

Theoretical Implications of Directionally Asymmetric Transparency

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1 Introduction

In long-distance processes of assimilation, like vowel harmony or consonant harmony, a segment can generally take three roles. It can be an undergoer, — assimilating to a feature; it can be opaque — not assimilating and blocking the feature from spreading any further, or it can be transparent — not assimilating but also not stopping other segments across it from participating¹. A segment may have more than one role in a single language, depending on its location with respect of the trigger, the source of the feature that spreads. As an example, consider the data from Bari (Nilotic, Yokwe 1987) in (1). The low vowel /a/ undergoes [ATR] harmony if it is on the right of the trigger, hence raising to [e]. To the left of the trigger, however, it does not undergo harmony and blocks the propagation of [ATR].

- (1) (a) kèbúr-àkìn → kèbúrèkìn ‘to agitate for’
(b) kámójòk-tí → kámójòk-tí ‘type of liana.SG’
(c) kójá-tí → kójátí ‘white.termite.SG’

Directionally asymmetric blocking is a well-analysed property of harmony systems (e.g. Baković 2001; Mullin 2011). Its counterpart, directionally asymmetric transparency, has so far escaped a thorough theoretical examination. This is not surprising, since alleged cases of directionally asymmetric transparency are exceedingly rare. One such case is vowel retraction in Tsilhqút’ín (Cook, 1993), where velars are transparent to spreading of the feature [+R(etracted)] if they are to the left of the trigger, but block the spreading if they occur to its right (2).

- (2) (a) g^wεtεgu:ljú:z^f → g^wətəgo:ljó:z^f ‘he’s rich’
(b) di:z^fk’ən → de:z^fk’ən ‘it’s burning’

Thus, velars are directionally asymmetric blockers and directionally asymmetric transparent at the same time. Even though Tsilhqút’ín retraction has been analysed before (Goad 1989; Cook 1993; Mullin 2011), the aspect of directionally asymmetric *transparency* was not addressed. Retraction interacts with another process, sibilant harmony, which manipulates the same feature. Crucially, both velars and uvulars, which are [-R] and [+R] respectively, are transparent for sibilant harmony.

This paper compares two established approaches to transparency in harmony systems, autosegmental spreading with underspecification (Kiparsky, 1981; Steriade, 1987) and Agreement by Correspondence (ABC, Walker 2000b,a; Rose & Walker 2004; Hansson 2001). On their own, neither can account for all cases of transparency encountered in Tsilhqút’ín dorsals. Underspecification can derive the asymmetric transparency, if some (minimal) serial component is introduced to the system: At a first step, an underspecified velar is transparent to regressive spreading of [+R]. At the next step, a now-specified velar blocks the progressive spread. This differentiates directionally asymmetric transparency from asymmetric blocking, which does not require seriality. However, underspecification fails to account for the transparent uvulars in sibilant harmony. ABC on the other hand has no problem in deriving the transparent uvulars, but it

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¹ A fourth possibility are so-called icy targets (Jurgec 2011; Walker 2018) — segments that act as an undergoer and blocker simultaneously. They assimilate to the feature but also block it from spreading any further.

struggles with the asymmetric transparency. I suggest a superset account that assumes that transparency can arise in multiple ways. Retraction is a process of autosegmental feature spreading, and only underspecified segments can be transparent to it. The asymmetry follows from a later step of specification and progressive retraction. The serial component is implemented here in Stratal OT (Kiparsky, 2000; Bermúdez-Otero, 2011, 2018). Sibilant harmony on the other hand is a consequence of Agreement by Correspondence. The intervening dorsals are transparent as they fall outside the correspondence relation.

This paper is structured as follows. In section 2, I present the patterns of vowel retraction and sibilant harmony in Tsilhqút'ín. After that, I introduce the two core assumptions on which the further discussion is based on, namely that No-Line-Crossing is an unviolable constraint of phonological representations and that all the processes introduced in section 2 are due to a single phonological feature: $[\pm R]$. In section 4, I first consider underspecification and ABC separately, and show their respective strengths and weaknesses in accounting for the puzzle. Then I move on to discuss the superset account, which combines underspecification and autosegmental feature spreading with ABC. Before concluding, I will briefly compare the account defended here with previous accounts of Tsilhqút'ín retraction.

2 Retraction & sibilant harmony

Tsilhqút'ín (also Chilcotin, Athabaskan, Cook 1993, 2013) is known for its process of vowel retraction, also called ‘flattening’. Vowels are retracted in the context of ‘flat’ consonants, which include both pharyngealised sibilants (3 a) and uvulars (3 b).

- (3) (a) $dz^{\zeta}, ts^{\zeta}, ts^{\zeta'}, s^{\zeta}, z^{\zeta}$
 (b) $\alpha, \alpha^w, q, q^w, q', q^{w'}, \chi, \chi^w, \beta, \beta^w$

The outcome of retraction of the vowels themselves is featurally rather complex. Retracted vowels are either lowered or backed (or both) with respect to their non-retracted counterpart. Laxness/ tenseness or RTR is an orthogonal distinction: Short vowels in Tsilhqút'ín are lax, whereas long vowels are tense. The table in (4) gives an overview over the changes. The different outcomes for /i:/ depend on its location with respect to the trigger.

(4)

non-retracted	retracted
i:	e:, əi
ɪ	əɪ
u:	o:
ʊ	o
æ:	ɑ:
ɛ	ə

The example in (5) shows retraction as triggered by pharyngealised sibilants. Bold face shows triggers and undergoers of retraction. If the trigger is to the right, regressive retraction is unbounded and affects the entire word (5 a). Retraction also applies rightwards. However, it stops after reaching the first long vowel (5 b;c).²

- (5) (a) $j\epsilon ti: \mathbf{lt} s^{\zeta} u: s^{\zeta} \rightarrow j\epsilon t\epsilon: \mathbf{lt} s^{\zeta} o: s^{\zeta}$ ‘he holds it’
 (b) $s^{\zeta} \epsilon li: n \rightarrow s^{\zeta} \epsilon \mathbf{l\grave{o}} i: n$ ‘it’s bloody’
 (c) $s^{\zeta} i: ti: n \rightarrow s^{\zeta} \epsilon \mathbf{it} i: n$ ‘I’m sleeping’

The long vowel thus behaves as an icy target (Jurgec, 2011; Walker, 2018), an undergoer that is at the same place and time a blocker. This property of Tsilhqút'ín retraction will not be discussed in this paper. Uvulars trigger vowel retraction, too. However, retraction triggered by uvulars is less strong, it is restricted to the vowels directly to the right or left of the uvular (6).

- (6) (a) $ju: n\epsilon q\alpha: d \rightarrow ju: n\epsilon \mathbf{q\alpha:} d$ ‘he’s slapping him’
 (b) $\beta \epsilon \mathbf{l} m\epsilon \mathbf{t} \rightarrow \beta \epsilon \mathbf{l} m\epsilon \mathbf{t}$ ‘it’s rolling’

² All examples are taken from Cook (1993), with the exception of (10 a) which is taken from Goad (1989).

Velar consonants act as blockers to progressive retraction. In the examples in 7, retraction is expected to target every vowel up to the first long vowel. However, it stops as soon as it encounters a velar consonant, hence blocking the retraction process from reaching its expected target.

- (7) (a) s^ɛεgɛn → s^ɛəgɛn ‘it’s dry’
 (b) di:z^ɛk’ɛn → de:z^ɛk’ɛn ‘it’s burning’

Regressive retraction triggered by sibilants is not blocked by velars (8). It always reaches the first vowel of the word. In this case, velars neither block nor undergo retraction and are thus transparent.

- (8) (a) g^wɛtɛgu:lju:z^ɛ → g^wətəgɔ:lju:z^ɛ ‘he’s rich’
 (b) nɑ:g^wɛni:ts^ɛɛs^ɛ → nɑ:g^wəne:ts^ɛəs^ɛ ‘fire’s gone out’

Velars are blockers in one direction, to the right, and transparent in the other direction. They are thus directionally asymmetrically transparent.

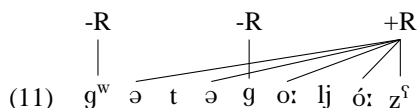
Retraction interacts with another process of Tsilhqú’ín, namely sibilant harmony. Sibilant harmony in Tsilhqú’ín targets all non-palatal sibilants in a word, which have to agree in pharyngealisation, i.e., they are all either pharyngealised or non-pharyngealised. The rightmost sibilant in the word is dominant and defines the value for pharyngealisation in the entire word. It is either non-pharyngealised or pharyngealised (9). (9 a) also shows that vowel retraction is transparently blocked by sibilant harmony.

- (9) (a) tɛz^ɛi:ɬtsæ:z → tɛzi:ɬtsæ:z ‘I started to cook’
 (b) dətá:sts^ɛi:ɬ → dətás^ɛts^ɛɔi:ɬ ‘I hear it’

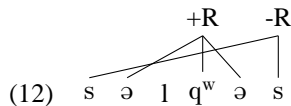
Both velars and uvulars do not interfere with sibilant harmony — they are transparent to it (10).

- (10) (a) s^ɛɛlq^wɛs → səlq^wɛs ‘he coughed’
 (b) χɑ:tɑ:sgɛ̃s^ɛ → χɑ:ta:s^ɛgɛ̃s^ɛ ‘I’ll twist it out’

2.1 The puzzle Based on the assumptions that 1) all the processes above are due to the spread of the feature [±R(etracted)] and 2) that No-Line-Crossing is inviolable, which will be argued for in section 3, we are faced with the following two puzzles. Due to its capacity to block the propagation of [+R] in progressive retraction, velars must be negatively specified as [-R] (cf. 7). The transparent — but specified — velars in (8) are therefore problematic for the universal constraints against crossing association lines, because the [+R] feature of the sibilants spreads across the [-R] velar to targets to its left (11).



The second problem is similar. Because uvulars are triggers of the spread of [+R] onto vowels, they must be specified as such. However, they do not interfere with the propagation of [-R] in the context of sibilant harmony with a rightmost non-pharyngealised sibilant (10). This results, too, in a configuration with crossing association lines (12).



In the next section, I will argue for the two core assumptions that underlie this conundrum.

3 Core Assumptions

The account proposed in this paper is as well as all previous accounts of Tsilhqút'ín retraction or sibilant harmony are based on two core assumptions: First, No-Line-Crossing is an unviolable constraint on phonological representations (Goldsmith, 1976). Second, sibilant harmony, retraction and dorsal minor place in Tsilhqút'ín are all distinguished by the same abstract phonological feature, following Cook (1993) $\pm R(\text{etracted})$. This feature can be considered a binary version of the feature [pharyngeal] in McCarthy (1994).

The abandonment of No-Line-Crossing as an unviolable constraint could straight-forwardly account for the Tsilhqút'ín puzzle: a global constraint forces [+R] to spread leftward, outweighing a violable constraint against crossing association lines (13).

(13)

		SPREAD[+R]!	NO-LINE-CROSSING
a.		**!	
b.			**

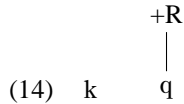
However, under the assumption that every tier is temporarily ordered, crossing association lines are uninterpretable (Sagey, 1988). The token of the feature [+R] temporarily precedes and succeeds the feature [-R], which is a paradox. Before such a crucial and consequential universal is abandoned, all alternatives should be carefully studied and evaluated.

The second assumption is arguably more contestable. After all, pharyngealisation of sibilants, vowel retraction and dorsal minor place are phonetically not the same. There are nonetheless two reasons to assume that a single, abstract phonological feature is at play here. First, the spreading of the feature from sibilants and dorsals does interact, namely in progressive spreading. Here, the negative specification of the velar does indeed block the spread of the feature — this does not follow if e.g. velars are by default not specified for [+pharyngeal]. Introduction of two separate features for dorsal minor place and pharyngealisation thus does not change much of the core conundrum: Blocking in one direction, transparency to the other. The second reason for assuming only one feature is the retraction of vowels: The effect that uvulars and pharyngealised sibilants have on vowels is featurally identical. This is at least unexpected if it was the effect of different features. This becomes more obvious if we consider Chomsky & Halle's (1968) assumption on their features: Here, velars are [+high, -low], uvulars are [-high, -low] and pharyngeals [-high, +low]. If pharyngealised sibilants are thus supposed to spread a feature that is not involved in the distinction between uvulars and velars, it must be [+low]. However, retraction in Tsilhqút'ín only targets the [\pm high], dimension, which is crucial for dorsal minor place. In summary, introducing multiple features does not address the core issue of directional asymmetric transparency, and it indeed introduces additional problems regarding the retraction of vowels.

4 Analysis

In this section, I first discuss two traditional approaches to transparency, underspecification and ABC, separately, demonstrating their merits as well as their difficulties in accounting for the Tsilhqút'ín puzzle. Then, I present a superset account that combines both approaches. This account is capable of accounting for both transparent velars and transparent uvulars.

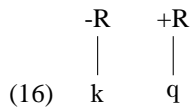
4.1 Spreading & Underspecification One traditional option in order to account for transparent segments in autosegmental phonology operates under the assumption that the segments in question are underspecified for the spreading feature [+F] (e.g. Kiparsky 1981; Steriade 1987). For Tsilhqút'ín that means that velars are (underlyingly) not specified as [-R], but not specified at all (14).



Spreading of [+R] from the trigger towards the left can then skip velars like it skips any other transparent consonant (15).



In order to block retraction in the other direction however, velars have to be specified as [-R] (16).

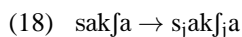


Since velars cannot have both representations at the same time, a limited seriality is needed for this derivation to work. The exact implementation of seriality is not crucial, it could be either extrinsically ordered rules (Chomsky & Halle, 1968), Strata (Pesetsky, 1979; Kiparsky, 1982) or even Harmonic Serialism (McCarthy, 2000, 2010, 2016). Since sibilant harmony bleeds retraction (sibilants that have been de-pharyngealised due to sibilant harmony do not trigger retraction, see (9)), it must not be ordered after progressive retraction. This means that the process has to apply at an early stage of the derivation, where velars are not yet specified (17).³

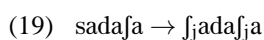
- (17) (a) First steps: sibilant harmony & leftward retraction
 (b) Second steps: specification of velars & rightward retraction

Crucially though, both types of dorsals — velars and uvulars alike — behave as transparent in sibilant harmony, as has been shown in (10). If, consequential to the logic of this approach, transparency is a consequence of underspecification, then uvulars must be underspecified for $[\pm R]$, too. This is paradoxical, since the distinction between velars and uvulars is phonemic. If both are underspecified for the feature that distinguishes between them, such a phonemic difference cannot arise.

4.2 Agreement by Correspondence In an ABC account, transparency is derived by non-continuous correspondence classes. A correspondence class is established between segments that share some features [F]. As an example, sibilants and only sibilants share the feature [+str(ident)]. A correspondence constraint CORR-CC[*str*], if ranked highly enough, makes all the sibilants in the relevant domain correspond with each other, this relation is commonly marked with indices. In the hypothetical example in (18), /s/ and /ʃ/ agree in the feature [+str] and form therefore a correspondence relation.



Other constraints refer to segments that are part of such a correspondence relation. These ID-CC constraints force corresponding segments to agree in some feature [G]. Crucially, this is not (necessarily) an instance of autosegmental feature sharing. An intervening segment specified for [-G] which is not part of the correspondence relation is thus no instance of a line crossing violation. In (19), /s/ is forced to agree with /ʃ/ in anteriority. /d/, specified as [+anterior], just like /s/, intervenes, but since it is not part of the correspondence relation, it neither blocks the process nor does it undergo palatalisation itself.



³ In a rule based approach or Harmonic Serialism, sibilant harmony must be ordered before leftward retraction and specification of velars must be ordered before rightward retraction. In Stratal OT however, those can happen in parallel since they do not involve opaque interactions.

In the case of Tsilhqút'ín, ABC accounts for sibilant harmony and transparent uvulars. A correspondence class is established that encompasses the non-palatal sibilants, based on the feature combination [+str,+ant(erior)], to the exclusion of everything else. This is driven by the constraint in (20).

(20) COR-CC[+str,+ant]

Count a violation for every pair of anterior sibilants that are not in a correspondence relation.

(21) ID-CC[R]

Count a violation for every pair of corresponding consonants that do not have the same feature specification for [±R].

The constraint in (21) is the driver of the assimilation. Since the dorsals are not part of the correspondence relation and there is also no feature spreading, as (21) may be satisfied by feature insertion, an intervening uvular has absolutely no effect on the outcome of sibilant harmony. There is also no constraint that would force it to change its feature specification itself.

(22)

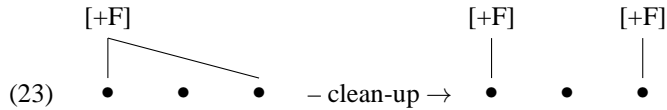
	$s^i \epsilon l q^w \epsilon s$	COR-CC[+str,+ant]	ID-CC[R]	ID-IO	*q
a.	$s^i \epsilon l q^w \epsilon s$	*!			*
b.	$s^i_j \epsilon l q^w \epsilon s_j$		*!		*
c. ☞	$s_j \epsilon l q^w \epsilon s_j$			*	*
d.	$s_j \epsilon l q^w_j \epsilon s_j$		*!*		*
e.	$s_j \epsilon l k^w_j \epsilon s_j$			**!	

This reasoning cannot be extended in order to account for vowel retraction. There is no feature that unites non-palatal sibilants and vowels to the exclusion of dorsals. Without such a feature, intervening velars are expected to end up as part in every correspondence relation between sibilants and vowels and would consequently be expected to agree in the same features. If a feature that distinguishes between dorsals on the one hand and sibilants and vowels on the other is stipulated, the transparency of velars can be accounted for following the same principle as laid out above. However, the blocking capacity of velars does not follow (cf. Hansson 2007; Rhodes 2012; Walker 2018). If velars do not correspond with sibilants to their right, they are not expected to correspond with sibilants to their left either.

4.3 Superset approach The fact that both uvulars and velars act transparent is problematic for an underspecification approach, while the asymmetric transparency is challenging for ABC. However, assuming both correspondence and feature spreading with underspecification allows us to account for all instances of transparency and opacity of dorsals. The gist of this analysis is that vowel retraction is the result of local feature spreading, whereas sibilant harmony is the result of non-local feature copy, induced by correspondence. As discussed in section 4.1, some limited seriality is essential for deriving the asymmetric transparency. Again, the exact source of this seriality is orthogonal to the argument made in this paper. Since ABC is a theory that has traditionally been connected with Optimality Theory (even though, in principle, it could be combined with rule-based systems), I will employ Stratal OT. Because the amount of seriality needed for this derivation is very low — two sequentially ordered steps. This aligns well with the reduced seriality of three levels encountered in Stratal OT. On the other hand, there is no connection between the strata assumed here and morphology — all the processes discussed in this paper seem to have the entire word as their domain. Departing from the standard assumption that the two lexical strata of Stratal phonology are the stem and the word, this entails that all prefixes (there are no suffixes in Tsilhqút'ín) must belong to the stem level stratum. Evidence for differential stratal affiliation of prefixes would therefore be evidence against this concrete implementation of seriality, but not against the account per se.

Before delving into the details of the derivation, I will summarise briefly the mechanisms that apply in each stratum. The first stratum is the place of sibilant harmony and regressive vowel retraction. The uvulars are transparent because they are not part of the correspondence relation between the sibilants. The velars are transparent because they are crucially not yet specified for the feature [±R].

I assume that in between strata there is an interstratal clean-up (cf. Trommer (2011)). The processes of the clean-up are assumed to be universal. They adjust the winning outputs of a previous stratum to become an input to the next. In the clean-up, gapped output structures are re-interpreted as multiple distinct autosegmental spans (23).



This is not a crucial assumption — de-gapping could also be transferred to the next stratum (with minor complications) or even be delayed until phonetic interpretation.⁴

In the second stratum, velars obtain their specification as [-R]. Additionally, [+R] is spread rightward. Since velars are no longer underspecified in this stratum, they do not act as transparent to the propagation of [+R], but as blockers. In the remainder of this section, I will discuss the derivation of transparent velars, opaque velars and transparent uvulars respectively.

4.3.1 Transparent velars In the first stratum, velars are underspecified for [\pm R]. This can be enforced by two means: There could be a redundancy constraint that says that velar dorsals do not have to be specified as [-R], since this is the unmarked status anyway. Factually, this amounts to the same as a constraint *k against velars, which could derive typologically odd languages where all dorsals are uvular. Nonetheless, I will assume this approach here. The alternative is to abandon Richness of the Base (Prince & Smolensky, 1993/2004) and assume that velars are underspecified due to a morpheme structure constraint. The first stratum is also the place of regressive vowel retraction. The retraction itself is triggered by the constraint SHARE-[-R] in (24) (cf. McCarthy 2009; Mullin 2011; Zaleska 2018).

(24) SHARE([-R])

Count a violation for every [-cons] segment that is adjacent to a [+R] segment on the R-tier and is not associated to it.

The unidirectional regressive spread is due to the constraint *DEPENDENT-RIGHT[+R] (cf. Mullin 2011), defined in (25). This constraint is not relevant for the first case, since rightward spread is not possible anyway.

(25) *D(EPENDENT)-R(IGHT)[+R]

Count a violation mark if the rightmost association line connecting [+R] and the root node tier is not present in the input.

In the following tableaux, boldface denotes that accordingly marked segments share the feature [\pm R], that is, they are connected to the identical feature token on the R-tier. Capital K and G indicate underspecified dorsals.

The tableau in (26) shows the derivation of a transparent velar. In this case, the input velar is indeed specified, a possibility in accordance with Richness of the Base. The faithful candidate a. however violates two highly ranked constraints: *k against specified velars and SHARE[+R], because the second vowel [ɛ] does not share the adjacent [+R] feature. Candidates c. and e. each solve only one of these problems. Candidate d. solves both, but creates a new violation of SHARE[+R]. Candidate b. eventually is the optimal candidate — with an underspecified dorsal and iterative spreading of [+R] — because it has no violation of these highly ranked constraints. An obvious alternative is candidate e., which deletes the [*R] specification. However, this violates MAX[R] twice, making it less optimal than the winner. A strong contender is candidate f., which avoids the marked gapped structure, penalised by *GAP, of the winner. However, this candidate creates additional associations, violating a higher ranked constraint *ASSOC(IATE).

(26)


	ɛkɛz ^f	ID-CC[R]	SHARE	*k	MAX[R]	DEP[R]	*ASSOC	*GAP	*K
a.	ɛkɛz ^f		*!	*!					
b.	əKəz ^f				*		**	*	*
c.	ɛkəz ^f			*!			*		
d.	ɛKəz ^f		*!		*		*		*
e.	ɛKɛz				**!				*
f.	əqəz ^f				*		***!		

⁴ If Harmonic Serialism is employed for the seriality, this last option becomes a necessity: Clean-up is not possible since there are no strata, and undoing the gapped structure at a later point would involve a re-ranking of constraints, which is not possible in Harmonic Serialism.

The gapped structure is re-interpreted as distinct during interstratal clean-up ($\text{əKəz}^{\zeta} \rightarrow \text{əKəz}^{\zeta}$). This new representation is then the input for the second stratum, where the underspecified K inserts the default value for retraction, [-R], and becomes [k].

4.3.2 Transparent uvulars Sibilant harmony, just as regressive retraction, is a process that belongs to the first stratum. Two constraints are necessary for deriving it, CORR-CC[+str,+ant] for enforcing the correspondence and ID-CC[R] for enforcing the agreement, as defined above in (21) and (20). The tableau in (27) does not include candidates that violate CORR-CC[+str,+ant], that is, candidates without correspondence between the sibilants. The constraint is therefore omitted from the tableau. The most faithful candidate a. violates the highly ranked constraint ID-CC[R] as well as the familiar SHARE[+R] and is thus filtered out. In candidate e., retraction affects the entire word. However, this violates the highly ranked constraints *D-R[R] against progressive spreading. Candidates c. and d. on the other hand spread [-R] to the entire word. This does not violate *D-R[R], since [-R] is the rightmost feature. However, deassociation of the uvular violates MAX[R] twice, incurring here more violations than the optimal candidate b. This candidate satisfies ID-CC[R] not by spreading but by inserting the feature [-R]. The constraint itself does not care about the origin of the feature. SHARE[+R] is satisfied, at least for the first vowel, by spreading [+R] from the uvular.


(27)

	$s^{\zeta}\text{ɛlq}^w\text{ɛs}$	ID-CC[R]	SHARE	*k	MAX[R]	DEP[R]	*ASSOC	*GAP	*K
a.	$s^{\zeta}_j\text{ɛlq}^w\text{ɛs}_j$	*!	*!						
b. 	$s_j\text{ə}lq^w\text{ɛs}_j$				*	*	*	*	
c.	$s_j\text{ɛlk}^w\text{ɛs}_j$			*!	**		****	*	
d.	$s_j\text{ɛlK}^w\text{ɛs}_j$				**!		***	*	*
e.	$s^{\zeta}_j\text{ə}lq^w\text{ɛs}_j$	*!					*	*	

Since no gapped structure has been created, nothing happens at interstratal clean-up. In the second stratum, progressive retraction affects the second ɛ , too. A detailed analysis of progressive retraction is exemplified with the case of opaque velars in the next section.


4.3.3 Opaque velars At the first stratum, retraction is only regressive due to the high ranked *D-R[R]. At the same time, (potentially) underlying velar /g/ loses its [-R] specification due to the redundancy constraint.

(28)

	$s^{\zeta}\text{ɛgɛn}$	*D-R[R]	SHARE	*k	MAX[R]	DEP[R]	*ASSOC	*GAP	*K
a.	$s^{\zeta}\text{ɛgɛn}$		*	*!			**		
b.	$s^{\zeta}\text{əGə}n$	*!			*		**	*	*
c. 	$s^{\zeta}\text{ɛGɛ}n$		*		*				*

At the second stratum, the constraint *K that penalises underspecified dorsals is promoted, so that the velar regains its [-R] specification. *D-R[R] on the other hand is demoted, so that bi-directional spreading is now possible. The faithful candidate a. in the tableau in (29) is suboptimal because it violates both *K and the Share constraint. Candidate b. creates a transparent velar, in parallel to what we have seen at the first stratum. Due to the promotion of *K, this candidate is suboptimal, too. Candidate c. spreads [+R] to the right edge, the dorsal acts as an undergoer of retraction, turning it into a uvular. This candidate is ruled out by a higher ranked constraint *q against new uvulars⁵ in this stratum. In the optimal candidate, d., the underspecified dorsal inserts a [-R] feature, making it velar. As such, it blocks the further rightward spread of [+R].

(29)

	$s^{\zeta}\text{eGɛ}n$	SHARE	*q	*K	DEP[R]	*ASSOC
a.	$s^{\zeta}\text{eGɛ}n$	**!		*		
b.	$s^{\zeta}\text{əGə}n$			*!		**
c.	$s^{\zeta}\text{əGə}n$		*!			***
d. 	$s^{\zeta}\text{əgɛ}n$				*	*

⁵ MAX[R] outranking *q will make sure that underlying uvulars will remain faithful.

5 Previous accounts

As has been mentioned above, all previous accounts, namely Goad (1989), Cook (1992) and Mullin (2011), share the core assumptions laid out in section 3: Line crossing is inviolable and retraction, sibilant harmony and dorsal minor place are due to a single feature. I will focus here on Goad (1989) and Mullin (2011), since Cook's (1992) account, albeit highlighting it, does not attempt to solve the puzzle of transparency.

Goad employs a unary feature [rtr] and her analysis focuses on sibilant harmony and intervening uvulars. Her solution to the apparent crossing association lines is the adoption of the assumption that [rtr] associated with velars is on a different tier than [rtr] associated with coronals in lexical phonology. In post lexical phonology, [rtr] shifts its tier, so that sibilants and uvulars are both able to interact with vowels. This account is very similar to the account proposed here, as the special [rtr] tier for coronals is equivalent to the correspondence relation (Hansson, 2014; Del Busso & Bennett, 2019). Nonetheless, this account does not consider asymmetric transparency and is not capable to solve it without modifications. The necessary modifications are the adoption of binary features and the splitting of rightward and leftward retraction with a different timing as proposed in this account. Tier-shifting and ABC are however not entirely identical. With ABC, a correspondence relation can exist simultaneous with a local feature sharing relation. In tier-shifting, all processes that require the non shifted tier have to apply before all processes that require the shifted tier.

Mullin (2011) focuses on the velars as asymmetric *blockers*. His approach assumes strictly local spreading of the feature, in his case unary [RTR], and is formalised in Serial Harmonic Grammar (Kimper, 2011; Pater, 2012), a combination of Harmonic Grammar and Harmonic Serialism. He assumes that the feature has to spread to every root node on its way, that is, underspecification does not account for transparency. In addition, his account derives a great deal of the intricacies of vowel retraction in Tsilhqút'ín that are not accounted for in this paper, namely the different strengths of uvular and sibilant triggered retraction and the boundedness of progressive retraction. However, based on the feature system and the spreading mechanism he adopts, the account fails to derive transparent velars in regressive retraction and derives undergoers instead (Mullin, 2011:49), wrongly predicting the mapping in (30).

(30) /g^wɛtɛgu:ljú:z[̣]/ → *g^wətəgo:ljó:z[̣]

However, even if the feature spreading mechanism and the feature is changed in order to be able to account for transparency, there is still the need for an additional mechanism that is responsible for sibilant harmony.

6 Conclusion

The presence of various transparent segments in Tsilhqút'ín sibilant harmony and retraction is challenging for existing approaches to transparency. This paper argues that two traditional approaches to transparency, underspecification and ABC, do not suffice to account for the data. A similar claim has been advanced by Blumenfeld & Toivonen (2016), who argue that underspecification is not enough to derive transparency in Votic. To solve the puzzle, I propose a superset account that combines both types of transparency — transparency by underspecification and by falling outside a correspondence relation. This entails two mechanisms of feature propagation, namely autosegmental feature spreading and feature copy. This is in line with Kim (2019), who argues for independent reasons that both of these mechanisms must be available.

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