

# Persistent innovations and historical conspiracies as reanalysis and extension

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This article explores temporally extended innovations as a form of phonological reanalysis and extension. Polabian (West Slavic) exhibits multiple dissimilatory innovations that target the reflexes of Late Common Slavic (LCS) \*v/w. In this paper, I propose that the outputs of syllable structure changes in early West Slavic were reinterpreted as restrictions on the distribution of [w], thus introducing dissimilation to the language. The new grammar was not able to stop other innovations from occurring (prophylaxis) and instead restructured intermediate outputs from subsequent innovations into an acceptable phonetic form (repair) thereby extending dissimilation to new items. I demonstrate that (a) outputs of an earlier onset epenthesis grammar conform to the surface-true generalizations enforced by the reanalyzed dissimilation grammar and (b) a single grammar can account for both the dissimilation which developed during the West Slavic period and subsequent extensions which occurred after Polabian was fully differentiated from its relatives.

**Keywords:** Polabian, Slavic, optimality theory, agreement by correspondence, dissimilation, historical conspiracy, prophylaxis, repair, reanalysis, extension

## 1. Introduction

This paper analyzes the chronological sequencing of labial dissimilation in Polabian (West Slavic: Lechitic, extinct). I show that variation in dissimilation outcomes over an extended period of time can be captured in a single Optimality Theory (OT) grammar which represents the generalizations made by speakers over the active period of dissimilation. I propose that the responses of language users (speakers, listeners, and learners) to the output of a different grammar at an earlier stage in the language's history are responsible for the development of the dissimilation grammar.

“Dissimilation” is a broad term applied to restrictions in segment sequencing based on shared features. Dissimilation can result in either loss of features or segments (Inkelas & Shih 2014). Polabian has one synchronic alternation exhibiting dissimilation [sɪot] ‘world NOM’ ~ [swatə] ‘world LOC’. The nominative form lacks the expected reflex of Late Common Slavic (LCS) \*v (LCS \*světŭ ‘world NOM’ should be Polabian †swiot). This alternation exemplifies dissimilation because the reflex of LCS \*v is restricted from co-occurring near another segment with labial features in the nominative, but the reflex of LCS \*v surfaces in the locative, which lacks an additional labial segment.

Although there is only one synchronic alternation exhibiting this process, there is evidence that Polabian went through two distinct waves of regular labial dissimilation. The patterns in each wave can be grouped into lexical classes which I represent in all caps. In the first wave, \*xvo > \*xo resulted in dissimilated reflexes shared across West Slavic like ILL, LCS \*xvorŭjĭ ‘ill’ > Polabian [çørə] ‘evil’ (cf. Polish [xɔɾi], Lower Sorbian [xɔɾi], Czech [xori], but Russian (East Slavic) [xvorij]). In the second wave, a variety of patterns developed which are unique to Polabian. During the second wave the innovation \*xvo > \*xo found in ILL happens again as in PRAISE, LCS \*xvali ‘praise 3SG’ > Polabian [xolə] (cf. Polish [xfali], Lower Sorbian [xwali], Czech [xfali], Russian [xvalit]).<sup>1</sup> Another type of dissimilation found in the second wave is \*svio > \*sio like in WORLD outlined above. Dissimilation that deletes reflexes of LCS \*v in ILL, PRAISE, and WORLD is connected to dissimilation that results in vowel unrounding \*vy > vi. Although Polabian innovated front-rounded vowels as in LCS \*kolo ‘wheel’ > [tʰøly] (cf. Polish [kɔwɔ], Lower Sorbian [kolo], Czech [kolo], Russian [kolo]), the vowel reflex in SCENT, LCS \*voňa ‘scent’ > Polabian [wɪnə], exhibits an unrounded reflex instead of the expected front-rounded vowel (cf. Polish [vɔɲ], Lower Sorbian [vɔɲ], Czech [vuɲə], Russian [vonʲ]).

While the regularity of Polabian labial dissimilation is interesting in and of itself, perhaps the most important aspect of this case study is what we can learn about temporal properties of sound change. We often think of timing in terms of “relative chronology”. If we observe the output of one innovation interacting with the input of another, we often assume that the innovations happened at separate

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1. All Lower Sorbian transcriptions are my own based on word lists and conversational audio from the Serbski Institute’s website (dolnoserbski.de/dnw/). The acoustic properties of each Lower Sorbian lexical item with <w> were examined in Praat (Boersma & Weenink 2019) and compared to the acoustic properties of Isoko (Atlantic-Congo) /f/, /v/, /v/, and /w/. Lower Sorbian segments transcribed as glides have a visible F1 and F2 structure throughout the production of the segment. Forms transcribed with [w] have low F1 and F2 whereas forms transcribed with [v] have higher F1 and F2. Segments transcribed as [v] or [f] had no visible formant structure.

times. If the innovations happened at separate times, we can establish a relative chronological sequencing of one with respect to the other. Relative chronology receives a lot of attention, but another aspect of timing is also important: rule duration. While it is believed that innovations must be able to activate and eventually deactivate, it is not known how long any given innovation will be active. Some innovations are “transient”, lasting only for a short time, whereas others are extended and “persistent” (Chafe 1968: 131; Myers 1991). In so far as multiple transient innovations feed a persistent innovation, we can infer how long the persistent innovation was active.

Polabian exhibits the innovation  $*xvo > xo$  at two separate times, once with ILL and again with PRAISE. It is notable that in the second wave of dissimilation, other dissimilation patterns arise such as those in WORLD and SCENT. All four innovations converge on restricting the surface distribution of [+LABIAL] segments. When the outputs of different rules converge on a shared surface structure, it is known as a “conspiracy” in constraint-based phonology (Kisseberth 1970). We observe this type of convergence towards a shared surface representation in persistent innovations because they repeatedly produce similar surface structures whenever fed by a transient innovation. Crist (2001) investigates several cases of seemingly distinct innovations that converge on shared surface structures, such as the loss of voiced fricatives in West Germanic, and labels these innovations “historical conspiracies”. Like persistent rules, historical conspiracies provide us insight into how long the structural restrictions in a given language were actively enforced.

Dresher & Lahiri (2005) call the behavior observed in persistent rules and historical conspiracies “pertinacity”, which they divide into two sub-types. In the first, the underlying grammatical structure changes, but the surface forms remain the same. In the second, surface forms change when a single grammatical structure is applied to new forms. These two behaviors are called “reanalysis” and “extension” in literature on syntactic change. I attribute the timing and structure of labial dissimilation in Polabian to a phonological version of reanalysis and extension.

Polabian labial dissimilation is linked to earlier changes to West Slavic syllable structure. The outputs of these structural changes were reanalyzed as distributional restrictions on LCS  $*v$  and the feature [+LABIAL] in the synchronic grammar. This shared West Slavic reinterpretation was applied to words which had not previously undergone syllable structure changes, like ILL, giving rise to the first wave of dissimilation. After this, Polabian developed its own unique set of sound changes which reintroduced restricted labial sequences. This led to the extension of dissimilation in PRAISE, WORLD, and SCENT during the second wave of dissimilation. I propose that in the second wave, extension was possible because

the grammar was not able to block other innovations from producing new forms, “prophylaxis”. Instead, the grammar took the outputs of other innovations before they were uttered and restructured them to fit within the acceptable bounds of the new synchronic grammar, “therapy/repair” (see Honeybone 2019 for a summary of positions on prophylaxis vs. repair). My proposal that the synchronic grammar can repair the output of other innovations conforms to Jakobson’s (1929), Weinreich et al.’s (1968), Crist’s (2001), and Kiparsky’s (2003) view that the structural consequences of an innovation must interact with synchronic systems.

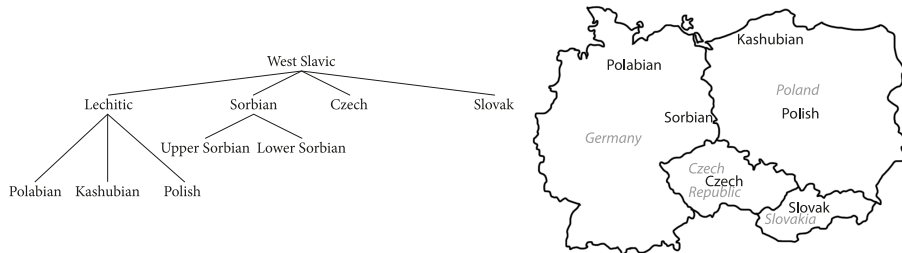
The rest of this paper is organized as follows. In §2, I present the sounds and features of Polabian. Based on language internal and cross-linguistic evidence, I propose that Polabian has [w] which was inherited from LCS (i.e., LCS \*v and \*w are allophones of the same phoneme (Kavitskaya 2017) and is an inherited segment in Polabian). Section 3 presents the synchronic and diachronic facts of LCS \*w in Polabian. This section establishes the history of labial dissimilation based on comparative West Slavic evidence. Crucially, an innovation of prothetic [w] in West Slavic preceded all other changes to [w] in Polabian. Glide prothesis led to a change in the distribution of West Slavic \*w across the lexicon. All subsequent innovations in the distribution of \*w follow the distribution of [w] introduced from glide prothesis. Section 4 looks at dissimilation as a cross-linguistic phenomenon. In this section, I propose that the restrictions on front-rounded vowels did not develop independently of the restrictions on back-rounded vowels. Section 5 presents the account of how glide prothesis was reanalyzed and led to the various dissimilation patterns (extension). This section outlines my assumptions concerning diachrony in a constraint-based framework and shows the grammars which account for dissimilation and glide prothesis. The dissimilation grammar, which is in the Agreement by Correspondence (ABC) sub-framework of OT (Rose & Walker 2004), can account for deletion across all West Slavic languages in ILL and subsequent repairs to innovations in PRAISE, WORLD, and SCENT. I argue that the structure behind labial dissimilation developed early in the history of West Slavic and continued to operate as long as it was provided with new inputs. Finally, this section connects a grammar which derives the behavior of prothetic and inherited [w] to the grammar which accounts for dissimilation. While the West Slavic glide prothesis grammar is simpler than the dissimilation grammar, both predict the same surface forms. The dissimilation grammar has an added benefit over the glide prothesis grammar in that it allows language users to assume more uniformity across the lexicon. This is likely a motivation behind why the glide prothesis grammar was reanalyzed. Section 6 closes with the findings and implications of this work.

## 2. The Polabian segment inventory

This section presents a basic overview of the Polabian language, segment inventory, and my interpretation of LCS \*v in West Slavic. I propose that the traditional understanding of LCS \*v reflexes in Polabian has been influenced by Low German orthography, which notably uses the grapheme <w> for both [v] and [w] (Lasch 1914: 152). After establishing the segments of the language, I briefly discuss the representation of features adopted in this work.

### 2.1 The segments of Polabian

Prior to its extinction in the 18th century, Polabian (< *po* ‘near’ + *labu* ‘Elbe’) was spoken along the shores of the Elbe River in present-day Germany. Polabian’s closest relatives are Polish and Kashubian (West Slavic: Lechitic) spoken in present-day Poland. Geographically, Polabian was close to Upper Sorbian and Lower Sorbian (West Slavic) which are both currently spoken in present-day Germany. Figure 1 shows the West Slavic family membership (left) and the approximate geographical distribution of West Slavic languages according to present-day country boundaries (right).



**Figure 1.** West Slavic (left) family membership, (right) approximate geographical distribution

Low German-speakers began documentation of Polabian after a government decree had officially banned its use (Polański & Sehnert 1967: 7). Although Polabian only exists in written records, linguists are fairly certain of the language’s pronunciation thanks to the detailed records made during the documentation period (Polański & Sehnert 1967: 1–18). This certainty notwithstanding, we must be open to the possibility that the Low German sound system influenced what was transcribed during documentation.

The established Polabian segment inventory is found in Polański’s body of work (Polański & Sehnert 1967; Polański 2002). Figure 2 presents the sound system of Polabian (nasal vowels not shown).

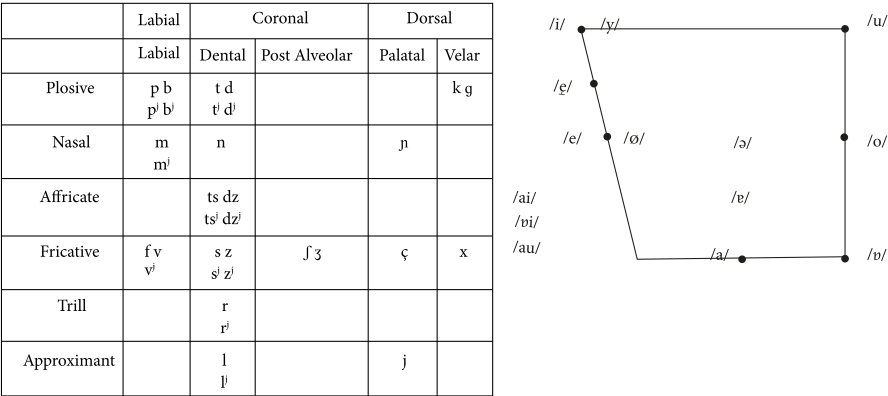


Figure 2. Polabian sound system (Source: Polański 2002)

Polabian has two low vowels; the [−BACK] segment is /a/ and the [+BACK] segment is low back-rounded /v/. Redundant rounding, wherein back vowels are round and front vowels are unround (Halle 1962), is found in Polabian’s back monophthong system due to innovations in the LCS high vowel series \*i > /ai/, \*y > /vi/, and \*u > /au/. While most Slavic languages have redundant rounding in the front-vowel system, Polabian looks more like a Germanic language because it has two front-rounded vowels. The vowels /y/ and /ø/ both derive from LCS \*o in native words (cf. LCS \*kolo > [tʰøly] ‘wheel’).

It is cross-linguistically common to co-articulate consonants and vowels. Consonant types with a low degree of obstruction in the oral tract, e.g., glides, often have a higher degree of co-articulation with vowels than consonant types with higher degrees of obstruction, e.g., obstruents. Timberlake (1995) challenges the accepted consonant system shown in Figure 2 by proposing a labiodental glide [ʋ] in onsets instead of [v] (1995: 283). He notices that phonologically, onset /v/ was often co-articulated with the following vowel in ways that were similar to the interaction of the glide [j].

Timberlake’s proposal is consistent with phonological and phonetic properties of LCS \*v reflexes in other Slavic languages. In Russian and Kashubian, reflexes of LCS \*v in the onset fail to undergo obstruent voicing assimilation (Kavitskaya 1999; Hopkins 2001: 47). In Russian, glides have been documented in native speaker production (Kavitskaya 1999: 240–242). In Polabian, reflexes of \*v behave like obstruents or sonorants depending on their position in the word.

Onset reflexes behave like highly sonorant segments and do not exhibit progressive voicing assimilation as in LCS \*kvi.li ‘whimper 3sg’ > [kvai.lə] <kvailě>. Coda reflexes behave like obstruents and are subject to regressive voicing assimilation as in LCS \*dě.vũ.ka ‘girl’ > [def.kə] <defkă>. If LCS \*ũ in \*dě.vũ.ka had not syncopated in Polabian, we would expect the reflex of LCS \*v to remain in the onset and not exhibit voicing assimilation.

Some scholars note that articulatorily, there is no categorical difference between central approximants and their fricative counterparts (Martinez-Celdrán 2004; Ball & Rahilly 2011). This means that some languages may have gradient phonetic variation in how these segments are realized. Danish has three distinct realizations of /v/: a labiodental fricative, a labial-velar glide with weak tongue dorsum raising, and a full labial-velar glide (Basbøll 2005: 63–64).

Middle Low German (MLG) loanwords provide evidence that the Polabian labial glide also had a dorsal constriction. For example, the MLG borrowing <kugel> ‘ball’ is not represented orthographically with <g> even though native Polabian lexical items with the plosive [g] are. The spelling of MLG <kugel> ‘ball’ is <kevål> in Polabian. MLG had a velar spirant [ɣ] in intervocalic position (Lasch 1914: 182), which is absent in Polabian and many other Slavic languages. Any loanword containing this non-native segment would need to be mapped to the closest articulatory and perceptual match in the native Polabian sound system. Articulatorily, both [ɣ] and [w] share continuancy properties and have a dorsal constriction. The dorsal constriction in [ɣ] and [w] contributes to perceptual similarities in F1 and F3 lowering on adjacent vowels (although the F3 lowering for [w] is stronger due to the added lip rounding). Although labials and velars can both lower F1 and F3, sociophonetic work on Spanish continuants shows that velars have a higher degree of co-articulation with back vowels than labials, and perceptually, labial continuants are more likely to be interpreted as velars in the context of a back vowel (Mazzaro 2010). This suggests that in the case of ‘ball’, [ɣ] is more likely to be interpreted by listeners as a segment with a dorsal constriction. The orthographic representation of Polabian <v> for MLG intervocalic <g> suggests that Polabian mapped MLG [ɣ] before a back vowel to the articulatorily and perceptually similar continuant [w], which has both a labial and a dorsal constriction. Other loanwords support the mapping of MLG [ɣ] to Polabian [w] such as MLG <wāge> ‘scale’ which is <vogvoi> in Polabian orthography. In this example, all vowel correspondences are regular, but the source language’s voiced velar fricative is represented orthographically by both labial and velar segments in Polabian.

Given the range of variation in reflexes of LCS \*v across Slavic, it is most parsimonious if we assume that LCS was like Danish and exhibited variable production of \*v which also included \*w. This would mean that Polabian’s labial-velar glide reflex represents a retention from LCS rather than an innovation which

occurred after LCS \*w > LCS \*v. Although the easternmost West Slavic languages (Polish and Czech) exhibit labiodental fricatives that correspond to \*w/v, to the west of this region, glides correspond to \*w/v in onset position. The onset reflex is [w] in Upper Sorbian, [ʋ] and [w] in Lower Sorbian, and [w] in Polabian (Schaarschmidt 2002: 10; Howson 2017: 361).<sup>2</sup> In the rest of this paper, I represent reconstructions of LCS with \*w.

2.2 Feature representation

This section briefly discusses the feature representation of dorsals and labials in this work. I adopt the view that palatals and velars share the same broad place feature [DORSAL] and are differentiated by their [±FRONT]/[±BACK] values (Chomsky & Halle 1968; Hayes 2009, among others). Many Slavic languages, including Polabian, exhibit phonetic secondary velarization and palatalization (Purcell 1979; Bolla 1981; Timberlake 1995; Padgett 2001, 2003; Operstein 2010; Litvin 2014; Burns 2021). Following from Padgett’s (2001, 2003) arguments concerning the development of velars and palatals in Slavic, primary and secondary velar constrictions are treated as [+BACK] whereas primary and secondary palatal constrictions are treated as [+FRONT].

Figure 3 shows the internal structure of dorsal strictures in feature geometry (Clements 1985; Clements & Hume 1995). In feature geometry representations, a consonant’s primary constriction place is represented in a C-place node whereas vowels are specified in a V-place node. Secondary consonant articulations are specified in a V-place node under C (Cahill 1999; Rubach 2007; Operstein 2010).

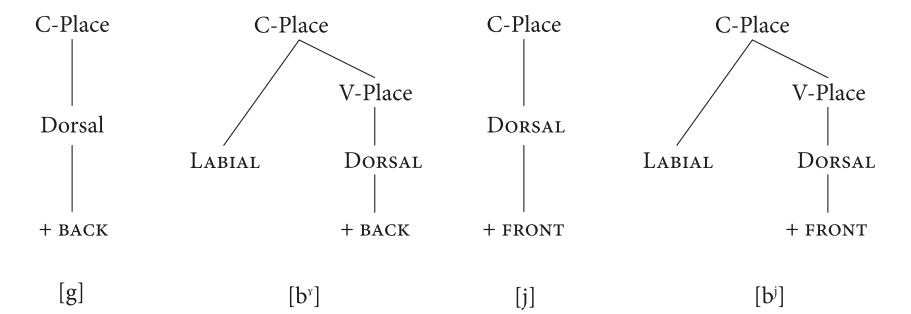


Figure 3. Dorsal strictures

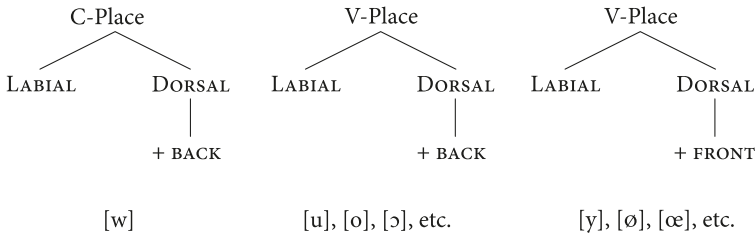
Slavic languages have a complex relationship between primary and secondary articulations in a variety of innovations. I only transcribe secondary articulations

2. Stone (2003) reports that both Lower Sorbian and Upper Sorbian have a fricative /w/ which he distinguishes from /v/.



when it is necessary to understand an innovation, otherwise they are often excluded from transcriptions for the sake of readability by non-Slavicists.

Following from Chomsky & Halle (1968) and Hayes (2009), I represent vowels and dorsal consonants with shared tongue body properties. Labial properties come from the activation of an independent articulator that can accompany other stricture places as shown in Figure 4.



**Figure 4.** Labial consonant and vowel specifications

Figure 4 shows that the main difference between back-rounded vowels and [w] is whether the strictures belong to either a consonant or a vowel. This work distinguishes between segments with two primary places of articulation ([w] from Figure 4) and segments with a primary and secondary place of articulation ([bʷ] from Figure 3). The segments [w] and [bʷ] share the same place features, but crucially, differ in terms of an intermediate V-Place node. The constraints proposed in §5 explicitly mention the role of primary vs. secondary articulation as necessary. In order to standardize how data is presented, I represent roundness through the feature [±LABIAL] going forward instead of using an additional feature [±ROUND].

### 3. The structure and timing of Polabian dissimilation

This section gives an overview of the labial dissimilation data. Section 3.1 provides comparative and internal properties of \*w reflexes. This section shows that dissimilation is sensitive not only to feature co-occurrence, but also to syllable structure. Section 3.2 focuses on the timing of labial dissimilation. Crucially, prothesis of [w] before \*o and \*u resulted in a redistribution of [w] across the lexicon. The redistribution of [w] provided language users with a pathway to reanalyze the synchronic grammar as imposing restrictions on [w], thus giving rise to dissimilation. Section 3.3 summarizes with a list of rules needed to account for labial dissimilation and highlights the generalizations of the rule's output structures.

3.1 Comparative and internal evidence of dissimilation

As mentioned in §1, WORLD is the only lexical item that exhibits a synchronic dissimilatory alternation ([sɪot] ‘NOM’ ~ [swatə] ‘LOC’). The corpus is too small to learn more about the development of dissimilation from internal reconstruction, but it is large enough to generalize based on (a) comparative evidence and (b) static synchronic distributional restrictions.

Comparative West Slavic evidence shows that Polabian has three outcomes for LCS \*w: retention, deletion, or retention with labial modification on an adjacent segment. Table 1 provides examples of these different outcomes with the LCS form. Polish represents the easternmost member of the Lechitic subgroup whereas Lower Sorbian represents a non-Lechitic language spoken in the west (see Figure 1). Polabian, which is in the Lechitic subgroup, is geographically situated between the two in the northwestern zone of West Slavic.

Table 1. LCS \*w reflex types

	Polabian	Polish	Lower Sorbian	LCS
Retention	[swɛʦʲvɐ]	[ɕʲɛʦʲsa]	[svʲɛʦʲa]	*swě.tja ‘candle’
	[sworət]	[sfazʲitɕ]	[sfariɕ]	*swa.rit ‘quarrel’
	[vʲotər]	[vʲatr]	[vʲɛʦʲ]	*wě.trũ ‘wind’
Deletion	[dʲɪzɔ]	[gvuɕʲɕ]/[guɕʲɕ]-	[gɛɕʲɕ]	*gwo.zdī ‘nail’
	[dər]	[dvur]	[dver]	*dwo.rũ ‘courtyard’
	[syj]	[sfuj]	[svej]	*swo.jī ‘3SG POSS’
	[sɪot]	[ɕʲɛʦʲat]	[svʲɛt]	*swě.tũ ‘world/light’
	[kos]	[kfas]	[kvas]	*kwa.sũ ‘sour, acidic’
Modified Retention	[wɪɲɐ] < *wɪɲɐ	[vɔɲ]	[vɔɲ]	*wo.ná ‘scent’
	[wis] < *(w)ys	[ɔɕ]	[ves]	*osī ‘axle’

All languages exhibit retention and loss of \*w. Polish variably deletes \*w in NAIL, but Lower Sorbian regularly deletes \*w in NAIL (see §3.2 for a discussion of variation in Polish reflexes). Neither Lower Sorbian nor Polish delete \*w in SOUR. Both \*gwo > go and \*kwo > ko are part of the same West Slavic innovation which led to the dissimilation in ILL mentioned in §1 (Stieber 1973: 124). The correspondences between NAIL and SOUR are reminiscent of the correspondences between ILL and PRAISE outlined in §1. NAIL, like ILL, is representative of a West Slavic innovation, whereas SOUR, like PRAISE, appears similar to the West Slavic innovation but occurred as an independent Polabian development after \*a > o.

Lexical items like COURTYARD underwent a Polabian-specific innovation \*o > [y], [ø] and exhibit deletion. Not all sequences of [w] followed by a front-rounded vowel underwent deletion as shown in SCENT and AXLE (Timberlake 1995: 283). Although COURTYARD and SCENT underwent the same vowel innovation, \*o > [y], [ø], they have different onset structures and different outcomes. The complex onset in COURTYARD underwent simplification and retained the front-rounded vowel, whereas the simplex onset in SCENT was retained but the vowel unrounded. Simplex onset unrounding is not dependent on inherited LCS \*w as shown by AXLE, which underwent prothesis.

All innovations involving [w] occur in environments adjacent to vowels sharing the [+LABIAL] feature. Because both deletion and vowel modification occur in environments where the onset and following vowel are both [+LABIAL], these innovations are a type of dissimilation. It would, however, be too simplistic to say that [+LABIAL] is the only feature relevant to dissimilation. As shown above, syllable structure is factored into the process. In complex onsets, dissimilation results in segment deletion, but in simplex onsets it results in feature loss.

Polabian exhibits multiple labial onset-vowel pairing gaps in the synchronic static distribution of segments. These gaps did not arise because LCS lacked the relevant input, rather they arose due to innovations in the history of Polabian after the breakup of LCS. Table 2 summarizes Polabian onset-vowel pairings. The columns are organized by nucleus type and the rows are organized by onset type. Attested sequences have a checkmark. For each unattested pairing, I give the historical forms which should have produced the sequence and an italicized note explaining which process led to the gap.

There is no input to the bottom left cell because \*w deletes across West Slavic, as in \*xworŭji ‘ill’ > \*xorŭ, before the Polabian innovation \*o > [y], [ø] produced [çorə] ‘evil’. When we look at the gaps in Table 2, they all involve [w]. The nature of the gaps supports the claim that Polabian had [w] instead of [v] or [ʋ]. The distributional restrictions for [w] rely on the feature [+BACK] which is shared by [w], back vowels, and dorsal onsets. Complex onsets with [w] and a dorsal segment show the most restrictions across all of the vowel pairings. Complex onsets with [w] and a coronal segment also show restrictions, but the restrictions do not target pairings of vowels with redundant rounding. Simplex onsets with front-rounded vowels show restrictions, but as mentioned above, all segments are retained and only the vowel’s labiality feature is lost. The next section examines the temporal sequencing of innovations which led to the synchronic distribution observed in Table 2.

Table 2. Synchronic distribution of Polabian onset vowel pairings

		Vowel type			
Onset	[+FRONT +LABIAL] /y/, /ø/	[−LABIAL][+LABIAL] /io/	[+BACK +LABIAL]		[+FRONT −LABIAL] /i/, /e/, /e/
			/u/, /o/, /v/		
Simplex	p, b, or m	✓	✓	✓	✓
	Vowel Unrounding LCS *wosmī > *wysəm > [wisəm] ‘eight’	✓	✓		✓
Complex	C <sub>[COR]</sub> <sup>W</sup>	Glide Deletion LCS *swōjī > *swyj > [syj] ‘3SG POSS’	Glide Deletion LCS *swęti > Lechitic *swiātə > *swiōtə > [siōtə] ‘celebrates’	✓	✓
		No Input Due to Previous West Slavic Innovation	Glide Deletion LCS *gwězda > Lechitic *gwiazda > *gwiozda > [giozda] ‘star’	Glide Deletion LCS *kwasū > *kwos > [kos] ‘sour’	✓
	C <sub>[DORS]</sub> <sup>W</sup>				

3.2 The diachronic sequencing of Polabian dissimilation

Around the end of the Common Slavic period, distinct eastern, western, and southern sub-groups developed. This period is difficult to date due to the lack of written records, and variation in how different scholars define Common Slavic. It is often assumed that LCS \*w > \*v developed across Slavic during the latter part of this period (Schenker 2002: 82), but based on the evidence presented in §2.1, it is more likely this was not a unified innovation across the entire western zone (West Slavic).

The earliest West Slavic innovation reflected in Polabian developed some time between the 5th and 7th centuries (Carlton 1990; Shevelov 1965). During this time, many innovations simplified syllable structures (Shevelov 1965: 246). Some

regions in the west developed glide prothesis, which resulted in overtly expressed onsets.<sup>3</sup> Reflexes of prothesis before back vowels are shown in (1).<sup>4</sup>

(1) Polabian	Polish Lower Sorbian LCS		
[wauçy] < *wuxo	[uxo]	[wuxo]	*u.xo 'ear'
[wis] < *wys	[ɔɛ]	[ʋɛs]	*o.sĩ 'axle'
[wɔn] < *won	[ɔn]	[ʋɛn]	*o.nũ '3SG MSC'
[wɔsɐ] < *wosɐ	[ɔsa]	[wɛsa]	*o.sa 'wasp'

Old Polish, modern dialectal Polish, Upper Sorbian, and Lower Sorbian all exhibit reflexes of glide prothesis, but Czech and Standard Polish do not. This innovation was likely centered in the northwestern West Slavic region. Polabian shows evidence that prothetic and inherited [w] merged because they both share the same reflexes in subsequent innovations (Timberlake 1995: 283).

Glide prothesis is the precursor of the dissimilation patterns observed in §3.1. This innovation played a large role in restructuring the distribution of [w] across the lexicon. In addition to restructuring root-initial lexical items like those shown in (1), glide prothesis also restructured the morphemes \*o(b) 'about' > \*wo(b), \*ot(ũ) 'from' > \*wot(ũ), and \*u 'by' > \*wu.<sup>5</sup> These are common prepositions which also serve as derivational prefixes as in LCS \*o-golije 'nakedness' > West Slavic

3. Carlton leaves open the possibility that these onsets reflect a Proto-Slavic innovation, but may also reflect a newer innovation specific to NW Slavic languages (1990: 103–107). Shevelov dates these innovations to the 5th century during the Common Slavic period (1965: 246), and similarly, Schenker places these innovations in the Common Slavic period (2002: 68). These differences in dating do not matter for the central claims in this current work.

4. Modern Standard Polish exhibits few reflexes of glide prothesis but historically reflexes with prothetic glides were more common. Polish inherited prothetic [w] and [j] reflexes, but some southern varieties innovated [h] (Stieber 1973: 74–75). Kashubian's preference for glide prothesis is mostly restricted to labial prothesis of [w] except in the North (Hopkins 2001: 54, 58). Older borrowings suggest that glide prothesis was more widespread in the language (Hopkins 2001: 58).

5. Polabian reflexes of the prefix \*u- are always realized as [ai-] instead of the expected reflex [wau-]. I take the view that the prefix historically underwent glide prothesis like in Lower Sorbian. Lower Sorbian has glide initial reflexes of \*u- and as noted above behaves most like Polabian in the treatment of LCS and West Slavic \*w. This suggests that the West Slavic prefix \*wu- underwent an extreme form of labial dissimilation in Polabian which deleted the glide and unrounded the vowel. This extreme form of labial dissimilation is specific to the prefix as unprefixed words, like LCS \*učiti 'to teach' > Polabian [wauřsət], exhibit the expected initial [wau] sequence. Even though this paper does not model this form of labial dissimilation, this does not conflict with the core argument concerning the regularity of labial dissimilation in the language. On the development of morphologically restricted innovations, see Blevins (2005) and Bybee (2015).

\*wo-golĭje > Polabian [wɔ-dɨjɫ] ‘barren place’ (cf. unprefixd LCS/West Slavic \*golŭ ‘naked’ > Polabian [dʲɔlə]). The fact that glide prothesis targeted common prefixes means that language users would have frequently encountered lexical items that underwent the process.

Glide prothesis resulted in two major changes to the phonological distribution of segments. First, many lexical entries now had an overtly expressed onset (especially items that were historically \*o or \*u initial).<sup>6</sup> Notice that in §3.1, dissimilation never occurred at the expense of expressing an onset. Second, the increase in the number of words beginning with \*wo and \*wu increased the proportion of words where onset \*w shared [+LABIAL] and [+BACK] properties with only one other segment in the onset-nucleus pairing. This resulted in a higher ratio of words like SCENT and AXLE (where only one segment shares features with [w]) to words like ILL (where multiple segments share features with [w]). After this innovation, one could infer that the synchronic grammar imposed restrictions on [w] and adjacent segments with shared features, thus leading to reanalysis as will be discussed further in §5.1.

After the 7th century, changes differentiating the various Slavic groups sped up during what is called the disintegration period (Shevelov 1965:2). An early post-Common Slavic innovation in the western zone is deletion of \*w in complex dorsal onsets when followed by [o] (Stieber 1973:124). The reflexes of this innovation are shown in (2).

(2) Polabian Polish		Lower Sorbian LCS	
[çɔrə]	[xɔri]	[xɔri]	*xworĭjŭ ‘ill’
[çɔst]	[xfɔst]	[xɔʒiɛtɕo]	*xwostŭ ‘tail/brush’
[dʲyɛd]	[gvuɛɕɛ]/[guɛɕɛ]	[gɛɕɛ]	*gwozdĭ ‘nail’
[stʲɔrtʃɛ]	[skɔvrɔ]–	[ʃkɛɕts]	*skworĭčĕ ‘starling’ <sup>7</sup>

Reflexes of this innovation are sporadic in Standard Polish, but dialectal Polish and older Polish exhibit regularity in the reflexes (cf. \*xwostŭ ‘tail/brush’ > non-

6. In Polabian, the largest exception to the overt onset trend is found in loan words from Low German which are either [h] or vowel initial (e.g., [omɔr] ‘hammer’ < MLG <hamer>). This loanword still undergoes the Polabian innovation \*a > o indicating that it was still subject to the native grammatical structures of the language.

7. Polabian develops new palatal reflexes of historical velars after the development of front-rounded vowels. Due to the coronal representation of the digraph <tj> in <stjörce>, I assume that the segment is a palatal reflex of \*k and not two separate segments. Polish <skowronek> has an epenthetic [ɔ] in the root and means ‘lark’ instead of ‘starling’. Both starlings and larks are small passerine birds. It is not clear when epenthesis happened, but it likely occurred prior to West Slavic glide deletion.

standard <chost>, [xɔɕʦiskɔ] ‘Chościsko (Name)’). In other West Slavic languages, like Czech, this innovation is sporadic (cf. \*xworŭji ‘ill’ > [xuravi] ‘bad’, but \*gwozdī ‘nail’ > [fivost] ‘forest’). Due to the regularity of correspondences between Polabian, Lower Sorbian, and non-standard Polish, in ILL, TAIL, and NAIL, I assume that deletion in these lexical items represents a shared West Slavic innovation.

Innovations differentiating the Lechitic subgroup (Polish, Kashubian-Slovincian, and Polabian) from other West Slavic languages began around the 10th century (Stieber 1973: 25). One of the defining subgroup innovations is conditioned diphthongization.<sup>8</sup> In this innovation, a coronal with secondary velarization triggered a preceding non-high front vowel to agree in the feature [+BACK]. The original [+FRONT] feature of the nucleus remained as an on-glide. Reflexes of Lechitic diphthongization are shown in (3) with \*w reflexes in bold. Intermediate representations are based on Polański & Sehnert (1967: 26) and Polański (2002).

(3) Polabian	Polish	Lower Sorbian	LCS
[bʲolə] < *bialə	[bʲawi]	[bʲewi]	*bělŭjī ‘white’
[dʲoly] < *dialo	[d̥zawɔ]	[ziwo]	*dĕlo ‘work/effort’
[wʲotər] < *wiatər	[vʲatr]	[vʲetʃ]	*wĕtr ‘wind’
[wʲōzət] < *wiāzət	[vʲōzatic]	[vʲezac]	*wĕzati ‘to bind’
[giozde] < *gwiazda	[gʲiazda]	[gʲiezda]	*gwĕzda ‘star’
[kiot] < *kwiāt	[kfʲat]	[kvʲetk]	*kwĕtŭ ‘flower’
[siot] < *swiat	[ɕfʲat]	[svʲet]	*swĕtŭ ‘world/light’

In the Lechitic intermediate stages, the inherited [w] is retained. In the Polabian output form, the vowel has changed from \*ia > [io] and only at this stage do we find deletion. In these cases, [w] deletes in complex onsets regardless of the primary place of the first consonant as shown in FLOWER and WORLD, but is always retained in simplex onsets as in WIND. Deletion resulting from \*ia > [io] is restricted to [w] and all other sonorants are retained as shown in \*gnĕzdo ‘nest’ > Polabian [gnʲōzdə] (cf. Polish [gnazdɔ]) and \*xrĕnŭ ‘horseradish’ > Polabian [xrʲon] (cf. Polish [xʂan]).<sup>9</sup>

Independent of other Lechitic languages, Polabian underwent a *vowel chain shift* (Burns 2021), a type of step-wise rotational innovation through the vowel

8. This change is sometimes referred to by the more general term “dispalatalization” (Feldstein 1980). Although other West Slavic languages exhibit lexical items with this innovation, it is not an exceptionless sound change like in Lechitic.

9. The reflex of a palatalized rhotic is [z] in Polish. This form exhibits progressive voicing assimilation.

space. The Polabian Vowel Shift diphthongized high vowels (\*i > [ai], \*y > [ɔi], \*u > [au]), fronted the remaining back vowels (\*o > [y], [ø]), raised lower vowels (\*e > [i], \*ě > [e], \*a > [o]), and lowered centralized vowels (\*ü > [ɐ], \*ĩ > [a]).<sup>10</sup> Precursors to the shift may have begun in the 14th century, but likely occurred later (Timberlake 1995: 293). It should be noted that in the Lower Sorbian examples above, fronting of back vowels follows a different pattern than the fronting found in the Polabian Vowel Shift. In Lower Sorbian, \*o fronts and unrounds preceding a coronal or palatalized consonant. Burns (2021) proposes that fronting in Polabian is unconditioned unless a following consonant, such as [r], blocks the process (e.g., \*xorniti ‘to feed’ > [xornə]).

The outputs of West Slavic glide prothesis (1) and Lechitic diphthongization (3) shaped the reflexes of the vowel chain shift as in \*osĩ ‘axle’ > \*wosĩ > \*wys > wis (cf. Lower Sorbian [ves]) and \*sěno ‘hay’ > \*siano > siony (cf. Polish [ɛano]). The vowel chain shift resulted in new onset-vowel pairings, some of which underwent repair, whereas others did not, as shown in (4). MLG loanwords are provided for comparison to native vocabulary. Intermediate representations are based on Polański & Sehnert (1967: 26) and Timberlake (1995: 283).

(4)	Polabian	Polish	Lower Sorbian	LCS
Simp	[wis] < *wys < *wosĩ	[ɔɕ]	[ves] < *wosĩ	*osĩ ‘axle’
	[wijn̩] < *wyjn̩	[vɔɲ]	[vɔɲ]	*wońa ‘scent’
Dors	[xolə] < *xwolə	[xfali]	[xwali]	*xwali ‘praise 3SG’
	[kos] < *kwos	[kfas]	[kvas]	*kwasũ ‘leaven’
	[kwapə]	N/A	N/A	MLG <i>quappe</i> ‘burbot’
Cor	[syj] < *swyj	[sfuj]	[svej]	*swojĩ ‘3SG POSS’
	[dør] < *dwør	[dvur]	[dver]	*dworũ ‘courtyard’
	[tyj] < *swyj	[tfuj]	[tvej]	*twojĩ ‘2SG POSS’
	[sworət]	[sfazɨtɕ]	[sfariɕ]	*swariti ‘to quarrel’
	[tworzə] ‘haunt 3SG’	N/A	N/A	MLG <i>dwarch</i> ‘dwarf’

In simplex onsets, adjustments depend on the complexity of the following vowel. If the features [+FRONT] and [+LABIAL] are shared within a single vowel as in [y] in SCENT and AXLE, the vowel unrounds. As shown in (3), if the features

10. The innovations found in the Polabian vowel system are consistent with Labov’s cross-linguistic findings of the phenomenon (1994: 116, 176, 262). In other vowel chain shifts, back vowels front (e.g., Akha /o/ → /u/ → /ʉ/, Albanian /a/ → /o/ → /ø/), long lower vowels rise (Middle English [ɛ:] → [e:] → [i:]), Greek [a:] → [ɛ:] → [i:]), long vowels diphthongize (Middle English [e:] → [i:] → [ai]), Czech [e] → [ɛ], [i] → [ei]), and short vowels fall (California English [ɪ] → [ɛ] → [æ], Vegliot /i/ → /ɛ/ → /a/). For more detail about LCS mid vowels which exhibit two distinct reflexes in Polabian, see Timberlake (1995) and Burns (2021).



[+FRONT] and [+LABIAL] are spread across different morae, as in the diphthong [i<sub>μ</sub>o<sub>μ</sub>] in WIND, there is no repair. Dorsal complex onsets are adjusted if the resulting onset-vowel pairing has multiple segments that share labial or backness features with [w] (similar to West Slavic glide deletion in (2)). Coronal complex onsets are repaired if the innovative vowel is [+FRONT +LABIAL] as in COURT-YARD, or as shown in (3), if the following vowel is a diphthong with [+FRONT] and [+LABIAL] spread across two different morae as in WORLD. Otherwise, coronal complex onsets show no adjustments if the innovative vowel has redundant rounding (i.e., [+BACK +LABIAL]) as in TO QUARREL.<sup>11</sup>

Finally, [w] is retained in both inherited vocabulary and loanwords. Loanwords are not exempt from Polabian innovations as shown by the fact that both LCS \*swariti and MLG <dwarch> ‘dwarf’ undergo \*a > o raising in the Polabian Vowel Shift. The main difference between the items which exhibit retention and the items which exhibit deletion is the fact that retention occurs when the onset-nucleus pairing contains no more than two sources of the features [+LABIAL] and [+BACK]. This indicates that even with two distinct waves of dissimilation, lexical items that did not exceed the threshold for feature distribution across the onset-vowel pairing, such as [swa], [swo], and [kwa], were never targets for repair.

### 3.3 Summary of dissimilation

Polabian has undergone a variety of innovations which resulted in a restricted distribution of \*w reflexes in the synchronic grammar. It is my position that the innovations involving \*w are all connected, but previous scholarship has failed to notice this. A summary of dissimilatory innovations is provided in (5).

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11. When considering which vowels conditioned loss of [w], it should be noted that Polabian has two diphthongs pairing the features [+BACK +LABIAL] and [+FRONT –LABIAL]: [io] < Lechitic \*ia < LCS \*ě and [vi] < LCS \*y. The diphthong /vi/ has the realization [oi] following labial consonants. Both diphthongs can occur with simplex onsets (e.g., LCS \*wy – ‘away’ > [woi], LCS \*wětr ‘wind’ > [wiotər]). While there is direct evidence that Polabian disallows [swio] and [kwio] sequences, there is no direct evidence in the extant corpus that it would disallow [swoi] or [kwoi] sequences. In this work, I take the view that [swoi] and [kwoi] sequences should also be banned because of the rounding mismatch on the vowel to be discussed further in §5.3. According to this assumption, diphthongs with [–LABIAL] on both morae, like Lechitic \*ia and LCS \*i > [ai] would not need to be resolved in swVV or kwVV sequences.

(5)	Rule Formulation	Examples
a.	$\begin{bmatrix} +\text{labial} \\ +\text{back} \\ -\text{cons} \\ -\text{voc} \end{bmatrix} \rightarrow 0 / \begin{matrix} \begin{bmatrix} +\text{back} \\ +\text{cons} \end{bmatrix} \begin{bmatrix} +\text{labial} \\ +\text{voc} \end{bmatrix} \\ \sigma \end{matrix}$	LCS *xwortŭji 'ill' > West Slavic *xorǫ > Polabian [çorǫ] LCS *kwasu 'sour' > Polabian *kwos > [kos]
b.	$\begin{bmatrix} +\text{labial} \\ +\text{back} \\ -\text{cons} \\ -\text{voc} \end{bmatrix} \rightarrow 0 / \begin{matrix} \begin{bmatrix} +\text{cons} \end{bmatrix} \begin{bmatrix} +\text{labial} \\ +\text{voc} \end{bmatrix} \\ \sigma \end{matrix}$	LCS *dwors 'courtyard' > Polabian *dwor > [dǫr]
c.	$\begin{bmatrix} +\text{labial} \\ +\text{back} \\ -\text{cons} \\ -\text{voc} \end{bmatrix} \rightarrow 0 / \begin{matrix} \begin{bmatrix} +\text{cons} \end{bmatrix} \begin{bmatrix} -\text{labial} & +\text{labial} \\ +\text{front} & +\text{back} \\ +\text{voc} & +\text{voc} \end{bmatrix} \\ \sigma \end{matrix}$	LCS *swētŭ 'world' > Lechitic *swiat > Polabian [sioŭt] LCS *kwetŭ 'flower' > Lechitic *kwiat > Polabian [kioŭt]
d.	$\begin{bmatrix} +\text{labial} \\ +\text{front} \\ +\text{voc} \end{bmatrix} \rightarrow \begin{bmatrix} -\text{labial} \end{bmatrix} / \begin{matrix} \begin{bmatrix} +\text{labial} \\ +\text{back} \\ -\text{cons} \\ -\text{voc} \end{bmatrix} \\ \sigma \end{matrix}$	LCS *osī 'axle' > West Slavic *wosī > Polabian *wys > [wis] LCS *woŭia 'scent' > Polabian *wyna > [wŭna]

The timing and outcomes of innovations restricting the distribution of \*w fit the description of persistent innovations. Intuitively, we would want to say that we are dealing with a single rule that undergoes modification at different times. While we may want to combine rules (5a) and (5b) into a single rule that generalizes the environment where it applies, this would require us to say that dissimilation operated in the environment of [+CONS]\_[+LABIAL +VOC]. Unfortunately this generalization is problematic because, although it captures the post-West Slavic innovations in SOUR and COURTYARD, it over-generates in words like [sworǫt] ‘to swear’ and [tworzǫ] ‘haunt 3SG’ (which are not †[sorǫt] and †[torzǫ]). If we are to unify rules (5a) and (5b), it would be better to propose that a rule change added the new, yet related, environment found in rule (5b) to the original rule in (5a).

As mentioned in §3.2, the observed dissimilation repair depends on the distribution of frontness and backness over the morae. If a vowel has [+FRONT] and [+LABIAL] on a single mora, like the monophthong [y] in SCENT (5d), the vowel undergoes repair. If [+FRONT] and [+LABIAL] are spread over two morae, like in the diphthong [io] in WIND, no rule applies. While we would not want to collapse (5d) with the previous rules, we may want to collapse rule (5c) with (5a)/(5b) by once again stipulating that rule change added an additional, yet related, environment. The result is that rule (5a) develops two additional environments from its original West Slavic formulation and all three environments actively produce dissimilation during the Polabian Vowel Shift.

The rules in (5) converge on certain surface structures, which is a trait of historical conspiracies. There is a targeted distribution of shared features with [w] and a targeted syllable structure. West Slavic glide prothesis temporally preceded dissimilation and is likely the precursor to the process, as outlined in §3.2. West Slavic glide prothesis produced many new instances of [w] across the lexicon

which match the surface generalizations found in Polabian labial dissimilation: (i) [w] should share [+BACK] and [+LABIAL] features with at most one other segment in the onset-vowel pairing and (ii) words should have initial onsets.

After West Slavic glide prothesis led to reanalysis of the grammar, the new generalization was applied to lexical items which were originally not the target of any process involving \*w (extension). This new dissimilation grammar remained stable as Polabian differentiated itself from its closest relatives. The stability of the grammar is what allows the dissimilation generalization in (5a) to be observed again at a later time in Polabian's history. As new innovations supplied new instances of [w] co-occurring with segments sharing labial and dorsal place features, dissimilation operated again in (5a–d), resulting in further extension.

In the next section I present arguments as to why we should account for the front-rounded vowel innovations in (5d) as related to the West Slavic innovations before back-rounded vowels in (5a). Ultimately, I take the position that the constraints and ranking that were needed to account for the original West Slavic dissimilation pattern in (5a) can capture all subsequent dissimilation patterns in (5b–d).

#### 4. Labial dissimilation from a cross-linguistic perspective

This section examines dissimilation as a cross-linguistic phenomenon. Dissimilation is often regarded as an irregular or sporadic innovation with a few notable exceptions such as Grassmann's Law wherein the distribution of aspiration is predictably restricted in Greek and Sanskrit (Hock 1991: 35, 111). There are, however, many languages including Polabian which exhibit phonologically regular innovations of dissimilation. Section 4.1 presents various ways of classifying dissimilation concerning its source in usage (perceptual vs. production), the distance of the process (long distant vs. adjacent), the features that are involved (redundant vs. non-redundant), and the amount of change imposed on the segment (partial vs. total). I observe that restrictions on [+FRONT +LABIAL] are generally not independent of restrictions on [+BACK +LABIAL]. This implies that the innovation in Polabian SCENT did not arise independently of restrictions imposed on ILL. Section 4.2 links dissimilation to other processes such as assimilation and metathesis. The relationship of these three processes has implications for how we should account for them in formal models.

#### 4.1 Types of dissimilation

There are many views on what constitutes dissimilation, each with its own assumptions about how to model the process. Most diachronic accounts of dissimilation attribute the process to listener error (Ohala 1981, 1993). Dissimilation relies on listeners failing to identify the source of drawn out acoustic signals over long distances. When presented with multiple drawn out signals, the listener assumes that there is a single source of one phonetic signal rather than multiple sources of multiple signals. In turn, the listener removes one of the original sources of the signal as in Grassmann's Law,  $C^hVC^h > CvC^h$  (e.g., PIE  $*d^hereb^h$  'nurture'  $> *treph^os$   $>$  Greek [trefos] <τρέφω> 'to nourish'). Jatteau & Hejná (2016, 2018) highlight the role that speakers have in long-distance dissimilation in English and Mongolian. They show that both languages exhibit a phonetically gradient process rather than the abrupt process which is predicted in listener-based accounts.

Labials and labialization are produced with long drawn out phonetic cues and are commonly involved in consonant place dissimilation (Ohala 1981). In Latin (Italic), labial dissimilation operated on labial-velar plosives as in *quinque* 'five' (cf. Spanish [sin̥ko], French [sɛ̃k]) but not on *quintus* 'fifth' (cf. Spanish [kinto], older French [kɛ̃t]) where the second labial segment is a vowel, not a plosive. In Akkadian (Afro-Asiatic), a labial consonant in a prefix became alveolar if a labial consonant was in the root as in *ma-zuukut* 'mortar' but *na-rkabt* 'chariot' (Suzuki 1998: 111). Tashlhiyt Berber (Afro-Asiatic) exhibits a similar pattern as in *am-las* 'shearer' but *an-bur* 'bachelor' (Bye 2011: 1412). In the Austronesian family, labial dissimilation has a variety of repairs. In Limos Kalinga (Austronesian), labial dissimilation triggers a labial root consonant to become velar as in /pija 'good' + -um- 'focus, inchoative' /  $>$  [k-um-ija], but in Tjuabar Paiwan (Austronesian), labial dissimilation triggers the infix labial to become alveolar as in /pajsu 'pound (rice)' + -əm- 'focus' /  $>$  [pənajsu] (Zuraw & Lu 2009: 209, 211).

Despite the focus on long-distance processes, dissimilation sometimes involves adjacent segments. Bennett (2013) cautions against analyzing adjacent segment interactions as dissimilation, as restrictions involving adjacent segments may arise due to other considerations (Bennett 2013: 480–488). Most approaches to labial dissimilation take into account how paradigmatic structure and prosodic structure affect the observed outcomes (Kang 1996; Donka Minkova personal communication).<sup>12</sup>

12. In Polabian, it is possible to distinguish between instances where [w] deletion is likely due to syllable structure alone and cases where the distribution of labial and dorsal place features across a syllable are implicated. Cases like  $*wūtorūjī$  'other'  $>$  [tørə] 'Tuesday' can be attributed

Labial-velar dissimilation relies on either shared labiality or dorsality. In Greek (Hellenic), a [+LABIAL] vowel triggered a following labial-velar consonant to become [-LABIAL]. The expected reflex of \*k<sup>w</sup> preceding a labial vowel is [p] as in \*k<sup>w</sup>ólos > pólos ‘pivot/hinge’. In compounds where a labial vowel precedes the sequence \*k<sup>w</sup>o we do not find a labial reflex of \*k<sup>w</sup>. Instead, dissimilation results in the reflex ko which bleeds the innovation \*k<sup>w</sup>o > po. Because of this, the compound \*g<sup>w</sup>ou-k<sup>w</sup>olos ‘cowherd’ becomes \*g<sup>w</sup>ou-kolos > bou-kólos instead of †bou-pólos. If a [-LABIAL] vowel precedes \*k<sup>w</sup>o, the labial-velar is retained and the expected development \*k<sup>w</sup>o > po is observed as in \*ai-k<sup>w</sup>olos > ai-pólos ‘goatherd’. In Greek, dissimilation of the labial-velar is dependent on labiality, as opposed to dorsality, because [+BACK -LABIAL] vowels do not trigger dissimilation as in \*a-k<sup>w</sup>ei-etos > a-tí-etos ‘unhonored’. In this word, we observe the expected innovation \*k<sup>w</sup>V[+FRONT] > tV[+FRONT] (c.f. \*k<sup>w</sup>ei-o > \*k<sup>w</sup>i-o > tío ‘I honor’). If dissimilation had removed the labial feature from the consonant in ‘unhonored’, we would expect to find a velar reflex as in †a-ki-etos. Middle English (West Germanic), on the other hand, restricted reflexes of Old English [w] in complex onsets based on shared dorsality. All [+BACK] back vowels, regardless of whether or not they share the feature [+LABIAL], trigger dissimilation in the form of deletion (Minkova 2014: 139). Deletion occurs in twa ‘two’ > twa (not represented orthographically), swā ‘so’ > sā, and swōte ‘sweet’ > sote, but not in twi – ‘two’ > twi–, swāetan ‘sweat’ > swete, and swēte ‘sweet’ > swete.

Old Norse (North Germanic) deleted reflexes of Proto-Germanic \*w before back-rounded vowels as in \*wurmaz ‘snake/worm’ > ormr and \*wōpjan – ‘weep’ > óp. The pattern in Old Norse was not dependent on the onset’s structure as shown by \*wullō ‘wool’ > ull, \*h<sup>w</sup>östō ‘cough’ > hósti, and \*swullaz ‘boil’ > sullr. Old Norse’s dissimilation pattern relies on shared labiality because \*w is retained before [-LABIAL] back vowels as in \*watar ‘water’ > vatn, \*h<sup>w</sup>alaz ‘whale’ > hvalr, and \*swalaz ‘cool’ > svalr (see Noreen 1903: 149–152 for more conditions on deletion in Old Norse). Finally, Seoul Korean exhibits variable [w] deletion in [pwa] ~ [pa] ‘look’ and [sakwa] ~ [saga] ‘apple’ (Kang 1996). Some scholars propose that the feature [+BACK] triggers deletion whereas others have demonstrated that deletion occurs more frequently after [+LABIAL] segments (see Kang 1996 for a

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to syncope of \*ū resulting in \*wtorə before the vowel shift. Deletion in ‘Tuesday’ is most likely driven by cross-linguistically observed sonority principles disfavoring falls in onsets (Steriade 1982; Selkirk 1982; Zec 2007). The Polish cognate [ftɔrɛk] retains a reflex of \*w because [ft] is an acceptable onset plateau rather than a disfavored fall (Jarosz 2017). Cases like ‘Tuesday’ where [w] deletes for reasons unrelated to place feature sequencing are excluded from this analysis. Cases where syncope results in new onset clusters with no sonority sequencing violation are considered as in LCS \*dūwojačijī > \*dwojafsə > \*dwyjofsə > [dyjofsə] ‘two kinds’ (cf. Lower Sorbian [dwejaki] ‘two kinds’, Polish [dvɔjɛ] ‘twosome’).

summary of the various positions). As discussed in §3, dissimilation involving [w] in Polabian is conditioned by both [+LABIAL] and [+BACK], not one or the other.

When we consider the role that frontness plays in restricting the surface distribution of multiple sources of labiality, [+FRONT] segments do not exhibit restrictions independent of those imposed on [+BACK] labial segments. Proto Chinantec has simplex labial consonants (\*p, \*b, \*m), labial-velar consonants (\*k<sup>w</sup>, \*g<sup>w</sup>, \*w), simplex velar consonants (\*k, \*g, \*ŋ), and labial vowels (\*u and \*iu) (Rensch 1989). Labial onsets never co-occur with [+LABIAL] vowels but they do co-occur with the monophthong \*i. Notably, there is no independent restriction on \*iu. Similarly, Cantonese (Sino-Tibetan) prohibits labial codas (either /p/ or /m/) from co-occurring with rounded vowels (/y/, /ø/, /u/, /o/, etc.) regardless of the frontness. Gurung (Sino-Tibetan) has [w], [jw], and redundant rounding in the vowel system. Neither [w] nor [jw] can occur before [+LABIAL] vowels (Mazaudon 2007:171). French (Romance) and Mandarin (Sino-Tibetan) have non-redundant rounding in glides and vowels. Similar to Gurung, French prohibits both [w] and [ɥ] from occurring before [+LABIAL] vowels. In Mandarin, [+LABIAL] glides must always match a [+LABIAL] vowel in frontness/backness when they co-occur. In the North Germanic example discussed above, dissimilation of \*w preceding back-rounded vowels developed prior to the development of the front-rounded vowel system (Noreen 1903:149).

The feature patterns mentioned above are curious because they seem to suggest that when multiple sources of labiality are restricted, the feature [+FRONT] doesn't impose restrictions independent of those imposed by [+BACK].<sup>13</sup> This has implications for the pattern found in Polabian because it is likely that innovations like \*wy > wi and \*swy > sy did not develop independent of the previously observed pattern in West Slavic \*kwo > ko.

Finally, the degree of restrictions imposed by dissimilation can vary. Inkelas & Shih (2014) view dissimilation and related processes as existing along a cline of segmental adaptation (2014:197). One end imposes minimal identity changes whereas the other end requires a segment's entire identity to be restructured. In the case of dissimilation, the extreme end results in segment deletion whereas the moderate end only alters one feature. Inkelas & Shih (2014) identify cases of partial nasal dissimilation in Polish, full nasal dissimilation in Lithuanian,

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13. Twi (Atlantic-Congo) may be the only exception to this generalization, but it is not clear based on the data presented in DeJong & Obeng (2000). Consonants in Twi have contrastive secondary labialization and [ɥ] can occur before back-rounded vowels but [w] does not. In some cases, palatalization of a labialized consonant produces [ɥ], but it is not clear if all instances of [ɥ] before a back vowel are from labial consonant palatalization.

and full aspiration dissimilation in Huave, but they do not analyze any cases of labial dissimilation. The examples cited above show that labial dissimilation fits within their typology and can be either partial (like in Akkadian, Tashlhiyt Berber, Limos Kalinga, Tjuabar Paiwan, and Greek) or full (like Middle English, Old Norse, and Seoul Korean). While Inkelaş & Shih (2014) do not identify any languages with both full and partial dissimilation, Polabian exhibits both types.

#### 4.2 Does a process confine the analysis or does the analysis confine the process?

As mentioned above, dissimilation involves restricting the co-occurrence of shared features. Many phonologists appeal to the *Obligatory Contour Principle* (OCP) in order to account for co-occurrence restrictions. In its simplest form, the OCP stipulates that adjacent segments should not have identical features from separate structural sources.<sup>14</sup> Phonological restrictions governing the distribution of features do not always decrease the number of segments bearing shared properties. Some restrictions require features to be shared across segments like the Mandarin restriction outlined in §4.1. When a process requires segments to share features, it is known as *assimilation*. Bennett (2013) views assimilation and dissimilation as related, thus leading him to reject the OCP as an account of dissimilation (2013: 20–21). In his view, the same types of tools should be able to account for both processes. His position finds some perceptual support in the fact that the same phonetic signals tend to be involved in each process. Blevins & Garrett (2004) explicitly link the development of metathesis to the development of dissimilation because both arise due to similar types of segment parsing errors (2004: 121). (6) provides examples of rhotics and laterals, which both share similar long phonetic cues, interacting in the processes of dissimilation, assimilation, and metathesis.

- (6) Dissimilation: Georgian (Bye 2011) /sur-uri/ > *suruli* ‘Assyrian’  
 Assimilation: Bukusu (Hansson 2001) /bir+il+FV/ > *birira* ‘pass.APPL’  
 Metathesis: Old Spanish *miraglo* > Spanish *milagro* ‘miracle’

This paper has shown that \*wo > [wi] reflects a dissimilatory process, but Burns (2021) provides evidence that \*wo assimilates to [wɔ] in Polabian if a velarized

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14. Early definitions of the OCP relied on adjacency being defined in terms of prosodic or feature tiers. Suzuki (1998) identifies a series of problems with this definition (1998: 16–26). He adopts a modified version of the OCP which still runs into theoretical problems that are not the focus of this paper.

consonant follows as in LCS \*wod<sup>u</sup>a ‘water’ > [wɔd<sup>u</sup>ɐ].<sup>15</sup> Burns (2021) notes that in the Polabian Vowel Shift, \*o fronts and rises as in \*do ‘until’ > [dy] unless the process is interrupted by \*o assimilating to segments bearing acoustic properties that conflict with the general direction of the chain shift. Post-vocalic velarized consonants prevent \*o from rising as in LCS \*polū ‘half’ > [pɔl<sup>u</sup>]. The combined contribution of acoustic cues from both [w] and a velarized consonant causes \*o to remain back and lower instead of the expected raising and fronting as in WATER.<sup>16</sup> Finally, Polabian has metathesized reflexes of [w] as in LCS \*owītsa ‘sheep’ > \*wotsa > \*wytsa > [wiʃsa] (cf. Polish [ofʃsa], Lower Sorbian [vejʃsa]).

Although it is common for languages to exhibit both dissimilation and assimilation involving the same feature, literature on labial-velar dissimilation does not highlight this property. It is not clear if this gap in the literature arises because assimilation and dissimilation relying on the same labial-velar feature is not common, or if the literature is too heavily focused on OCP-based explanations which ignore assimilation as a related process.

## 5. Towards a unified account of Polabian dissimilation

Section 3 proposed that after West Slavic glide prothesis, the synchronic grammar of West Slavic was reanalyzed and extended to new lexical items. This section models the reanalyzed grammar which can account for all of the dissimilation patterns observed in §3 across the different stages of Polabian’s history. The structure of the grammar at the time of West Slavic dissimilation, which involved [+BACK +LABIAL] vowels, can also account for subsequent dissimilation involving [+FRONT +LABIAL] vowels without needing to stipulate new restrictions.

As stated in §1, while the reanalyzed synchronic grammar can interact with the output of other innovations, it cannot prevent another innovation from influencing the structure of forms. While this may seem paradoxical because it is the grammar’s job to constrain forms, this property arises because constraints themselves are violable and rankings are subject to change. For this reason, I make a distinction between historical forms which are posited to be actual utterances (\*) and historical forms which are intermediate outputs of an innovation that still need to be filtered through the synchronic grammar. I mark the latter with a wax-

15. See Burns (2021) for a model of assimilation processes in the Polabian Vowel Shift.

16. Although the unrounding of \*o happens between [w] and a palatalized consonant as in LCS \*wosmī ‘eight’ > \*wysʲəmī > [wiʲsəmī], the source of the unrounding is the [w]. Palatalized consonants do not otherwise trigger unrounding of front-rounded vowels as shown by LCS \*pole ‘field’ > [pyli].



ing crescent moon ( ☾ ).<sup>17</sup> Evaluation of inputs created by other innovations ( ☾ ) is what gives rise to extension and the persistent innovation effect.<sup>18</sup>

Section 5.1 presents some of my assumptions concerning how innovation occurs in OT and how this connects to the concepts of reanalysis and extension. Section 5.2 presents the basic machinery of Agreement by Correspondence (ABC) which is used to account for the labial dissimilation patterns. Section 5.3 implements two models. The first is the unified dissimilation model which can account for innovations from the time of West Slavic glide deletion through the Polabian Vowel Shift. The second is a model of the innovation which preceded dissimilation: glide prothesis. I show that these two models are capable of predicting the same surface forms after glide prothesis, but the inputs and structure of the dissimilation grammar allow for more uniformity in how surface forms are derived. Finally, §5.4 summarizes the main points of this section and presents the Hasse Diagram for the shared West Slavic dissimilation grammar and its predecessor, the West Slavic glide prothesis grammar.

### 5.1 Change in historical OT and phonological reanalysis and extension

We can account for dissimilation based on rules, constraints, or phonetic data. As mentioned in §2, Polabian died in the 18th century, so phonetic analysis is not possible. Section 3.3 discussed the rule representation of dissimilation and noted that while many changes in the structure of the rules could be accounted for in terms of rule change adding environments to the original West Slavic glide deletion rule, that approach requires the speech community to change the structure of a single rule multiple times. In this paper, I adopt an OT framework because constraints can explicitly connect all of the rules in (5) in a single model. This allows us to stipulate that there was a single unified grammar behind all of the observed rules and the structure of the model did not change.

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17. Traditionally, reconstructed forms are marked with an asterisk (star). I chose the waxing crescent moon to represent the pre-filtered form in OT because it maintains the tradition of marking unattested forms with celestial bodies.

18. An alternative account of persistent innovations is found in Hickey (2002). He analyzes case studies wherein social changes drove the speech-community to adopt new linguistic forms and effectively stop the diffusion of an on-going sound change. Similarly, social changes can reinstate sound changes which have been previously halted. There is no evidence that this type of social shift occurred in the Polabian population, nor is there any evidence that the first iteration of labial dissimilation was interrupted.

The largest question in historical OT is how the grammar changes from one state to another (McMahon 2000, 2003: 83).<sup>19</sup> While differences between stages are modeled as constraint re-ranking, this is a descriptive property and may not be an actual explanation of change (McMahon 2000: 128). Hock (1991: 164–166), Crist (2001), and Dresher & Lahiri (2005) propose that grammatical generalizations develop from language users engaging in small-scale production acts over time. Those acts produce variation, and the sum of variation can culminate in grammatical change when language users try to interpret the synchronic grammar based solely on output data (Dresher & Lahiri 2005 among others). This suggests that constraint re-ranking is not the source of an innovation, but rather a descriptive property of an innovation after language users reanalyze their grammar.

Within diachronic constraint-based phonology, variation is an accepted fact and has been attributed to the process of inductive learning itself (Hendriks & van Rij 2011), inherent volatility in constraint ranking (Boersma & Patter 2008; Hayes & Wilson 2008), or independent innovations (Hutton 1996 as cited by Holt 2003; Kiparsky 2003).<sup>20</sup> Regardless of its source, variation is a prerequisite for linguistic change (Weinreich et al. 1968) and its mere existence can lead language users to reanalyze the grammar's structure.

In my view, variation and the rise of ambiguous contexts are at the core of phonological pertinacity. I have previously stated that pertinacity involves “reanalysis” and “extension” which are terms borrowed from historical syntax. In “reanalysis”, the surface structure of an utterance remains stable over time, but the grammatical interpretation changes because of an ambiguity which is present in the surface form. In “extension”, an underlying grammatical property does not change, but it is applied to previously unaffected lexical items, thereby resulting in changes in surface distribution. These terms are often used in historical syntax in the context of “grammaticalization” wherein a lexical item or phrase comes to take on a more structural role in the grammar. I will contextualize the connection

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19. April McMahon (2000, 2003, 2006, 2007) provides more fleshed out critical reviews and rebuttals to the use of OT in historical linguistics.

20. Zubritskaya (1997) assumes that OT grammars lack variation in output forms, but this assumption is not held by everyone who uses variable constraint ranked OT (Kie Zuraw personal communication; Bruce Hayes personal communication).

The “source” of an innovation depends on how one chooses to conceptualize an OT grammar. As mentioned above, some scholars treat the OT phonological grammar itself as the source of the variation and innovation. Others believe that the phonetic variation resides in a separate part of the language faculty than the phonological constraints which frame the grammar itself (Kiparsky 2003). Yet others claim that because the social source of variation has not been incorporated into the grammar, OT cannot truly account for variation (Hale 2007: 180–192).

between the syntactic and phonological version of reanalysis and extension with the example of English *going to* in (7).

- (7) a. *I am going to my house.*  
 b. *I am going to visit your house.*  
 c. *It is going to be hot.*

(7a) represents the original uses of *going to* where *going* functions as a motion verb and *to my house* is the goal of the movement. (7b) represents the ambiguous context in which *going to* is reanalyzed. Originally, the structure in (7b) would have been interpreted like the structure in (7a) where *going* is a motion verb. The phrase *to visit your house* references a physical location, but importantly the whole phrase is the intended outcome of the *going* action. Expression of an intended outcome which also contains a physical location opens the possibility for the whole phrase to be interpreted in the SPACE is TIME conceptual metaphor. When interpreted in this metaphor, the journey that the agent/theme takes from one location to another is a journey through time. The agent/theme starts in the present and the final destination is the future, thus *going* adopts a future tense reading and the goal is the intended outcome or future event. When this reanalysis occurs, *going to* is treated as a syntactic unit which is distinct from *visit your house* and phonological reduction to *gonna* can occur. After reanalysis occurs, sentences like (7c) are observed where *going to* is used for states and events where motion was never implied. Extended cases like (7c) can only have a future reading.

The stages of reanalysis and extension of English *going to* parallel the development of Polabian dissimilation. When West Slavic glide prothesis first produced [w] in lexical items like LCS \*uxo ‘ear’ > West Slavic \*wuxo, prothesis would have been transparently associated with the appearance of [w] in this lexical set. Initially, language users would be able to distinguish the source of [w] in EAR and LCS/West Slavic \*wolŭ ‘bull’. As the innovation gained momentum and glide prothesis neared saturation, language users would encounter fewer forms undergoing the process. This led language users to the stage of reanalysis with two possible ways to interpret [w] in surface forms. They could (a) try to interpret which [w]s were underlying and which ones were derived, or (b) they could assume that all surface [w]s belonged to a unified underlying set and identify which static properties of the synchronic grammar could account for the set’s distribution. The second option leads language users to find that [w] usually co-occurs with no more than one other tautosyllabic [+LABIAL] and [+BACK] segment as outlined in §3.2. This generalization allows language users to structure a new grammar refitted to the surface data in such a way that reflexes of prothetic [w], the original source of variation and ambiguity, remain the same. While the majority of the surface forms with inherited [w] would not change, inherited lexical

items like ILL would now be considered in violation of the distributional generalization because [+LABIAL] and [+BACK] occur with two additional segments in the same syllable. This leads to the first wave of dissimilation (extension). As long as the grammar's restrictions on [w] remained stable, innovations producing novel combinations of [w] with the feature [+LABIAL] and [+BACK] resulted in further extension of dissimilation to previously unaffected items, thus giving rise to the persistent rule/historical conspiracy effect. Phonological reanalysis and extension can be summarized as follows in (8).

- (8) a. An innovation produces an increase in surface variation leading language users to identify an ambiguity in the relationship between underlying representations and surface representations.
- b. Due to the ambiguity in the relationships of forms, it is unclear which phonological process can account for the surface distribution. Language users try to resolve this ambiguity by understanding the underlying forms based on the surface distribution. As a result, they assume a unified underlying representation and restructure the synchronic grammar around the surface distribution (reanalysis).
- c. The refitted grammar can alter historically conservative lexical items if they conflict with the new generalization and it can force subsequent innovations to fit the generalization (extension).

Critically, because reanalysis involves changing the synchronic grammar, all subsequent innovations will conform to the new synchronic grammar's structure giving the appearance that the same innovation is repeating itself multiple times. The extension of repairs to new forms will continue to occur until the synchronic grammar is reanalyzed again.

This leads us back to an issue raised in §1: What would happen if an incipient innovation would result in a structure that violates some constraint ranking? Would the synchronic grammar block the innovation (*prophylaxis*) or would the innovation still occur and get corrected (*repair*)? According to the view that I have put forward, the innovation can still occur because constraints are violable and illicit forms can be repaired by the more stable structures in the synchronic grammar. This implies that while the stable synchronic grammar does not inhibit innovation (as proposed by Kiparsky 2003), it can redirect an illicit structure before it is ever produced, thus bringing the output of an incipient innovation (\* form > ʘ form) in line with an acceptable utterance in the synchronic grammar (ʘ form > [ ] form). The ʘ form is effectively an intermediate stage that isn't a surface realization, but is necessary input to an observed surface realization.

The foregoing describes what happened in the history of Polabian to allow dissimilation to extend beyond the original case of West Slavic glide deletion

in ILL. The distributional restrictions placed on [w] through reanalysis of West Slavic glide prothesis' output remained in place even as Polabian continued to undergo independent innovations which replenished the contexts that were now viewed to be problematic. The stabilized synchronic grammar did not prevent other structures in the language from producing innovative forms; instead, it served as a channel that filtered the subsequent innovations into acceptably structured surface forms (thus resulting in the sequence \*form > ɔ̯ form > [ ] form).

## 5.2 Modeling dissimilation in agreement by correspondence

ABC models segment identity restrictions with surface-driven constraints (Rose & Walker 2004). It has two basic ingredients: correspondence constraints and correspondence identity constraints. Segments sharing a certain degree of similarity fall into a relationship called "correspondence". When segments are in this relationship, their features become more like each other. Rose & Walker's (2004) survey found that cross-linguistically, similarity is often based on sharing either [±SONORANT], [±CONTINUANT], or place.

It should be noted that vowels and glides match in sonority and continuancy, and both have a dorsal place node (see §2.2 for place feature specifications). Glides frequently interact in an array of agreement processes cross-linguistically. The Algonquian family exhibits various glide-vowel interactions that enforce restrictions on different place properties (Oxford 2015). Menominee exhibits height agreement of mid vowels triggered by [+HIGH] glides and vowels. Its relative Mi'kmaq exhibits [+BACK] and [+LABIAL] agreement in which /ɛ, a/ > o before /kw/. Additionally, Mi'kmaq exhibits total identity agreement of intervocalic glides resulting in a new series of long vowels.

Correspondence relationships are governed by CORR-XX constraints. XX is a stand-in for specific segment types which correspond (e.g., CORR-CC for consonant interactions, CORR-VV for vowel interactions, and CORR-CV for consonant-vowel interactions). This paper specifies which features must be shared in CORR-XX constraints (see Bennett & DelBusso 2018 for a typology of feature specification types). Penalties to CORR-XX are incurred when segments meet the minimum correspondence requirements but fail to correspond. There is no penalty for gratuitous correspondence (Bennett 2013: 62). ABC permits the existence of structurally different but phonetically equivalent candidates (Bennett & DelBusso 2018: 4). There is no phonetic difference between a fully faithful candidate and a candidate exhibiting correspondence that fails to modify its phonetic content. This difference, although phonetically irrelevant, is modeled in §5.3.

Correspondences are governed by correspondence-specific identity constraints (IDENT-XX). This paper specifies which feature matches are enforced in

IDENT-xx constraints. Violations of IDENT-xx occur when features in established correspondences fail to match. When two independent CORR-xx constraints establish correspondence across three segments, a single IDENT-xx constraint may enforce itself across all three segments in a property known as “transitive correspondence” (Bennett 2013: 40). This analysis does not explore a set of constraints known as xx-Limiters used to define phonological and morphological domains of correspondence (see Bennett 2013 for a discussion of these types of constraints). All interactions in Polabian are between tautosyllabic onset-vowel pairings which are assumed in all candidates and repairs.

ABC was primarily developed to account for assimilation/harmony, but was later extended to account for dissimilation with the same machinery. The main difference between assimilation and dissimilation is the cost of maintaining the correspondence. In dissimilation, conforming to the requirements of correspondence identity incurs so many fatal violations that the best candidate is one devoid of the basic requirements for establishing correspondence in the first place.

Most models of ABC dissimilation involve simplex segments, but Polabian dissimilation involves a segment with two primary constrictions, [w]. Faytak (2014) models labial-velar dissimilation in Aghem (Bantu) velarized diphthongs using a broadly defined CORR constraint that targets a timing sequence rather than a specific feature. Similarly, his correspondence identity constraint is broadly defined requiring a bundle of features to match (place and continuancy). Broadly defined correspondence constraints work in Aghem because conflicting correspondences are always repaired by deletion. As shown in §3, repairs in Polabian are more nuanced and vary based on different feature properties of the surrounding environment.

### 5.3 Polabian grammar models

This subsection implements the constraint based model of dissimilation in Polabian and the extension of the process to novel lexical sets. Because the model simulates the structure of a single reanalyzed grammar that was active over a long period of time, examples are organized according to complexity of the model rather than period of the innovation. After I establish the reanalyzed grammar, I provide an account of how the reanalyzed grammar developed from the glide prothesis grammar.

Two constraints are not modeled here for space considerations. First, initial segments of the onset are always retained. While \*w does occur word-internally, word-internal [w] does not occur in contexts where correspondence requires repair. For this reason, I adopt L-ANCHOR, which references word boundaries as opposed to syllable boundaries. I assume that L-ANCHOR is highly ranked. Sec-

ond, unrounding only affects certain vowels. Front vowels unround to alleviate pressure from [w], but not back vowels, suggesting \*V[+BACK -LABIAL] is highly ranked. (9) defines these constraints, but they are not shown in the tableaux.

- (9) a. L-ANCHOR: The leftmost segment of the input must correspond to the left edge of the output
- b. \*V[+BACK -LABIAL]: Do not have back vowels without redundant rounding

The basic set of observations made in §3 is that all innovations to \*w involve (i) maintenance of certain syllable structures and (ii) restriction of the distribution of features associated with [w]. The first set of constraints defined in (10) address syllable structure and features of [w].<sup>21</sup>

- (10) a. ONSET: All syllables must have an onset
- b. MAX-μ: Every mora present in the input must correspond to a mora in the output.
- c. IDENT-IO[DORSAL]: All features and sub-features of primary dorsal constrictions must remain the same between the input and output.
- d. IDENT-IO[LABIAL]: Labial/rounding features of all segments in the input must remain the same between the input and output.
- e. CORR-WV[+LABIAL]: Labial-velar glides are in correspondence with labial vowels.
- f. IDENT-CV[BACK]: Corresponding CVs must agree in the feature [±BACK]

ONSET requires an onset in every syllable even if it historically lacked one. This constraint has a high ranking in other historical conspiracies involving glide prothesis (Crist 2001: 146–157). MAX-μ is a faithfulness constraint which requires every mora in the input to be in the output. As discussed in §2.2, deletion of moraic material is never observed as a repair in Polabian dissimilation. This suggests that MAX-μ is also highly ranked. I propose an input-output identity constraint for each primary constriction of [w]. As defined in §2.2, these constrictions are also properties of vowels, therefore these identity constraints also apply to vowels. As mentioned in §2.2, dorsality has a range of possible front-back feature configurations within the category. The constraint IDENT-IO[DORSAL] requires that **primary** dorsal constrictions (including sub-specifications) not change (e.g., do not change coronal > dorsal, velar > palatal, or front > back, but coronal > coronal palatal is ok). The proposed correspondence and correspondence identity constraints both reference constrictions of [w]. These two constraints stipulate that [w] must correspond with labial vowels, and the glide-

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21. This paper adopts Faytak's (2014) approach of treating glides as consonant-like enough to be moderated by consonant constraints.

vowel pairing must agree in backness. Tableau 1 shows dissimilation in simplex onsets after the Polabian Vowel Shift.

Tableau 1. Dissimilation; vowel shift front round reflex in simplex onset

*wońa ‘scent’ > » wyne	ONSET	MAX-μ	IDENT-IO [DORSAL]	CORR-WV [+LABIAL]	IDENT-CV [BACK]	IDENT-IO [LABIAL]
a. wyne				*!		
b. w <sub>1</sub> y <sub>1</sub> ne					*!	
c. w <sub>1</sub> u <sub>1</sub> ne			*!			
d. yne	*!					
☞ e. wine						*
f. jyne			*!			*
g. wne		*!				

Candidates A and B are phonetically the same, but structurally distinct. Both of these lose for failing to satisfy the basic correspondence and correspondence identity constraints. Vowels in Candidates C and F match the features of the glide. Assimilation requires a change in primary dorsal place properties for each candidate. Candidate F also changes the labiality of the glide with the change in dorsality. Candidates D and G circumvent changing features by deleting a segment contributing to correspondence. For Candidate D this results in an onsetless output while for Candidate G, this results in an output which deleted moraic material. Candidate E wins because it circumvents feature matching by changing the labial properties of the vowel, a less egregious violation than those incurred by other candidates.

Second are the cases of complex onsets with front-rounded vowels. The clearest instance of dissimilation in complex onsets with front-rounded vowels comes from words beginning with coronal clusters. In order to model these cases, a constraint disfavoring consonant deletion is defined in (11).

- (11) MAXC: Every consonant in the input must have a corresponding segment in the output.

Although there will be overlap in violations of MAXC and ONSET in cases like Tableau 1’s Candidate D, they fundamentally reference different properties. MAXC is an important faithfulness constraint in many Slavic languages, but ONSET is an important markedness constraint in the West Slavic languages which underwent glide prothesis (e.g., Lower Sorbian, Polabian, and some varieties of Polish). Tableau 2 models dissimilation triggered by the Polabian Vowel Shift in coronal complex onsets. Notice that in the tableau, the MAX constraints have different



rankings and therefore cannot be unified under a generic MAX constraint which would evaluate consonant and mora deletion as a unified phenomenon.

**Tableau 2.** Dissimilation; vowel shift front round reflex in complex coronal onset

*dworü ‘courtyard’ > ɔ dwør	ONSET	MAX-μ	IDENT-IO [DORSAL]	CORR-WV [+LABIAL]	IDENT-CV [BACK]	IDENT-IO [LABIAL]	MAXC
a. dwør				*!			
b. dw <sub>1</sub> ø <sub>1</sub> r					*!		
c. dw <sub>1</sub> o <sub>1</sub> r			*!				
☞ d. dør							*
e. dwer						*!	
f. djør			*!			*	
g. dwr		*!					

The candidates in Tableau 2 are organized in the same way as the candidates in Tableau 1. The two phonetically faithful candidates (A and B) fail for the same reason as do candidates that match the place feature between the glide and vowel (C and F) and candidates which delete moraic material (G). The main difference between the tableaux is found in how the constraints evaluate Candidates D and E. Because of the critical low ranking of MAXC, deletion of the glide in the complex onset is preferable to changing the labial features of the vowel. Notice that when deletion occurs, ONSET and MAXC do not show overlapping constraint violations as they would in Tableau 1. If applied to Tableau 1’s candidates, the ranking provided in Tableau 2 would maintain Candidate E as the winner because of the highly ranked ONSET constraint.

The vowel shift did not trigger repairs in all complex coronal outputs. If the vowel remained back, the complex onset was retained as shown in Tableau 3.

**Tableau 3.** Retention; vowel shift back round reflex in complex coronal onset

*swariti ‘to quarrel’ > ɔ sworət	ONSET	MAX-μ	IDENT-IO [DORSAL]	CORR-WV [+LABIAL]	IDENT-CV [BACK]	IDENT-IO [LABIAL]	MAXC
a. sworət				*!			
☞ b. sw <sub>1</sub> o <sub>1</sub> rət							
c. sw <sub>1</sub> ø <sub>1</sub> rət			*!		*		
d. sorət							*!
e. sɔrət			*!			*	
f. swrət		*!					

In Tableau 3, Candidates A and B are both phonetically faithful but structurally different. Candidate A loses based on a structural technicality. Candidate C loses because the dorsality of the vowel changes, but it should also be noted that there is no motivation to change this feature as the input already matched dorsality. Candidate D deletes the glide like in Tableau 2, but once again, deletion is unmotivated because the input features do not require this type of repair. Candidate E circumvents correspondence by changing dorsal place features. Candidate F circumvents correspondence by deleting the moraic material. In this case, it is more costly to avoid correspondence (D, E, and F) rather than just set up correspondence and leave the input feature properties the same (B). The ranking in Tableau 3 explains why West Slavic glide deletion did not target complex onsets with coronals like Lower Sorbian [svej] and Polish [sfuj] ‘3SG POSS’ < \*swojĭ. Because the ranking is shared with Polabian, it follows that the glide in the Polabian cognate [syj] deletes only after the Polabian vowel shift introduced front-rounded vowels (see Tableau 2). The ranking in Tableau 3 also explains why dissimilation did not target the MLG loan <dwarch> ‘dwarf’ after the Polabian Vowel Shift modified it to Polabian [tworzə].

In order to model the behavior of complex dorsal onsets, I propose two new constraints defined in (12).

- (12) a. CORR-CV/[+BACK]: Consonants and vowels specified as [+BACK] are in correspondence  
 b. IDENT-CC[LABIAL]: Consonants in correspondence must agree in labiality

Velars failing to correspond to back vowels incur a violation of the constraint in (12a). This includes labial-velar glides which also trigger a violation of (10e) because rounding is redundant in Polabian back vowels. The identity constraint in (12b) operates on the basis of transitive correspondence as there are no constraints independently establishing CC correspondence. Tableau 4 models West Slavic dorsal onset dissimilation. Because I assume a highly ranked L-ANCHOR, [worŭjĭ] is not modeled.

Failure to set up correspondence automatically removes Candidates A, B, and C. Candidate D properly sets up correspondence, but it fails to meet the transitive correspondence identity requirement of shared labiality among consonants. Candidate F sets up this labiality but in doing so, runs afoul of the labial IO identity constraint. Candidate G fails because even though the correspondence exists and correspondence features match, it does so at the expense of changing dorsal place features and removing labiality from the input. Candidate H loses because it deletes moraic material, but deletion does not have the same effect of circumventing correspondence as it did in the previous candidate sets. In this case, deletion of moraic material introduces a new problem because the resulting nucleus is

Tableau 4. Dissimilation; West Slavic glide deletion dorsal complex onset

*xworǔjǐ ‘ill’	ONSET	MAX-μ	IDENT-IO [DORSAL]	CORR-WV [+LABIAL]	CORR-CV [+BACK]	IDENT-CC [LABIAL]	IDENT-CV [BACK]	IDENT-IO [LABIAL]	MAXC
a. xworǔjǐ				*!	**				
b. xw <sub>1</sub> o <sub>1</sub> rǔjǐ					*!				
c. x <sub>1</sub> wo <sub>1</sub> rǔjǐ				*!	*				
d. x <sub>1</sub> w <sub>1</sub> o <sub>1</sub> rǔjǐ						*!			
<sup>CF</sup> e. x <sub>1</sub> o <sub>1</sub> rǔjǐ									*
f. x <sup>w</sup> <sub>1</sub> w <sub>1</sub> o <sub>1</sub> rǔjǐ								*!	
g. x <sub>1</sub> j <sub>o</sub> rǔjǐ			*!					*	
h. x <sub>1</sub> w <sub>1</sub> rǔjǐ		*!				*			

back. This means that in Candidate H, deletion still results in the need to establish correspondence and match features. Candidate E wins because it simply removes the glide. Although Tableau 4 models a Polabian input, the same constraints and ranking explain glide deletion in Polish [xɔina] ‘Scotch pine’ and Lower Sorbian [xej̥sa] ‘Scotch pine’ (cf. Russian [xvojɲij] *хвойный* ‘coniferous’).

After differentiation from the rest of West Slavic, Polabian reintroduced sequences of dorsal clusters with back-rounded vowels in the vowel shift. Dissimilation in the later innovation is modeled in Tableau 5 using the exact same constraint set and ranking as found in Tableau 4.

Tableau 5. Dissimilation; Polabian vowel shift dorsal complex onset

*kwasǔ ‘sour’ > D kwos	ONSET	MAX-μ	IDENT-IO [DORSAL]	CORR-WV [+LABIAL]	CORR-CV [+BACK]	IDENT-CC [LABIAL]	IDENT-CV [BACK]	IDENT-IO [LABIAL]	MAXC
a. kwos				*!	**				
b. kw <sub>1</sub> o <sub>1</sub> s					*!				
c. k <sub>1</sub> wo <sub>1</sub> s				*!	*				
d. k <sub>1</sub> w <sub>1</sub> o <sub>1</sub> s						*!			
<sup>CF</sup> e. k <sub>1</sub> o <sub>1</sub> s									*
f. k <sup>w</sup> <sub>1</sub> w <sub>1</sub> o <sub>1</sub> s								*!	
g. k <sub>1</sub> j <sub>o</sub> s			*!					*	
h. kws		*!				*			

The candidates in Tableau 5 are structured in the same way as the candidates in Tableau 4. The violation structure of Tableau 5 almost matches the structure of Tableau 4 except for Candidate H which has fewer violations in Tableau 5. Regardless of this difference, the winners and losers in Tableaux 4 and 5 are selected for the same reasons.

Finally I explore dissimilation repairs for [io] < Lechitic \*ia. While some complex onsets with \*w are allowed before [o] < \*a, there is a total ban on complex onsets with \*w before [io] < \*ia. MAX-μ, which penalizes the deletion of moraic material, plays an important role in structuring this behavior. As was discussed earlier, MAX-μ is ranked high enough that morae never delete in dissimilatory repairs. Front-rounded vowel monophthongs paired with a complex onset, like ɔ dwɔ, can delete the glide to avoid running afoul of IO and correspondence identity constraints as in COURTYARD. In simplex onsets, like ɔ wy, the front-rounded vowel can default to redundant rounding in order to fit the requirements of the various identity constraints and ONSET as in SCENT. Onsets paired with diphthongs, like ɔ swio, ɔ kwio, or ɔ wio, face a unique dilemma. Because morae cannot be deleted and ɔ io already has redundant rounding on each mora, conflicts between IO constraints and correspondence identity constraints must be resolved by deletion. Tableau 6 models a complex coronal onset before [io] < \*ia.

Tableau 6. Dissimilation; Polabian vowel shift coronal complex onset with complex vowel

*swětü ‘world’ > *swiat > ɔ swiot	ONSET	MAX-μ	IDENT-IO [DORSAL]	CORR-WV [+LABIAL]	CORR-CV [+BACK]	IDENT-CC [LABIAL]	IDENT-CV [BACK]	IDENT-IO [LABIAL]	MAXC
a. swiot				*!	*				
b. sw <sub>1</sub> io <sub>1</sub> t							*!		
c. sw <sub>1</sub> uo <sub>1</sub> t			*!					*	
d. sjiot			*!					*	
<sup>CF</sup> e. sw <sub>1</sub> o <sub>1</sub> t		*!							*
f. siot									*
g. sot									*
h. s <sup>w</sup> <sub>1</sub> w <sub>1</sub> io <sub>1</sub> t							*!	*	

Candidate A fails to meet the proper correspondence relationship and loses. Candidate B sets up the relationship, but the backness of the glide does not agree with the first mora in the diphthong. Candidate C changes the identity of the back mora, but this triggers violations of IO dorsal and labial faithfulness constraints. Candidate D violates the same set of constraints by circumventing correspondence with a different glide. In Candidate H, the introduction of gratuitous onset correspondence does not fix the vowel mismatch and only introduces superfluous changes to the labial features of the initial segment. Notice that H does not violate the dorsal place constraint. This is because the primary place of articulation is the same. The only way to avoid changing feature specifications is to delete material (Candidates E, F, and G). Candidates E and G are automatically removed because they delete moraic material leaving Candidate F as the winner.

Tableau 7 models the same innovation but with a dorsal complex onset. The main difference between Tableaux 6 and 7 is that in Tableau 7, a critical ranking emerges between IDENT-CV[BACK] and all other previously unranked constraints.

**Tableau 7.** Dissimilation; Polabian vowel shift dorsal complex onset with complex vowel

*kwětŭ ‘flower’ > *kwiat > ɔ kwiot	ONSET	MAX-μ	IDENT-IO [DORSAL]	CORR-wV [+LABIAL]	CORR-CV [+BACK]	IDENT-CC [LABIAL]	IDENT-CV [BACK]	IDENT-IO [LABIAL]	MAXC
a. kwiot				*!	**				
b. kw <sub>i</sub> io <sub>i</sub> t					*!		*		
c. k <sub>i</sub> wio <sub>i</sub> t				*!	*		*		
d. k <sub>i</sub> w <sub>i</sub> io <sub>i</sub> t						*!	**		
e. k <sub>i</sub> w <sub>i</sub> uo <sub>i</sub> t						*			
f. kw <sub>i</sub> w <sub>i</sub> io <sub>i</sub> t							**!		
g. k <sub>i</sub> w <sub>i</sub> o <sub>i</sub> t		*!							
☞ h. k <sub>i</sub> io <sub>i</sub> t							*		*
i. k <sub>i</sub> o <sub>i</sub> t		*!							*

Lack of correspondence (Candidates A, B, C), lack of feature-matching (Candidates B, C, D, F), and modification of labiality or dorsality (Candidates E and F) result in failure. Unlike Candidate F in Tableau 6, Candidate H in Tableau 7 is still subject to correspondence identity on the vowel. The new critical ranking prevents Candidate G from winning, and breaks a potential tie in the violation structure of the winner H and a candidate which deletes too much material from the vowel, Candidate I.

With the ranking established in Tableau 7, we can finally account for why simplex onsets fail to repair structures with [+FRONT] and [+LABIAL] expressed on separate morae. This is modeled in Tableau 8.

**Tableau 8.** Retention; Polabian vowel shift simplex onset with complex vowel

*wětŕ ‘wind’ > *wiatŕ > ɔ wioter	ONSET	MAX-μ	IDENT-IO [DORSAL]	CORR-wV [+LABIAL]	CORR-CV [+BACK]	IDENT-CC [LABIAL]	IDENT-CV [BACK]	IDENT-IO [LABIAL]	MAXC
a. wiotŕ				*!	*				
☞ b. w <sub>i</sub> io <sub>i</sub> tŕ							*		
c. w <sub>i</sub> uo <sub>i</sub> tŕ			*!					*	
d. jiotŕ			*!					*	
e. iotŕ	*!								*
f. w <sub>i</sub> o <sub>i</sub> tŕ		*!							

The structure of candidates in Tableau 8 most closely resembles the structure of candidates found in Tableau 3. The critical difference between these two

tableaux is that while the vowel shift produced an input not needing repair in Tableau 3, the input to Tableau 8 is in desperate need of repair but there is no valid fix. Changing anything about dorsality or labial features automatically fails (Candidates C and D). Deletion, the normal escape, cannot work because it targets either the mora or the entire onset, neither of which are allowed. The only possible remedy in this case is to tolerate the conflict between the onset and diphthong (Candidate B). Without the ranking established in Tableau 7, Candidates B and F would tie.

Now that we have established a unified structure of the reanalyzed grammar in Tableaux 1–8 and how it accounts for cases of extension, the looming question remains: How can we account for the changes from the original LCS system, with no restrictions on [w], to the reanalyzed system in OT? To recap, I proposed in §3.2 and §5.1 that innovations to LCS reflexes in early West Slavic history precipitated reanalysis and extension. The major difference between LCS and West Slavic discussed in this work was the development of glide prothesis, a subset of epenthesis. In the simplest representations, differences between linguistic varieties which exhibit onset epenthesis and those which do not are modeled with the constraints ONSET, DEP-IO, and MAX-IO (Kager 1999:100–102).<sup>22</sup> ONSET is defined in (10a), so (13) only defines DEP-IO and MAX-IO.

- (13) a. DEP-IO: All segments in the output must have a representation in the input  
b. Max-IO: All segments in the input must have a corresponding representation in the output

DEP-IO is a faithfulness constraint that penalizes epenthesis of segments, whereas Max-IO is a faithfulness constraint that penalizes deletion of segments (a unified version of MAX- $\mu$  and MAXC). These two faithfulness constraints interact with the markedness constraint ONSET. The original LCS ranking of these three constraints favors both faithfulness constraints over the markedness constraint, DEP-IO, Max-IO >> ONSET, resulting in a fully faithful output. The original constraint ranking is modeled in Tableau 9 with the LCS forms \*uxo ‘eye’ and \*wolŭ ‘bull’.

In Tableau 9, any change to the underlying structure is penalized and results in failure before the surface markedness constraint is considered.

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22. Although it is possible to build a more complex model which predicts the quality of the epenthetic segment, I do not construct such a model for space considerations. The purpose of the epenthesis model is to show how its outputs can be captured with the dissimilation grammar.

Tableau 9. LCS onset ranking

* uxō ‘eye’	DEP-IO	MAX-IO	ONSET
☞ a. uxō			*
b. wuxō	*!		
c. xō		*!	
*wolŭ ‘bull’	DEP-IO	MAX-IO	ONSET
a. olŭ		*!	*
☞ b. wolŭ			

The structure of the grammar shown in Tableau 9 was stable through much of the LCS period, but began to destabilize around the early West Slavic period (see §3.2 for a discussion of dating glide prothesis). Destabilization allowed for the development of some forms with prothesis that were not corrected by the synchronic grammar. As glide prothesis continued to develop, DEP-IO and ONSET were eventually re-ranked leading to the new ranking ONSET, MAX-IO >> DEP-IO. Tableau 10 models the new ranking in West Slavic.

Tableau 10. West Slavic glide prothesis onset ranking

* uxō ‘eye’	ONSET	MAX-IO	DEP-IO
☞ a. uxō	*!		
b. wuxō	*!		*
c. xō		*!	
*wolŭ ‘bull’	ONSET	MAX-IO	DEP-IO
a. olŭ	*!	*	
☞ b. wolŭ			

In Tableau 10, the surface forms both begin with wV[+BACK], but they share this surface property for different reasons. In the case of [wuxō], [w] appears because of repair whereas in [wolŭ] it does not. As was mentioned in §5.1, the relationship between the constraint violations, the underlying representation, and the surface representation will be most apparent to language users before an innovation reaches saturation. After this point, language users must make a choice: either try to identify which surface forms arise due to an infrequent process, or treat all surface realization of [w] as representative of a unified underlying form and moti-

vate the distribution from that perspective. When language users choose the latter, reanalysis occurs.

In West Slavic, the surface distribution of [w] reveals that it most frequently occurs in onset-nucleus pairings with at most one other segment bearing the features [+LABIAL] and [+BACK]. Accepting this generalization as the basis for refitting constraints to the match the surface data brings us to the reanalyzed grammar which was modeled in Tableaux 1–8. Tableau 11 shows the reanalyzed grammar operating on the new underlying West Slavic forms \*wuxo ‘eye’ and \*wolŭ ‘bull’.

Tableau 11. West Slavic reanalyzed grammar

*wuxo ‘eye’	ONSET	MAX-μ	IDENT-IO [DORSAL]	CORR-WV [+LABIAL]	CORR-CV [+BACK]	IDENT-CC [LABIAL]	IDENT-CV [BACK]	IDENT-IO [LABIAL]	MaxC
a. uxO	*!								*
b. wuxO				*!	*				
☞ c. w <sub>1</sub> u <sub>1</sub> xO									
*wolŭ ‘bull’	ONSET	MAX-μ	IDENT-IO [DORSAL]	CORR-WV [+LABIAL]	CORR-CV [+BACK]	IDENT-CC [LABIAL]	IDENT-CV [BACK]	IDENT-IO [LABIAL]	MaxC
a. olŭ	*!								*
b. wolŭ				*!	*				
☞ c. w <sub>1</sub> O <sub>1</sub> lŭ									

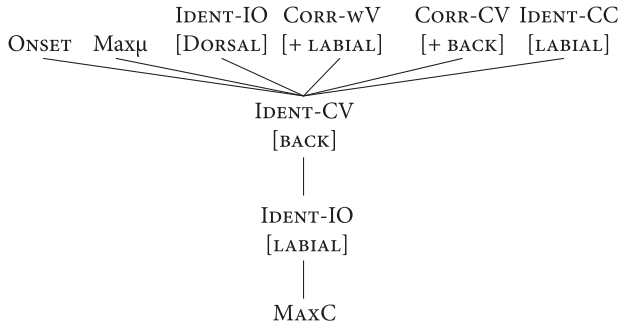
Although the winning Candidates B in Tableau 10 are notationally different from the winning Candidates C in Tableau 11, they are functionally the same surface form as discussed in §5.2. This means that despite the differences between the grammars modeled in Tableaux 10 and 11, the surface realizations remain the same. As a consequence of reanalyzing the input forms, the evaluation of EYE and BULL is identical. The language users no longer have to identify which surface [w]s are repairs and which ones are underlying. This reanalysis must have occurred prior to being extended to ILL and all other lexical sets which underwent dissimilation.

5.4 Summary: The structure of West Slavic dissimilation

This section has explored a formal model of Polabian labial and dorsal feature restrictions and how its feature-restricting grammar relates formally to an earlier grammar that produced glide prothesis. Dissimilation restricting the distribution of the co-occurrence of [w] with vowels bearing the features [+LABIAL] and [+BACK] began during the West Slavic period and continued even after Polabian



had differentiated itself from other West Slavic languages. The constraint ranking of the West Slavic labial dissimilation is shown in the diagram in Figure 5.



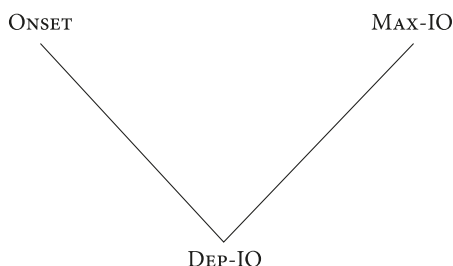
**Figure 5.** Hasse diagram of West Slavic labial-velar dissimilation

In the West Slavic dissimilation grammar, tautosyllabic feature interactions operate in conjunction with prosodic properties. Bennett (2013) predicts that prosodic structures should play a role in local dissimilation, but in his view, prosody is more of a liability when it comes to understanding how dissimilation actually functions. Contrary to Bennett’s view, prosody is an integral part of how features can be distributed and is the source of Polabian’s unique pattern which has bi-directional repairs.

Although Polabian’s segment inventory differs from those found in contemporary West Slavic languages, the constraint ranking of Figure 5 is applicable to historical developments in Upper Sorbian, Lower Sorbian, and dialectal forms of Polish (which all exhibit both [w] prothesis and full dissimilation). Like Polabian, these languages require a ranking that allows \*xwo > xo but not \*swo > so. The crucial difference between these languages, which lack Polabian’s complex dissimilation pattern, and Polabian lies in what happened after dissimilation first developed. In the case of Polabian, new innovations provided novel sequences in need of repair (intermediate Ǿ forms), but Polabian’s closest relatives did not undergo these same innovations. If anything, Polish and Czech underwent innovations that would bleed any future labial dissimilation by removing dorsal properties from \*w.

Part of the reason prosody plays such a prominent role in Polabian dissimilation is that dissimilation originated from a different grammar with prosodically motivated insertion: West Slavic glide prothesis. The West Slavic glide prothesis grammar is shown in the diagram in Figure 6.

The glide prothesis grammar is simpler than the dissimilation grammar, but it required that language users identify which surface [w]s arose due to repair and



**Figure 6.** Hasse diagram of glide prothesis

which ones did not. When language users adopted the assumption that all surface [w]s were representative of underlying /w/, the grammar presented in Figure 5 could account for the most of the synchronic distribution of surface [w], effectively refitting the constraint in the grammar based on static distributional data (reanalysis). Reanalysis of the glide prothesis grammar resulted in the extension of distributional restrictions to words with inherited \*w which historically never underwent prothesis like ILL.

## 6. Closing

This paper has given an account of the mechanisms underlying pertinacity (also called “persistent rules” or “historical conspiracies”) by using the example of labial dissimilation in Polabian. I have proposed that pertinacity is the phonological version of reanalysis and extension. To summarize, phonological reanalysis and extension include the stages outlined in (14) (repeated here from (8) in §5.1):

- (14) a. An innovation produces an increase in surface variation leading language users to identify an ambiguity in the relationship between underlying representations and surface representations.
- b. Due to the ambiguity in the relationships of forms, there is ambiguity as to which phonological process can account for the surface distribution. Language users try to resolve this ambiguity by understanding the underlying forms based on the surface distribution. As a result, they assume a unified underlying representation and restructure the synchronic grammar around the surface distribution (reanalysis).
- c. The refitted grammar can alter historically conservative lexical items if they conflict with the new generalization and it can force subsequent innovations to fit the generalization (extension).

The stages outlined in (14) are relevant to the historical development of [w] in Polabian. West Slavic glide prothesis (5th–7th century) produced words with prothetic [w] like EAR, but these words existed alongside words with inherited LCS \*w reflexes like BULL. After EAR and BULL were reinterpreted as having the same underlying source of surface [w], language users restructured the synchronic grammar to capture the best-fit of [w]’s synchronic surface distribution (reanalysis). Refitting the grammar left the outcome of glide prothesis intact, but the grammar subsequently restructured words with inherited [w] that were not previously subject to rules affecting onset structure (extension). The extension of generalizations involving [w] led to the first wave of labial dissimilation after the 7th century (but prior to the 10th century) which was followed by a second wave of labial dissimilation sometime after the 14th century.

I have shown that formally, the grammar that accounts for the first wave of labial dissimilation can account for the second wave. This suggests that all of the changes which occurred over this span of time have a unified motivating force behind them in the grammar. Furthermore, I have shown that the dissimilation grammar is able to account for the outcome of glide prothesis and inherited initial \*w, when it is assumed that both lexical sets share the same underlying source of [w]. The dissimilation grammar therefore affords language users the advantage of evaluating violations in forms like EYE and BULL identically.

I suggest that Polabian restrictions of [w] extended beyond the original West Slavic wave of dissimilation because new innovations supplied novel combinations of the restricted features. Crucially, novel combinations of restricted features can develop because innovations that would violate the synchronic grammar’s constraints are not blocked (prophylaxis). Instead, these innovations run their course and produce intermediate forms (  $\supset$  forms), and it is the grammar’s job to repair intermediate forms so that they are in line with acceptable synchronic bounds before a phonetic output can be produced. This is possible because the constraints of the synchronic grammar are violable, but still exert some influence on structures resulting from innovation.

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## Résumé

Dans cet article, j'examine la diachronie de la perte de *w* en polabe, une langue morte du groupe slave occidental. Je propose que l'ancien slave occidental a restreint la distribution de *\*w* quand un processus d'insertion de *w* a été réanalysé comme un cas d'amuissement. La grammaire qui a restreint le segment est devenue la nouvelle grammaire synchronique et est restée stable pendant le développement d'autres innovations dans cette langue. Des innovations ultérieures à celle en question ont réintroduit des structures restreintes, parce que la grammaire ne peut empêcher les innovations (prophylaxie). En revanche, les structures ont été reconfigurées (extension) puisque la grammaire peut certainement influencer les résultats des innovations (réfection). Je modélise la diachronie de la perte de */w/* ailleurs (Rose & Walker 2004).

## Zusammenfassung


In diesem Beitrag untersuche ich den Verlauf des *w*-Schwunds in der polabischen Sprache (westslawisch, ausgestorben). Ich schlage vor, dass in dem frühwestschlawischen Sprachraum wurde die Verteilung von *\*w* verengt, weil die Einschlebung von *\*w* als Tilgung reanalysiert wurde. Die Grammatik, durch die diese Verengung durchführen wurde, wurde die neue synchronische Grammatik und blieb fest, als andere Lautwandel in der polabischen Sprache sich entwickelten. Durch die neue Entwicklungen wurden der Sprache die beschränkten Strukturen wieder eingeführt, weil durch die Grammatik keine Entwicklungen werden absperren können (Prophylaxe). Ich schlage vor, dass *\*w* nochmal verengt wurde (Erweiterung), weil die Grammatik das Ergebnis der Sprachwandel beeinflussen kann (Reparatur). Ich modelliere den Verlauf des *w*-Schwunds nach der Methode Agreement By Correspondence (Rose & Walker 2004).



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