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Indo-Aryan 'six'
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1. The onset of the Middle Indic word for 'six' and its family is a well-known crux of Indo-Aryan historical phonology. Whereas the Sanskrit forms always begin with *ṣ-*, Pāli and the major Prākṛits have *ch-* in the words for 'six' and 'sixth', and *s-* elsewhere. The Middle Indic forms are conveniently listed in NORMAN 1992, the most important of which are given in the table below¹:

	Sanskrit	Pāli + major Prākṛits	Northern Prākṛits
'six'	<i>ṣaṭ</i>	<i>cha</i>	Niya <i>ṣo</i> , Aś. <i>ṣaṣu</i>
'six' (in cmp.)	<i>ṣaṭ</i> ^o <i>ṣoḷhā</i> '6-fold'	<i>cha(ḷ)</i> ^o , except <i>saḷāyatana</i> 'six sense facilities' AMg. <i>saḍamga</i> '6 const. parts' Inscr. (W) <i>ṣaṇuvisa</i> '26'	Aś. <i>sa(ḍ)-</i>
'sixth'	<i>ṣaṣṭhā-</i>	<i>chaṭṭha(ma)</i> ²	Niya <i>ṣodhama</i>
'sixteen'	<i>ṣoḍaśa</i>	<i>soḷasa, sorasa, solasa</i> ³	Gāndhārī <i>ṣoḍasa</i>
'sixteenth'	<i>ṣoḍaśā-</i>	<i>soḷasa(ma), solasama</i>	Khar. <i>ṣoḍaśa</i>
'sixty'	<i>ṣaṣṭī-</i>	<i>saṭṭhi(m)</i> ⁴	
'sixtieth'	<i>ṣaṣṭitama-</i>	<i>saṭṭhitama, JM saṭṭhima</i>	Khar. <i>ṣaṣṭihā</i>

The difference between the Northern Prākṛits and the rest is also reflected in Modern Indo-Aryan languages, where the Dardic languages (Shina [Kohistan] *ṣva*, Gawar-Bati *ṣ"ō, ṣō"*) and the Nuristani languages (Ashkun *ṣu*) continue the Northern form, whereas Hindi, Sindhi *cha* 'six', etc. continue the form of the other Prākṛits.

Initial *ch-* in the MI word for 'six' is incompatible with *ṣ-* of Skt. *ṣaṭ*. Therefore, scholars generally assume a deviating proto-form for MI *ch-*, viz. **kṣ(v)-* (e.g. HIERSCHE 1964:98f., TURNER CDIAL:12803, HAMP 1978, VON HINÜBER 1986:167, NORMAN 1992:204, BERGER 1992:247, EMMERICK 1992:169), but this reconstruction can hardly be called a solution. First of all, it does not account for the difference in anlaut between *cha* 'six' and *soḷasa* 'sixteen', *saṭṭhi(m)* 'sixty', a problem which has never been discussed in the literature. If *cha* goes back to **kṣ(v)-*, why don't we find initial *ch-* in the words for 'sixteen' and 'sixty'? Secondly, the reflex of

¹ Abbreviations are: AitB = Aitareya-Brāhmaṇa, AMg. = Ardhamaṅgadhī, Av. = Avestan, AV = Atharvaveda, AVP = Atharvaveda-Paippalāda, AVŚ = Atharvaveda-Śaunakīya, Aś. = Aśokan inscriptions, Inscr. (W) = Western Inscriptional Prākṛits, JB = Jaiminiya-Brāhmaṇa, JM = Jaina-Māhārāṣṭrī, Khar. = Kharoṣṭhi inscriptions, MI = Middle Indic, PB = Pāṇcaviṃśa-Brāhmaṇa, PIE = Proto-Indo-European, PIlr. = Proto-Indo-Iranian, RV = R̥gveda, Saur. = Sauraseni, ŚB = Śatapatha-Brāhmaṇa, TS = Taittiriya-Saṃhitā, Yt = Yasht.

² The variant *saṭṭha* given by NORMAN, is "nicht zu belegen" (VON HINÜBER 1986:171).

³ The forms *chaddasa* 'sixteen', *chaddasahā* 'sixteen times', quoted by SHETH 1963, are clearly based on *cha* 'six'.

⁴ Saur. *chaṭṭim* is "either a wrong reading, or by analogy with *cha* 'six'" (NORMAN 1992:213).

**kṣ* in Middle Indic is different in the Eastern dialects, where it becomes *kkh*, and the Western dialects, where we find *cch*. There was a subsequent exchange of the forms between the dialects, mostly in favor of the *kkh*-forms, but in our word family all Middle Indic dialects show *ch*- (or *s*-), and it is not very probable that the numeral was borrowed⁵. Furthermore, in the North-Western dialects, the reflex of *kṣ* is represented by a special sign *ch* (e.g. Niya *chetra* < Skt. *kṣetra*, BURROW 1937:18f.), but as we can see from the table, the word for 'six' in Niya is *ṣo*.

2. To my mind, it is precisely the opposition between *ch*- in the word for 'six' and *s*- in the word for 'sixteen' that provides the key to the solution of the puzzle. In order to understand the nature of the processes which have led to these forms, we have to consider the fate of **z* in Indo-Aryan.

2.1. Indo-Iranian **z* is of twofold origin, viz. the 'ruki'-*z* before voiced stops and PIE palato-velars (*ǩ, ĝ, ĝʰ*) before dentals (PIE **-ǩdʰ(h)-, *-ĝʰdʰ(h)-, *-ĝʰt- > PIlr. *-z dʰ(h)-*). In Sanskrit, **z* normally disappears with compensatory lengthening of the preceding short vowel, cf.:

**izC > īC*

nīlā- m.n. 'abode, nest' < **nizda-* < PIE **ni-sd-o-*;

mīlhā- 'contest, reward' < **mizdha-* < PIE **mis-dʰ(h)o-*;

sīkṣa-, desiderative of √*sah-* 'to conquer', < **sizgʰa-* < PIE **si-sĝʰ-so-*⁶;

**uzC > ūC*

dūḷābha- adj. 'hard to deceive' < **duz-dabha-* < PIE **dus-dʰebʰo-*;

dūḷhī- adj. 'malevolent' < **duz-dhiH-* < PIE **dus-dʰiH-*;

dūṇāśa-, *dūṇāśa-* 'hard to attain' < **duz-nāśa-*;

ūḷhā-, *ta*-ptc. of √*vah-* 'to drive', < **uzdha-* < PIE **ugʰ-tó-*;

**ṛzC > ṛC*⁷

√*mṛd-* 'to be merciful' < **mṛzd-* (cf. Av. *mərəzd-* 'id.');

dṛlḥā-, *ta*-ptc. of √*dṛh-* 'to fasten', < **dṛzdʰa-*;

tṛlḥā-, *ta*-ptc. of √*(s)tṛh-* 'to crush', < **tṛzdʰa-* < PIE **(s)trĝʰ-to-*.

2.2. In a similar fashion, we expect short *a* to be lengthened in this position, but in reality we find three different reflexes, viz. *ā*, *o* and *e* (cf. WACKERNAGEL 1896:37ff., 44f.).

⁵ Note that, for instance, in Kāśī (an Eastern dialect), where we find the form *ṣaṣu*, the reflex of **kṣ* is (*kkh*): *lukha* < Skt. *vrkṣa-*, *khudaka* < Skt. *kṣudraka-* (VON HINÜBER 1986:114).

⁶ Vs. the desiderative *sīkṣa-* from √*sak-* 'to be able' with a short vowel. Long *ī* in *sīkṣa-* shows that the loss of *z* with compensatory lengthening of the preceding vowel was anterior to devoicing of **zʰ* to *ṣ* (DEBRUNNER 1957:28). INSLEER 1968 argued that desideratives with a monosyllabic stem (like *dips-*, *dits-*, *sīkṣ-*) have been formed analogically on the basis of the zero grade of the perfect stem, cf. *śek-ūr* : *sīk-ṣati*, *debh-ūr* : *dip-sati*, *ap-ūr* : *īpsati*. In his opinion, *sīk-ṣati* was made after *sāh-vāms-*, and *dīk-ṣati* after *dās-vāms-*. Even if the mechanism proposed by INSLEER was operative at some stage, there must have been a starting point for the long vowel desideratives, where the development was phonetically regular. Such a starting point was probably *sīkṣati*, which is the only such formation attested in the RV. Another regular formation was the desiderative *dīkṣa-* < **didkse-* from the root √*dās-* 'to honour' (for the development see LUBOTSKY 1994:203f.). The finite forms appear since the Brāhmaṇas, but *dīkṣitā-* and *dīkṣā-* are found in the AV.

⁷ Written short in the texts, but being metrically long.

2.2.1. The most frequent reflex is \bar{a} (i.e. $*azC > \bar{a}C$):

$v\acute{i} t\bar{a}lhi$ (RV 10.180.2) 2sg. impv. $\sqrt{tak\bar{s}}$ - 'to fashion' < $*tazd^hi$ < PIE $*tetk\bar{-}d^hi$;
 $s\bar{a}lhar$ - m. (RV 7.56.23) 'conqueror' < $*sazd^har$ - < PIE $*seg^h\bar{-}ter$;
 $\bar{a}-s\bar{a}lha$ - adj. 'unconquerable' < $*-sazd^ha$ -⁸ < PIE $*-seg^h\bar{-}to$ -⁹;
 $b\bar{a}lha$ -, ta -ptc. \sqrt{bamh} - 'to be firm'¹⁰ < $*bazd^ha$ - < PIE $*(d)b^hng^h\bar{-}to$ - (cf. Av. $dabazaiti$ 'strengthens')¹¹.

2.2.2. The reflex o ($*azC > oC$) is found in derivatives of the root \sqrt{vah} - 'to drive' (PIE $*ueg^h\bar{-}$) and in derivatives of $\bar{s}as$ - '6', cf.

$volham$, $volh\bar{a}m$ 2,3 du. impv. root aor. \sqrt{vah} - 'to drive' (cf. NARTEN 1964:240, fn. 727);
 infinitives $v\acute{o}lhave$, $\acute{a}nu pr\bar{a}volhum$ < $*vazd^hu$ - < PIE $*ueg^h\bar{-}tu$;
 $v\acute{o}lhar$ - m. 'driving (horse)' < $*vazd^har$ - < PIE $*ueg^h\bar{-}ter$;
 $\bar{s}oda\bar{s}a$ (TS+) 'sixteen' < $*\bar{s}vaz\bar{-}da\bar{s}a$ (cf. Av. $x\bar{s}uuas$ 'six', $x\bar{s}uuas.dasa$ - 'sixteenth'), AV+
 $\bar{s}oda\bar{s}a$ - 'the sixteenth', AV+ $\bar{s}oda\bar{s}in$ - (AVŚ 11.7.11 = AVP 16.83.1, AVP 17.29.16) adj.
 'the one of sixteen', $\bar{s}oda\bar{s}a\bar{-}rc\bar{a}$ - (AVŚ 19.23.13) adj. 'consisting of sixteen verses';
 $\bar{s}olh\bar{a}$ (RV 3.55.18) adv. 'sixfold'¹².

Since the o reflex of $*az$ only occurs after v , it is likely to be conditioned by this sound. For $\bar{s}oda\bar{s}a$, etc. we can then assume the following chain of developments: $*\bar{s}vazd^o > *\bar{s}vod^o > \bar{s}od^o$. The loss of $-v-$ is not unexpected considering the Sanskrit tendency to drop post-consonantal v in labial environment, cf. $k\bar{s}ip$ - 'to throw, fling', $k\bar{s}ipr\bar{a}$ - 'quick' < $*k\bar{s}vip$ - (cf. Av. $x\bar{s}uuas\bar{e}\beta a$ - 'quickly moving', $x\bar{s}uu\bar{i}\beta ra$ - 'quick'); $\bar{s}iti\bar{-}p\bar{a}d$ - 'with white feet', $\bar{s}iti\bar{-}pr\bar{s}th\bar{a}$ - 'with white back' < $*\bar{s}viti\bar{-}C_{lab}$ (cf. $\bar{s}vitr\bar{a}$ - 'white', $\bar{s}vity\bar{-}a\bar{n}c$ - 'whitish', etc.; DEBRUNNER 1938)¹³.

In order to understand the v -coloring from a phonetic point of view, it should be borne in mind that Sanskrit a was a middle vowel, approximately a shwa (HOFFMANN 1976:552f.), which was sensible to the phonetic environment. In the position before r or $*z$, it was realized as [e], and when it was compensatorily lengthened to [e:], the result merged with long \bar{a} (cf. also the sandhi rule $-ar\bar{r}- > -\bar{a}\bar{r}-$). The development $*vazC > oC$ implies that $*vazC$ was pronounced as [vɔzC]. When $*z$ disappeared, [ɔ] was lengthened to [ɔ:] and later merged with the phoneme /o/. For the sake of completeness, I can add that before $*z$, the realization of the shwa was more fronted, and the lengthening yielded e ([əzD] > [ə:D] > eD , cf. $edh\bar{i}$ 'be!' < $*azd^hi$).

2.2.3. The only example of $*azC > eC$ is 3sg. impv. $tr\bar{n}edhu$ from $\sqrt{(s)tr\bar{n}h}$ - 'to crush' < $*tr\bar{n}azd^hu$ < PIE $*(s)tr\bar{n}-eg^h\bar{-}tu$, attested in AVŚ 8.8.11 = AVP 16.30.1, AVP 9.6.3¹⁴. As already indicated by MARSH 1941:47 and RENOU 1952:30, e of the impe-

⁸ With the assimilation $*-s- > -\bar{s}-$.

⁹ The epic and classic forms $\bar{s}odha$ - and $\bar{s}odhar$ - are secondary, formed by analogy with $v\acute{o}dhar$ -, etc., for which see below.

¹⁰ Attestation in the RV are: $n\bar{i}-b\bar{a}lha$ - (1.106.6), $b\bar{a}lha\bar{-}s\bar{r}ivan$ - (1.122.10), $b\bar{a}lhe$ adv. 'strongly' (1.181.7).

¹¹ MARSH (1941:47) claimed that the normal reflex of $*azC$ is o , so that he had to explain away all examples of \bar{a} . He did this by positing lengthened grade in $t\bar{a}lhi$ and $s\bar{a}dh$ - and declaring $b\bar{a}dh\bar{a}$ - of unclear etymology, which is of course *ad hoc*.

¹² In later texts restored to $\bar{s}ad\bar{d}h\bar{a}$ (ŚB), $\bar{s}atdh\bar{a}$ (PB).

¹³ I have to admit, however, that I have been unable to find another example of the sound change $*Cvo- > Co-$.

¹⁴ In later Vedic texts we only find a hapax 3sg. $tr\bar{n}edhi$ (JB 2.271). 1sg. $tr\bar{n}ehmi$ is a form invented by the grammarians. From this root, the RV only attests participles $tr\bar{l}h\bar{a}$ - (with metrically long r) and $tr\bar{n}h\bar{a}t$ -

rative *ṭṛṇédhu* can be secondary, taken from imperatives like *edhí*, *dehí*, *dhehí*. To be sure, these imperatives are 2sg. and not 3sg., but *-e-* of the 2sg. imperatives went beyond its original limits, as appears from 2pl. impv. *dhetana* (RV 8.67.5; 10.37.12) beside the regular *dhattana*. From the imperative, *e*-vocalism spread to the other forms (cf. n. 14).

2.3. The distribution of the three reflexes of short *a* before *ṛC* can be formulated as follows: the normal reflex is *ā*, whereas *o* is conditioned by the preceding *v*; *e*-vocalism of *ṭṛṇédhu* is probably secondary. This distribution is by no means a novel one. Already in the 19th century, BENFEY, HAVET and BLOOMFIELD (cf. WACKERNAGEL 1896:39) assumed that the *o*-vocalism is due to the preceding *v*, but since they combined this observation with the theory that this *o* directly continues PIE **a*, their position was generally ignored¹⁵. More recently, in 1952, RENOUE gave the same distribution in his *Grammaire de la langue védique*¹⁶, but even then this view did not find its way into the scholarly literature, where it is commonly held that the normal reflex of *a* before *ṛC* is *o*¹⁷.

3. Now we can return to the word for 'six'. The development of the words for 'sixteen' and 'sixfold', discussed above, suggests that the Proto-Indo-Aryan forms were: **śvát̥* '6', **śváz-ḍaśa* > *śoḍaśa* 'sixteen', **śvaz-ḍhā* > *śoḍhā* 'sixfold'. My contention is that this system perfectly accounts for all attested forms both in Sanskrit and Middle Indic. The only difference is that **śvát̥* was preserved in the dialect which formed the basis of Middle Indic, whereas Sanskrit has analogically removed the *-v-*. There are various reasons for this analogical development. First of all, in *śoḍaśa* and *śoḍhā*, *-v-* was phonetically lost. Further, the ordinal must have played an important role. As was suggested by HOFFMANN (1965:253f. = 1975:189f.), the Indo-Iranian form of the ordinal 'sixth' was **śušt̥a-*, which was replaced by *ṣaṣṭhā-* in Indo-Aryan on the basis of **pakthā-* 'fifth'. The ordinal *ṣaṣṭhā-* is then responsible for the absence of *-v-* in the word for 'sixty' (Skt. *ṣaṣṭí-*, Pāli *saṭṭhi*, see below) and in Skt. *ṣát̥*.

In the Proto-MI, however, the analogical removal of *-v-* in the word for 'six' did not take place. It has been indicated long ago (e.g. TURNER CDIAL:12803) that Niya *šo* and the reflexes in the Nuristani and Dardic languages directly point to **śvát̥*, but it remained unnoticed that this form also directly accounts for initial *ch-* in Middle Indic. There is important evidence that **śv* regularly gives MI *ch* (cf. BERGER 1955: 81ff.), viz. *mātuḥśvas̥* f. 'mother's sister' > Pāli *mātuccā-*, Pkt. *māucc(h)ā-* (next to *māus(s)ī-*, *māussiā-*, *māsīā-* with restored anlaut of the word for 'sister', CDIAL

(10.102.4).

¹⁵ Cf. WACKERNAGEL's conclusion: "für *aṣ* findet sich *e o* und ausserdem *ā* [...], ohne dass die Ratio erkennbar wäre" (p. 38).

¹⁶ p. 30: "La forme isolé *ṭṛṇédhu* (...) de TRH atteste un traitement vocalique conforme à celui de *edhí dehí*, en sorte que *vódhave* peut en définitive devoir son timbre radical à la précedence de la consonne *v*".

¹⁷ Compare, for instance, THUMB - HAUSCHILD 1958:300 ("*a* [wird] zu *ā*, seltener zu *ā*"), ALLEN 1962:72 n. 8 (regular reflex of *aṛC* is *oC*, i.e. "*ṣaḍaśa* > *ṣavḍaśa*"), and "for two rare cases of simple lengthening of the vowel (*tādhi*, *sādhā-*) see p.94 n63", where these two cases are only mentioned without further adstrution, BURROW 1973:95 ("*a* preceding short *a* may be either lengthened [exx.], turned to *o* [exx.], or turned to *e* [ex.]", etc.

10001); *pituḥṣvaṣṭ-* f. 'father's sister' > Pāli *pitucchā-*, Pkt. *piucc(h)ā-*, *piucchī-* (next to *piussiyā-*, *piusiā-*, CDIAL 8177). The phonetic development of **śv* presumably went through **tśv* > **tś* > **ch*. The reflex of **śv* thus merged with that of **kś* in some dialects, which may explain forms like Khowār *choi*, the initial *ch* of which is a normal reflex of **kś* (VON HINÜBER 1986:67,167)¹⁸.

4. A final detail to be taken care of is the initial *s-* in some Middle Indic words of the 'six' family. The Aśokan forms (loc.pl.) *sasu*, *śaśu* (= *sasu*), *sa(d)-* in *saḍuvīsati* '26', *sapaṃnā* '56', *āsaṃmāsika-* 'up to six months' and Inscr. (W) *ṣaṇuvisa* '26' must be due to a different treatment of **śv-* (e.g. **śś-* > **ss-* > *s-*). Pāli *saḷāyatana* (next to *chaḷāyatana*) 'six sense facilities' and AMg. *saḍaṃga* 'six constituent parts' (vs. Pāli *chaḷaṅga-*) are borrowings from an Eastern dialect¹⁹.

More problematic is Pāli *saṭṭhi*, AMg. *saṭṭhi(m)*, etc. 'sixty', which cannot be separated from Sanskrit *ṣaṣṭi-*. How can we account for the fact that there is no **śv-* in this word? Let us compare the "paradigms" of '6' in Sanskrit and the proto-form of Middle Indic:

	Sanskrit	Proto-Middle-Indic
'6'	<i>ṣaṭ</i>	<i>*śvaṭ</i>
'6th'	<i>ṣaṣṭhā-</i>	<i>*śvaṣṭhā-</i>
'16'	<i>ṣoḍaśa</i>	<i>*śoḍaśa</i>
'60'	<i>ṣaṣṭi-</i>	<i>*śaṣṭi</i>

The most likely scenario which would explain both systems seems to be the following:

Proto-Indo-Iranian **śuacś* '6' – **śuštHa-* '6th' – **śuaṣṭi* '60'

↓

**śvaṭś* – **śuštHa-* – **śvaṣṭi*

↓

**śvaṭ* – **śaṣṭhā-* (cf. §3) – **śvaṣṭi*

↓

Proto-Indo-Aryan **śvaṭ* – **śaṣṭhā-* – **śaṣṭi*

↙

↘

Skt. *ṣaṭ* – *ṣaṣṭhā-* – *ṣaṣṭi-*

Proto-MI **śvaṭ* – **śvaṣṭhā-* – **śaṣṭi*.

¹⁸ The difference in the treatment of **śv* between Niya and the other Prakrits is in line with the usual behaviour of *Sv* clusters: they are normally preserved in Niya (BURROW 1937:21) and some other inscriptional Prakrits, while in other Middle Indic dialects they become a geminate *ss*, simplified in anlaut (cf. SAKAMOTO-GOTO 1988:95 for the evidence).

¹⁹ Cf. VON HINÜBER 1986:167, who points to *cchaḷāyatana* of the Devnimori inscription vs. *saḍāyatana* of the Ratnagiri inscription.

In other words, Sanskrit has removed the *-v-* in the word for 'six' by analogy with the ordinal '6th', whereas Proto-MI has levelled the paradigm in the opposite direction.

5. The explanation of Middle Indic *cha* proposed above is of some importance for the reconstruction of the Proto-Indo-European word for 'six'. Since the Indo-Aryan reflexes can be accounted for without recourse to the initial cluster **kš-*, there is no reason for reconstructing it for the proto-language. Avestan *xšuuas* and other Iranian forms show the regular development of initial **š-* to *xš-* (cf. PIE **ǵneh₃-* > PIIr. **znā-* > Ir. **šnā-* > Av. *xšnā-* 'to know'), so that we can reconstruct Proto-Indo-Iranian **šuačš*. The assimilation of the initial **s-* to **š-* must then be dated at least to the common Indo-Iranian stage²⁰.

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²⁰ The relationship between Skt. *śāt*, Middle Indic *cha(t)* and Avestan *xšuuas* is reminiscent of that between Skt. *śépa-* 'tail, penis', Prākṛit and Pāli *cheppā* 'tail' (< **pyā-*, cf. AV *sepyāvant-* 'tailed') and Av. *xšuuāēpā-* (Yt. 19.40) 'tail', which is likely to be cognate (for a discussion of this word see HINTZE 1994:216f.). The Iranian and Middle Indic words point to **šuaipā-*, whereas *u* may have been lost in Sanskrit due to dissimilation. In order to combine this form with Skt. *śépa-*, we can either reconstruct PIIr. **pčuaipa-* or assume that the word for 'tail' is a loan word (cf. also AitB *śepha-* m. 'scrotum').

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