# Interpreting Panini

# Two

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# In retrospect

In 1984 I had completed the final draft of my book "Panini: His description of Sanskrit", Published later in 1991. In chapter 14 dealing with '**ru** and its variants' I wrote as follows.

> "To account for phonological changes in place of word final **s** and in place of the final segments of certain other items discussed in (8266) etc. and in (831) etc., he introduces a hypothetical segment **r** represented lexically as **ru** to distinguish it from the segment **r** included in the inventory of basic phonological segments. It changes to **u, y**, **visarjaniya** or is retained in particular environments stated by Panini. However, we eschew their mention here. The **r** (=**ru**) changes to **u** (61111-12) e.g. **devas gacchati** becoming **devo gacchati** 'Deva goes' where **s** of **devas** becomes **r** which changes to **u** and combines with the preceding a to give o; becomes y (8317) which is dropped (8322). Thus in a way **ru** is elided here. For example, in **balas hasanti**, **s** changes to **ru** which changes to **y** and dropped finally. It gives **bala hasanti** 'The children laugh'. The **ru** grouped with **r** is dropped before another **r** (8314); e.g. **kavis ramate** changes to **kavir ramate** and then to **kavi ramate** 'The poet enjoys'; **punar ramate** to **puna ramate** 'he enjoys again'. Here the vowel preceding the **r** which is dropped, is lengthened (63110). Again **ru** forming a group with **r** changes to **h** (**visarjaniya**) (8315), **vrksas**

**patati** becomes **vrksar patati** and then **vrksah patati** 'the tree falls'; **ayati devas** becomes **ayati devar** and then **ayati devah** 'Deva comes'; **punar karoti** becomes **punah karoti** 'he does again' and **karoti punar** becomes **karoti punah** etc. Elsewhere **ru** as also **r** are retained; e.g. **agnis dahati** becomes **agnir dahati** 'the fire burns'; **haris atra** becomes **harir atra** 'Hari is here' etc. **sadhus atra** becomes **sadhur atra** 'the good man is here', **dur-gama** 'inaccessible'; **nir-yati** 'goes out', etc.

In the examples discussed above the hypothetical **r=ru** changes to **u, y, r** and **h** (**visarjaniya**). Of these **h** is a new segment while all others are in the basic inventory. Thus **s** and some other segments (all included in the basic phonological elements) change to a new phonetic element ***visarjaniya*** through a hypothetical segment, phonetic value of which is never defined by Panini. It is indeterminate.

In turn the element **visarjaniya** changes to **'x, F'** (velar and labial voiceless fricatives respectively) (8337) e.g. **vrksah kampate** becomes **vrksa x kampate** 'the tree shakes'; **padapah patati** becomes **padapa F patati** 'the tree falls' etc., changes to **s** (8339 etc) e.g. **sarpih-kalpam idam** changes to **sarpiskalpam idam** 'it is like ghee'; **sarpih-pasam idam** changes to **sarpispasam idam** 'it is bad ghee'; changes to **s,** e.g. **suryah tapate** becomes **suryas tapate** 'the sun shines bright'; **sobhanah candrah** becomes **sobhanas candrah** and then **sobhanaš**

**candrah** 'the moon is beautiful'; or is retained as such as in **balah ksiram pibati** 'the child takes milk' etc.

Panini exploits **ru** to account for some other phonological changes also in the language. It causes optional or obligatory nasalization of the vowel preceding the segment it replaces (832-3). Take the expression **bhavan tarati** 'you go across, swim'. Here the word-final **n** is replaced by **ru=r** (837) and the preceding **a** is obligatorily nasalized (833). Thus we have **bhavaṁr tarati**. Now **r** changes to **h** (8315) and then to **s** (8334). Thus finally we have **bhavaṁs tarati**. So also **mahan asi** changes to **mahaṁr asi** where **r** changes to **y** by 8317 and **y** being dropped by 8322 as indicated above.

Postulation of **ru** helps Panini to explicate yet another phenomenon. The segment **anusvara** is introduced as an augment after that vowel which has not been nasalized in terms of 832 (834). In the example discussed above nasalization of **a** in **bhavan** is optional. We may instead have **anusvara** (symbolized as ṁ here) after the vowel **a.** Thus **bhavan tarati** first changes to **bhavar tarati** and then to **bhavaṁ tarati.** Similarly we have **puṁs kokila** 'a male cuckoo'; **kan kan** 'which is which' becomes optionally **kaṁskan** or **kanskan** (8312) etc.

Confronted with phonetically divergent facts of the language, Panini decides to invoke from the blue, as if, the infallible missile in the form of **ru (=r)** of indeterminate

> phonetic nature to explicate these facts. He manipulates it to his satisfaction to replace such diverse segments as **s, s, m, n** and **d** and in turn to be replaced by more divergent elements such as **r, y, u, h, s, x, F** besides causing nasalization of vowel or inducting the segment **anusvara** after the vowel preceding the segment replaced by it. No strategy seems mean if it helps you get out of the unseemly situation, and no scruples need be heeded to when one finds himself helpless. Is **ru** a symbol of desperation?" (PP 393-95).

Prof. David Stampe, Ohio State University, Columbus, Ohio (now University of Hawaii) going over the draft as he noticed my observations with regard to **ru**, remarked in all earnestness that I had done grave injustice to Panini.

I had no answer to that. There was no question of my defending what I had said. I honestly confessed that I could not make any head or tail why Panini had postulated an entity like **ru**, totally unrelated to facts of language, to explicate certain phonological alternations. And tradition was completely silent about it. His commentators bypassed it as if it posed no problem. Under these circumstances my observations, I admitted, were expressions of my inability and helplessness in interpreting **ru** in any meaningful way.

I could not do anything. My observations were printed as part of the above book.

Time passed. But professor Stampe's remarks would keep

recurring to me. Imperceptibly a sense of guilt overwhelmed me. But how could I help myself? The mystical **ru**, I felt, was beyond my comprehension. It defied all solutions. The problem was simmering as if inside me. I was not lucky to have any new flash of light.

In the meantime we had moved to California. One day I put aside the work in had and decided to work on the problem of **ru** afresh and in all earnestness.

In Panini's treatment of **ru** two ends are clearly visible viz. linguistic data i.e. phonological alternations and environments of their occurrence, on the one hand and explanatory (structural) statements, on the other. What is missing there in his account is the trail that leads him to formulation of network of structural statements.

In my reappraisal of the problem, facts of language are described in the Introduction. These are presented there in tabular form also. I manipulated these in three or four different ways to see if I could retrace the way Panini followed in evolving (building up) the explanatory apparatus. But to no avail.

My approach had been a matter-of-fact one, keeping very close to linguistic facts all the time. I was working within the closed circuit of data. I realized it was a piecemeal approach. It was certainly not the way Panini addressed himself to the problem.

Panini, on the other hand, as I looked closely into his structural statements, dealt with this particular body of data in a larger and

broader context. He obviously had set his eyes on evolving an overall integrated account of the language and any particular set of data simply constituted a piece that had to be fitted into this mosaic. I needed, thus, to understand this truth and proceed to interpret structural statements accordingly in a larger context. The results of my efforts in this direction are presented in (a) **abstract schema** under **Panini's approach** and in (b) From **abstract to concrete.**

I have discussed here other related issues also. At the end I have explained and interpreted Panini's statements dealing with **ru**. It is now for other students of Panini to examine and review treatment of **ru** presented here.

# Acknowledgement

I express my heartfelt gratitude to Dr. Baldeo Singh, vyakarnacarya, with whom I read the manuscript and to Dr. Som Pal for preparing camera-ready copy of the manuscript. This task is arduous enough in itself and it becomes a little more taxing when it has to be done and redone to achieve some sort of excellence. It tries one's endurance. Dr. Som Pal cheerfully undertook to accomplish it. Dr. Arvind Rana scrutinized the final version and prepared the press copy. I appreciate his skill, technical and pragmatic.

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# Introduction

Structural description of a language involves analysis of its discourses, the only appropriate units of language for purposes of analysis, successively into constructions at various levels of linguistic organization. The analytical process comes to a halt at some level down the road where constituents no more succumb to further break-up.

Units of constructions at different levels, as set up by an analyst, may show different phonological shapes. For instance, the syntactic constructions, forming part of one discourse or the other, nm dv>y š nms t>ym ú nmx cN>msú ixvay nm š nmy AaidTyayú nm AaidTya y etc. are analyzed into constituents nmú dv>y"ú nms ú t>ym , nmx , cNdms, ixvayú nm", nmy ú AaidTyayú nmú AaidTyay etc. Here the constituents nm, nms š nmx , nm, nmy , nm etc are regarded as different phonological realizations of the same unit.

It may be asked: What is the phonological shape of the constituent considered 'the same'? It is a question that cannot be dealt with in passing. We, thus, better postpone its consideration at this occasion. Moreover, its discussion is not germane to the problem to be considered here. It is sufficient to know at this stage that Panini recognizes nms as basic that underlies all of these forms including nms itself. The final s of nms appears variously as sš xš yš £š .š ivsjnty etc. in different contexts. All these realizations of s are interrelated via a network of phonological processes in a regular and systematic way.

There are a few more segments that are regarded pada-final by Panini.

In the present study we discuss phonological alternations of speech segments s z d n m occurring finally in particular basic pd forms, identified variously by Panini in (8266-75) and (831-12) along with their respective environments.

Before we examine how Panini deals with the problem, we shall like to survey linguistic facts viz. syntactic constructions in which pds ending in these segments participate, their relevant environments and various alternations these show.

It may be pointed out that facts of language, we propose to notice below, are such which are in conformity with his structural statements and linguistic data contained in them. We believe Panini's structural statements are based on facts arrived at by him on scrutiny of appropriate syntactic constructions similar to ones proposed by us.

# Linguistic facts

## Alternation of pd final s

One of the pd final segments included in this group is s. There is an indefinite number of basic pd forms, nominal and verbal, ending in s , e.g. dvs , AiGns , vanrs , gam,ts , v/s , Ads , dds , prts , ins , drts etc. There are virtually no restrictions on their occurrence in syntactic constructions. Panini, thus has not to specify expressly environments in which these are found.

Underlined pds in the following constructions illustrate various alternations of s in their respective environments.

dvs trit
.ys Tvam kay inyo+yaim
AiGns tPyit kaîE
kn vym svaé ndts trm
jGms t sv rajs.m
gos t,aNyiÒ
gam,ts tät l inztdit

dvx crit
s/tx ccyit vdan
Ûox ckast
goé m<@kvadan AnadTy ipbit j lm
xrx ^adyamas n.E
l+m,x i^niÒ xp,%ayaE k,nasm

dvz $¢kt gamm
ixxz i$iÈ.m /rit
ASmai.z $ikta Eza p¤$ilka
AiGnz $km tapyit

dv£ • dv x ²Ntit padpm
AiGn£ • AiGn x k<@ .ast
v/£ • v/ x k◊xyain vS]ai, pir/Ò
iSqt/¢£ • iSqt/¢ x ikm p.azt
n◊£ • n◊ x kasar àvt
ixx£ • ixx x %Êam Ai/xt

v=£ • v= F ptit
AiGn£ • AiGn F pnrip /mayt
v=a£ • v=a F fliNt kal
.an£ • .an F pkaxt Vy¤iMn
sm›m Aap£ • Aap F pivxiNt
som£ sva A¤z/¢£ • A¤z/¢ F pZ,ait

bal£ =¢rm ipbit
viô£ =]m dhit
l+m¢£ =¢rsagrm Ai/vsit
ixx£ i=pit kNdkm £Cc£
v@van l£ Psait £di/m
päz£ Tsär Aym

jyt pyÓn Svkm mn£
n ktVy¤_] sxy£
pnr jayNt y mta£
inx;km ivcr r x×/¢£

mny£ • mnys ðaiNt pa; sy¤dyat
s%¢£ • s%¢s s%aym –C^it

svE • svs smthtsvm
vTsE • vTss iðöit matir
sv dozaE • dozas skLpjaE

ishE • ishx x;%lya b?yt
kasaraE • kasarax xZyiNt inda`
kakaE • kakax xBdayNt täz
AiGnE • AiGnx xaMyit
minE • minx xaiNtm AaPnoit

v×E • v×z îtvit y] t]
AiGnE • AiGnz z@ v=an dhit
.µE • .µz z<m%ay nmSkroit

v×o_ip tä,ayt Kvict
daä,o_ym kìE
s?yahtno_xicr ivpE
m`o gjit
yto vaco invtNt
grvo vNÛaE
iS]yo m?yas t svtE

dvy AgC^t or dv AgC^t
dvay AgC^n or dva AgC^n
.oy A] itî or .o A] itî€

vda>yaso ih ivpa,am ivixìm tp £Cyt
n ga ivhNyat
m`a gjiNt

Ai]r £vac
AiGnr dhit
/nr Aaklyit gopalE

ivZ,Œ svl0kr vNdnŒyŒ
ivZ,0r Axs t päzŒ
AiÙr ga]ai, x?yiNt
pa,ayamr dhd d0zan
£Tstdyr –m l0ka n kyam km cd Ahm

The following basic forms ending in s deviate diversely in their alternatives from the usual pattern displayed by forms given above.

(a) In ^Nds texts basic pd forms AMns 'secretly', ¤/s 'an udder'; Avs 'downward' (8270) and .vs when used to denote mhaVyaòit, the supreme invocation, (8271) ends alternately in r also.

The two alternate forms differ in their alternations only in environments involving voiced segments. Before voiceless consonants their alternatives are the same. E.g.
AMns Ev • AMn Ev or AMnr Evš

.vs –TyNtir=m ~ .vy –TyNtir=m • .v –TyNtir=m or
.vr –TyNtir=m etc.

(b) Basic pd forms from verb roots ending in s e.g. xas 'rule', ckas 'shine', ihs 'injure' etc. in l; II person singular are realized as Axas 'you ruled' Ackas 'you shone' Aihns 'you injured' etc. The final s here varies freely with d. (8274) Thus we have alternant pairs like Axas^ Axad. The pds ending in s conform to the usual pattern of alternating in diverse environments as illustrated above. Forms ending in d follow their own pattern. We need not describe that here.

(c) Derivatives are made from verbal stems by adding the

affix Kvs†vs in the meaning of il$ (32107-108) e.g. ji=vs ƒ‡Ad„, pipvs ƒ‡pä„š £psidvs ƒ£pˆsd„š £pxèˆvs ƒ£pˆè„ etc.

Also there are derivatives made from verb stems ñs 'fall', Ýs 'destroy' by adding the affix iKvp†ø , cooccurring with or without an £ppd (3276), e.g. ñs 'falling', Ýs 'destroying', £%äˆñs 'falling from the kettle', p,ˆÝs 'destroying leaves' etc.

Again verbal forms in il; , III sg. made from such verb roots as xäs , ckäs , ihs etc. are realized as Axäs 'he ruled', Ackäs 'he shone', Aihns 'he injured.

All these forms are pds ending in s. (Nominal derivatives in Kvs and iKvp are pds before certain affixes including most of the nominal inflectional affixes (1417)). In actual use, however, these occur with a final d. Thus s as basic ending is replaced by d for all time (8272). This group of pds forms exception to general patterning of alternations of basic forms of pd final s.

However, the verb form Aäs 'he was', l; , III e.g. from As 'be' is an exception. It retains its s and falls in the general pattern of alternations.

Thus it follows that all basic forms of pds ending in s , except those listed above, dsplay a general pattern of alternations of their final as displayed above.

## Alternation of basic pada final z

There is the lone basic pd form ending in z, namely sjz 'a companion; with'. It is treated as pd before the set of certain affixes (1417). However, Panini assumes that it is pd even before s, nominal 1st iv.iµ affix also.

The pd final z in sjz follows the pattern of alternation of pds ending in s (8266) e.g. sjr dvi.ƒ 'with gods' etc.

## Alternation of basic pada final d

Basic forms in l;, II sg. from roots ending in d such as i.d 'break', i^d 'cut', ivd 'know', äN/ 'obstruct', td 'destroy', =d 'pound', ^d 'shine, play' £Nd 'moisten' etc. (all belonging to the ä/aid class of roots) are made from such underlying strings as A^i.^Xnm^d^isp (Here Xnm†n is the ivkr, which is introduced after the last vowel of the root). The verbal affix isp†s is dropped being the final consonant of a cluster. The forms are, thus, realized as Ai.nd etc. Such inflected forms made from verb stems ending in d, are assumed to end in d which belongs to the verb stem (e.g. i.d etc), the inflectional suffix s (II sg) being dropped as indicated above. The final segment d of such forms is optionally replaced by s (8275). Thus, we have Ai.nt Tv kaîm alternating with Ai.ns Tvm kaîm 'you split the wood', Ai.nc c Tv kaîm with Ai.nx c Tv kaîm 'and you split the wood' etc.

Forms ending in d follow the pattern of other pds ending in d while alternate forms with s belong to the general pool of forms ending in s.

## Alternation of basic pada final n

Basic forms ending in n fall into various groups vis-à-vis their environments. These are discussed below.

(a) Ahn

i. The form Ahn is pd in its several roles. As a **stem**, Ahn (neut.) 'a day' is considered pd before certain affixes including >yam ši.s etc. (1417). Before these affixes n shows the same variations as s does. It is replaced by ä (8268) which in turn is replaced by £ before voiced consonants (6112). Thus Ahnˆi.s? Ahäˆi.s? Ah£-i.s and £ combines with the preceding A and both become Aø thus we have Ahøi.s , also Ahø>yam.

ii. The form Ahn also denotes 1st and 2nd iv.iµ singular. The inflectional affixes s and Am are dropped by lk (7123). Participating in syntactic constructions it is found replaced by r (8269), e.g. Ahn ddait? Ahr ddait 'he gives the whole day', Ahn .;µ? Ahr .;µ 'he eats continuously the whole day'.

iii. The form Ahn may occur as final member in bhv¢ih compounds, e.g. d¢`ahn ‡ d¢`ai, Ahain yiSmn 'having long days'. The compound is used like an adjective. It shows agreement in gender, vibhakti and number with the nominal it qualifies. Qualifying a form in neuter, e.g. inda``ˆjalm 'summers', d¢`ahn is neuter and the pd final n is replaced by r (8269). Thus we get d¢`ahr inda`jalm 'summers having long days'.

On the other hand, qualifying a noun in masculine the pd final n shows a different pattern of alternation. It is the same pattern as displayed by pd final s e.g. d¢`ahn inda`Œ ? d¢`aho inda`Œ, d¢`ahn inda`€ ? d¢`aho inda`! 'O summer, with long days!' (For details see appendix).

## (b) n of vocative sg. from derivatives in mtp and vs

The n of vocative singular made from stems ending in the derivative affixes mtp (5294) and vs (32107) occurring in ^Nds in continuous speech, shows the same pattern of alternations as do pds ending in s. i.e. it is replaced by ä (831) which in turn undergoes other processes of change. e.g.

–N› mäTvn –h paih ? –N› mäTv –h paih *f¨*. 3.51.7)
m¢!vn t¤kay tnyay ? m¢!vs t¤kay tnyay.
(For details see appendix).

**(c)** In the basic forms of pds discussed below, simultaneous with the alternative of pd final n as well as m , the vowel preceding them is either replaced by the nasal variety of it or the augment AnSvar is inserted after it.

## i). pd final n in general

In continuous speech before voiceless dental, palatal and retroflex stops followed by any vowel, semivowel, nasal or h , pd final n in

general except that of pxan ($1^{st}$ iv.iµ sg from pxam 'quiet') changes to corresponding sibilant i.e. s š x or z (837) E.g.

dvan tpyit ? dvas tpyit or dvas tpyit
v=an i^niÒ ? v=ax i^niÒ or v=ax i^niÒ
.van $¢kt ? .vaz $¢kt or .vaz $¢kt

This pattern of alternation, it may be pointed out, is identical with that of s in similar environments. s is replaced by ä which undergoes other relevant processes.

**ii).** However in ¨c texts in continuous speech these alternations are just optional (838) e.g. n of tiSmn in tiSmn Tva d/ait either remains unmodified or is replaced by s i.e.

tiSmn Tva d/ait or tiSms Tva d/ait or tiSms Tva d/ait.

**iii).** In ¨c texts, in continuous speech, pd final n preceded by any long vowel and followed by any vowel, h y v r if occurring in the same pad , quarter of a verse, shows alternations as illustrated below (839).

mhan –N>0 y A0jsa ? mhan ~ mha ~ mha –N>0 y A0jsa
pir/¢n Ait ? pir/¢n ~ pir/¢r ~ pir/¢r Ait

The pd final n here displays two different patterns. When preceded by long Aa it is dropped. On the other hand when preceded by any other long vowel, it is replaced by r.

These two patterns of alternation match with those of s respectively in the environments (a) when s is preceded by A or Aa and followed by any voiced segment and (b) when it is preceded by any vowel short or long other than A and Aa and followed by any voiced segment. The two sets of environments of n , illustrated

above, are respectively fully contained in those of s .

## iv). pd final n of nn

The pd final n of nn 2nd iv.iµ plural from n 'a man' shows the following alternations before any pd beginning with p , voiceless unaspirated stop (8310).

nn pwih ? n" pwih š n" pwih š n" ? pwih š n ? pwih.

The pattern of change is the same as that of pd final s before labial stops.

## v). pd final n of Svtvan

The alternation of pd final n of Svtvan being discussed here is before any pd form derived from the nominal stem pay 'protector' recurring in continuous speech (8311). It is illustrated in the following construction.

Svtvan payr AGn ? SvtvaE payr AGn.

This usage is confined to Vedic literature. The alternative, as illustrated above, is the only one attested. Other possible alternations are not generated here.

## vi). pd final n of kan

Again the context in which alternation of n of kan , treated here, is a closed one. The change occurs before kan , the form repeated as called Aami@t (8312. It is illustrated in the phrase kaSkan or kaSkan occurring in such constructions as kas kan AamN]yit 'who are the various people whom he is inviting?' Thus n changes to s before the repeated form of kan.

## Alternation of pd final m

(a) The pd final m of sm before the augment s$†s changes to s (835). Both, the pd undergoing change and the conditioning factor, are unique. The construction sm^s$^krit, for instance, is realized as s^s^krit or s^s^krit 'he adorns'. Forms with two ss are also produced.

(b) The pd final m of pm (in a compound construction) changes to s before voiceless stops followed by any vowel, nasal, semi-vowel or h (836). e.g. pm^kikl ? ps^kikl or ps^kikl 'male cuckoo', pm^p] ? ps^p] or ps^p] 'male child', pm^]y ? ps^]y or ps^]y 'three generations.

(For details see appendix).

## To sum up

We may now state below in tabular form what pd finals undergo what alternations under what environments

| pd final | alternation | environment | Remarks |
|---|---|---|---|
| 1. s z d and n of voc. sg from stems ending in affixes mtp†mt and vs†vs | x | - - c ^ | inflectional affixes |
| | z | - - $ # | |
| | s | - - t q | |
| | x ~ iv | - - k % | |
| | F ~ iv | - - p f | |
| | iv ~ x | - - x | |
| | iv ~ z | - - z | |
| | iv ~ s | - - s | |
| | iv | - - #(Avsan) | |
| | iv | - vl stops followed by sibilants | |
| | £ | non-pluta A - non-pluta A or vd consonant | |
| | y | A Aa - - vd segment except A | |
| | r | vowel other than A Aa - - vd segment | |
| | £ | - - >yamš i.s etc | |
| | r | - - linguistic expressions other than nominal | |
| 2. n of Ahn | | | |

(a) Exceptions: d replaces pd final s in pds made from stems ending in the affix vs†vs , verb roots ñs of Ýs with or without £ppd with iKvp and 3rd person sg form in l ; except Aas from As

(b) In ^Nds ,pd final s in AMns š ¤/s š Avs and .vs when denoting mhaVyaòit alters freely with r .

y -ø optionally before vowels and obligatorily before consonants

| pd final | alternation | environment |
|---|---|---|
| 3. n (in general) | | |
| | x | - c ^ followed by any vowel, |
| | z | - $ # nasal, semi- |
| | s | - t q vowel or h |
| 4. n in ¨c in sman pad. | | |
| | ø | Aa - - any vowel, h y v or r |
| | r | long vowel other than Aa - any vowel h y v or r |
| 5. n of nn | | |
| 6. n of Svtvan | | |
| 7. n of kan | ? ~iv | p |
| | ? ~iv | pay |
| | s | kan (as Aami@t) |
| 8. m of sm | s | s$†s (an argument) |
| 9. m of pm | x | c ^ followed by any vowel, nasal, semi-vowel or h . |
| | z | $ # followed by any vowel, nasal, semi-vowel or h . |
| | s | t q k % p f follow ed by any vowel, nasal, semi-vowel or h . |

i. except n of
pxan .
ii. optional in ¨c .

**Remarks**

Note: In (3-9) the vowel preceding the pd final element that undergoes change, is replaced either by its nasalized variety or the augment AnSvar is inserted after it. In (4) however the long vowel is obligatorily replaced by its nasalized variety.

From the above statement it is clear that pd final segments differ variously in their range of distribution. The segments s z d and n of vocative singular of forms like mäTvnš m¢!vn etc. have no restrictions on their distribution. These occur freely in all types of environments.

Rest of the pd final ns and ms divide into several groups, each occurring in its respective environments. Environments of some of these are just unique. Environments of some of these are further circumscribed (narrowed down) by such factors as genera of literature or literary composition (e.g. ^Ndsš ¨cš pad) in which these forms occur.

There may be overlapping of environments in some cases. For instance. pd final segments s z d n and n of nn as also of Svtvan all share the environment p , voiceless unaspirated labial stop. n (in general) shares the environments of c ^ $ # t q with s z d n. Consequently segments sharing environments may show the same alternations. This expectation, however, may not be fulfilled all the time. The m of pm , for instance, changes to s before velar and labial voiceless stops instead of the expected x and F respectively. Thus it is crucial to identify uniqueness of environments of each segment on the one hand and what alternation it undergoes before we come out with a generalized statement.

Environments are found to fall into two broad types viz. one type

comprising voiceless consonants and the other involving voiced segments, vowels as well as consonants.

Voiceless consonants occur as right hand environments. These divide into various groups. A voiceless consonant may constitute the whole environment by itself or in conjunction with immediately following segment. For instance, change of s into x in dvs crit may be accounted for in terms of the following voiceless palatal consonant namely c. On the other hand change of s into ivsjnty in dvs =trm AadÒ may have to be explicated in terms of the following voiceless velar stop in conjunction with the immediately following voiceless retroflex fricative (sibilant) z. In one case the environment consists of a simple voiceless consonant while in the other case it is a cluster of voiceless consonants, namely, stop and fricative.

A close study of environments consisting of voiceless consonants will reveal several patterns of alternations occurring before unique sets of simple or complex environments. Accordingly there have to be as many structural statements in this regard as there are such pairs of environments and alternations.

As to environments involving voiced segments, these are found to comprise segments that precede and follow the pd final entities. For instance, to account for change of s in dvs AXnt 'Deva eats', dvs yait 'Deva goes' etc. both the preceding and the following segments together constitute the proper environments. Here s is replaced by £ when preceded by A and followed by A or any voiced consonant. (Next £ combines with the preceding A and both are replaced by A. A following a pd final A merges in it. Thus finally we get dv_Xntš dv yait).

Any alteration in any of the environmental factors will vitiate or change the nature of alternation. In other words, preceding and

following segments function as one unit to account for alternation of a segment.

Here also different patterns of alternations in various sets of environments are found. Again structural statements matching such pairs have to be formulated.

It is on the basis of our analysis of relevant language data that we are led to make above observations. Now we may turn to Panini to see how he handles the problem.

# Panini's approach

## (a) Abstract schema

Panini has no quarrel over the analysis of linguistic data. However, he brings to bear upon these data a different interpretation. He does recognize, for instance, dichotomy of environments viz. that of voiceless and voiced segments. He proceeds to describe each group separately. Environments comprising voiceless consonants are more diversified and intriguing. It is before various groups of these environments that a pd final segment demonstrates more diverse and distinct alternations. But Panini does **not** admit so many different sets of voiceless consonants. He looks upon all voiceless consonants as constituting **one single** environment. And so are regarded pd final entities and various alternations as single entity each. We shall discuss below how he manages to achieve this end.

In the first instance, we presume, he considers the initial voiceless consonant of the following expression to constitute the entire environment. He **disregards** the immediately following sibilant as part of the environment. For him k alone constitutes the full environment in the constructions dvs krid and dvs =lrm AdTt to account for alternation of s. By ignoring the presence of the following voiceless retroflex sibilant in **ks** he, in a way, simplifies the composition of environments. He, thus, assumes that right hand environment solely consists of initial voiceless consonant of the expression following pd final segment.

He knows he is being unrealistic. Facts of speech are that s before k is realized as either ivsjnty or voiceless velar fricative while before the cluster only as ivsjnty. But his explanatory procedure, as will be clear soon, does not consist of isolated and self contained devices. Rather it consists of a series of steps (devices), well coordinated and interrelated resulting into one fully integrated complex mechanism explicating facts of language as occurring in a discourse. He is not being unrealistic for all times.

Next he goes a step further. He looks upon the environments as one amorphous undifferentiated mass of **voicelessness** rather than as various sets of voiceless segments just as one may view dvdÒš yDdÒš smdÒ and others as not so many individuals but only human beings, homo sapiens, belonging to the same species. He postulates **voicelessness**, thus extracted as the **sole** conditioning factor. Differentiating features of various sets are allowed to dissolve (merge) into one **unitary** feature of voicelessness. By manipulating linguistic facts in this way Panini reduces multiplicity of environments to a **single** factor viz. voicelessness.

It may be pointed out that to denote voicelessness Panini makes use of the familiar term %r (8315).

(Basically the term %r is an abbreviatory device in Panini denoting the group of voiceless consonants % f ^ # q c $ t k p x z s as enumerated in the pTyahar fixv„ s]s (11-13). For instance, in %ir c (8455) the term %r signifies any one of these. However in different contexts it may signify different things associated with this group. For instance, the expression %r is carried over in (8334-35). In (8334) it designates only ^ # q c $ t as an undifferentiated block while in (8335) it may refer to any one of the voiceless stops only. In (8315) %r cannot be interpreted to refer to any one of the

various voiceless consonants of the group. If we do that the question arises which one of these. Moreover, individual segments are referred to in the sutras (8334-37). The only feasible interpretation on it in (8315) is that it denotes all of these but only in abstraction. It denotes thus %r^Tv, (voicelessness)).

Next he turns his attention to alternations. Analysis of language data brings out that overall alternations before voiceless consonants are x z s x F and ivsjnty. Panini does not regard these as so many isolated items. He sees structural relationship between x z s x F, on the one hand and ivsjnty on the other. The ivsjnty we assume, is regarded by him phonetically a mere release (puff) of voiceless breath, easily assimilable to the following voiceless consonants. The segments x z s x F, all voiceless fricatives may be, thus, interpreted as reflexes of ivsjnty of corresponding voiceless stops in the environments, namely palatal, retroflex, dental, velar and labial. Thus ivsjnty is postulated as **alternation par excellence**, singular alternation before feature of voicelessness. All alternations, including ivsjnty itself, are derived from it.

We are now left with pd final segments viz. s z d n m the entities that undergo change. We may find out how Panini deals with these.

Obviously phonetically these are a hybrid lot. There is no phonetic feature that may tie these together. In their phonological behavior, however, these are found to display remarkable structural kinship. Each one of these is realized as fricative of one sort or the other, more usually the one corresponding to the voiceless stop that follows it. Two or more of them show the same alternation in identical environments. For instance, in the following constructions all of these are realized as s, dental voiceless fricative, before t, dental voiceless stop.

| | | |
|---|---|---|
| dvs trit | ? | dvs trit |
| sjz Tvya yaim | ? | sjs Tvya yaim 'I go with you'. |
| Ai.nd Tv kaîm | ? | Ai.ns Tv kaîm |
| .van trit | ? | .vas trit |
| pm^]y | ? | ps^]y 'three generations'. |

At phonological level, thus, these may be considered to belong to one unit. To capture this common (shared) distinctive trait of their phonological behavior, Panini replaces each one of them in their respective environments by a common element symbolized as ä. In a way he paints all of these with the same hue to give them the same exterior.

Since replacement of pd finals by ä is tied up with their respective environments, one may visualize as many äs as there are environment types. ä replacing n before ^ # q c $ t followed by any vowel, semivowel, nasal or h (cf. 837) is different from ä replacing s or d before any voiceless consonant (cf. 8266-8275) and so is ä replacing n occurring after Aa and before any vowel, h y v r (833) different from ä replacing s occurring after A or Aa and before any voiced segment (cf. 8317). And when environments of two or more of these segments are identical, äs replacing them also fall together. As discussed above, Panini collapses all environments comprising voiceless consonants into one unit, namely the feature of voicelessness, ipso facto along with their environments all äs merge into one ä.

Now the end result is that Panini manipulates very ingeniously to reduce pd finals, environments and alternations each to unitary elements, namely ä, voicelessness and ivsjnty respectively. To describe linguistic phenomenon of alternation of pd final elements all that Panini has to say is that ä changes to ivsjnty before voicelessness (cf. 8315). The structural statement has the format: x become y before z.

It may be pointed out that replacement of ä by ivsjnty holds good also finally in a discourse (Avsan) (cf. 8315).

The picture painted above is at an **abstract level**. It is intended to bring out subtle structural relationships between units of various factors involved here, viz. pd finals, environments and alternations. From this pinnacle of abstraction Panini descends gradually and systematically (orderly) to earthly levels – to facts of real language. We describe below the path he is assumed to have traversed to reach his destination.

## (b) From abstract to concrete

As we have seen above, Panini establishes a chain of replacements: pd finals ? ä ? ivsjnty. Replacement of pd finals by ä takes place before various sets of voiceless consonants as attested in linguistic data and that of ä by ivsjnty in environment consisting of an abstract unitary feature, voicelessness. Once all the pd finals have been replaced by ivsjnty via ä, environments peculiar to each segment have served their purpose. These are no longer relevant in describing alternation of ivsjnty. Unitary feature of voicelessness gives way to various sets of voiceless consonants before which ivsjnty occurs. These are organized into four groups as follows.

| | |
|---|---|
| 1. %r | In the present context the term %r stands for voiceless dental, palatal and retroflex stops. |
| 2. %r, xr | %r denotes any one of the voiceless stops and xr any sibilant. |

| | |
|---|---|
| 3. xr | Any sibilant. |
| 4. k and p | These denote respectively k % and p f i.e. voiceless velar and labial stops. |

The ivsjnty occurring in these environments is replaced respectively as follows.

i. s (8334).

ii. ivsjnty i.e. ivsjnty remains unmodified (8335).

iii. Optionally before x z s (8336).

iv. Optionally **x** and ? respectively before k and p (8337).

One may be intrigued to find that Panini does not account for change of ivsjnty to x and z before palatal and retroflex voiceless stops respectively as attested in the data. Rather he states that ivsjnty is replaced by s before them. This goes counter to linguistic facts.

***Apparently*** it does go counter to facts. Panini deliberately adopts this strategy to demonstrate (bring out) structural relationship between s and dental consonants on the one hand and x and palatal consonants and z and retroflex consonants on the other. He treats x and z as conditioned variants of s rather than of ivsjnty in a larger context involving palatal and retroflex consonants also which are explicated as variants of dental consonants. He is, thus, able to formulate generalized statements describing that s and dental consonants coming in contact with x and palatal consonants are replaced by x and palatal stops and in contact with z and retroflex stops by z and retroflex stops (8440-41).

# To sum up:

Explication of alternations of pd final segments s z d n m under discussion, before voiceless consonants (and Avsan, pausa) is organized in three steps. In this treatment, it may be noted, pd final elements as well as environments are represented in terms of abstract entities, namely ä and the feature of voicelessness denoted by the term %r. In the initial step ä is replaced by ivsjnty before %r (8315). In the next step ivsjnty either remains unmodified (8335) or is replaced by voiceless fricatives corresponding to voiceless stops in the environments. The fricatives x and z are the only exceptions which are left unaccounted (8334, 36-37). These are explicated in the third and final step as conditioned variants of s rather than of ivsjnty in a broader frame work of phonological changes.

# Illustrative examples

We may discuss a few illustrative examples to demonstrate how the system of rules developed by Panini works.

Consider the following construction.

dvs kìm An.vit

All the pds occurring as its constituents appear in their basic forms. However two of these, namely kìm and An.vit do not need to undergo any phonological changes in their phonological constituency in the present context. Only the form dvs calls for phonological change. Thus the construction, as it stands, may be regarded as its underlying form. Vis-à-vis the form it realizes after having gone through phonological changes.

This is how Panini proceeds to effect phonological changes in pd final s. The entity ä replaces pd final s whatever the environments may be (8266). Thus

dvs kìm An.vit ? dvä kìm An.vit

Now ä occurs before k, voiceless unaspirated velar stop. Panini, however, asks us to forget its unique phonetic nature. He asks us to look upon it merely as voiceless entity undifferentiated from any other voiceless consonant. The environment before which ä occurs is ***unique*** only in relation to voiced speech segments and not before voiceless ones. All voiceless segments are treated the same. Treating k merely as a symbol of voicelessness ä is replaced by ivsjnty (8315). Thus

dvä kìm An.vit ? dvt kìm An.vit

With the appearance of ivsjnty the scenario changes. Real phonetic nature of k finds recognition. Panini regards it as member of class of voiceless velar stops. And states that before such stops ivsjnty is optionally replaced by voiceless velar fricative (ijøamlly ) (8337). Thus.

dvt kìm An.vit ? dv x kìm An.vit or dvt kìm An.vit.

Now take the following constructions where pd final s and n occur in the same environment.

dvs icC^d kiHct padpm

.van icC^d kiHct padpm

Both s and n satisfy the conditions in which these can be replaced by ä (8266, 837). Thus we obtain

dvä icC^d kiHct padpm

.vaä icC^d kiHct padpm

(In case of pd final n the vowel preceding it is replaced either by its nasalized variety or the augment AnSvar is introduced after it (832-4)).

Now dvä and .vaä are subjected to the same set of operations in the shared environments. The ä undergoes the following operations.

ä ? ivsjnty (8315)
ivsjnty ? s (8334)
s ? x (8440)

Thus finally we obtain.

dvx icC^d kiHct pädpm

.vax icC^d kiHct pädpm

Reorganization of environments allows Panini to bring together under one group environments shared by two or more pd final elements. For instance, environments of s and n (in general) are fully covered by the reorganized group %r (i) above. The environments peculiar to n , namely ^v followed by Am (837) are entirely contained in %r , the voiceless environments of s (8266). Similarly the specific environments of m of pm , namely %y followed by Am (836) are found spread over two groups. The speech sounds k % and p f are included in the group (4) above and the rest in (1). Consequently reorganization of environments help Panini achieve economy and generality in structural statements. Alternations of two or more pd final segments may be described together in a single statement.

## Alternation in voiced environments

Panini's data reveal following patterns of environments involving voiced segments in which pd final segments are found to occur.

1. s and d are found to occur after and before non-pluta A (61111), e.g.

dvdÒs Avdt

Ai.nd ASyæ `$ Tvm

s and d are replaced by ä in this environment (cf. 8266; 75). Thus we have:

s d ? ä / A / -A

ä is subjected to appropriate operation.

2. s and d also occur after non-pluta A and before any voiced consonant (hx ) (61112), e.g.

dvs vdit
AiC^nd v= Tvm

In these environments also s and d are replaced by ä (cf. 8266; 75). We have

s d ? ä ‹ A / -hx

ä undergoes appropriate phonological processes.

3. s occurs after A or Aa and before any voiced segment, (cf. 8317) e.g.

dvs AaSt
dvas £pivxiNt sdmain
ks Aayait
Aëas /aviNt

s is replaced by ä (cf. 8266). Thus we have.

s ? ä ‹ Aš Aa / - Ax
ä undergoes appropriate processes.

It may be noted that in particular lexical items .0s š .g0s and A`0s , though the pd final segment s is preceded by A0, but before voiced segments (Ax ), it undergoes the same alternations as s preceded by A or Aa. (cf. 8317) E.g.

.0s A]
.0s ddait
.g0s A]
.g0s ddait

A`0s A]
A`0s ddait

here s is replaced by ä (cf. 8266). We get.

s ? { < A0 / - Ax

ä is subjected to appropriate processes.

4. n occurs after a long vowel and before any vowel or hyvr (A$ ) in the same pad in ¨c , (839) e.g.

dvan AC^a d¢Vyn
pir/¢n Ait

ä replaces n in these environments (639). Thus we have.

n ? ä / V̄ - A$ (in the same pad of a ¨c )

ä undergoes appropriate processes.

5. s z n occur after any vowel, short or long, other than A and Aa and before any voiced segment (Ax ), e.g.

AiGns dhit
vza.s £TpÛt vzas
sjz dvn
m/man ASt syt

Substituting ä for s z (cf. 8266; 839) we have

s z ? ä / vowel other than A or Aa ? any voiced segment.

We may scrutinize statements of environments given above to see

if any of these could be combined or collapsed with any other.

Panini could legitimately collapse (1) and (2) and make a complex statement. If he does not do that it is because he wants to carry over the expression hx onto the following sutra. If he formulates a complex statement then along with hxš At ƒ†A„ will also be carried over. That is not desirable. (see pdmHjr¢ on 61 111-112).

The environments of n (4) above, namely v̄ - A$ are broken into two as follows.

(a) Aâ / - A$
(b) Long-vowel other than Aâ / - A$

Why ?

The environment Aâ / - A$ is completely contained in (3) above. It may be merged into it. Thus (3) as it stands absorbs 4(a).

4 (b) is covered fully by (5). It may thus be amalgamated with it. The statement (4) is thus eliminated.

We are now left with (1), (2), (3) and (5).

We may give below a few illustrative examples describing alternations of ä.

(1) ä preceded and followed by non-pluta A is replaced by £, (61 111); e.g.

¨Gvd .gvs ƒ? ä„ A?yim ? ¨Gvd .gv_?yim 'Holy sir! I study the rg-veda'.

Here ä is replaced by £ which combines with the preceding

A. Both are replaced by A (6186). A following pd final E or A is merged with it (6193). Thus finally .gv £ A?yim ? .gv_?yim. In writing the symbol (_ ) is substituted in place of A to indicate that A is merged into the preceding vowel.

dvs ƒ? dvä„ AÞm AiÒ ? dv_Þm AiÒ
Asts ƒ? Astä„ AjayNt svai, .tain ? Ast_jayNt svai, .tain
Tv nE èîs ƒ? èîä„ Ais ? Tv nE èî_is
ks ƒ? kä„ Ay magE ? k_y magE.

(2) ä preceded A and followed by any voiced consonant is replaced by £ (61 112) e.g.

tmss ƒ? tmsä„ ma Jyitr gmy ? tms ma Jyitr gmy
AaidTys ƒ? AaidTyä„ bõ ? AaidTy bõ
AakaxsƒƒAakaxä„ ivÛt sv] ? AakaxivÛt sv]
m`s ƒ? m`ä„ gjit ? m` gjit
Axrtrs ƒ? Axrträ„ vayE ? Axrtr vayE

(3) ä precede by A or Aa and followed by any voiced segment (Ax ) becomes y (cf. 8317).

As stated above the same alternation takes place in ä substituting s in .s š .gs and A`s.

It may be pointed out that y is dropped optionally before a vowel and obligatorily before a consonant (8319, 8322).

A few examples are.

dvs ƒ? dvä„ AaSt ? dvy AaSt or dv AaSt.
dvas ƒ? dvaä„ Advas ƒ? Advaä„ .viNt ? dvay or dva Adva .viNt.

sys ƒ? syä„ £dit ? syy £dit or sy £dit.
AGns ƒ? AGnä„ =›as ƒ? =›aä„ ivSfil½as ƒ? ivSfil½aä „ VycriNt ? AGnE =›aE ivSfil½aE VycriNt.
m/man ƒ? m/maä„ ASt syE ? m/ma ASt syE (bhdar<yk 6.3.6)
Evm AaTmanm ANtkal sv pa,as ƒ? pa,aä„ Ai.smayiNt? ...pa,a Ai.smayiNt

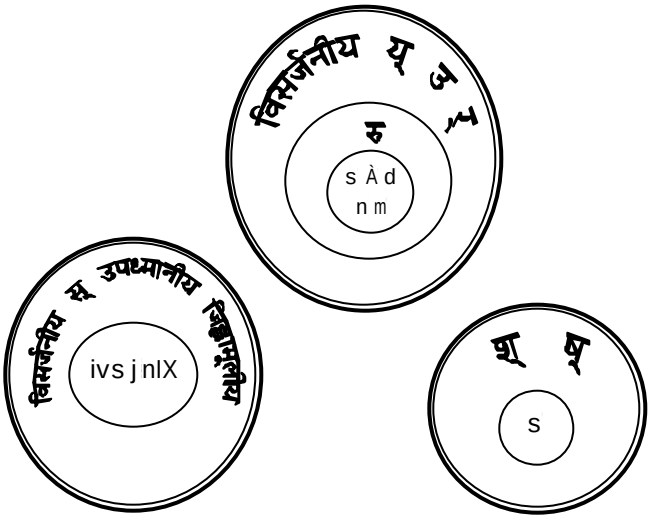
An overlapping of environments in case of Ax (8317) and hx (61112) may be noticed. However any conflict in application of rules may be resolved in terms of the principal of Ais× (821). It directs that rules presented in (821-84) are considered not to have been applied with reference to the application of rules given in the earlier parts of the Aìa?yayt.

(5) ä preceded by any vowel, short or long, other than A and Aa and followed by any voiced segment remains unmodified. E.g.

viôs ƒ? viôä„ Jvlit ? viôr Jvlit
èts ƒ? ètä„ v/t ? ètr v/t
gUs ƒ? gUä„ /avit ? gUr /avit
maÝts ƒ? maÝtä„ gavU .vNt nE ? maÝtr gavU .vNt nE
gam,ts ƒ? gam,tä„ Aayait ? gam,tr Aayait.

Panini, however, does not explicitly state this rule. It is otherwise so obvious.

A composite schematic representation of alternations of pada-final segments s z d n m before voiceless and voiced environments may be presented as follows.


विसर्जनीय य् उ श्
क
s À d
n m
विसर्जनीय स् उपध्मानीय जिह्वामूलीय
ivs j nlX
ष् प्र
s

## What is ä ?

Panini discusses that the segments s z d n m occurring finally in pds constitute a unique group in as much as all of these display the same alternations in identical environments comprising voiceless consonants. How does he account for this?

There is no common phonetic feature in terms of which he could seek an explanation of this phenomenon. It seems what characterizes this structural behavior of this group is some phonological property peculiar to this group. To capture this Panini introduces in the phonology of the language an entity called ä which replaces all these segments in their respective environments. Postulation of such an entity, in a way, is sine qua non to bring out structural interrelationships among them and to allow him to evolve and sustain a network of phonological rules reflecting these interrelationships. **Induction of a theoretical entity is, thus, in response to the needs of phonological system**.

It may be pointed out that symbols employed in Panini are always entities that are pronounceable. It could have, thus, been any such expression in this context. If he opts for ä it is for certain pragmatic considerations which we shall presently discuss below.

Panini does not say a word about what ä is. His commentators agree that the vowel £ is not an integral part of it. It is there for ease of pronunciation. Bereft of the vowel it is simple r , identical with the phonological entity r , read in the ixvs] h y v r $ (5).

Since now we come to acquire two identical phonological entities, it is necessary to distinguish these when these need to be distinguished. The vowel tag, thus, besides being there to facilitate its pronunciation, also serves to distinguish r in ä from the regular

r , e.g. in (61111, 8316).

The element ä is treated as **substitute** (Aadx) in place of pd final segments. However as substitute of phonological units it may not be treated like its substituenda (Sqainn) in operations relating to speech sounds (1156).

## Why ä ?

We may now consider the question why Panini elects for ä . The main consideration for Panini to opt for ä *f†r„*, we believe, is that pd final r in general shows the same alternations as does this group of segments before voiceless consonants. Consider, for instance, the following constructions.

AaGNtaiSm ëE pnE
pnE =i]y>y0 nmE
pnE ~ pnx ixvay nmE
pnE ~ pnz z<m%ay nmE
pnE ~ pns sv>y0 dv>y0 nmE
pnE ~ pn x ²Z, vNd
pnE ~ pn ? pcit ma,vkE
pns trm nd¢m
pnx cagC^Nt .vNtE
pnz $lkt gamm AjapalE

In the above constructions alternations of pd final r in pnr before voiceless consonants and also finally in pausa are precisely the same as these of the pd finals in this group. The same set of structural statements is applicable in toto to account for alternations of r.

To bring pd final r and pd final s z d n m at par, each of the pd final

element of this group is replaced by ä † r instead of by any other speech expression. With substitution of ä † r in place of pd final elements in dvs š sjz š Ai.nd š .vân etc. these items assume the form dvrš sjrš Ai.nrš .vâr etc. Now formally these forms are identical in their endings with pnr š xr š pr š bihr etc. where r is original.

Now a single structural statement: pd final r is replaced by ivsjn¢y before voiceless consonants and in pausa describes alternations of pnr š Ür etc. as well as those of dvs š sjz š Ai.nd etc. (8315).

Here is an additional consideration. The pd final s z n occurring after any vowel, short or long, other than A and Aâ and before any voiced segment, vowel or consonant, are realized as r e.g.

viôs A] Jvlit ? viôr A] Jvlit
maÝ¢s gav∅ .vNt nÆ ? maÝ¢r gav∅ .vNt nÆ
sjz dvn siv]â ? sjr dvn siv]â
pir/¢n Ait ? pir/¢r Ait

Substitution of ä † r in place of s z n etc secures change of s z n etc. to r at no cost. It saves Panini a structural statement.

Thus Panini's choice of ä to replace pd final segments s z d n m in the environments discussed above is well-motivated grammatically. In terms of ä he is able to explicate alternations of these pd final segments more economically, can relate these segments to their environments structurally more significantly, and establish interrelationships among themselves and with pd final r in voiceless environments more realistically.

In conclusion we may say that phonetically ä may be assumed to be indistinguishable from the original r. It aligns itself with the original r when occurring before r . Both are dropped there and the vowel preceding them is lengthened, e.g.

AiGnr raj t ? AGnt raj t pnr raj t ? pna raj t

Phonologically ä differs distinctively from r in environments comprising voiced segments. We have discussed above that ä becomes £ when preceded by non-pluta A and followed by non-pluta A or voiced consonants (hx ) and y when preceded by A or Aa and followed by any voiced segment, vowel or consonant. On the other hand, pd final r remains unmodified in these environments. As mentioned above before r (a voiced consonant), however, both rs are dropped and the vowels preceding them are lengthened. Again before 7th iv.iµ plural affix sp † s both rs show contrast. The original r remains unmodified e.g. Üar•s ? Üarzš igr•s ? gtrz etc. On the other hand, ä is replaced by ivsjnty (8317), e.g. masˆs ? maEˆs. Optionally ivsjnty changes to s. Thus we have mas-s back. Similarly we get pyE s ~ pysˆs š mnEˆs ~ mnsˆs etc

# Appendix One

## pds ending in s z d n m

Panini discusses here alternations of segments s z d n m occurring as final in particular pds in specified environments only. Two or more of these segments may share some of their environments. In such shared environments the segments concerned show the same alternations. This structural feature sets off these segments as a unique group.

To let him describe alternations of two or more segments together in a single statement, Panini replaces all segments by a common symbol ä in their respective environments. Thus in a set of statements (8266-75, 831-12) Panini identifies what pd final segment is replaced by ä and in what environments. Before we discuss these statements we shall like to be certain what the notion of pd implies here and what form of a pd is considered basic.

## What is pd ?

(a) The term pd used here is in the sense defined in (1414-17). Largely final elements enumerated by Panini in statements, referred to above, belong to pds that are characterized as ending in nominal and verbal affixes, sp and it; respectively (1414). In case of loss of an affix, the final element of the form that survives is understood as pd final (1162). For instance, in the derivation of the verbal form Aˆxas 'you ruled' from the underlying structure Aˆxasˆs, the inflectional affix s is dropped by lop (6167). The

surviving form Axas is considered a pd ending in it; and the element s as legitimate pd final. (However refer to our discussion of the form Ahn below).

(b) Linguistic expressions in general or particular occurring before certain affixes in morphological constructions are also recognized as pds (1415-17). The nominal stems are considered pds before affixes >yam š i.s etc. and n and z in Ahn and sjz are pd finals (8266-68).

(c) Nominal compounds in Panini are derived from underlying phrases constituted of pds, inflected forms in the sense of (1414). Thus pm as prior member in the compound form ps^p]t < pm^p] < pst p]t is treated as pd, although the iv.iµ affix As is dropped (2471) and m is considered its final element (836).

(d) The lexical items called £psgs as members of AVyy class are treated as paitpidk. Nominal affixes are admitted after them and then dropped obligatorily by lk (2482). These are treated as pds (1162). The segment m in sm is considered pd final (835).

## Basic forms of pds

Each set of pd form e.g. dvy š dvš dvtš dvtš dvx š dvz š dvs š dv x, dv F; AiGntš AGntš AiGnx š AiGnz š AiGns š AiGn x, AiGn F AiGnr etc. as illustrated in syntactic constructions considered above, occur in the same meaning and fill the same syntactic slot. Forms in each set, thus, may be regarded as conditioned alternates of the same pd.

The question arises: what is the phonological shape of the form considered 'the same'.

Neither Panini nor his commentators raise this question. Panini assumes (and his commentators tacitly agree with him) that forms like dvs š AiGns etc. are basic.

In Panini, we presume, search for structural patterns and analysis of language data proceed side by side (simultaneously). There is continual interaction between ongoing analysis and evolving structural designs. Language facts are manipulated to accord with grammatical formulations and grammatical formulations are rewritten (edited) to conform to linguistic data. One feeds the other. Panini, we believe, tries several alternative explanations before he comes to acquire a feel of complete fit of overall design of linguistic structure and language facts. He has, so to say, a full vision of grammatical apparatus against the backdrop of an equally full view of linguistic data.

In the matter of selection of basic forms of grammatical items at any level of linguistic organization his consideration, thus, seems to have been grammatical. He opts for an item as basic which allows him to derive all variants from it in most simple, regular and systematic way by application of appropriate rules. To capture generalizations and avoid ad hoc treatment, he does not fight shy of postulating basic forms in terms of hypothetical entities.

The question of selection of basic forms and formulation of system of phonological operations is complex. We propose to discuss it in all its aspects while dealing with Panini's principles of linguistic analysis in general and his theory of segmentation of morphological constructions in particular.

In the present context Panini posits s z d n m as final segments in basic forms of pds in general or in particular pds. Here his primary consideration has been grammatical. For instance, in the set of variants dvx , dvz š dvs , dv x dv F dv¢ dvy dv dv the form with ivsjn¢y occurs in more varied environments and, thus, from phonological point of view, is the most convenient form to be posited as basic. Similarly in the group of variants AiGnx AiGnz š AiGns š AiGn x AiGn F, AiGn¢ AGn¢ AiGnr the form AiGnr has wider range of distribution and could be recognized as basic. However Panini rejects both these in favor of the ending s. With s as basic he is able to evolve an integrated system of phonological operations that accounts for not only forms ending in s but also those ending in z d n m as well as r as discussed above.

# Appendix Two

## Panini's statements explained

Statements identifying pds ending in s z d n m , environments of their occurrence and replacement of these elements by ä are read separately in two blocks under the general domain of pdSy (8116) implying that grammatical operations apply to pd finals. Bifurcation of these statements into two blocks is presumably to account for distinct nature of their respective environments. The block comprising statements (831-12) is read under sihtayam carried over from (82108). It is implied that the conditioning factor here belongs to the initial segment of the following pd. Consider the statement smE si$ (835) which describes replacement of m of sm by ä before the augment s$†s. An augment necessarily forms integral part of the grammatical expression with which it is associated. Here the augment s$ is attached initially (1146) to the verb ² in the sense 'adorn' (61134). It is thus presumed sm is followed by any such verbal form as s^krdits s^Akrdt etc. Such a condition may or may not hold for pd finals described in (8266-75). s in dvs , for instance, is replaced by ä before t in trit i.e. initial of a pd. The conditioning here is as good as that under sihtayam. But d in Ai.nd , on the other hand, is replaced by ä before the verb inflection s which is dropped later (8234). Thus to differentiate the environments in which pd finals occur these are separated into two groups, one being read under sihtayam.

The term sihta in principle denotes closest proximity of two speech elements in syntactic constructions i.e. proximity of finals and

initials of pds occurring side by side in syntactic constructions (cf 14109). Thus under sihtayam are described euphonic combinations of such sequences. In general euphonic changes characteristic of morphological constructions are described separately.

We shall discuss below these statements in the order in which these are found in Panini. We eschew any discussion of rationale of their linear order.

**1.** As stated above, most of the pd finals discussed here belong to pds ending in nominal and verb inflections. Of these s is most frequent. An indefinite number of nominal and verbal pds are found to end in s. Thus Panini initiates his discussion with pd final s. He deals with them in the order of nominal and verbal forms.

There is a lone form ending in z , namely sjz 'a companion, with'. He tags it with the statement relating to s which reads as follows.

ssjz∅ äÉ (8266).

pd final s and z of sjz are replaced by ä. E.g.

dvs ? dvä ; AiGns ? AiGnä ; nms ? nmä ; prs ? prä ù ës ? ëä ; sjz ? sjå ; sjzˆi.s ? sjäˆi.s.

There is no mention of environments in which ä replaces s and z. So far as pds are concerned these occur in all types of environments in syntactic constructions. The expression sjz has z replaced by ä before inflectional affixes as illustrated above. Or z is replaced by ä when it is used as an AVyy in any syntactic construction such as sjz dvi.s ? sjä dvi.ä.

Thus Panini makes no mention of environments.

**2.** The statement that follows is a little intriguing. It introduces the forms Avya£š ëtva£ and pr@a£ as readymade with ä substituting pd final s and ä in turn replaced by ivsjnty. (It may be pointed out that kt derivatives Xvtvah , pr@ax and Avyas (3271-71) underlie the formation of these readymade forms). To understand why Panini chooses to introduce readymade forms, we need to digress a little.

Linguistic usage attests that these forms denote 1st iv.iµ singular and vocative singular (sMbi×) as well. In both these usages these are derived from the underlying structures Avysˆs š ëtvsˆs and pr@sˆs. Panini's statement ATvsNtSy ca/at£ (6414) with the expression AsMb×@ read from (648), provides lengthening of £p/a vowel of As ending stems before the affix s among others except that of the vocative singular. And Panini does not provide anywhere else for formation of forms for vocative singular. Panini takes advantage of the present context where ä substitution is being described of pd final ss. He throws in here the vocative singular forms ready-made. He, thus, saves himself the bother of finding a suitable context and formulating a structural statement describing derivation of vocative singular forms. Thus it is to account for lengthening of £p/a vowel in vocative forms, these are read as readymade in this context.

The 1st iv.iµ singular forms, homophonous with these, are well taken care of by the preceding statement as these are derived regularly and belong to the general pool of s ending pds.

In his statement Panini exhibits these forms in the phonological shapes which these would have assumed when s had been replaced by ä and ä by ivsjnty, perhaps, to highlight that these denote vocative singular, the forms which have not yet been described in grammar any where and not the 1st iv.iµ singular which have been described already. His statement reads:

Avya£ ëtva£ pr@ax c (8267).

'The forms Avya£š ëtva£ and pr@a£ and (any other form which may be detected belongs here, e.g. £Kqxa£) are introduced ready-made denoting vocative singular (with consequent phonological changes after replacing final s by ä and ä by ivsjnty).

**3-4.** Next Panini considers pd forms ending in n made from the neuter stem Ahn 'a day'. Before we discuss his structural statements in this regard, we may better take cognizance of linguistic facts.

To make 1st or 2nd iv.iµ singular forms, the inflectional affix s or Am is added after Ahn. The string Ahnˆs/Am is produced. After a neuter stem inflectional affixes are dropped by lk (7123). Thus Ahnˆs/Am is realized as Ahn , denoting the 1st or 2nd iv.iµ singular. Its use is attested in such syntactic constructions as follows. (Here the form denotes 2nd iv.iµ singular).

| | |
|---|---|
| Ahr .;µ | 'He eats continuously all the day long'. |
| Ahr ddait | 'He distributes gifts all the day'. |
| Ahr .ait | 'He shines the whole day'. |

Further Ahn may occur as final constituent in a bhvtih compound, e.g. d¢`ahn (<d¢`ai, Ahain yiSmn ) 'having long days (of summer)'. As bhvtih compound this form is used in neuter when it is construed with a neuter form in a syntactic construction e.g.

d¢`ahr inda`jlm 'Summers having long days'.

It may be noted that the pd final n of Ahn (neuter) whether used singly or as final constituent of a compound is replaced by r in such environments as illustrated in the construction given above. Panini explains change of n to r as follows.

As described above Ahn is derived from the underlying string

Ahn^s/Am. Here s or Am is dropped by lk. Although an affix after its disappearance continues to trigger operations characteristic of it, but an affix zeroed before an entity containing l, as lk does, ceases to cause such operations (1162-63). Thus presence of s or Am after disappearance is not felt after Ahn. In this situation n of Ahn is replaced by r. His statement in this regard reads:

r_sip (8269) 'n of Ahn is replaced by r when not followed by any nominal inflectional affix (sp )'.

(It may be pointed out that the statement describes a specific phonological operation. And this is not the context where statements describing specific operations are expected. However, Panini accommodates it here since he feels this is the **only** appropriate context where it could be stated).

Now consider the form Ahn in another role.

The paitpidk Ahn (neuter) is regarded a pd before particular affixes including >yam š i.s š sp etc.(1417). Here n is replaced by ä and undergoes phonological operations to which ä is subjected. Thus we get forms like Ah>yam š Ahi.s etc. (61112) and Ahs^s š Ah" s (8316).

Further Ahn as final member in a bhvtih compound such as dt`ahn may occur in collocation with a masculine stem where it shows agreement in gender, vibhakti and number with it. To produce masculine form from the compound stem dt`ahn , for instance, the process of derivation is started afresh. The affix s is introduces after it. There emerges the string dt`ahn^s. Here s is dropped by lop (6167) and not by lk (7123). This mode of zeroing in Panini's system is significant structurally. The affix s , now, even after its disappearance, continues to effect phonological operations on the base Ahn by virtue of its zeroing by lop (1163).

Thus penult vowel A of h is lengthened before s but not when it denotes vocative singular (648). The string d¢`ahn^s is realized as d¢`ahan as masculine singular. n is replaced by ä here. The syntactic string d¢`ahaä inda`ä after appropriate phonological operations is realized as d¢`aha inda`£ 'the summer with long days'.

In case of vocative singular, as stated above, there is no lengthening of the penult A. The pd form remains d¢`ahn. Here n is replaced by ä which is realized as £ (61112) and combining with the preceding A becomes A0 (6186). Thus we have:

d¢`aho inda`£ 'O summer with long days'!

To describe replacement of pd final n of Ahn by ä in the environments discussed above Panini has a very laconic statement. It reads:

Ahn (8268).

The form Ahn in this statement is considered in Paninian tradition identical with its paitpidk form. The statement as it stands defies any interpretation. To extract desired sense, certain information has to be supplied here. The form Ahn , in the first instance, has to be recognized as pd. The statement (1417) applies to Ahn (neuter) which may, thus be recognized as pd before s š >yam š i.s š sp etc.

Next the form Ahn has to be changed to the 6th iv.iµ singular. Now we may render it as:

pd final n of Ahn is replaced by ä before the affixes s š >yam š sp etc'.

Panini's commentators, however, believe that in the sūtra Ahn occurs in its paitpidk form. They argue that it is deliberately

read so to imply that Ahn even as paitpidk is pd. This fact, however, is explicitly conceded by Panini in (1417).

Now we have the following two statements relating to Ahn , viz.

rsip (8269).
Ahn (8268).

Linear order of these statements is determined by consideration of 'recurring process (AnviÒ)'. To read ä in the statement Ahn it is placed immediately after (8267) and to carry over rÉ to the statement. (8270) and (8271), rsip is placed immediately before them. Accordingly we have:

Ahn (8268).
rsip (8269).

These are interpreted as given above.

**5-6.** Statements (8270-75) that follow constitute a block in as much as pd finals described therein are either represented multiply or form exception to (8266). Linear order of these statements is determined primarily on the basis of the 'recurring process'.

Of these the first two statements refer to usages in the ^Nds literature. The first statement reads:

AMnå/rvr –Ty.yqa ^Ndis (8270).

The expression £.yqa 'in both ways' refer to ä read from (8266) and r from the preceding statement. It may, thus, he rendered as:

'In the domain of ^Nds , the pd final s in AMnsš ¤/s and Avs may be replaced by ä or r'.

It may be noted that the forms in the statement are exhibited with a final r instead of s . Maybe it is for convenience of euphonic combinations.

The second statement reads:

.vé mhaVyaòtE (8271).

The expression £.yqa and ^Ndis are read into it from the preceding statement. It may be rendered as:

's of .vs 'atmosphere' is also replaced by ä or r in the domain of ^Nds when it denotes mhaVyaòit, the supreme Vyaòit, invocation'.

**7.** The following is a composite statement. It reads:

vs^ñs^?vSvn@ha dE (8272).

It has two components. The first component describes pd forms ending in s and the second one lists the lone form An@h , ending in h.

The s ending pds are derivatives made from verb stems by adding to them the affix vs ƒKvs„. Derivatives such as pip^vs from pa 'drink' with reduplication, meaning 'he drank' occur in ^Nds (32107) and £psidvs 'he sat in the feet of, approached' from £p^sd 'sit close' in the colloquial, .aza (32108) illustrate stems ending in vs†vs. The affix here replaces il$ and denotes past in general.

There is another derivative made from the verb stem ivd 'know' by adding vs , namely ivd^vs. The affix replaces xt†At here (7136).

Derivative from the verb roots ñs 'fall' and Ýs 'destroy' are made by adding iKvp =ø (3276). E.g. ñs^iKvp ? ñs 'falling'; Ýs^iKvp ? Ýs 'destroying'; also ¤%a^ñs 'falling from the pot'; p,^Ýs 'causing leaves to fall' etc.

The s ending stems are considered pd before affixes enumerated

in (1417). Under these environments final s is replaced by d instead of ä. Thus these form exceptions to (8266).

The lexical item An@h 'the animal that pulls cart, bullock' also replaces its final h by d and is thus included here. Otherwise it has no affinity with pds ending in s.

Thus Panini comes to make a composite statement. It may be rendered as follows.

> 'The pd final s of stems ending in the affix vs†vs (treated as pd before particular affixes (1417)); derivative stems ending in verb stems ñs 'fall', Ýs 'destroy' and h of An@h 'bullock', are replaced by d' (before these affixes).

**8.** The next three statements deal with replacement of pd final elements in verbal forms. Panini does not tell us in so many words what verbal forms ending in s are involved here. Consider the next statement which reads:

> itPynSt£ (8273).

Reading d£ from the preceding statement and pdSy and s£ (6th iv.iµ singular) from earlier ones, the full text of the statement may be reconstructed as follows:

> AnSt£ pdSy s£ itip d£ f.vit„.
>
> 'd replaces the pd final s of a verbal form before itp (3rd person sg) other than one made from As 'be'.

Mention of As in the statement leads us to identify verbal forms intended to be referred to here. Panini provides in (7397) for derivation of the form Aas 3rd person sg. in l; occurring in ^Nds corresponding to Aast in the colloquial (.aza) It is derived from the underlying structure A^As^xp^t. The ivkr, xp is dropped by

lk (2472) and t by (6167), being final in a consonant cluster.

Panini's reference here is, thus, obviously to forms derived from stems ending in s , e.g. xas š cks etc. where underlying structures are found parallel to that of As. It is in such forms that s is replaced by d. Axas becomes Axad.

It may be pointed out that the expression itip in the 7th iv.iµ is used in the statement to restrict replacement of s by d in 3rd person singular only.

**9.** Panini notices that final s of some verbal forms denoting 2nd person sg. in l; is found to alternate with d e.g. Axas ~ Axad in such constructions as

Axas Tvm –ma prt pra or Axat Tvm –ma prt pra.

On the other hand, there are other l; forms in 2nd person sg. where no such alternations occur, e.g. Apcs š Akrs etc.

Now the question arises how to characterize forms where s ~ d alternation obtains. Panini happily observes that forms where s alternates with d are such where the pd final s belongs to the verbal root (/at), the inflectional affix s being dropped. For instance, in the derivation of Axas from the underlying structure Aˆxasˆxpˆisp š xp is dropped by lk and s as being final of a consonant cluster as referred to above. The pd form now ends in the root. The pd final s here, thus, belongs to the verbal root xas. On the other hand, in such forms as Apcs š Akrs etc. the final s belongs to the inflectional affix. In Panini's structural statement describing s and d alternation these facts are reflected. It reads:

isip /ato är va (8274).

Reading pdSyš sE and dE from preceding statements, the full text of

the statement may be reconstructed as follows:

pdSy /at0E isip sE äE f.vit„ dE va.

Here pdSyš /at0E qualify sE, 6th iv.iµ sg. It may be rendered as follows:

'pd final s of 2nd person sg. forms in l; which belongs to verbal root (/at0E) is replaced either by ä or d'.

Panini's commentators, however, consider the expression /at0E and äE as redundant on the plea that äE can be inducted form the preceding statements (8266-71) and /at0E on the plea that no entity other than a verbal root ending in s can occur before isp (–h t isip prt0 /at0rNySyasM.vE fpdmHjr¢„š n c isip skaraNtad /at0r ANydiSt fNyas„ on (8274). The only purpose they assume for introducing these expressions in this statement is for the sake of inducting these later in the statements that follow.

However according to us the expression /at0E, as observed above, qualifies sE and thus characterizes what pd final s undergoes alternation. Thus we consider /at0E as an integral part of the statement. Since carrying over of äE from earlier statements has been interrupted by (8272-73), it has, thus, been reintroduced here for the sake of clarity. We consider it a desirable constituent of the present statement.

**10.** Basic verbal forms in 2nd person sg. in l; from such verbal roots as i.d 'break' (belonging to ä/aid class) are made from such underlying structures as Aˆi.ˆXnmˆdˆisp. Here Xnm is ivkr,. It is introduced after the last vowel of the root. The verb inflection isp†s is dropped being the final element of a consonant cluster. The form realized is Aˆi.ˆnd. It is found to alternate with s e.g.

Ai.nd Tv tSya `$m
Ai.ns Tv tSya `$m.

To describe this pattern of alternation Panini replaces pd final d optionally by ä. This statement reads:

dé (8275).

Supplying isip /at0 är va from the preceding statement and dE (1st iv.iµ sg.) and pdSy from earlier statements, the full text of the s] is:

pdSy /at0E dE isip äE f.vit„ dE va.

'Final d of a verbal form (in 2nd person sg in l ; ) being part of the root is replaced by ä or d before isp'.

Other verb roots which follow this pattern are i^d š äN/ , ivd š £Nd š td š =d and ^d .

We interpret here /at0E as qualifying dE, 6TH iv.iµ sg., implying that the d which is part of the verbal root (/at0E) is replaced by ä. On the other hand, the is×aNtk0md¢ and bal mnorma following it, construe dE as qualifying /at0E meaning 'that pd is replaced by ä which end in d of the verbal root'

(/ator daNtSy pdSy isip pr äE Syad va (is. k0.)
d –it zîyNtn /atr ivxZyt (ba. m.))

**11.** Alternations described under siht a constitute a separate block as stated above. These fall into two groups as will be clear from our discussion below.

**(a).** Consider the underlined pd in the following construction.

–N> mäTv –h paih somm (¨. 3.5.17)
'O Indra accompanied by mät , drink soma here!'

The underlined pd form mäTv denotes vocative sg. Several

layers of structure are involved in its formation. It may be described as follows.

There is the nominal stem mät 'god of wind'. The derivative affix mtp†mt in the sense of 'whose it is' is added after it (5294). The m of mt is replaced by v when it occurs after a stem ending in &y class of speech sounds i.e. oral stops (8210). Thus mätˆmt ? mätˆvt.

To make vocative sg. from it the affix s comes after it (411). The string mätˆvtˆs is generated. The augment nm†n is added to vt (7170). As per convention, described in (1147), nm comes after the last vowel in vt. Thus mätˆvtˆs ? mätˆv–nm–tˆs † mät vn t s.

In this situation s is dropped by (6167) which states among other things that s†s (as consisting of a single consonant) is dropped by l▯p when occurring after nominal stem ending in a consonant. Anyway mätˆvnˆt is a pd now. t here is dropped as final of a consonant cluster by (8223). We are thus left with mätˆvn , a pd form denoting vocative sg.

Final n of mät–vn , is replaced by ä. In the environments in which it occurs in the above construction. ä becomes y and then dropped (8317, 19). Thus we have mäÏv as vocative sg.

Now consider underlined forms in the following:

m¢!vs t▯k▫y tny▫y m@ (¨. 2.33.14)

The form denotes vocative sg. It is a variant of the basic vocative sg. form m¢!vn made from the stem m¢!vs. The stem is derived irregularly from the underlying structure imhˆvs. Irregularities consist in non-reduplication of imh before vs , substituted for il$ (618); non-insertion of the augment

–$ before vs as required by (2267); lengthening of the penult vowel before vs and change of h to ! (not provided in Panini).

Thus phonological path from imh^vs to m¢!-vs is not mapped out step by step. Rather the stem form m¢!^vs is indicated in its 1st iv.iµ sg. form m¢!van read readymade in (6112). The form m¢!vs occurring in the above syntactic construction is a variant of the vocative sg. form m¢!^vn by replacing final n by ä.

Now Panini describes in a composite statement replacement of final n of vocative sg. forms made from stems ending in the affixes mtp†mt and vs†vs in the domain of ^Nds as illustrated above. The statement reads:

mtvs¢ ä£ sb×) ^Ndis (831).

'In continuous speech in ^Nds š ä replaces pd final element n of pds formed from stems ending in mtp†mt and vs†vs denoting vocative singular'.

**(b).** Alternations of pd final elements described in the second sub-set of statements under siht viz. 835-12 are characterized simultaneous to substitution of pd final by ä by replacing of (oral) vowel preceding it by either nasalized variety of it or introduction, in the alternative, of the augment AnSvar after it. For instance, in the construction .van ]atm Ahit xr<yan the pd final n in .van is substituted by ä in the environments obtaining here (837). At the same time Aa preceding n is substituted by Aa or the augment AnSvar is inserted after Aa (Aa is the symbol used for a vowel and AnSvar following it).

The pd under question undergoes these alternations besides replacement of its final by ä, viz. (i) substitution of oral vowel preceding the final element by its nasalized variety or in the

alternative (ii) introduction of the augment AnSvar after it, and (iii) obligatory substitution of nasalized variety in certain environments (839). Accordingly Panini is to make three separate statements.

**12.** Of these substitution of nasalized variety is central. The other two are dependent on it. Thus he proceeds to formulate it first. The statement reads:

A]annaisk¡ pvSy t va (832).

As for the element preceding ä (pvSy t ) it is replaced by nasalized variety (Annaisk) optionally (va) in the pd finals described here (A]).

**13.** This statement is followed by one that describes the environments in which substitution of nasalized variety is obligatory. It reads:

Aat¤_i$ inTym (833).

'Substitution of nasalized variety is obligatory in place of Aa preceding ä before A$ class of speech sounds i.e. any vowel or h y v r'.

**14.** The last of the three statements describes introduction of AnSvar in the alternative. It reads:

Annaiskat pr¤_nSvar¡ (834).

The desired sense of the statement is not in doubt. However syntax of the pds is a little problematic.

We know that AnSvar is an augment. It is to be associated with the oral vowel preceding the element replaced by ä. It is introduced

when the oral vowel is not being substituted by its nasalized variety. Substitution of Annaisk and insertion of AnSvar are two different and independent phenomena. One may, thus, argue that reading of the expression Annaiskat in the statement under discussion is unwanted. Rather it is misleading. A happier wording of the statement could be something like pvSmat pr_nSvarE meaning 'the augment AnSvar is introduced after the vowel preceding the element replaced by ä in the alternative'. This exactly describes the environments in which AnSvar is to be introduced.

To appreciate why Panini reads Annaiskat here, it is important to bear in mind that substitution of Annaisk is optional. What happens if the option is not exercised? Is the status quo to be maintained? Yes, in one sense. The oral vowel remains intact. And no, in another sense. The oral vowel is augmented by insertion of AnSvar. Thus there is a change in the structure. There is retention of oral vowel but at the same time there is its augmentation by AnSvar. Structural relationship between the statements (832) and (834) has to be recognized. Panini spells it out by formulating the statement as he does. It may be rendered as follows:

'The AnSvar comes (AnSvarE) (after the vowel preceding the element replaced by ä) in lieu of Annaisk (Annaiskat prE) i.e. when Annaisk is not effected, substituted'.

The kaixka has to belabor to arrive at this meaning by supplying here the expression ANyE relating it syntactically with Annaiskat. It thus, interprets it as: the augment AnSvar comes after that vowel which is other than Annaisk that occurs before ä and has not been replaced by nasalized vowel

(Annaiskad ANyo yo v,E roE pvE ySyannaisko n ²tE ttE pr_nSvar Aagmo .vit)
.

Even this rendering does not appear to be altogether flawless. We

do not understand what it means by saying Annaiskad ANyE …, 'other than Annaisk'. There is only one vowel before ä, not two. It is either retained intact or replaced by its nasalized variety.

However we are grateful to the kaixka for recording an interpretation of some other commentators who interpret prE in the sense of ANyE 'other than, different from'. Thus according to them the statement may be rendered as:

> 'As an alternative of Annaisk, there is introduction of AnSvar after the vowel preceding the element replaced by ä
>
> (AnnaiskaT prE † Annaiskad ANyo_nSvaro .vit · yiSmn p= Annais ko naiSt t]anSvar Aagmo .vit)'.

**15.** There are only two pd final elements viz. m and n being discussed in this context. Each one of these occurs in various contexts. Following Panini we may discuss these below:

He starts with pd final m. His first statement is:

> smE si$ (835).

Reading ä from (831), it may be rendered as follows:

'pd final m in sm is replaced by ä before the augment s$'.

The facts stated in the statement are bare minimum. We have to find out where sm occurs with s$ .

Panini states in (61133) that the augment s$ is inserted in continuous speech before expressions beginning with k. In the same context he further describes that the augment s$ is inserted before ² co-occurring with sm in the sense 'adorn, embellish'

(61134). Thus the string sm s$^² provides the appropriate context for replacement of m by ä. Thus we get sä s$^².

Now the vowel A preceding m , which is replaced by ä, is either substituted by its nasalized variety i.e. A or the augment AnSvar is introduced after it. The symbol A is used to denote the sequence of A and AnSvar. Finally we have:

sä s^² or sä s^².

**16.** The next statement that follows it is:

pmE %YyMpr (836).

'The final m of pm is replaced by ä in continuous speech before an expression beginning with %y class of speech sounds i.e. voiceless stops followed by Am class of speech sounds i.e. any vowel, semivowel, nasal or h'.

What is pm ?

Panini assumes in its basic form a nominal stem pMs 'a man, male' to derive various inflected forms such as pman pmaSo pmasm psa etc.

(It may be mentioned here that Panini's commentators derive pMs from the verbal root pa 'protect' or p 'purify' by adding the £,aid affix @Msn†Ms. The derivative pMs is still not very transparent in its structure. Nor does it match in meaning with its constituents. The derivation is offered to satisfy the assumption that all nominal stems are derived in ultimate analysis from verb stems (roots). Otherwise the suffix is unique, the verbs, though real, have little relevance in the formation of this stem and the grammatical process is all too ad hoc.)

Inflected forms like pman š pss etc. participate in syntactic

constructions e.g. pman kÉikl¢ 'a male cuckoo', ps¢p]¢ 'son of a male'; pmasm ivna 'without a male' etc. Some of these phrases may serve as basis of formation of nominal compounds.

In Panini a phrase like pman kÉikl¢, with pds occurring in this particular order, is treated as a nominal compound stem. Once a nominal phrase is accorded the status of a compound construction, it is subjected to certain grammatical processes. The iv.iµ affixes of the constituents are elided by lk as the initial step (2471). Thus pman kÉikl¢, equivalent to pMs^s kÉikl^s is reduced to pMs kÉikl. Still both the constituents are treated as pd. Now s in pMs is dropped as being pd final in a consonant cluster (827). We are left with pm kÉikl.

In his structural statement above Panini refers to pd final m of this pm occurring as constituent of a compound. It is replaced by ä. Thus pm goes to pä. Here £ preceding ä is either replaced by £ or £, a sequence of £ and AnSvar. The compound stem, now, assumes the form

pä ^ kÉikl or pä ^ kÉikl.

**17.** The rest of the statements in this section deal with pd final n. The first is made in general terms. Others that follow it are restricted in scope.

nx ^Vypxan (837).

Here the expression AMpr and other elements are read from earlier statements. It may be interpreted as follows:

'In continuous speech the pd final n except that of pxan is replaced by ä before ^v class of segments i.e. palatal retroflex and dental voiceless stops followed by vowels, semivowel, nasal or h'.

Examples are:

.van ^adyit ? .vää ~ .vää ^adyit
.van $lkt ? .vää ~ .vää $lkt
.van trit ? .vää ~ .vää trit

**18.** Replacement described above is optional in ¨k. The statement reads:

£.yq= (838).

'In continuous speech in ¨k both n or ä occur before ^v followed by Am'.

e.g. tiSmn Tva d/ait or tiSmä Tva d/ait ~ tiSmä Tva d/ait.

**19.** The following statements also describe replacement of n by ä in ¨k verses but in more restricted environments.

d¢`ad Ai$ smanpad (839).

'In continuous speech in ¨k verses ä replaces pd final n occurring after a long vowel before vowels and h y v r within the same pad, quarter of a ¨k'.

mhan –N>o y Aojsa ? mhää –N>o y Aojsa

By (833) the vowel Aa is obligatorily replaced by its nasalized variety.

**20.** Next three statements describe replacement of final n by ä in unique pds in restricted environments.

The first statement reads nn p (4310). It is interpreted as follows.

"The element { replaces n of nn before a form beginning with p, voiceless labial stop, in continues speech."

nn pwih? nn or n{ pwih.
nn plxlih? n{ plxlih

**21.** Similarly n of Svtvan is replaced by ä before a unique expression.

Svtvan pay0 (8311).

'In continuous speech the final n of Svtvan is replaced by ä before the expression pay'.

Svtvan payrg? Svtvää ~ Svtvää payrg.

**22.** So also n of kan in the environment described below:

kan Aami@t (8312).

'In continue speech the pd final n of kan is replaced by ä before Aami@t i.e. kan itself repeated after it'.

It may be pointed out that what pd is to be recognized as Aami@t in a sequence of formally identical pd forms depends on the sense such a sequence expresses. Panini describes the various meanings such sequences denote in (812-15) under (811). For instance, in kan kan .0jyit when the sequence expresses the sense of 'which cursed ones you are feeding!', the second kan does qualify to be called Aami@t. Thus here the final n of the first kan is replaced by { before second kan which is regarded as Aami@t as explained above.

# Appendix Three

## Sutras referred to in the text.

1140 KTvaˆtsnˆksn
1156 Sqainvdadx_niLv/
1162 pTyyl p pTyyl=,m
1163 n lmta½Sy
1414 siß;Nt pdm
1415 n Ky
1416 isit c
1417 SvaidZvsvnamSqan
2467 n gpvnaid>y
2471 sp /atˆpaitpidky
2472 Aidˆp.it>y xp
2482 AVyyadaPsp
3271 mN] ëtvhKqxSpr@ax i<vn
3272 Av yj
3276 iKvp c
32107 Kvsé
32108 .azaya sdˆvsˆèv
5290 AnpÛNvìa
618 ili$ /atrn>yasSy
6112 daëan saøan m!vé
6167 hL;)aB>y d`at sitSypµ hl
6168 E; hSvatˆsb×
6186 AaÔ,
6193 Ei; pråpm
61111 At rràtadàt
61112 hix c
61133 s$ kaTpv
61134 spyp>y krt .z,
639 karnaiMn c pac hlad
648 svnamSqan casMb×

6414 ATvsNtSy ca/at0E
7123 Svm0npskat
811 svSy Ü
812 tSy prmami@tm
813 AndaÒ c
814 inTy^vtPsy0E
815 prvjn
816 psmp0dE padpr,
821 pv]ais×m
822 nl0pE sp^Svr^sDa^tiGvi/z ²it
823 n m n
824 £daÒSvirty0y,E Svirt0_ndaÒSy
825 Ekadx £daÒn0daÒE
826 Svirt0 vandaÒ pdad0
827 nl0pE paitpidkaNtSy
828 ni;^sb×)0E
829 madp/ayaé mt0v0_yvaid>yE
8210 &yE
8211 sDayam
8212 AasNdtvdît vt^c¹lvt^k=tvd^äm<vt^cm<vtt
8213 £dNvand/0 c
8214 rajNvaNs0raJy
8215 ^NdstrE
8216 An0 n$
8217 nad `Sy
8218 ²p0 r0 lE
8219 £psgSyayt0
8220 g0 yi;
8221 Aic iv.azа
8222 pré `a;ky0E
8223 sy0gaNtSy l0pE
8224 raTsSy
8225 i/ c
8226 &l0 &il
8227 hSvad½at
8228 –$ ¡i$

8229 Sk0E sy0ga0r0rNt c
8230 c0E kE
8231 h0 !E
8232 dad/at0`E
8233 va >h^mh^Z,h^iZ,ham
8234 nh0 /E
8235 AahSqE
8236 vé^.Sj^sj^mj^yj^raj^.aj^C^xa zE
8237 Ekac0 bx0 .z &zNtSy SÝ0E
8238 d/Stq0é
8239 &la jx0_Nt
8240 &zStq0/0_/E
8241 z!0E kE is
8242 rda>ya inîat0 nE pvSy c dE
8243 sy0gadrat0 /at0y<vtE
8244 Lvaid>yE
8245 A0idté
8246 i=y0 d0`at
8247 Xy0_Spx
8248 AHc0_npadan
8249 idv0_ivijg0zayam
8250 inva,0_vat
8251 xzE kE
8252 pc0 vE
8253 =ay0 mE
8254 pSTy0_NytrSyam
8255 Anpsgat fæ^=0b^²x0æa`aE
8256 nd^ivd0Nd^]a^`a^h0>y0_NytrSyam
8257 n ?ya^:ya^p^mi^^mdam
8258 ivÒ0 .0g^pTyyy0E
8259 i.Ò xk lm
8260 ¨,ma/m<y
8261 nsÒ^inzÒanÒ^ptt^st^gtain ^Ndis
8262 iKvNpTyySy kE
8263 nxva
8264 m0 n0 /at0E

8265 Mvé
8266 ssjz äE
8267 AvyaE ëtvaE pr@aé
8268 Ahn
8269 r_sip
8270 AMnå/rvirTy.yqa ^Ndis
8271 .vé mhaVyaòtE
8272 vs^ñSvn@ha dE
8273 itPynStE
8274 isip /at ävа
8275 dé
8276 väp/aya dt` –kE
8277 hi l c
8278 £p/aya c
8279 n .^k^ram
8280 Ads_sdaddo mE
8281 Et ¡d^bhvcn
8282 vaKySy $E àt £daÒE
8283 pTyi.vad_x›
8284 drad /t c
82108 tyYvavic sihtayam
831 mtvsä sb×^Ndis
832 A]annaiskE pvSy t va
833 Aatо_i$ inTym
834 Annaiskat^pr_nSvarE
835 smE si$
836 pmE %YyMpr
837 nX^Vypxan
838 £.yq=
839 dt`adi$ smanpad
8310 nNp
8311 Svtvan^pay
8312 kanami@t
8315 %rvsanyivsjntyE
8316 rE sip
8317 .^.g^A`^ApvSy y_ix

8319 lpE xakLySy
8322 hil svzam
8334 ivsjntySy sE
8335 xpr ivsjntyE
8336 va xir
8337 kPv k p c
8340 nmsˆprsgTyE
8341 –ddp/Sy capTyySy
8355 ApdaNtSy m/NyE

# Appendix Four

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