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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 ś-, Pāli and the major Pārākṛtās 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 below:

<table>
<thead>
<tr>
<th>Sanskrit</th>
<th>Pāli + major Pārākṛtās</th>
<th>Northern Pārākṛtās</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘six’</td>
<td>śāt</td>
<td>cha</td>
</tr>
<tr>
<td>‘six’ (in cmp.)</td>
<td>śatə</td>
<td>cha( /) ʂə, except</td>
</tr>
<tr>
<td></td>
<td>sofbā ‘6-fold’</td>
<td>salāyatana ‘six sense facilities’</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AMg. sadamga ‘6 const. parts’</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inscr. (W) ʂəmuvisə ‘26’</td>
</tr>
<tr>
<td>‘sixth’</td>
<td>ʂaṣṭhə-</td>
<td>chaṭṭha(ma)</td>
</tr>
<tr>
<td>‘sixteen’</td>
<td>sōḍasa</td>
<td>solasa, sorasa, solasa</td>
</tr>
<tr>
<td>‘sixteenth’</td>
<td>sōḍāsa-</td>
<td>solasa(ma), solasama</td>
</tr>
<tr>
<td>‘sixty’</td>
<td>ʂaṭṭi-</td>
<td>ʂaṭṭhi(m)</td>
</tr>
<tr>
<td>‘sixtieth’</td>
<td>ʂaṭṭitama-</td>
<td>saṭṭhitama, JM saṭṭhima</td>
</tr>
</tbody>
</table>

The difference between the Northern Pārākṛtās and the rest is also reflected in Modern Indo-Aryan languages, where the Dardic languages (Shina [Kohistan] ʂə, Gawan-Bati ʂə( d ), ʂə( k ) ) and the Nuristani languages (Ashkon ʂə) continue the Northern form, whereas Hindi, Sindhi cha ‘six’, etc. continue the form of the other Pārākṛtās.

Initial ch- in the MI word for ‘six’ is incompatible with ś- of Skt. śāt. Therefore, scholars generally assume a deviating proto-form for MI ch-, viz. *kš(v)- (e.g. Hiersche 1964:98f., Turner C/Dial:12803, Hamp 1978, Von Hinnüber 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 solasa ‘sixteen’, satlhi(d ‘sixty’, a problem which has never been discussed in the literature. If cha goes back to *kš(v)-, why don’t we find initial ch- in the words for ‘sixteen’ and ‘sixty’? Secondly, the reflex of

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2 The variant satthha given by Norman, is “nicht zu belegen” (Von Hinnüber 1986:171).

3 The forms chaddasa ‘sixteen’, chaddasahā ‘sixteen times’, quoted by Sheth 1963, are clearly based on cha ‘six’.

4 Saur. chaṭṭhmī is “either a wrong reading, or by analogy with cha ‘six’” (Norman 1992:213).
256 Alexander Lubotsky

*ks 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 ś-), and it is not very probable that the numeral was borrowed. Furthermore, in the North-Western dialects, the reflex of *ks is represented by a special sign ch (e.g. Niya āṭheta < Skt. kṣetra, Burrow 1937:18f.), but as we can see from the table, the word for ‘six’ in Niya is so.

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 *ṣ in Indo-Aryan.

2.1. Indo-Iranian *ṣ is of twofold origin, viz. the ‘ruki’-ṣ before voiced stops and PIE palato-velars (k, g, ɣ) before dentals (PIE *kʰdʰ-, *gʰdʰ-, *ɣdʰ-) > PlIr. *zdʰ-). In Sanskrit, *ṣ normally disappears with compensatory lengthening of the preceding short vowel, cf.: 

\[ *izC > IC \]

niitä- m.n. ‘abode, nest’ < *niizda- < PIE *ni-ṣd-o-;
mlhā- ‘contest, reward’ < *mlzdha- < PIE *mis-d(h)l-o-;
sīkṣa-, desiderative of \( \sqrt{suḥ} \) ∼ ‘to conquer’, < *ṣīkgṣa- < PIE *si-gṣ-so-;

\[ *uC > UC \]

dālāhā- adj. ‘hard to deceive’ < *duz-dābhā- < PIE *dus-deb’o-;
dālīhā- adj. ‘malevolent’ < *duz-dhibhā- < PIE *dus-dih’h-;
dānpāsā-, dānāsā- ‘hard to attain’ < *duz-tāśa-;
tūḥā-, ta-p.t.c. of \( \sqrt{uḥ} \) ∼ ‘to drive’, < *uṣṭha- < PIE *uṣ-g’-tō-;

\[ *zC > TC \]

\( \sqrt{mṛṣ} \) ‘to be merciful’ < *mṛṣa- (cf. Av. mṛṣad- ‘id.’);
dṛṣṭha-, ta-p.t.c. of \( \sqrt{ṛṣ} \) ∼ ‘to fasten’, < *dṛṣṭha-;
tṛṣṭha-, ta-p.t.c. of \( \sqrt{ṛṣ} \) ∼ ‘to crush’, < *ṭṛṣṭha- < PIE *ṭṛṣ-c’-tō-.

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., 44ff.).

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5 Note that, for instance, in Kāśī (an Eastern dialect), where we find the form ṛāṣu, the reflex of *ks is (kkh: lākha < Skt. vrksa, khudaka < Skt. kṣetra (von Hinüber 1986:114).
6 Vs. the desiderative sīkṣa- from \( \sqrt{ṣāk} \) ‘to be able’ with a short vowel. Long ṛ in sīkṣā- shows that the loss of ṛ compensatory lengthening of the preceding vowel was anterior to devoicing of *ṛ to ṛ (Debrunner 1957:28). Inslser 1968 argued that desideratives with a monosyllabic stem (like dīps-, dīs-, sīks-) have been formed analogically on the basis of the zero grade of the perfect stem, cf. sek-ir : sik-sati, deh-ir : dip-sati, ap-ir : ipati. In his opinion, sik-sati was made after sah-vāṃs- and dik-sati after dās-vāṃs-. Even if the mechanism proposed by Inslser 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 sīkṣa-, which is the only such formation attested in the RV. Another regular formation was the desiderative dikṣa- < *dīkṣe- from the root \( \sqrt{dāṣ} \) ‘to honour’ (for the development see Lubotsky 1994:203f.). The finite forms appear since the Brāhmaṇas, but dikṣā- and dikṣā- are found in the AV.
7 Written short in the texts, but being metrically long.
2.2.1. The most frequent reflex is ā (i.e. *aZC > āC):

vi tálihī (RV 10.180.2) 2sg. impv. vākṣya- ‘to fashion’ < *taZd’hī < PIE *tetk’d’ī;
sālhar- m. (RV 7.56.23) ‘conqueror’ < *sazd’har- < PIE *segh’-ter-;
ā-sālha- adj. ‘unconquerable’ < *sazd’hā < PIE *segh’-to-;
bālha-, ta- ptc. vārth- ‘to be firm’10 < *bāzdh’a- < PIE *(d)bēṅg’-to- (cf. Av. debhātī ‘strengthens’).11

2.2.2. The reflex o (*aZC > oC) is found in derivatives of the root √vah- ‘to drive’ (PIE *ueg’-) and in derivatives of sās- ‘6’, cf.

volhām, volhām 2,3 du. impv. root aor. √vah- ‘to drive’ (cf. NARTEN 1964:240, fn. 727);
infinitives vālhave, anu prāvolhūm < *vazdh’u- < PIE *ueg’-tu-;
volhar- m. ‘driving (horse)’ < *vazdh’ar- < PIE *ueg’-ter-;
svolhā (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 sādha, etc. we can then assume the following chain of developments:


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 *√, it was realized as [e], and when it was compensatorily lengthened to [eː], the result merged with long ā (cf. also the sandhi rule -ar r- > -a r-). The development *vaZC > oC implies that *vaZC was pronounced as [eC]. When √ disappeared, [e] was lengthened to [eː] 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 ([eD] > [eːD] > eD, cf. edhi’bet’ < *azdni1.

2.2.3. The only example of *aZC > eC is 3sg. impv. trnēdhu from √(s)tr- ‘to crush’ < *trAzdhu- < PIE *(s)r-n-ēg’-tu, attested in AVS 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 imper-
rative *tr̥medhu* can be secondary, taken from imperatives like *edhi, dehi, dhehi*. 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. *dhettana* (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 *kC* can be formulated as follows: the normal reflex is *a*, whereas *o* is conditioned by the preceding *v*; *e*-vocalism of *tr̥medhu* is probably secondary. This distribution is by no means a novel one. Already in the 19th century, BENFÉY, HAYET 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 ignored. More recently, in 1952, RENOU gave the same distribution in his *Grammaire de la langue védique*, 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 *kC* is *o*.

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: *sv̥at̥ ‘6’, *sv̥aṭ-ḍaśa > śoḍaśa ‘sixteen’, *svaṭ-dhā > 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 *sv̥at̥* 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, the phonetic loss. 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 *ṣaṣṭha-, which was replaced by *ṣaṣṭhā- in Indo-Aryan on the basis of *pakhātha- ‘fifth’. The ordinal *ṣaṣṭhā- is then responsible for the absence of -v- in the word for ‘sixty’ (Skt. *ṣaṣṭi-, Pāli *saṣṭhi, see below) and in Skt. *ṣaṭ*.

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 *so* and the reflexes in the Nuristani and Dardic languages directly point to *sv̥at̥*, but it remained unnoticed that this form also directly accounts for initial *ch- in Middle Indic. There is important evidence that *sv̥* regularly gives MI *ch* (cf. BERGER 1955:81ff.), viz. *mātuḥṣvast-f. ‘mother’s sister’ > Pāli *mātuccchā-, Ptkt. *māucc(h)ā- (next to *māus(s)-, *māussia-, *māsiā- with restored anlaut of the word for ‘sister’, CDIAL

(10.102.4).

17 Compare, for instance, THUMB - HAUSCHILDE 1958:300 (“a [wird] zu o, seltener zu ā”), ALLEN 1962:72 n. 8 (regular reflex of azC is oC, i.e. “śaṣḍaśa > savādāśa”, and “for two rare cases of simple lengthening of the vowel (śādhi, sādha-) see p.94 n63”, where these two cases are only mentioned without further adstruction), BURROW 1973:95 (“a preceding short *a* may be either lengthened [exx.], turned to o [exx.], or turned to e [ex.]”), etc.
Indo-Aryan 'six'

10001): *pituḥsvaspṛ- f. ‘father’s sister’ > Pāli pitucchā-, Pkt. piucc(h)ā-, piucchi- (next to piussiyā-, piusīā-, CDIAL 8177). The phonetic development of *sv presumably went through *ṭsv > *ṭṣ > *ṭh. The reflex of *sv thus merged with that of *ks in some dialects, which may explain forms like Khowār choi, the initial ch of which is a normal reflex of *ks (von HīNÜBER 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.) sa-su, sa-su (= sa-su), sa(d)- in saḍuvisati ’26’, sapamna ’56’, āsammāsika- ‘up to six months’ and Inscri. (W) saṇuvīsa ’26’ must be due to a different treatment of *sv- (e.g. *ṣv- > *ss- > s-). Pāli saḷāyaṭana (next to chaḷāyaṭana) ‘six sense facilities’ and AMg. saḍamga ‘six constituent parts’ (vs. Pāli chaḷaṅga-) are borrowings from an Eastern dialect\(^{19}\).

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

<table>
<thead>
<tr>
<th>Sanskrit</th>
<th>Proto-Middle-Indic</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘6’</td>
<td>sāt</td>
</tr>
<tr>
<td>‘6th’</td>
<td>saṣṭhā-</td>
</tr>
<tr>
<td>‘16’</td>
<td>sōḍaśa</td>
</tr>
<tr>
<td>‘60’</td>
<td>saṣṭi-</td>
</tr>
<tr>
<td></td>
<td>*ṣvat</td>
</tr>
<tr>
<td></td>
<td>*ṣvaṣṭha-</td>
</tr>
<tr>
<td></td>
<td>*sodaśa</td>
</tr>
<tr>
<td></td>
<td>*ṣaṣṭi</td>
</tr>
</tbody>
</table>

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

Proto-Indo-Iranian *ṣvačs ‘6’ – *ṣuṣṭha- ‘6th’ – *ṣuṣṭi ‘60’

↓

*ṣvaṭṣ – *ṣuṣṭha- – *ṣvaṣṭi

↓

*ṣvaṭ – *ṣaṣṭha- (cf. §3) – *ṣvaṣṭi

↓

Proto-Indo-Aryan *ṣvaṭ – *ṣaṣṭha- – *ṣaṣṭi

✓

Skt. sāṭ – saṣṭhā- – saṣṭi-

Proto-MI *ṣvaṭ – *ṣvaṣṭha- – *ṣaṣṭi.

\(^{18}\) The difference in the treatment of *sv between Niya and the other Prākṛitis is in line with the usual behaviour of sv-clusters: they are normally preserved in Niya (BURROW 1937:21) and some other inscriptive Prākṛitis, 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 HīNÜBER 1986:167, who points to cchaḷāyaṭana of the Devnimori inscription vs. saḍaṭyaṭana of the Ramagiri 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 *ks-, there is no reason for reconstructing it for the proto-language. Avestan xšuuaš and other Iranian forms show the regular development of initial *š- to xš- (cf. PIE *ǵeh₁ > PhIr. *źnā- > Ir. *śnā- > Av. xšnā- ‘to know’), so that we can reconstruct Proto-Indo-Iranian *šuač. The assimilation of the initial *s- to *š- must then be dated at least to the common Indo-Iranian stage.

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The relationship between Skt. sdr. Middle Indic cha(t) and Avestan xšuuaš is reminiscent of that between Skt. sepa- ‘tail, penis’, Prākrit and Pāli cheppa ‘tail’ (< *pyā-, cf. AV sipyāvant- ‘tailed’) and Av. xšuuašapā- (Yāst. 19.40) ‘tail’, which is likely to be cognate (for a discussion of this word see HINÜBER 1994:216f.). The Iranian and Middle Indic words point to *šuapa-, whereas y may have been lost in Sanskrit due to dissimilation. In order to combine this form with Skt. sepa-, we can either reconstruct PhIr. *payaipa- or assume that the word for ‘tail’ is a loan word (cf. also AitB sepha- m. ‘scrotum’).


