Welsh has three simple schemes of word initial mutation, the Nasal Mutation, which nazalizes stops, and the Aspirate and the Soft Mutations which use lenition. Unlike Sanskrit or Ajitorujan the three mutations are triggered by particular lexical items. The Soft Mutation is also triggered by particular syntactic structures. The notorious difficulty of mastering the Welsh mutation system is not caused by how they function but by when they function.

Sandhi being of course a Sanskrit term, one might expect Sanskrit sandhi to be fairly extensive, and to be an exemplar of a loanguage whose phonology is characterized by sandhi. I have formulated most of the sandhi rules that operate over word boundaries. On the whole the Sanskrit rules equal Ajitorujan in complexity and number, though they are more consistently phonologically explicable in general and assimilative in particular.

An A rule operates before a B rule.
$\begin{bmatrix} +voice \\ +asp \end{bmatrix}$ is equivalent to $\begin{bmatrix} +voice \\ +murmur5 \end{bmatrix}$

1. $\begin{bmatrix} -cont \\ -nas \\ -voice \\ \alpha place \end{bmatrix} \longrightarrow \left[ \begin{bmatrix} -cont \\ -nas \\ +voice \\ \alpha place \end{bmatrix} \begin{bmatrix} +cont \\ +nas \\ \alpha place \end{bmatrix} \right] / \_\_\_\_ \# \begin{bmatrix} -nas \\ +voice \end{bmatrix} \begin{bmatrix} +cons \\ +nas \end{bmatrix}$

2Ai. $\begin{bmatrix}-\text{cont}\\-\text{nas}\\+\text{cor}\\-\text{voice}\\-\text{asp}\end{bmatrix} \longrightarrow \alpha \,/\, \underline{\quad} \,\#\, \alpha \left\{\begin{bmatrix}+\text{lat}\end{bmatrix}, \begin{bmatrix}+\text{high}\\-\text{back}\end{bmatrix}\right\}$

2Aii. $\begin{bmatrix}+\text{cor}\\+\text{nas}\end{bmatrix} \longrightarrow \begin{bmatrix}+\text{nas}\\\alpha\text{place}\end{bmatrix} \,/\, \underline{\quad} \begin{bmatrix}+\text{obst}\\+\text{high}\\-\text{asp}\\\left\{\begin{bmatrix}-\text{cor}\end{bmatrix}, \begin{bmatrix}+\text{cor}\\-\text{cont}\end{bmatrix}\right\}\end{bmatrix}$

2B. $\begin{bmatrix}+\text{obst}\\+\text{high}\\-\text{back}\\-\text{cor}\\+\text{cont}\end{bmatrix} \longrightarrow \alpha\begin{bmatrix}+\text{asp}\end{bmatrix} \,/\, \alpha\begin{bmatrix}+\text{obst}\\-\text{cont}\\+\text{asp}\\+\text{high}\\-\text{back}\\-\text{cor}\\-\text{voice}\end{bmatrix} \,\#\, \underline{\quad}$

3. $\emptyset \longrightarrow \alpha \,/\, \begin{bmatrix}+\text{voc}\\+\text{short}\end{bmatrix} \alpha\begin{bmatrix}+\text{cons}\\+\text{nas}\end{bmatrix} \underline{\quad} \,\#\, [+\text{voc}]$

4. $\left\{\begin{bmatrix}+\text{cons}\\+\text{voc}\\+\text{high}\\-\text{back}\\-\text{cor}\end{bmatrix}, \begin{bmatrix}+\text{obst}\\+\text{cont}\\+\text{cor}\end{bmatrix}\right\} \longrightarrow \begin{bmatrix}+\text{obst}\\+\text{cont}\\\alpha\text{place}\end{bmatrix} \,/\, \underline{\quad} \,\#\, \begin{bmatrix}+\text{obst}\\-\text{cont}\\-\text{voice}\\\alpha\text{place}\end{bmatrix}$

5. $\begin{bmatrix}+\text{obst}\\+\text{cont}\\+\text{cor}\end{bmatrix} \longrightarrow \begin{bmatrix}+\text{cons}\\+\text{voc}\\+\text{high}\\-\text{back}\\-\text{cor}\end{bmatrix} \,/\, \begin{bmatrix}+\text{voc}\\-\text{low}\end{bmatrix} \underline{\quad} \,\#\, [+\text{voice}]$

6A. $\begin{bmatrix}+\text{voc}\\+\text{short}\end{bmatrix} \longrightarrow \begin{bmatrix}+\text{voc}\\+\text{long}\end{bmatrix} \,/\, \underline{\quad} \,/\text{r}/\,\#\, /\text{r}/$

6B. $/\text{r}/ \longrightarrow \emptyset \,/\, \underline{\quad} \,\#\, /\text{r}/$

7A. $/\text{h}/ \longrightarrow \begin{bmatrix}+\text{asp}\\+\text{voice}\\\alpha\text{place}\end{bmatrix} \,/\, \begin{bmatrix}+\text{obst}\\-\text{cont}\\-\text{voice}\\-\text{asp}\\\alpha\text{place}\end{bmatrix} \,\#\, \underline{\quad}$

7B. $\alpha\begin{bmatrix}+\text{obst}\\-\text{cont}\\-\text{voice}\\-\text{asp}\\\beta\text{place}\end{bmatrix} \longrightarrow \alpha[+\text{voice}] \,/\, \underline{\quad} \,\#\, \alpha\begin{bmatrix}+\text{voice}\\+\text{asp}\\\beta\text{place}\end{bmatrix}$

## NOTES

1. Some positive features have been omitted.
2. Joseph Greenberg Language Universals, 1966
3. Deletion can of course be taken as the most extreme form of lenition.
4. i.e. morpheme boundary
5. See Lass 5.3.8.

## BIBLIOGRAPHY

Awbery, G.M. Welsh in Language in the British Isles, 1984 Ed. Peter Trudgill

Gonda, Jan A Concise Elementary Grammar of the Sanskrit Language, 1966, tr. Gordon B. Ford Jr (very opaquely)

Ladefoged, Peter A Course in Phonetics, 1982

Lass, Roger Phonology, 1984

Halle, Morris & Clements, G. N. Problem Book in Phonology, 1983 (in the form of a photocopied extract issued as a lecture handout)