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A Re-examination of the Alleged Common Development of Proto-Iranian **ćw* and **ǰw* in Wakhi and Khotanese-Tumshuqese

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Abstract

The most commonly cited isogloss between Wakhi and Khotanese-Tumshuqese is their similar reflexes of the Proto-Iranian clusters **ćw* and **ǰw* (cf. Skjærvø 1989: 375; Cathcart 2015: 10–11), which exhibit monosegmental fricative developments that are distinct from those of most Iranian languages (cf. Novák 2013). However, the two languages do not exhibit identical reflexes of these clusters, and old loanwords from prehistoric Khotanese-Tumshuqese into other languages indicate that the glide **w* was still present after Wakhi and Khotanese-Tumshuqese had split from each other. By examining evidence from articulatory phonetics and typology, it will be argued that one should be skeptical that Khotanese-Tumshuqese and Wakhi have developed alveolo-palatal fricatives from **ć* and **ǰ* as a common isogloss, given that Wakhi's reflex of the cluster shows the common formant-lowering effect characteristic of labialization, while Khotanese-Tumshuqese must have retained the following glide beyond the period when they would have split from Wakhi.

Keywords

Wakhi – Khotanese – Tumshuqese – historical phonology – Proto-Iranian – articulatory phonetics – typology

1 Introduction

The Wakhi people live in a fairly wide area centered around the Wakhan valley in far Northeastern Afghanistan, as well as in neighbouring regions of Xinjiang, Tajikistan, and Pakistan, where a plurality of speakers live. Their language is a member of the Iranian branch of the Indo-European language family, though one without any particularly close relatives. Many scholars support a close relationship with Khotanese and Tumshuqese (cf. Skjærvø 1989: 375; Novák 2013) based on a small number of alleged phonological and lexical isoglosses.

This paper will investigate the phonological isoglosses between Wakhi, Khotanese, and Tumshuqese in the literature, applying rigorous methods of comparative reconstruction and typological parallels. Then, implications of the aforementioned investigations for the relationship between Wakhi and Khotanese-Tumshuqese will be outlined. Finally, there will be a brief discussion on the basis of the evidence prevented about how Wakhi should be classified in future models.

2 Wakhi and Khotanese Reflexes of **ćw* and **ǰw* and Ramifications for Classification

The Iranian sibilant affricates generally represented as **ć* and **ǰ* in the literature are potentially very important in the process of establishing a relationship between Wakhi and Khotanese-Tumshuqese. Since most other Iranian languages exhibit alveolar sibilants for **ć* and **ǰ* in all positions, whereas Wakhi, Khotanese, and Tumshuqese show post-alveolar or palatal reflexes of these segments before original **w*, it could be argued that the change from palatal affricates to alveolars or dentals is a common innovation uniting all other Iranian languages (cf. Bernard 2023: 160).

If Wakhi, Khotanese, and Tumshuqese do actually share the retention of an original palatal articulation for these sounds before **w* against all other Iranian languages, this may indeed establish them as the first branch to split from Proto-Iranian. The status of **ć* and **ǰ* as palatal affricates by the Proto-Iranian stage is contested, however, as alternative explanations for post-alveolar or palatal reflexes of these sounds in Wakhi and Khotanese have been proposed. Martin Kümmel (2020), for example, proposes that Proto-Iranian had alveolar affricates that result from the depalatalization of Proto-Indo-Iranian **ć*, **ǰ*, and **ǰʰ*. Karim (2021: 17) builds on Kümmel's proposal and reconstructs a tree where the depalatalization of the original Indo-European palatovelars is a shared innovation between Iranian and Nuristani which may establish them

as a genetic clade. There are also many authors who have reconstructed post-alveolar affricates for Proto-Iranian **ć* and **ǰ*, which would contrast with 'secondary palatal' **č* and **ǰ* (cf. Tremblay 2005: 679). It will, however, be shown later that proposals reconstructing original palatal affricates are more viable (cf. Sims-Williams 1998: 136).

In order to justify his alveolar reconstruction, Kümmel remarks that, since the post-alveolar reflexes *š* and *ž* of **ćw* and **ǰw* in Wakhi are not depalatalized to retroflexes as were the reflexes of original **ćy* and **ǰy*, the apparently palato-alveolar character of the former cannot be assumed to be old (Kümmel 2007: 234). In order to derive Wakhi *š* and *ž*, he proposes that the semivowel **w* caused the retraction of the following originally alveolar sibilants: "Wahrscheinlich muss man in diesen Fällen doch mit einer bei alveolaren und palatoalveolaren Sibilanten häufigen konkomitanten Rundung rechnen, die dazu führte, dass die durch w-Schwund zurückgezogenen und labialisierten Sibilanten anders in das System eingeordnet wurden: *s̪ʷ* > /*s*/ [*s̪ʷ*] bzw. *sʷ* > /*ʃ*/ [*ʃʷ*] gegenüber sonstigem *s̪* > *ϑ* bzw. *s̪* >/= *s*" (Kümmel 2007: 234).

Above, Kümmel argues that the original **w* caused labialization which subsequently retracted the segment reconstructed as **ć* while, until a point, preserving the concomitant labialization. This retracted segment was subsequently re-analyzed not as a labialized variant of **ć* but as a new phoneme, and this is the explanation for the post-alveolar and alveolo-palatal fricatives seen in Wakhi and Khotanese-Tumshuqese respectively. This proposal that Wakhi *š*, which is laminal post-alveolar like English *sh* or French *ch* (Shaw 1876: 11; Yoshie 2005: 53), derives from a labialized **sʷ* is an intriguing conundrum for Wakhi classification, as, while this would still mark it as a 'peripheral' Iranian language in that it did not turn the **ćw* cluster into *-sp-*, for example, the argument proposing close unity between Wakhi and Khotanese-Tumshuqese may be more difficult to assert.

Skjærvø (2018) states that: "Old Northeast Iranian is represented by Khotanese and Wāk̲i, in which **ćw* and **ǰw* were assimilated to **ś* and **ź*", preferring a palatal articulation for the intermediate forms of the Wakhi and Khotanese reflexes of **ćw* and **ǰw*. This reconstruction is clearly based on the Khotanese evidence and the (almost certainly correct) assumption that Khotanese *śś* [ɕ] and *ś* [ʑ] were, in fact, palatal (cf. Palmér 2019: 22).

Since this *-śś-* reflex in Khotanese is thought to have been (alveolo-)palatal [ɕ] rather than post-alveolar or retroflex (Peyrot et al. 2022: 417–418), the latter of which has its own letter in the Khotanese script and was clearly contrastive (cf. Bailey 1979), there may have also been a completely different phonetic mechanism of palatalization than in Wakhi. For example, it may have been the case that, in Khotanese, an original **ɕw* became **ɕɥ*, which then re-palatalized

the *s that emerged after depalatalization (cf. Kümmel 2007: 234). This is similar to the simultaneous occurrence of palatalization and labialization on glides following the fricative [ɕ] in Akan Twi (de Jong/Obeng 1996), where it seems the palatal articulation of high vowels has caused original rounded consonants to become labio-palatalized. Additionally, the fact that the Khotanese reflexes of *ćw and *ǰw have the same place of articulation as the reflexes of *ćy and *ǰy, compare *śā-/ śāva-* 'copper' (Bailey 1979: 396–398) from *ćyāwa-*, is evidence of the palatal articulation of the former.

Likewise, Tocharian loanwords from Pre-Khotanese unambiguously show (alveolo-)palatal consonants *c* and *ś* in place of original Pre-Khotanese reflexes of *ć and *ǰ (cf. Dragoni 2022: 64). Tocharian *ṣ*, in contrast, is not used to render these loanwords, as it was likely a palato-alveolar because it derived from a palatalized *s and, more importantly, coalesced into a geminate with a following palatalized *k: *sʲkʲ > *šč > *šš (Ringe 1996: 150). For example, compare the Tocharian B word for 'mustard': *śāñcapo* from Pre-Khotanese **śanźapa* (Bernard 2023: 210). This would be less expected if Khotanese *ṣ* was a retroflex. Given the perceptual similarities between palato-alveolars and retroflexes in e.g. individual formant and centroid frequency (Hamann 2003: 110–111, Chang et al. 2008: 68; Toda et al. 2010: 26; Howson 2024), it seems that even if Tocharian *ṣ* was retroflex, it would have been used to render *ʃ if the sound had existed in Pre-Khotanese or Proto-Khotanese-Tumshuqese. This is known, for example, in Russian, where French words containing /ʃ/ or /ʒ/ are borrowed with retroflexes, compare *bagáž* /bɐˈgaʂ/ from French *baggage*.

Furthermore, in Tocharian A, initial *st- became *ṣt-* (Adams 1988: 42), while the following stop was not written with a retroflex character used for Sanskrit words, indicating that a sound change like German *st- > [ʃt] was at play, as a preceding retroflex consonant would likely have caused assimilation of the following *t to a retroflex as well (Hamann 2003: 120–121). The change from *st- > [ʃt] is also more typologically common than retroflexion of the initial stop in this position, as, among other reasons, many languages disallow or neutralize retroflexion in word-initial position anyway (cf. Hamann 2003: 115, 118). In fact, it seems that no sound change *st > *ʂt is known from anywhere in the world. Thus, this provides evidence for the fact that Tocharian *-ṣ-* was [ʃ] (as this new *ṣ* is written the same way as the regular *ṣ*), and that, since the Tocharian palatals *ś* and *c* (cf. Ringe 1996) were used to render Pre-Khotanese *ś, that the Khotanese sibilants were (alveolo-)palatal rather than palato-alveolar or laminal post-alveolar as the Wakhi sibilants are.

It is also worth noting that when languages have a three sibilant contrast with /s/ and /ʂ/ as Khotanese almost certainly did, as the latter can also be derived from *ćr- (cf. Emmerick 1989: 213–215), the third sibilant is usually /ɕ/,

because of the similarities between /ʂ/ and /ʃ/ in their formant values and spectral mean (Boersma/Hamann 2008: 229–231) that can make their contrast more difficult to hear. Since /ʃ/ is laminal post-alveolar (Hamann 2003: 14), it does not contrast as easily with apical post-alveolar /ʂ/ (cf. Boersma/Hamann 2008: 229–231). Thus, since the three-way contrast between /s/, /ʂ/, and /ɕ/ is more common than /s/, /ʂ/, and /ʃ/ or /s/, /ʃ/, and /ɕ/ for reasons of contrast perception and markedness (cf. Boersma/Hamann 2008: 229–231), it seems best to posit that Khotanese *śś* and *ś* were laminal (alveolo-)palatal.

Since Khotanese cannot be shown to have undergone a post-alveolar stage as is attested in Wakhi, the notion that even the sound change **ćw, *ǰw* > *śś*/*š*, *ś*/*ž* unites the two languages is obscure. Surely, if Khotanese-Tumshuqese underwent the stage of retraction that Wakhi is hypothesized to have undergone wherein **ćw* > **sw* (depalatalization) > *sʷ > [ʃʷ] > *š*, a retroflex articulation instead of a palatal for *ś* and *śś* in Khotanese-Tumshuqese would be more expected. Since Wakhi does not form its word for 'iron' in the same way as Khotanese, which will be treated later, it likely split from Khotanese-Tumshuqese at a time when both the glide **w* and the previous affricate or fricative, with a palatal articulation, were still preserved in this cluster, as Tocharian B *eñcuwo* and Tocharian A *añcu* show (Bernard 2023: 208).

Because of this, and the fact that palatal fricatives being derived from retraction caused by labials is not likely (de Jong/Obeng 1996), coupled with the fact that Wakhi is known to have depalatalized **ć* and **ǰ* in all other positions (Steblin-Kamensky 1999: 17), Wakhi is unlikely to share this as an innovation with Khotanese. They probably split at a stage where a cluster **ćw* or **św* existed, but this would not be much different from Proto-Iranian itself. Certainly, almost all Iranian languages exhibit de-affrication of **ć* and **ǰ* (cf. Bernard 2023: 243).

3 Loanword Evidence for the Articulation of **ć* and **ǰ* in Pre-Khotanese

It is worth noting that many sound changes from **ʃ* to [ɕ] only occur after delabialization has already occurred (cf. Conrad 2023: 30), which cannot apply to Pre-Khotanese *henśwanya (Bernard 2023: 210) due to the presence of the **w* in its descendants: Tocharian B *eñcuwo* and A *añcu*. Furthermore, the **w* is unlikely to have been a Tocharian reflex of concomitant rounding of a single segment **ɕʷ in Pre-Khotanese for typological reasons.

Indeed, many languages such as German (Krech et al. 2009: 51–52), English (Collins/Mees 2013: 86, 93), and Russian (Yanushevskaya/Bunčić 2015: 223)

have a labialized articulation to their post-alveolar or retroflex sibilants and affricates, and these are not usually perceived by learners or speakers of other languages to be labialized. For instance, Ubykh *talmaš* [tʰalmaʃ] 'interpreter' is borrowed from Russian *толмáч tolmáč* 'id.' (Vogt 1963: 190a). Despite the fact that Ubykh had labialized phonemes /ʃʷ/, /ɕʷ/, and /t͡ɕʷ/ (Fenwick 2011), the Russian sibilant affricate is not borrowed with a labialized consonant. This indicates that the tongue position is more prominent in perception in some cases than the presence of labialization. This shows that the Tocharian cluster *-cw-* is unlikely to have derived from a single labialized segment in Pre-Khotanese, as concomitant labialization is common in post-alveolars and likely would not have been so perceptually strong as to generate an entirely new following consonant *w* which would become the onset of a syllable.

Additionally, since Pre-Khotanese probably had a palatal sibilant rather than an affricate as its reflex of **ć* (Dragoni 2022; Bernard 2023), it seems that the common retraction caused by labialization (Hamann 2003: 108–109; Smorenburg 2023: 22) would have resulted in something like Tocharian B ***ṣ* if the Pre-Khotanese form had a single labialized fricative. Thus, it may be that Pre-Khotanese reflects a palatal reflex of originally palatal **ć* here, and the influence of the following labial stop on the articulation was minimal. The same cannot be said for Wakhi, which depalatalized, as aforementioned, with its post-alveolar fricative *š* being an effect of the following labialization retracting the fricative.

Thus, it is clear that, unless one would like to derive the Khotanese palatal fricative in **henśwanya* (Bernard 2023: 210) ancestral to Toch.B. *eñcuwo* from an alveolar segment and say that the retraction by the following **w* is a common innovation (which is unlikely for Khotanese-Tumshuqese, as will be shown later), Wakhi and Khotanese-Tumshuqese must be derived from a common ancestor with palatal reflexes of **ć* and **ǰ*. Furthermore, Wakhi is known to have depalatalized **ć* and **ǰ* (Steblin-Kamensky 1999: 17) and, as such, its *-š-* may be better explained as coming from labialization and retraction of a depalatalized **s* whether or not the relation with Khotanese and Tumshuqese is tenable. Incidentally, retraction of an alveolar sibilant or affricate due to following labialization is so incredibly common that it should not be treated as a common innovation, even if one would like to ignore the problems caused by the palatal articulation of Khotanese *-ś-* and *-śś-* and its retention of the following segment in the ancestral form of *eñcuwo* and *añcu*.

4 Retraction of Sibilants by Concomitant Labialization in World Languages

In order to show the likelihood of retraction of an original alveolar by a following labial in Wakhi or Khotanese, and whether or not a palatal or alveolar reconstruction for the Proto-Iranian sibilant affricates *ć and *ʃ́ is best, it may be helpful to examine other clusters of alveolar affricates and sibilants with /w/ in world languages in order to determine if they frequently turn into something like [ʃ]. Typologically, it is highly likely for post-alveolars and retroflexes to co-occur with labialization. For instance, the Nyungwe (Ngunga/Faquir 2012: 113) and Copi (Ngunga/Faquir 2012: 214) languages of Mozambique have labialized sibilants written ⟨*sv*⟩, ⟨*zv*⟩ and ⟨*sw*⟩, ⟨*zw*⟩ respectively in which retroflexion co-exists with lip rounding.

Likewise, in Halk'omelem, a Salish language spoken in and around Vancouver, /*s*/ and /*ts*/ are almost universally realized as [ʃ] and [*tʃ*] when occurring before the labialized velar consonant /*x*ʷ/ (Suttles 2004: 5). Similarly, the Iroquoian language Huron, among a few others in North America, regularly changed **s* to /ʃ/ before **w* as well as before **n*, **t*, and **k*ʷ (Julian 2010). It is, likewise, known to be common for **w* to become ∅ after another consonant, as may have happened with Khotanese **ćw* and **ʃ́w*. For example, Blackfoot consistently changed Proto-Algonquian **CwV* into *cv* (Proulx 1989).

Furthermore, in English, labial consonants such as /*p*/ and, more relevantly, /*w*/ have been shown to also have a lowering effect on the spectra of /*s*/ (Smorenburg 2023: 22), thus making it phonetically closer to /ʃ/ (cf. Reidy 2016). A similar tendency towards retraction in the environment of labialization can also be seen in the reconstructions of Proto-Athabaskan (cf. Cook 1981: 263–264) or in the Northwest or Northeast Caucasian languages, where alveolar **ts*ʷ or **s*ʷ often become [*tʃ*ʷ] or [ʃʷ] respectively in many disparate languages (cf. Starostin/Nikolayev 1994: 45; Chirikba 1996: 329).

It is also worth noting that in Starostin and Nikolayev's admittedly imperfect *A North Caucasian Etymological Dictionary*, there is not a single example of an original sibilant followed by *w acquiring a palatal articulation in a daughter language (1994: 45, 48, 50). Furthermore, the phonemes reconstructed as Proto-Northeast Caucasian (a well-accepted proto-language) **św* and **źw* with a palatal articulation of the first segment, are frequently reflected as post-alveolars in different daughter languages, losing their palatalization (Starostin/Nikolayev 1994: 50). Notably, in the examples above, no language alternates /*s*/ and /*ɕ*/ or can be shown to have turned **s* into [*ɕ*] in the environment of labialization. This is because concomitant labialization is very closely associated with retraction (including retroflexion) but is generally not associ-

ated with palatalization since, as stated by de Jong and Obeng (1996): "palatalization and labialization have opposite effects on second formant frequency".

4.1 *Evidence against Wakhi-Khotanese-Tumshuqese from Phonetic Typology*

The above examples show that it is highly plausible that the Wakhi post-alveolar sibilants can just as likely have originated from clusters of alveolars and a following semivowel **w*. In the case of Khotanese and Tumshuqese, it seems that the palatal reflex (in contrast to the Wakhi post-alveolar) is markedly more difficult to derive from an original alveolar affricate with the retracting influence of **w*, as aforementioned. If the Khotanese and Tumshuqese palatal sibilant fricatives *śś-* and *ś-* can be derived from **sw* as Kümmel (2007: 234) proposes, they must have gone through an intermediate post-alveolar or retroflex stage, after which they were subsequently palatalized. This proposal has manifold problems, however, as, for example, the retraction caused by a following [w] is perceptually similar to retroflexion or post-alveolarization rather than palatalization (cf. Hamann 2003: 108; Toda et al. 2010: 27), and it is highly unlikely or impossible for retroflexes to palatalize (Hamann 2003: 47–49, 77–79).

Indeed, the retraction caused by labialization almost never produces palatalization due to the fact that labialization lowers the second (F2) and third formant (F3) while palatalization raises them (de Jong/Obeng 1996; Howie 2001: 2; Culnan/Yiu 2023: 925). The phoneme /ɕ/, represented by Khotanese *-śś-*, additionally, has a higher F3 than retroflex /ʂ/ (Toda et al. 2010: 27) and thus would be less likely to co-occur with the F3 lowering that labialization causes. In contrast, the two aforementioned segments /ʃ/ and /ʂ/ often co-occur with labialization due to their lower upper formants and front cavity resonance than plain /s/ or /ɕ/ (Toda et al. 2010: 26; Smorenburg 2023: 22) because of the enlarged anterior cavity caused by lip protrusion. In the experimental results of Toda et al. (2010: 27): "The first fricative formant for /ɕ/ tends to be higher in frequency than that of /ʂ/. The size of the front oral cavity (larger for the latter) is largely responsible for this difference. (2) In both /ɕ/ and /ʂ/, the spectral prominence is made of a set of resonances arising from distinct cavities. In our results, the first front oral cavity resonance is clustered with the first palatal channel resonance in /ɕ/, whereas the lip resonance is clustered with the front oral cavity resonances in /ʂ/".

What this means, essentially, is that resonance caused by labialization experimentally co-occurred with retroflex coronal sibilants, while palatalization clusters with alveolo-palatal or palatal sibilants, even in a language without contrastive labialization. Furthermore, Toda et al. (2010: 28) note that, in Polish:

"the larger number of peaks observed in the lower frequencies for /ṣ/ are mainly due to the longer front oral cavity (including the sublingual cavity), which leads to lower resonances, combined with the lip resonance".

While it may be argued that these experimental results are simply one example, this experiment agrees very closely with typological phonetic data on retraction phenomena and lowering of F2 and F3 caused by labialization in the literature (cf. Hamann 2003: 108–109) and known formant raising caused by palatalization (cf. Bennet et al. 2018). As such, it seems very unlikely for labialization, which causes lower resonance and thus perceptual similarity to retroflexion, to cause the emergence of a higher resonance fricative *ɕ. It seems that for the reasons above, those listening to labialized sibilants would likely never perceive them to be something akin to *ɕ, thus making the sound change improbable. Thus, it does not seem like Khotanese and Tumshuqese can be derived from a stage where Proto-Iranian or Common Iranian had alveolar affricates for *ć and *ǰ. In this sense, Bernard (2023: 165) is partially correct, though he includes Wakhi in this group as well.

Wakhi š /ʃ/ and ž /ʒ/ (Shaw 1876: 11; Yoshie 2005: 53) are, unlike Khotanese and Tumshuqese, perceptually similar to Polish /ṣ/, which has a flat tongue profile (cf. Toda et al. 2010: 26; Howson 2024), and could easily be derived from alveolars with concomitant labialization (cf. Hamann 2003: 81). It is also worth noting that Wakhi reflexes of *ćw and *ǰw do not merge with the retroflex reflexes of *ćy, *ǰy, and *š (cf. Steblin-Kamensky 1999: 351), indicating that they were not palatal or post-alveolar at the stage when *ćy, *ǰy, and *š were depalatalized and retracted. One should compare Wakhi ṣ̌ʉw 'black' from *ćyāwa- (Steblin-Kamensky 1999: 30) and ɣ̌iṣ̌ 'ear' from *gauša- (Steblin-Kamensky 1999: 188), which indicate that *ćw > š must have happened after the merger of *ćy and *š. Since these clusters do not merge in Khotanese (cf. Bailey 1979: 397–398), it seems better to posit that Wakhi had already split from Khotanese by the time it underwent the merger of *ćy and *ǰy and *š, and, thus, that the change from *ćw to -š- is not shared.

Those wanting to assert that what is allegedly the single common innovation shared between the so-called 'Sakan' languages (cf. Cathcart 2015: 10–11; Bernard 2023: 165) is a valid isogloss must also overcome the fact that it is highly unlikely for Khotanese-Tumshuqese -ś- and -śś- to be derived from labialization due to the raised F2 and F3 values of alveolo-palatal sibilants (Howie 2001: 2; Culnan/Yiu 2023: 925) and the lowering of formant frequencies that accompanies labialization (de Jong/Obeng 1996; Hamann 2003: 108–109; Smorenburg 2023: 22). Thus, it would be highly unlikely for a labialized segment to become an alveolo-palatal, especially with the conditioning factor of labialization still present due to the following *w.

It seems as if Khotanese-Tumshuqese reflexes of **ćw* and **ǰw* cannot have developed into alveolo-palatals from a laminal post-alveolar stage like Wakhi *š* /ʃ/ and *ž* /ʒ/ (Yoshie 2005: 53) as the following **w* segment was still preserved in Pre-Khotanese after it had split from Wakhi (cf. Dragoni 2022: 37), as **henśwanya* indicates (Bernard 2023: 210). Indeed, Wakhi cannot be derived from Proto-Khotanese-Tumshuqese, as, among other things, it does not show the change of **-rt-* to **-rd-* (Dragoni 2022: 38) in its oldest layer of vocabulary, compare Wakhi *ðart* 'dung cake' from **dart(i)* (Steblin-Kamensky 1999: 162) or *tʁırt* 'ford' from **tārta-* (Steblin-Kamensky 1999: 368).

4.2 *A Case for Skepticism*

The change from a post-alveolar fricative as seen in Wakhi to an (alveolo)-palatal one in the vicinity of a labial is simply incredibly improbable on phonetic grounds. Those trying to assert that the reflexes of **ćw* and **ǰw* represent an unproblematic isogloss between Wakhi and Khotanese-Tumshuqese must also explain why, if Wakhi *š* /ʃ/ and *ž* /ʒ/ (cf. Yoshie 2005: 53) are derived from original palatals that lost their following labialization (Bernard 2023: 165), they did not merge with the reflexes of **ćy* and **ǰy* or **š*, which are retroflex (Steblin-Kamensky 1999: 351).

Indeed, it seems, given the typological evidence, that there are three possibilities for those who would like to relate Wakhi and Khotanese-Tumshuqese. The first is for **ćw* and **ǰw* to have originally become post-alveolar **š(w)* and **ž(w)* in both languages. This is impossible for both Wakhi and Khotanese given the fact that inherited **š* and **ćw* do not merge in either, compare e.g. Wakhi *čəx-:čəxt-* 'cut, kill, stab' < **kuš-* or *ðəṣ* 'late' < **duša-* (Steblin-Kamensky 1999: 138, 166), while **ćw* never becomes *-x̌-* or *-ṣ̌-*. Khotanese intervocalic **š* first becomes retroflex *-ṣ-* then deletes intervocalically leaving *-t-* [*d*], *-g-* or *-w-* to break hiatus, while the reflex of **ćw* does not, compare *bätu* 'poison' < **wišam* and *aśśa-* 'horse' < **Haćwa-* (Emmerick 1989: 214–216). It, furthermore, does not seem probable that concomitant labialization would prevent retroflexion given that retroflexion is frequently accompanied by labialization (cf. Hamann 2003; Ngunga/Faquir 2012: 214).

The second is for the clusters **ćw* and **ǰw* to have become retroflexes. This is unlikely given the improbability of the palatalization of retroflexes (Hamann 2003: 47–49, 77–79) which would be required for the Khotanese-Tumshuqese reflexes, especially before a glide **w* as is known in forms like **henśwanya*, which must be posterior to the split of Wakhi.

The third possibility is that **ćw* and **ǰw* became palatals, which is highly unlikely on typological grounds as outlined in previous sections (cf. Hamann 2003: 108; Toda et al. 2010: 27). Additionally, Wakhi depalatalizes all other

instances of **ć* and **ʃ* to *-s-* and *-z-* (Steblin-Kamensky 1999: 17) so it is very difficult to see why the palatals from **ćw* and **ʃw* would become laminal post-alveolars while the other palatals, including **ćy* and **ʃy* would not. Furthermore, this third explanation is impossible because it is known that Pre-Khotanese still had the following glide (cf. Dragoni 2022). As such, it is more parsimonious to posit that the cluster **św* represents a retention rather than a change from **ćw* > **sw* > **św*, also given the unlikelihood of palatalization by a following labiovelar approximant (cf. de Jong/Obeng 1996; Toda et al. 2010: 27).

Furthermore, if glides formed a phonological class in Pre-Wakhi, it is difficult to see why **w* would be deleted after a preceding palatal consonant but **y* would remain to create a pair of sibilants distinct from allegedly already palatal **ć* and **ʃ*, especially when speakers are known to perceive formant transitions of alveolo-palatals as the palatal glide /*j*/ (Żygis/Padgett 2010: 5). Certainly, it seems probable that a palatal glide **y* with more perceptual similarity to a preceding palatal consonant would be assimilated to that consonant over a labiovelar glide which is more phonetically distinct and thus involves more movement of articulators when transitioning between phones. There is also the fact that labio-palatalization is very rare (de Jong/Obeng 1996), and should not be invoked as an explanation when it does not need to be, especially given the fact that Pre-Khotanese shows evidence of **w* still being present as a segment in the cluster **św* in the word for 'iron' (Bernard 2023: 210), as aforementioned.

It is just as easy to argue that Wakhi may have depalatalized a cluster like **św* to **sw* and then developed *š*, but this deaffrication, if it is the only shared innovation between the two, would make a hypothetical Proto-Wakhi-Khotanese scarcely different from Proto-Iranian itself. Furthermore, a number of Iranian languages are known to have de-affricated **ć* and **ʃ* independently and, as such, it is not clear why this must be viewed as an isogloss uniting just Wakhi and Khotanese and not all Iranian languages other than those closely related to Old Steppe Iranian (Bernard 2023: 26). In all, the argument that Wakhi *š* /ʃ/ and *ž* /ʒ/ are derived from original alveolars with labial retraction seems strongest, and, thus, the notion that Wakhi and Khotanese-Tumshuqese share their reflexes of *ćw and *ʃw as a common innovation seems equally or less likely than competing hypotheses, warranting skepticism about the nature of their relationship.

5 Conclusion

This paper investigated the **ćw* and **ʃw* isogloss between Wakhi, and Khotanese-Tumshuqese in detail, determining that, since Khotanese-Tumshuqese *ś*

and *śś* were likely (alveolo-)palatals [ɕ] and [ʑ] (cf. Kümmel 2007: 234; Palmér 2019: 22), there are a number of problems in assuming that Khotanese-Tumshuqese underwent the same historical development as Wakhi, which shows laminal post-alveolar reflexes of **ćw* and **ǰw* (Yoshie 2005: 33). Furthermore, given that the following **w* was preserved in Pre-Khotanese, and the same cannot be shown to be true for Wakhi, it seems better to assume Khotanese-Tumshuqese preservation of the original palatal rather than palatalization before **w*, which has been shown to be improbable.

All in all, this paper has attempted to show most importantly that the fields of Iranian and Indo-European studies should be skeptical in assigning Wakhi a particularly close relationship to Khotanese-Tumshuqese on the basis of the alleged shared development of **ćw* and **ǰw*. Current proposals that it is a 'Sakan' language (cf. Cathcart 2015) are less airtight than is often assumed, with other phylogenies being plausible. Overall, a great deal more work may be required in determining a close relationship for Wakhi, and it is possible that it may not even be possible to find its closest relative with any kind of methodological rigor. Hopefully, this will inspire others to attempt to find more stable isoglosses uniquely uniting Khotanese-Tumshuqese and Wakhi, or to unite Wakhi with other Iranian languages.

Bibliography

Adams, Douglas Q. (1988), *Tocharian Historical Phonology and Morphology*, Ann Arbor.

Bailey, Harold W. (1979), *Dictionary of Khotan Saka*, Cambridge.

Bernard, Chams B. (2023), *Like Dust on the Silk Road: An Investigation of the Earliest Iranian Loanwords and Possible BMAC Borrowings in Tocharian*, Leiden.

Boersma, Paul/Hamann, Silke (2008), "The Evolution of Auditory Dispersion in Bidirectional Constraint Grammars", *Phonology* 25.2: 217–270.

Cathcart, Chundra A. (2015), *Iranian Dialectology and Dialectometry*, PhD dissertation, UC Berkeley.

Chang, Charles B. et al. (2009), "A Tale of Five Fricatives: Consonantal Contrast in Heritage Speakers of Mandarin", *University of Pennsylvania Working Papers in Linguistics* 15.1: 37–43.

Chirikba, Viacheslav (1996), "Common West Caucasian: The Reconstruction of its Phonological System and Parts of its Lexicon and Morphology", Leiden.

Collins, Beverly/Mees, Inger M. (2013), *Practical Phonetics and Phonology: A Resource Book for Students*, London.

Conrad, François (2023), "Regional Differences in the Evolution of the Merger of /ʃ/ and /ç/ in Luxembourgish", *Journal of the International Phonetic Association* 53.1: 29–46.

Cook, Eung-Do (1981), "Athapaskan Linguistics: Proto-Athapaskan Phonology", *Annual Review of Anthropology* 10: 253–273.

Culnan, John M./Suki, S.Y. Yiu (2023), "Distinct Acoustic Properties Pattern Differently in a Sound Change in Progress in Hong Kong Cantonese", *Journal of the International Phonetic Association* 53.3: 922–949.

de Jong, Kenneth J./Obeng, Samuel G. (1996), "Rounding and Palatalization Convergence in Twi", *Journal of the Acoustic Society of America* 99.4 (Supplement): 2547–2574.

Dragoni, Federico (2022) *Watañi lāntaṃ: Khotanese and Tumshuqese Loanwords in Tocharian*, PhD dissertation, Leiden University.

Emmerick, Ronald E. (1989), "3.2.3 Khotanese and Tumshuqese'", Rüdiger Schmitt (ed.), *Compendium Linguarum Iranicarum*, Wiesbaden: 204–229.

Fenwick, Rohan S.H. (2011), *A Grammar of Ubykh*, Munich.

Hamann, Silke (2003), *The Phonetics and Phonology of Retroflexes*, Utrecht.

Heggarty, Paul et al. (2023), *Supplementary Data and Results Files for Heggarty* et al. *in Science* [Data set].

Howie, Stephen M. (2001), "Formant Transitions of Russian Palatalized and Nonpalatalized Syllables", *IULC Working Papers* 1: 1–22.

Howson, Phil J. (2024), "Foreign Language Acquisition of Perceptually Similar Segments: Evidence from Lower Sorbian", *Open Research Europe* 3: 56.

Julian, Charles (2010), *A History of the Iroquoian Languages*, PhD dissertation, University of Manitoba.

Karim, Shuan O. (2021), "The Heuristic of Economy and Proto-Iranian Stop Clusters", *Chatreššar* 2: 5–18.

Krech, Eva-Marie et al. (2009), *Deutsches Aussprachewörterbuch*, Berlin-New York.

Kümmel, Martin J. (2007), *Konsonantenwandel: Bausteine zu Einer Typologie des Lautwandels und ihre konsequenzen für die vergleichende Rekonstruktion*, Berlin.

Kümmel, Martin J. (2020), "Substrata of Indo-Iranic and Related Questions", Thomas Olander (ed.), *The Indo-European Language Family: A Phylogenetic Perspective*, Cambridge: 237–278.

Ngunga, Armindo/Faquir, Osvaldo G. (2012), *Padronização da Ortografia de Línguas Moçambicanas: Relatório do III Seminário*, Maputo.

Novák, Ľubomir (2013), *Problem of Archaism and Innovation in the Eastern Iranian Languages*, PhD dissertation, Charles University.

Palmér, Axel (2019), *Traces of 'Pre-Indo-Iranian' Chronological Layers and Structural Characteristics of Early Indo-Iranian Loanwords*, Master's thesis, Leiden University.

Peyrot, Michaël/Dragoni, Federico/Bernard, Chams B. (2022), "The Spread of Iron in Central Asia: on the Etymology of the Word for 'Iron' in Iranian and Tocharian", *Bulletin of the School of Oriental and African Studies* 85.3: 403–422.

Proulx, P. (1989), "A Sketch of Blackfoot Historical Phonology", *International Journal of American Linguistics* 55: 43–82.

Reidy, Patrick F. (2016), "Spectral Dynamics of Sibilant Fricatives are Contrastive and Language Specific", *The Journal of the Acoustical Society of America* 140.4: 2518.

Ringe, Donald A. (1996), *On the Chronology of Sound Changes in Tocharian from Proto-Indo-European to Proto-Tocharian*, Vol. I, New Haven.

Shaw, Robert (1876), *On the Ghalchah Languages*, Calcutta.

Sims-Williams, Nicholas (1998), "The Iranian Languages", Anna Giacalone Ramat/Paolo Ramat (eds.), *The Indo-European Languages*, London: 125–153.

Skjærvø, Prods O. (1989), "Modern Eastern Iranian", Rüdiger Schmitt (ed.), *Compendium Linguarum Iranicarum*, Wiesbaden: 370–383.

Skjærvø, Prods O. (2018), "Iran vi. Iranian Languages and Scripts. Old Iranian Languages", *Encyclopaedia Iranica* XIII.4: 376–377.

Smorenburg, Laura (2023), *Hello, Who is This?: The Relationship between Linguistic and Speaker- Dependent Information in the Acoustics of Consonants*, PhD Dissertation, Leiden University.

Steblin-Kamensky, Ivan M. (1999), *Ètimologičeskij Slovar' vaxanskogo yazyka*, Sankt-Peterburg.

Suttles, Wayne (2004), *Musqueam Reference Grammar*, Vancouver.

Toda, Martine/Shinji, Maeda/Kiyoshi, Honda (2010), "Formant-Cavity Affiliation in Sibilant Fricatives", Susanne Fuchs/Martine Toda/Marzena Żygis (eds.), *Turbulent Sounds: An Interdisciplinary Guide*, Berlin-New York: 343–374.

Tremblay, Xavier (2005), "Bildeten die iranischen Sprachen ursprünglich eine genetische Familie oder einen Sprachbund innerhalb des indo-iranischen Zweiges? Beiträge zur vergleichenden Grammatik der iranischen Sprachen V", Gerhard Meiser and Olav Hackstein (eds.), *Sprachkontakt und Sprachwandel* 17–23: 673–688.

Vogt, Hans (1963), *Dictionnaire de la Langue Oubykh*, Oslo.

Yanushevskaya, Irena/Bunčić, Daniel (2015), "Russian", *Journal of the International Phonetic Association* 45.2: 221–228.

Yoshie, Satoko (2005), "The Sound System of Gojal Wakhi", *Area and Cultural Studies* 71: 43–82.

Żygis, Marzena/Padgett, Jaye (2010), "A Perceptual Study of Polish Fricatives, and Its Implications for Historical Sound Change", *Journal of Phonetics* 38: 207–226.