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## THE RELATION BETWEEN PHONES AND PHONEMES ON EXAMPLES FROM PĀLI

### Abstract

*The issue of the paper is, first, to describe the concept of an allophonic number, second, to confront the allophony both in Vedic and in Pāli, and third, to express different allophony in both languages with the use of allophonic numbers.*

### Key words

*Vedic; Pāli; phonemes; allophony; alternations*

The Middle Indo-Aryan languages (MIA) are often beyond the interest of linguists, except those focused on the diachronic development of the Indo-Aryan languages (OIA). For Indo-Europeanists, the MIA languages do not offer anything they could not know from OIA, and for general linguists, the data are just beyond the horizon.

But the MIA languages offer some data which could be very interesting for general linguistics, especially in the field of phonology. In the following lines we will demonstrate the extraordinary degree of allophony in MIA, with a special reference to Pāli.

### 1 Phones, phonemes, allophony

**1.1** Both phones and phonemes are atomic elements of strings. By the term *atomic* we mean that an element is indivisible to elements of the same degree of analysis.

Hence any phone or phoneme is established by its successful identification through the substitution for the class of phones and through the substitution and a distributional analysis for the class of phonemes.

**1.2** The mutual relation between strings of phones and strings of phonemes could be expressed as a mapping between both strings. This process could be generalized just for sets of phones and phonemes.

**1.3** The allophony can be defined as a mapping of a phoneme on one or more phones or a mapping between a phone and one or more phonemes. The first type of allophonic relations can be termed for simplicity *a realization* (a phoneme is *realized* by a phone), the second type can be termed an *assignment* (a phone is assigned to a phoneme).

If a phoneme is realized in more phones, we can express the number of its allophones by an *allophonic number* ( $\mathcal{A}^N$ ). Or in other words: the allophonic number expresses the number of elements in a set of allophones of a given phoneme.

If a phoneme is realized in only one phone and this phone is a realization of only one phoneme, it is a **bilateral allophony**, or we can say that a given phoneme has an allophonic number equal to 1 ( $\mathcal{A}^N/x/ = 1$ ).

In other cases we face a **multilateral allophony**. Phonemes realized in two or more phones have always the allophonic number higher than 1, i.e. equal to 2 or more ( $\mathcal{A}^N/x/ \leq 2$ ).

## 2 Briefly on the MIA languages and especially on Pāli

**2.1 Middle Indo-Aryan** is a later stage in the development of the Indo-Aryan languages, in the wide timeline between Sanskrit (especially the Vedic language) and Modern Indo-Aryan (which started with the coming of Islam in India). Generally, the whole timeline is roughly spanned over two millennia! We can divide the MIA period into three stages (see BUBENIK 1996, 1–11; BUBENIK 2003, 205–210; MASICA 1991, 166–185; PISCHEL 1981, 1–40):

1. Older MIA – Pāli and Aśokan and other inscriptions;
2. Middle MIA – Māhārāṣṭrī, Śaurasenī, Māgadhī and other literally dialects;
3. Newer MIA – Apabhraṃśa and Avahaṭṭha.

All MIA languages share several properties in their development (see BUBENIK 1996, 25–65; BUBENIK 2003, 205–220; MASICA 1991, 166–185; OBERLIES 2003, 168–184):

- MIA1. Both OIA vocalic liquids are replaced by simple vowels;
- MIA2. all OIA diphthongs are monophthongized;
- MIA3. OIA long vowels are shortened before clusters;
- MIA4. three sibilants of OIA are reduced to one;
- MIA5. all onset consonantal clusters are reduced to just one consonant, internal consonantal clusters are reduced to two-consonantal ones and subject to assimilation of the manner and the place, or the cluster is split by an epenthetic vowel;
- MIA6. all final consonants are dropped, and nasals are reduced to the nasalization of the preceding vowel;
- MIA7. dentals are palatalized by a following *y*;

MIA8. a single intervocalic stop is weakened.

It is important to keep in mind that there is no direct genetic line between Old MIA or Middle MIA, as there is none between Vedic and any MIA language, because each literary language is based on some dialect of a continuum of the Indo-Aryan languages, but it does not represent directly a genealogic line. So both Vedic and Pāli reflex the supposed OIA state of the language development, Vedic represents one or more dialects of the OIA language continuum, and Pāli is a descendent of another dialect of the same continuum.

**1.2 Pāli** is supposedly a North-Western Indian language, though attested in the texts of the Theravādin school of Buddhism especially from Ceylon (see GEIGER 1994, xxiii-xxix).

It shares features MIA1–7 with other MIA languages, but it lacks MIA8 (or more correctly, the process MIA8 is exceptional in Pāli but systematic in younger languages). Other, more peculiar, phonemic changes are omitted for the sake of simplicity. The morphology is basically the same as that of Classic Sanskrit (or Epic Sanskrit). So, on the one hand, Pāli is very progressive in its phonemics; on the other hand, it is very conservative in its morphology (which is a typical feature of Older MIA), with generally preserved grammatical categories and morphemic diversity, though transformed by phonemic processes.

### 3 The allophony in Pāli

**3.1** The phonemic system of Pāli is not very different from those of the Vedic language or of the modern central Indo-Aryan languages (in Vedic, *h* is in the position of the palatal voiced aspirated and the phonemic status of some nasals and cerebrals is dubious) (see BUBENIK 1996, 25–65; BUBENIK 2003, 205–210; BURROW 1955, 66–117; ERHART 1980, 12–16; MACDONELL 1910, 5–59; MACDONELL 1916, 1–19; MASICA 1991, 166–185; OBERLIES 2003, 168–184; PISCHEL 1981, 59–284; WHITNEY 1924, 10–34).

**Table 1: Consonants of Pāli**

	T	Th	D	Dh	S	N	R
velars	k	kh	g	gh	h	ṅ	
palatals	c	ch	j	jh		ñ	y
cerebrals	ṭ	ṭh	ḍ/ḷ	ḍh/ḷh		ṇ	r
dentals	t	th	d	dh	s	n	l
labials	p	ph	b	bh		m	v
“nasalization”						ṁ	

**Notes:** 1. T = unvoiced unaspirated stops, Th = unvoiced aspirated stops, D = voiced unaspirated stops, Dh = voiced aspirated stops; S = fricative; N = nasal; R = liquids, semivowels.

2. The *h* is phonetically a glottal sound.
2. The phonemic status of some nasals (*ñ, ṁ*) is dubious.

**Table 2: Vowels of Pāli**

	Ṽ	Ṃ	VV
front	i	ī	e
central	a	ā	
back	u	ū	o

- Notes:**
1. /e/ and /o/ are interpreted as diphthongs, as in OIA. Before vowels, both diphthongs alternate with a *sequence* *a* + semivowel. They are generally long, though shortened in some positions.
  2. The Vedic vowel system has long diphthongs *ai, au*, too, which later merged with *e, o* in MIA.
  3. Both vowels and diphthongs are subject to the ablaut process, as in OIA.

**3.2** The phonemic inventory of Pāli is almost identical to the inventory of Vedic, and even both morphological systems are structured almost alike and with the same properties. We have to turn our focus on a system of phonemic alternations in Pāli because **it is the system of phonemic alternations, which makes the Pāli surface structure different from that of OIA.**

Hence the basic difference between the Older MIA languages and the OIA language is in the allophony of phonemes. Some of the processes, marked above as steps in the development of MIA from OIA, are productive syntagmatic (linear) processes in Pāli. The number of allophones of given phonemes in Pāli is higher than in OIA.

**Note 1:** All examples below are taken from the following literature (FAHS 1989, 230–398; MACDONELL 1910, 369–435; WHITNEY 1885). The references to the literature in the tables are hence omitted, but I will use references in the main course of the text.

**Note 2:** In the following examples, etymologically identical roots both from the Vedic language and Pāli are always shown, so the reader could find quickly the equivalent form in the other language. The roots are compared with the use of TURNER 1966.

### 3.2.1 First example: allophony in the present passive

Let us compare the forms of the present *ya*-passive in both languages.

The present passive is generally formed in both languages by the reduced ablaut grade of the root with the suffix *-ya* which can lengthen the preceding root vowel if not blocked by the root-coda. In both languages the *ya*-passives could be formed with the suffix *iya*, too, which blocks any syntagmatic changes of a root allomorph. The root allomorph in some cases remains in the full grade. Both tables show the forms of the *ya*-passives both in Vedic and in Pāli, formed from the etymologically identical roots (see ERHART 1980, 148; FAHS 1989, 197–205; GEIGER 1994, 170–172; MACDONELL 1910, 444–446; MACDONELL 1916, 178–179; WHITNEY 1924, 275–277).

**Table 3: Vedic *ya*-passive**

	√ <sub>ROOT</sub>			EXAMPLE
V101	√ <i>hā-</i>	+ <i>ya</i>	→	<i>hīyate</i>
V102	√ <i>śru-</i>			<i>śrūyate</i>
V103	√ <i>kṣi-</i>			<i>kṣīyāte</i>
V104	√ <i>dhā-</i>			<i>dhīyate</i>
V105	√ <i>kar-</i>			<i>kriyate</i>
V106	√ <i>gam-</i>			<i>gamyate</i>
V107	√ <i>han-</i>			<i>hanyate</i>
V108	√ <i>tap-</i>			<i>tapyate</i>
V109	√ <i>pac-</i>			<i>pacyate</i>
V110	√ <i>rudh-</i>			<i>rudhyate</i>
V111	√ <i>labh-</i>			<i>labhyate</i>
V112	√ <i>chid-</i>			<i>chidyate</i>
V113	√ <i>tud-</i>			<i>tudyate</i> E.
V114	√ <i>kṛṣ-</i>			<i>kṛṣyate</i>
V115	√ <i>drś-</i>			<i>drśyate</i>

The Vedic *ya*-passive is quite regularly formed. Examples V101–05 demonstrate the lengthening of the root-allomorph vowel, realized as the sequence *ir* in the case of *r*. Examples V106–15 demonstrate the forming of clusters with *y* where the final consonant of a root allomorph contacts with *y*. In all examples we can see the bilateral allophony of the phoneme /y/ which is always realized by a phone [y]. Hence  $\mathcal{A}^N/y/$  based on the examples above is 1 (= [y]).

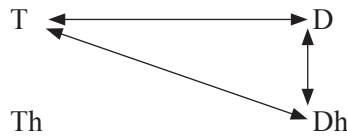
**Table 4: Pāli *ya*-passive**

	√ <sub>ROOT</sub>			EXAMPLE
P101	√ <i>hā-</i>	+ <i>ya</i>	→	<i>hīyati, hiyyati, hāyati</i>
P102	√ <i>su-</i>			<i>sūyati, suyyati</i>
P103	√ <i>khī-</i>			<i>khīyati, khiyyati</i>
P104	√ <i>dhā-</i>			<i>dhīyati, dhiyyati</i>
P105	√ <i>kar-</i>			<i>kīrati, kayyati</i>
P106	√ <i>gam-</i>			<i>gammati</i>
P107	√ <i>han-</i>			<i>haññati</i>
P108	√ <i>tap-</i>			<i>tappati</i>
P109	√ <i>pac-</i>			<i>paccati</i>
P110	√ <i>rudh-</i>			<i>rujjhati</i>
P111	√ <i>labh-</i>			<i>labbhati</i>
P112	√ <i>chid-</i>			<i>chijjati</i>
P113	√ <i>tud-</i>			<i>tujjati</i>
P114	√ <i>kas-</i>			<i>kissati, kassati</i>
P115	√ <i>das-</i>			<i>dissati</i>

The situation in Pāli is quite different. Examples P101–04 express the same allophony as in Vedic, i.e. the bilateral allophony /y/ → [y]. On the contrary, examples P105–15 represent the doubling of the final root-allophone consonant (with palatalization in examples P107, P110–13). In example P105 we can notice that the lengthening is really only an allophony to the simple suffix *ya* because we face here both examples: the suffixed and geminated one. The allophonic number of *y* in Pāli, based on the examples above only, is then definitively higher than in OIA, for  $\mathcal{A}^N/y/ = 9$  (= [y, ñ, m, p, c, jh, bh, j, s]).

### 3.2.2 Second example: allophony in the passive preterit *ta*-participle

OIA developed a system of phonemic alternations between members of the class of stops. This alternation is in features /±voice/ and /±aspiration/ and generally covers only three classes of phonemes: unvoiced & unaspirated (T), voiced & unaspirated (D) and voiced & aspirated (Dh), but the class of unvoiced & aspirated (Th) is never subject to the alternation. Hence *T*, *D*, *Dh* has each the allophonic number equal to 3, and *Th* equal to 1.



The situation in Pāli is very different, which can be demonstrated on the alternation of *t* in the *ta*-passive preterit participle (when forms of the participle are not attested, I use other derivatives, formed with *t*).

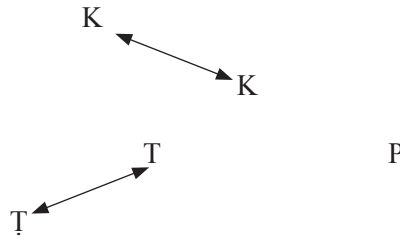
The participle is in both languages formed by simple concatenation of the *ta*-suffix to a reduced root-allomorph (again, in some cases, to a full grade root-allomorph) (see ERHART 1980, 182; FAHS 1989, 168–174; GEIGER 1994, 184–186; MACDONELL 1910, 572–576; MACDONELL 1916, 183–187; WHITNEY 1924, 340–344).

**Table 5: Vedic *ta*-passive preterit participle**

	√ <sub>ROOT</sub>		EXAMPLE
V201	√ <i>jñā-</i>	+ <i>ta</i>	<i>jñāta</i>
V202	√ <i>śru-</i>		<i>śruta</i>
V203	√ <i>nī-</i>		<i>nīta</i>
V204	√ <i>dhā-</i>		<i>hīta</i>
V205	√ <i>yam-</i>		<i>yata</i>
V206	√ <i>han-</i>		<i>hata</i>
V207	√ <i>kar-</i>		<i>kṛta</i>
V208	√ <i>tap-</i>		<i>tapta</i>
V209	√ <i>pac-</i>		<i>paktvā</i> (absolute)

	√ <sub>ROOT</sub>			EXAMPLE
V210	√ <i>chid-</i>	+ <i>ta</i>	→	<i>chettum</i> B. (infinitive)
V211	√ <i>kṣip-</i>			<i>kṣipta</i>
V212	√ <i>krś-</i>			<i>krṣṭa</i>
V213	√ <i>darś-</i>			<i>drṣṭa</i>
V214	√ <i>vas-</i>			<i>uṣṭe</i> E., <i>uṣṭa</i> S., <i>vasita</i> C.
V215	√ <i>rudh-</i>			<i>ruddha</i>
V216	√ <i>labh-</i>			<i>labdha</i>

In examples V201–14 we see simple concatenation of *t* to a root-allomorph, either ending in a vowel or in any consonant except *Dh*. If a root allophone ends in *Dh* (examples V215–16), *t* is itself realized as *Dh*, while the preceding *Dh* loses its aspiration, which follows the principle described above. Note that after *ṣ* dental *t* becomes cerebralized, otherwise the location of *t* is preserved and the *t* causes (as in example V209) depalatalization of the preceding palatals. In the following graph we try to express alternations of the place (location):



Hence the allophonic number in Vedic, based on our examples, is  $\mathcal{A}^N/t/ = 3$  (= [*t*, *t̪*, *dh*]).

Let us now look at the Pāli system:

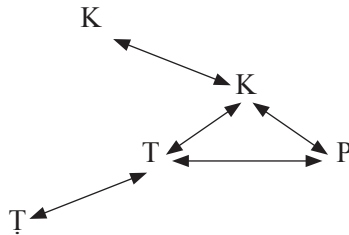
**Table 6: Pāli *ta*-passive preterit participle**

	√ <sub>ROOT</sub>			EXAMPLE
P201	√ <i>jñā-</i>	+ <i>ta</i>	→	<i>ñāta</i>
P202	√ <i>su-</i>			<i>suta</i>
P203	√ <i>nī-</i>			<i>nīta</i>
P204	√ <i>dhā-</i>			<i>hita</i>
P205	√ <i>yam-</i>			<i>yata</i>
P206	√ <i>han-</i>			<i>hata</i>
P207	√ <i>kar-</i>			<i>kata</i>
P208	√ <i>tap-</i>			<i>tatta</i>
P209	√ <i>pac-</i>			<i>pakka</i> , <i>pacita</i>
P210	√ <i>chid-</i>			<i>chettum</i> (infinitive)
P211	√ <i>khip-</i>			<i>khitta</i>



	√ <sub>ROOT</sub>		EXAMPLE	
P212	√ <i>kas-</i>	+ <i>ta</i>	→	<i>kaṭṭha</i>
P213	√ <i>dars-</i>			<i>diṭṭha</i>
P214	√ <i>vas-</i>			<i>vuṭṭha, vuṣita, vaṣita</i>
P215	√ <i>rudh-</i>			<i>ruddha</i>
P216	√ <i>labh-</i>			<i>laddha</i>

Generally, in Pāli the process of forming the *ta*-passive preterit participle follows all principles of the Vedic formation. Examples P201–07 are simply realized in the way /t/ → [t]. In the other examples we can see a more complex system of allophony. Examples P208–14 demonstrate the complex allophony, including the allophony of the location. In particular, examples P212–14 represent the alternation based on the clusters /sT/ → [TTh], hence *Th* is an allophone of a sibilant! Examples P215–16 follows roughly the way of the same examples in the table above but with a process of assimilation of the place, too, as expressed in the following graph:



The allophonic number of /t/ in our examples is  $\mathcal{A}^N/t/ = 5 (= [t, k, \text{ṭh}, th, dh])$ .

### 3.2.3 Third example: allophony in the sigmatic aorist

The last example of the allophony in Pāli is that of the sigmatic aorist, again confronted with the same formation in OIA.

Generally, the sigmatic aorist is formed by concatenation of the *s*-suffix (in some cases thematized) to a root allomorph, generally in the lengthened grade (see ERHART 1980, 164–165; FAHS 1989, 158–160; GEIGER 1994, 159–161; MACDONELL 1910, 519–536; MACDONELL 1916, 158–167; WHITNEY 1924, 313–326).

**Table 7 : Vedic s-aorist**

	√ <sub>ROOT</sub>		EXAMPLE	
V301	√ <i>jñā-</i>	+ s	→	<i>ajñāsam</i> B.
V302	√ <i>śru-</i>			<i>aśrauṣīt</i> B.
V303	√ <i>dhū-</i>			<i>adhūṣata</i>
V304	√ <i>dā-</i>			<i>adiṣi</i>
V305	√ <i>stā-</i>			<i>asthiṣi</i> B.
V306	√ <i>nī-</i>			<i>anaiṣīt, neṣati</i>
V307	√ <i>kar-</i>			<i>akṛṣi</i>
V308	√ <i>drś-</i>			<i>drkṣase</i>
V309	√ <i>bhuj-</i>			<i>bhukṣiṣīya</i>
V310	√ <i>ruh-</i>			<i>arukṣat</i>
V311	√ <i>labh-</i>			<i>alapsata</i>
V312	√ <i>chid-</i>			<i>acchātsīt</i> B.

The Vedic data show regular formation, with bilateral allophony /s/→ [s], with cerebralization due to the „ruki”-rule in examples V302–10, and with devoicing of the preceding voiced (either aspirated or unaspirated) occlusive, including *h*, and depalatalization of the palatalized (examples V308–10).

The allophonic number for /s/ in Vedic is, based on our examples,  $\mathcal{A}^N/x/ = 2$  (= [s, ṣ]).

**Table 8 : Pāli s-aorist**

	√ <sub>ROOT</sub>		EXAMPLE	
P301	√ <i>jñā-</i>	+ s	→	<i>aññāsi</i>
P302	√ <i>su-</i>			<i>assosi</i>
P303	√ <i>dhū-</i>			<i>adhosi</i>
P304	√ <i>dā-</i>			<i>adāsi</i>
P305	√ <i>thā-</i>			<i>atṭāsi</i>
P306	√ <i>nī-</i>			<i>nesi</i>
P307	√ <i>kar-</i>			<i>akāsi</i>
P308	√ <i>das-</i>			<i>addasam</i>
P309	√ <i>bhuj-</i>			<i>bhokkham</i>
P310	√ <i>ruh-</i>			<i>rucchi</i>
P311	√ <i>labh-</i>			<i>lacchim</i>
P312	√ <i>chid-</i>			<i>acchecchi, acchejji</i>

The situation in Pāli is generally the same, influenced again only by a higher degree of allophony. Examples P301–09 demonstrate bilateral allophony /s/→ [s], but without any *s/ṣ* alternation (the result of MIA4, see above). In example P307 we can see again the lengthening of the preceding vowel. Examples P309–12 demonstrate more complex allophony, identical to that of examples P215–16

from paragraph 3.2.2 above. Here again the aspiration is part of a realization of /s/.

The allophonic number of /s/ in Pāli, based on our examples is then  $\mathcal{A}^N/x/ = 4$  (= [s, kh, ch, j]).

#### 4 Concluding remarks

On the examples above we demonstrated that the degree of allophony is higher in Pāli than in OIA. In Vedic it is at least generally preserved the both in a manner and in the place of articulation. In Pāli both the manner and the place of articulation are subject to systematic alternation which is a synchronic reflex of the MIA5 rule mentioned above.

The MIA5 rule is then either a pure synchronic process in Pāli clusters, developed by a morphemic process, the one which distinguishes the system of Pāli from the system of OIA, or a static state of all other Pāli clusters which are results of the general diachronic development of clusters in OIA into MIA.

Generally, allophonic numbers of consonantal phonemes are higher in Pāli than in OIA. Besides, very often are allophones of one phoneme mutually quite different: they can vary in voicing, aspiration, place or manner of articulation on a scale not present in OIA, which is best demonstrated on the examples of the Pāli *ya*-passive.

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## VZTAH MEZI FONY A FONÉMY NA PŘÍKLADECH Z PĀLIJŠTINY

Středoidická pálijšťina je jedním z jazyků, jimž není věnována v obecné či srovnávací lingvistice (mimo vlastní indologii) větší pozornost, jsouc zastíněna staroindičtinou (védštinou a klasickým sanskrtem) a moderními indickými jazyky. Tento nezájem však neznamená, že pálijšťina či středoidické jazyky obecně, nenabízí pozoruhodná data k analýze.

V tomto příspěvku jsme se zaměřili na ojediněle bohatý systém alofonie, kterou vykazuje pálijšťina ve srovnání se staroindičtinou. Jako alofonické číslo jsem zavedl  $\mathcal{A}^N/x/$ , kde  $/x/$  je daný foném a číslo vyjadřuje počet alofonů daného fonému, kdy v případě  $\mathcal{A}^N/x/ = 1$  mluvíme o bilaterální alofonii, pokud  $\mathcal{A}^N/x/ \leq 2$ , pak o alofonii multilaterální. Morfologické systémy staroindičtiny (zde védštiny) a pálijšťiny jsou principiálně identické, můžeme dokonce tvrdit, že pálijšťina se od védštiny liší právě větším množstvím syntagmatických alternací. Soustředili jsme se na alofonické procesy vznikající mezi kořenem a derivačním prostředkem a to na: tvoření *ya*-pasiva, tvoření *ta*-participia préterita pasiva a tvoření sigmatického aoristu. Srovnali jsme tvoření vždy ve staroindičtině a pálijšťině a spočítali jsme alofonické číslo, které daný proces vykazuje (viz 3.2.1 až 3.2.3).

Z výsledků je zřejmé, že se pálijšťina od védštiny liší výrazně větší alofonií, danou syntagmatickými procesy akomodace konsonantických trsů v lokaci a způsobu artikulace.

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