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Lechitic Vowel Development of Eastern Low German

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1 Introduction

This paper traces the rise of secondary palatalization (SP) in Low German (LG) from the former German state of Posen (Polish Poznań). Three descriptions from Posen show that SP is a regional feature, as shown in (1). Posen Low German (PLG) words are given with their Plautdietsch, Standard German, and English translations. Words not cognate to the PLG word are noted in quotation marks.

(1)

PLG	Plautdietsch	German	English	Source
brjal	*Brell*	*Brille*	"glasses"	Teuchert (1913)
brjǫlǫ	*brelle(n)*	*brüllen*	"roar"	Koerth (1913, 1914)
djǫnn	*denn*	*dünn*	*thin*	
mjaaš	*Mensch*	*Mensch*	*man*	
zjǫn	*Sonn*	*Sonne*	*sun*	
špjǫǫs	"Spetzbub"	"Spitzbube"	"scoundrel"	
štjaa	*stell*	*still*	*still*	
vjal	*Welle(n)*	*Wille*	*will*	

The closest relatives of PLG, Plautdietsch and English, lack reflexes of SP in any of the cognates. Standard German, while lexically more like PLG than English is, also lacks SP and shares few vowel correspondences with PLG.

Previous accounts of PLG attribute the rise of SP to Polish influence, but fail to explain how Slavic languages contributed to the development

(Koerth 1913:281, Teuchtert 1913:37). In this paper, I explain three questions regarding SP in PLG:

(2) a. ***What*** was borrowed from Slavic?
b. ***How*** did the element become a candidate for borrowing?
c. ***Who*** was responsible for the borrowing?

I present evidence that a VC co-articulation constraint from the West Slavic Lechitic sub-group is ultimately responsible for the rise of SP. The co-articulation constraint was able to enter PLG through the process of replication based on a perceived similarity between the conditioning environment in Lechitic and the consonants of PLG. Although Slavic-dominant bilinguals introduced the co-articulation pattern into PLG, the PLG reflexes are different because speakers prioritized retention of certain native LG features.

The rest of Section 1 provides background to LG in the historical Province of Posen and to theories of language contact which will help answer the questions in (2) above. Section 2 presents language-internal information about the sound inventory of PLG and the rise of SP. Section 3 provides information about the development in Lechitic and its counterpart in PLG. Section 4 gives an integrated OT analysis of SP in PLG that incorporates the findings and constraints of Sections 2 and 3. Finally, Section 5 sums up the overall findings of this paper.

1.1 Poznań as an LG Speaking Region

LG is a West Germanic language descendant from Old Saxon (9th – 12th c.) and Middle Low German (12th – 16th c.). Prior to the 12th century, LG was only spoken west of the Elbe River. During this time, LG was in contact with Polabian around Lüneberg. LG rapidly expanded to the east during the *Ostsiedlung* 'eastern settlement' period of German history. This period began in the 12th century and lasted into World War II. During the *Ostsiedlung*, LG spread as far east as present day Kaliningrad.

LG was a culturally important language along the North and Baltic Sea coasts from the 12th to the mid-17th century. During this time, the Hanseatic League, a highly successful trade group, operated in these regions. Middle Low German was the league's official trade language, both written and spoken, which provided a strong economic incentive for non-native speakers to learn it. Even after the league collapsed, many Balto-Slavic languages previously spoken in northern Poland and Germany vanished because the speaker populations switched to LG (Prussian †17th c., Polabian †18th c., Slovincian †20th c.). Other languages, like Kashubian, underwent heavy lexical and structural borrowing from LG (Stone 2002). After World War II, the German–Polish border was redrawn and LG-speakers in Poland were relocated to Germany. As a consequence, varieties of LG from Poland underwent obsolescence as speakers adjusted to the local LG and literary German of their new home.

Documentation of PLG in the early 20th century comes from the cities of Rogoźno (German *Rogasen*) and Puck (German *Putzig*). The region historically known as Greater Poland, which encompasses Poznań, was first settled by German-speakers in the mid-12th century (Higounet 1986:205). After the initial settlement, there was a surge of German settlement in the 13th century (Higounet 1986:203,205-6).

Teuchert is the first to provide a historical analysis of PLG in 1913 in the *Bühnendeutsch* transcription system.[1] Koerth, a native LG-speaker from Rogoźno, also undertook documentation of PLG after learning of Teuchert's investigation (1913:18, 1914). Koerth found a high degree of similarity in the LG varieties spoken in Poznań, Rogoźno, Puck, Chodzież (German *Kolmar*), and Wągrowiec (German *Wongrowitz*). All reports note that Polish and LG of the region have influenced each other.

1.2 Borrowing Theories

As stated, the goals of this paper are to identify three central issues of language contact: ***what*** was borrowed, ***how*** the element became a candidate for borrowing, and ***who*** did the borrowing. Although this paper attempts to explain the first question in terms of the OT framework, the latter two questions will be answered according to the framework of Heine & Kuteva 2005 and Van Coetsem 1988.[2]

Linguistic structures can be borrowed in a process called *replication* (Heine & Kuteva 2005). In this process, a structural property of a matrix

[1] The first linguistic investigation of LG spoken in Posen was Bernd 1820. His report does not provide information about the transcription system which he used. By the 20th century, Bernd's work was considered "unusable" (Koerth 1913: 4).

[2] Traditional approaches to contact typologies e.g., Haugen 1950, Ferguson 1959, and Thomason & Kaufman 1988, are not addressed here due to space limitations.

language is integrated into the structural properties of a recipient language, when bilingual speakers identify highly comparable elements in the two structures (Heine & Kuteva 2005:3-4, 40). Although it is not explicitly stated, all OT approaches to loan phonology adaptation rely on replication. These studies claim that loan phonology adaptation must necessarily reference perceptual or articulatory matches between the recipient and donor languages in order to make sense of the outcome of loan phonology adaptation (Jacobs & Gussenhoven 2000, Alder 2005). I provide evidence that PLG incorporated a Lechitic VC co-articulation constraint based on the similarity of LG consonants to a Lechitic trigger (see Section 2.3).

In order to answer who was responsible for the borrowing, I will use VanCoetsem's framework of linguistic agentivity (later expanded by Winford 2005). The agentivity model draws on insights from language acquisition to identify structural properties typical of different contact scenarios. Every contact situation has recipient language speakers and source language speakers. If recipient language dominant speakers catalyze borrowing, they adapt structures of the source language to preexisting recipient language structures (e.g. Japanese [san·gu·ɾa·su] 'sunglasses' < American English [sʌn·glæ·sɪz]; Winford 2005:378). Recipient Language Agentivity tends to not introduce new structures into the recipient language and mostly enhances its preexisting structures. It is possible for Recipient Language Agentivity to introduce new structures, but these tend to be structures which already had some degree of variability in the recipient language (Winford 2005:386-7, Van Coetsem 1988). If source language dominant speakers catalyze borrowing (i.e., they are imperfect speakers of the recipient language), the structures of the source language are imposed upon the recipient language's structures (e.g. German L1 speakers replace English [θ] with [s] in *thin* and *think*; Winford 2005:380). Source Language Agentivity can bring in large systematic structural changes, possibly altering otherwise stable recipient language structures (Winford 2005:377, Van Coetsem 1988:73-4).

OT phonology usually describes Recipient Language Agentivity focusing on the phenomenon of "loan-phonology adaptation" (see Jacobs & Gusshoven 2000, Itô & Mester 1999, and Alder 2005). All OT approaches to Recipient Language Agentivity scenarios indicate that some, if not all, of the constraints of the recipient language are highly

ranked. Itô & Mester 1999's account of loan-phonology nativization in Japanese indicates that more recent loans may violate some constraints which native vocabulary cannot, but there are still native constraints which loan words do not violate.

Source Language Agentivity is not widely explored in OT contact phonology literature and the question remains open as to whether Source Language Agentivity manifests an inverse relation in constraint rankings to Recipient Language Agentivity.

2 Low German of Poznań (PLG)

This section presents data concerning the segments of PLG and the rise of SP. Section 2.2 provides the account of SP found in Teuchert (1913) and Koerth (1913, 1914). I show that their account fails to exclude cases where the development did not occur and correct this oversight in Section 2.3.

2.1 Segment Inventory

PLG has 22 consonant phones (Teuchert 1913:10; Koerth 1913, 1914). Table 1 lists the closest IPA approximations to the PLG consonant segments from Teuchert 1913.

	LABIAL	ALVEOLAR	POST ALVEOLAR	PALATAL	VELAR	GLOTTAL
PLOSIVE	p, b	t, d			g, k	
NASAL	m	n		ɲ	ŋ	
FRICATIVE	f, v	s, z	ʃ	ç	x, ɣ	h
TAP		ɾ				
LATERALS		l				
GLIDES				j		

Table 1: PLG Consonant Segments (Teuchert 1913)[3]

[3] The only *Bühnendeutsch* symbols that do not match the IPA representation are <ñ>=[ɲ], <c>=[ç], and <ʒ>= [ɣ]. In Koerth's description, it is unclear if <ʒ>, labeled as IPA [ɣ], is a fricative or a more sonorant segment. Clearly, it represents a non-plosive

The initial accounts indicate that there are roughly 20 monophthongs.[4] Table 2 provides the monophthong inventory of PLG in IPA with three height categories (Teuchert 1913:9).

Long Vowels	Front	Central	Back
High	i: · y:		· u:
Mid	e: · ø:		· o:
Low	ɛ: · œ:	a: ·	· ɔ:

Short Vowels	Front	Central	Back
High	ɪ · ʏ		· ʊ
Mid	e · ø		· o
Low	ɛ · œ	a ·	· ɔ

Table 2: PLG Vowel Segments (Teuchert 1913)[5]

The long and short vowel inventories differ only in quantity except for [+HIGH] vowels, which also differ in laxness. Although all texts predate phonemic analysis, Teuchert notes that short mid vowels are positional variants of [ɛ], [œ], and [ɔ] before $C_{[SONORANT]}C$ clusters (1913:10). Though phonetically there are three height levels of short vowels, phonologically there are only two underlying heights: [+HIGH] and [+LOW].

Table 3 lists PLG forms affected by SP.[6]

voiced segment, the reflex of Middle Low German *g*. Teuchert mentions that the palatal nasal is not frequently used, and assumes that it must have been more prevalent in the language at an earlier stage, but provides no evidence for this (Teuchert 1913:10).

[4] Additionally there are two diphthongs and five triphthongs; they are not involved in the development SP and will not be discussed further.

[5] In *Bühnendeutsch* orthography, long vowels are written as geminates and short vowels as singletons. All vowels are tense unless an ogonek is written underneath them in which case they are lax. Teuchert lists [æ] as a phone of PLG, but the symbol he used for this phone does not appear in any of his examples nor in Koerth's examples. Some of the final <ǫ>s are weakly nasalized, but these are reflexes of word final <en> (Teuchert 1913:5,7).

[6] PLG also has consonants which are the reflexes of older palatalization from the Ingvaeonic period in the words such as *jęęvǫ* 'to give'. For more information about other types of palatalization in PLG and their relation to inherited or contact based features, see Burns forthcoming.

	Labial	Coronal	Velar
Plosive	*pjal* 'peel, Pelle' *bjan* 'feedrack, Raufe'	*tjalǫ* 'count, zahlen'	*kjal* 'ladle, Kelle'
Nasal	*mjǫl* 'garbage, Müll'		
Fricative	*fjaaste* 'window, Finster' *vjǫǫta* 'root, Würzel'	*zjǫn* 'sun, Sonne'	
Tap		*rjǫnǫ* 'run, rennen'	
Lateral		*ljǫǫštaf* 'stake, Runge'	

Table 3: PLG Secondary Palatalization Inventory

In addition to the segments in Table 3, PLG has initial *j* in words which were historically vowel-initial or *h*-initial (e.g. *jan* < *hen* 'hen', *jalbǫǫzǫ* < *elbogo* 'elbow'). *H*-initial words underwent the changes *h* > *hj* > *j* (Teuchert 1913:37).[7]

There is evidence that SP was contrastive at one point, but synchronic variation suggests that speakers reanalyzed these segments as allophones in free variation with other segments in the inventory. Example (3) provides evidence of three distinct phonemic statuses.

(3)	Contrast:	*mjǫl* : *mǫl*	'garbage: mole'
	Free Variation 1:	*štjǫǫtǫ* : *štǫǫtǫ*	'tumble INF: tumble INF'
	Free Variation 2:	*bjan* : *bęn*	'feed rack: feed rack'

The minimal pair 'garbage' and 'mole' shows contrast between palatalized and plain consonants. The documentation shows more instances of allophony, which fall into one of two types. Free Variation Type 1,

[7] Even though <*š*> and <*j*> don't appear with SP, these segments underwent a similar change exemplified by the words *šaava* 'shard, Scherben' < Middle Low German *scherve* 'shards' and *jaast* 'barley, Gerste' < **jerste* <Middle Low German *gerste*. Only three segments from Table 1 can occur word initially and do not exhibit evidence of the changes in Table 3: <*d*>, <*n*>, <*g*>. For more on the Eastern LG reflex *j* < Middle Low German *g*, see Burns (forthcoming).

exemplified on the root of the verb 'tumble', exhibits alternation between palatalized and plain consonants. Free Variation Type 2, exemplified in 'feed rack', is the most common type of allophony across all texts. In this type of free variation, the palatal off-glide of the consonant is removed and the quality of the immediately following vowel changes.

2.2 Early Accounts of Secondary Palatalization (SP)

Teuchert identifies the rise of SP as contingent on the diphthongizing of /ɛ/ and /œ/ into [ja] and [jɔ] respectively (Teuchert 1913:36-7).[8] Typologically, the most common triggers of SP are high front vowels and *j* (Bateman 2007, 2011; Bhat 1978). If low front vowels trigger palatalization, higher front vowels will also trigger it (Bateman 2007:64). Seemingly contradicting this generalization, both authors are correct to attribute SP to [+LOW] vowels. Example (4) shows that SP did not develop after other front vowels.

(4)

Vowel	PLG	Translations	(Teuchert 1913)
[i:]	*kriit*	'chalk, Kreide'	
	liim	'lime, Leim'	
[ɪ]	*bljš*	'blaze, Blesse'	
	tsjbǫlə	'onion, Zwiebel'	
[y:]	*büüda*	'bag, Beutel'	
	düüva	'devil, Teufel'	
[ʏ]	*šüpt*	'3SG swills, säuft'	
	drüpo	'drop, Tropfen'	
[e:]	*keez*	'cheese, Käse'	
	zeep	'soap, Seife'	
[ø:]	*zööt*	'sweet, süß'	
	zöökǫ	'search, suchen'	

None of the examples in (4) have reflexes of SP, but just as important, none of them show evidence of diphthongization.[9] PLG SP arose due to yodation after the diphthongization of /ɛ/ and /œ/ to [ja] and [jɔ]. The

[8] The alternation *fjǫ̈st* : *fǫst* 'first' is an exception to the change in quality of the vowel's nucleus. The original *œ* has not been lost in either variant.

[9] The only word with SP after a high front vowel is *bjid* 'poverty' (<Polish *bieda* 'poverty'). SP in this word is independent of LG specific innovations.

rules presented in (5) capture the original author's account of the rise of SP.

(5) *Stage 1:* $\left[\begin{matrix}\varepsilon\\ œ\end{matrix}\right] \rightarrow \left[\begin{matrix}ja\\ jɔ\end{matrix}\right]$

Stage 2: C[jV] → [C^{j}]V

The two types of allophony observed in Section 2.1 can be attributed to repairs that target different stages of the developments in (5). Free Variation Type 1 removes SP after Stage 2 of the change has applied. Free Variation Type 2 arose from an attempt to reverse engineer SP by removing Stage 1 of the change from some words, thus yielding tokens that appear not to have undergone any of the changes in (5) (e.g. *bjan* : *bǫn* 'feed rack', *jal* : *hǫ̈l* 'space behind the oven/hell').[10] Type 2 repairs sometimes only targeted the vowel in the case that the initial consonant was not recoverable, as in *jamp* : *jǫmp* 'hemp' (Teuchert 1913:36). Free Variation Type 2 was common among younger speakers from Posen and shows that these speakers had some awareness that SP corresponded to plain consonants and vowels of a different quality (Teuchert 1913:36).

2.3 Diphthong Over-generation and Revision

In order to model the rise of Stage 1 diphthongs in an OT framework, three constraints are needed: one promotes diphthongization, one preserves roundness of the input vowel, and one favors retention of the original frontness feature on the initial mora. These are listed in (6).

(6)
- **Δμμ**: Promotes diphthongization and increased featural distance across two morae.
- **Ident-IO ROUND**: Favors outputs which retain the original round feature of the input vowel.
- **Align-L Faith [FRONT]**: Favors retention of the original frontness feature only on the first mora.

[10] The word *hǫ̈l* 'hell' seems to have been borrowed from a different West Germanic language. If *hǫ̈l* were the actual repair, *jǫl* should have been the palatalized variant. This provides evidence that speakers were actually replacing the palatalized variants of words with words from other regions rather than reverse engineering the change.

The broadest generalization that the constraint set must capture is the fact that this change involves vowel unpacking. VOWEL UNPACKING is a type of diphthongization where the original quality of the input vowel is no longer present as a single unit; rather the original features are distributed across two morae (Anderson 1972). Unpacking favors larger distances between two morae than other diphthongization processes such as breaking.[11] Δμμ assigns a maximum of two violations to candidates that do not exhibit either frontness distinction across morae or a maximal height difference across morae. As an entailment, this constraint assigns a critical violation to vowels lacking two morae. Ident-IO ROUND favors outputs which retain the original round feature of the input vowel and incurs a violation for any number of morae that are unfaithful to the

Input [ɛ]	Δμμ	Align-L	Faith[FRONT]	Ident-IO	ROUND
a. ɛ	*!				
b. jɛ	*!				
☞ c. ja					
d. jɔ				*	
e. jœ	*!			*	
f. je	*!				
g. wa		*		*	
h. wɔ	*!	*		**	

Input [œ]	Δμμ	Align-L	Faith[FRONT]	Ident-IO	ROUND
a. œ	*!				
b. jɛ	*!			**	
c. ja				**	
☞ d. jɔ				*	
e. jœ	*!			*	
f. je	*!			**	
g. wa		*		*	
h. wɔ	*!	*			

original round feature.[12] Align-L Faith [FRONT] requires the original frontness feature of the vowel to be on the first mora. These constraints are modeled in Tableaux 1a and 1b.

[11] Minkova & Stockwell (2003) use the constraint HEARCLEAR to capture diphthongization in the Great English Vowel shift. This constraint favors outputs with large perceptual distance between two morae. I use a constraint called Δμμ because perceptual distance necessarily relies on access to a listener's perceptual categories, which is difficult to define diachronically.

[12] PLG retains front rounded vowels (e.g. *tüšo* 'between' cf. Plautdietsch *twischen*) even though they are frequently lost in West Germanic languages spoken outside of

Tableau 1a is the most straightforward: the winning candidate, C, accurately reflects the correct reflex and incurs no violations. Tableau 1b provides evidence that Ident-IO ROUND cannot be the highest ranked constraint or else Candidate D, the correct one, would be out too early in the running. In Tableau 1b, candidates with rounded on-glides are dispreferred because the original frontness feature is not retained on the leftmost mora. There is no clear ranking of Δμμ and Align-L Faith [FRONT].

Although (5) and (6) produce the expected outputs, they over-generate diphthongs across the entire vowel inventory. To eliminate this problem, we need to recognize that diphthongization has a conditioning environment.[13] Example (7) shows that place features of the post-vocalic consonant conditioned diphthongization.

(7)

Input Vowel	PLG	Translation	Consonant
[ɛ]	*ęma*	'receptacle, Eimer'	BILABIAL
[œ]	*šǫ̈ba*	'white bean, Bohne'	BILABIAL
[ɛ]	*tjalǫ*	'to count, zahlen'	CORONAL
[œ]	*zjǫn*	'sun, Sonne'	CORONAL
[ɛ]	*bęęxiŋ*	'berry, Beeren'	DORSAL
[œ]	*brǫ̈ct*	'brought, brachte'	DORSAL

Low vowels only diphthongized if they immediately preceded a coronal. This generalization holds in all three sources. Two surface exceptions to it are *jaap* 'help', which had an *l*, and *jamp* 'hemp', which had an *n* (cf. Old English *hænep*, Russian *конопля*, Greek *κάνναβις*). (8) presents a revised diphthongization rule.

(8) $\begin{Bmatrix} \varepsilon \\ œ \end{Bmatrix} \rightarrow \begin{Bmatrix} ja \\ jɔ \end{Bmatrix} \; / \_\_ C_{[coronal]}$

Diphthongization, which ultimately leads to the rise of SP, occurred in a highly restricted environment. The environment found in PLG is neither relevant to the rise of SP in other varieties of West Germanic which have this feature (e.g. Central Yiddish; Jacobs 1996) nor is it a common

predominantly German speaking regions (e.g. Texas German, Plautdietsch, Pennsylvania Dutch, Central Yiddish, etc.).

[13] Koerth 1913 is aware that umlaut does not condition palatalization (1913:281).

environment cross-linguistically for the rise of SP (Bateman 2007, 2011). The next section explores a similar environment to the one in (8) that historically triggered vowel movement in Lechitic.

3 Lechitic Consonant Influence on Vowel Development

The previous section closed with a descriptively adequate formulation of diphthongization, which feeds SP. This section advances towards the goal of explanatory adequacy by presenting information about VC developments in the Lechitic languages which LG was in contact with during the *Ostsiedlung*. Examples are presented from Polish, Kashubian, and Polabian, but the majority are from Polish because it is the best understood language of the group.

3.1 Lechitic VC Co-Articulation

Historically, Lechitic languages developed leftward-spread of the feature [+BACK] of a coronal consonant on the immediately preceding vowel.[14] This development in Polish is believed to have started in the 9th century and written evidence of adjustments are attested as late as the 13th century (Stieber 1973:24-6). Table 4 provides reflexes of this change in three Lechitic languages.[15]

Coronal[+BACK]		Coronal[-BACK]		Source
świat	world NOM	*świecie*	world LOC	Polish (Rothstein 2002: 696)
kościół	church NOM	*kościele*	church LOC	
miara	measure N	*mierzyć*	measure V	
miasto	town NOM SG	*miesce*	town LOC SG	Kashubian (Stone 2002:768)
l'otü	summer/year	*letě*	summer LOC	Polabian (Polański 2002:806)
corně	black	*carnaićă*	blackberry	
dišętě	tenth	*disąt*	ten	

Table 4: Reflexes of Lechitic Vowel Backing

[14] Stieber (1973) refers to this process as "vowel metaphony before hard dentals".

[15] In Slavic languages, the ogonek represents a nasalized vowel. The vowel ě represents a low front vowel. The breve mark in Polabian represents a short reduced vowel.

Polish and Kashubian synchronically alternate between regular coronal consonants and their palatal counterparts. The Polabian data is obscured by lack of orthographic representation of palatalization on the consonant which triggered the change, but there is still alternation of the vowel. Polabian also differs from the other two Lechitic languages in its treatment of <a> as [-BACK]. The types of changes exemplified in Table 2 also occurred in Sorbian and Eastern Slovak (Stieber 1973:24).

Although we do not know the exact phonetic realization of the [+BACK] segments which triggered the change, if other Slavic languages provide a window into the past, the non-palatal consonants might have been slightly velarized as in current Russian (Padgett 2011). The co-articulatory changes in the Lechitic vowel system can be summed up in (9).

(9) $\left[\begin{matrix} e \\ ę \\ ě \end{matrix}\right] \rightarrow$ [+back] / ____ $C_{[coronal, +back]}$

The constraints that capture Lechitic VC co-articulation are listed in (10).

(10)
- **Ident-IO Cor [±BACK]**: Favors retention of input coronal features.
- **Match (Cor$_\alpha$, V[-HIGH, -BACK], αBACK)**: Triggers feature matching between non-high vowels and coronals.[16]
- **Ident-IO HEIGHT**: Favors retention of the original input height.

In this change, the quality of the vowel depends on whether the following coronal consonant is front or back (i.e., palatal [-BACK], non-palatal [+BACK]). In OT we need two constraints to capture the movement of the vowel to match the following consonant's backness. The first is a faithfulness constraint Ident-IO Cor [±BACK], which incurs a violation if the original coronal changes its quality. The second constraint is a surface markedness constraint, Match (Cor,V[- HIGH -

[16] This feature matching surface constraint is first proposed in Orgun 1995. Today, surface-level feature matching is dealt with in the Agreement By Correspondence (ABC) framework (Rose & Walker 2004). I have not used the ABC framework because some Slavic phonologists have an association of CORR with base-reduplicant (B-R) and input-output (I-O) correspondence. To avoid confusion, I adopt MATCH.

BACK], αBACK), which penalizes non-high vowels that do not match in backness with the immediately following coronal. This constraint is shortened to Match (Cor,V, αBACK) in the tableaux. Lechitic disfavors changes in height, which is captured in the faithfulness constraint Ident-IO Height. Tableaux 2-3 show the output of these constraints in Polish *e* and *ě*. Although there is no discernible ranking of the constraints, I have placed coronal faithfulness as the leftmost constraint because the only features which are eligible to change are vowel features.

Input [eβlα]	Ident-IO Cor[±BACK]	Match (Cor,V, αBACK)	Ident-IO HEIGHT	Input [eβlβα]	Ident-IO Cor[±BACK]	Match (Cor,V, αBACK)	Ident-IO HEIGHT
a. [eβlα]		*		☞ a. [eαlβα]			
b. [eαlβα]	*!			b. [oαlα]	*!		
c. [εβlα]		*	*	c. [εαlβα]			*
☞ d. [oαlα]				d. [oβlβα]		*	
e. [ɔαlα]			*	e. [ɔβlβα]		*	*
f. [aαlα]			*	f. [aβlβα]		*	*

Tableaux 2a and 2b: Mid-High Vowel with [±BACK] Coronal

Input [εβlα]	Ident-IO Cor[±BACK]	Match (Cor,V, αBACK)	Ident-IO HEIGHT
a. [eβlα]		*	*
b. [εβlα]		*	
c. [oαlα]			*
☞ d. [ɔαlα]			
e. [aαlα]			*

Tableau 3: Low Front Vowel with [+BACK] Coronal

In Tableaux 2a and 2b, the winning candidate is the historically correct reflex of the change. In Tableau 3, Candidate D, the winner, has the phonetic realization [ɔ] which goes against the generally accepted view that [ɛ] developed into [a] (Stieber 1973; Carlton 1991:175-177, 252-253; Polański 2002:801). It is possible that the phonetic output actually was [ɔ], but phonemically /a/. It is the commonly accepted view that short [a] in Polish developed into [o] (Stieber 1973:25). This type of vowel raising usually requires an intermediate phase of [ɔ] unless it is conditioned by another process.

3.2 The Role of Language Contact in PLG

There are clear similarities between the PLG diphthongization rule and Lechitic VC co-articulation as shown in rule notation in (11).

(11) *PLG:* $\left\{\begin{matrix}\varepsilon\\ \text{œ}\end{matrix}\right\} \rightarrow \left\{\begin{matrix}\text{ja}\\ \text{jɔ}\end{matrix}\right\}$ / ___$C_{[\text{coronal}]}$

Lechitic: $\left\{\begin{matrix}\text{e}\\ \text{ę}\\ \text{ě}\end{matrix}\right\} \rightarrow$ [+back] / ____$C_{[\text{coronal, +back}]}$

The rule notation given in (11) highlights the similarity of the input and trigger of the change. The trigger is of particular interest because typologically, coronals articulated with a front tongue body, often the default for West Germanic coronals, promote fronting of back vowels (Flemming 2003). Coronals which promote retraction of vowels are those articulated with a back tongue body (Flemming 2003). These tendencies implicate the Slavic [±BACK] distinction as the source of vowel backing.[17]

[17] Most West Germanic languages do not have [±BACK] contrast encoded in the phonology of coronals. While some West Germanic languages have individual coronal phonemes with [±BACK] allophony, e.g. velar and non-velar l, the feature is not present in the full coronal inventory (see Russ 1990). Vocalized reflexes of *l* in PLG, e.g., *jaap* 'help' and *štjaa* 'still', indicate that PLG had velar reflexes of *l* at one point. However, the fact that the velar *l* did not prevent the alveolar *l* from participating in the vowel backing rule indicates that the velar *l* might have arisen after the Lechitic rule was already in place.

The treatment of loan segments in Slavic is best understood in terms of Russian loan phonology literature. This body of research provides evidence that unless a consonant is either already palatal or in the presence of a conditioning vowel, it will be interpreted as [+BACK] in Russian, e.g. *Гёте* [gʲøtʲe] 'Goethe' < Standard German [gø:tə], *ликёр* [lʲikʲor] 'liqueur' < French [likœ:ʁ], but *кок* [kok] 'chef' < Dutch [kɔk] (Padgett 2003, Antonyuk-Yudina 2009).

Russian shows evidence that [+BACK] consonants have some velarization. The degree of velarization in [+BACK] consonants varies, but there is no variation in the degree of palatalization of [-BACK] consonants; either a consonant does or doesn't have palatalization. This implies that unless a loan segment has a cue that it should be considered palatal, it will be shuffled into a set of [+BACK] consonants that can be realized with varying degrees of velarization. For recent borrowings, alveolar consonants are especially susceptible to being interpreted as [+BACK], more so than either dorsal or labial consonants, even if they are in the presence of a [-BACK] vowel (Antonyuk-Yudina 2009, Holden 1976). If one can expand the Russian observations to earlier stages of Lechitic, the basic allophones of West Germanic coronals best correspond to [+BACK] coronals.[18]

The incorporation of VC co-articulation into PLG must still be considered a phonological borrowing and not a phonetic one. If this were a phonetic borrowing, we would expect that all [+BACK] consonants would trigger diphthongization to occur, but only coronal triggers do so.

Taken together, the diphthongization in PLG is most likely due to Source Language Agentivity. Similar to other case studies of Source Language Agentivity, PLG exhibits cross-linguistically marked innovations which occur in otherwise stable part of the grammar.

4 Constraint Integration in Language Contact

As stated in Section 3, the change which takes place in Lechitic languages is triggered by the [±BACK] quality of a coronal interacting with a vowel. Once Lechitic-speakers align the LG consonant inventory

[18] In Modern Polish, the [-BACK] lateral is a non-palatalized alveolar consonant, and the [+BACK] lateral is a labio-velar glide. This is not the case for older stages of Polish; the [-BACK] lateral was a palatalized alveolar, and the [+BACK] lateral was a non-palatalized alveolar.

with their [+BACK] consonant inventory, all one would need for the Lechitic rule to operate in LG would be a coronal following a lower front vowel.

Now that we have accounted for how the Lechitic trigger aligns to the LG consonant inventory, the constraints of the Lechitic change in (10) can be integrated with PLG constraints in (6) with only two revisions. (i) The Match constraint in PLG is revised to target [+LOW -HIGH] vowels and (ii) Δμμ, which leads to over-generation, is removed because it is not the motivation for diphthongization. Diphthongization is actually an artifact of the interaction of the Lechitic Match and the native Faith [FRONT] constraints.

Tableaux 4 and 5 model the integrated constraints. Candidate A represents the output selected by other varieties of LG and Candidate B represents the output selected by Lechitic languages. I have not provided any candidates which violate the coronal identity constraint because the quality of the consonant never changes in either the Germanic or the Lechitic data.

Input [ɛl]	Align-L	Faith[FRONT]	Ident-IO	Cor[±BACK]	Match	(Cor, V, αBACK)	Ident-IO	Round	Ident-IO	HEIGHT
a. $ɛ_{β}l_{α}$					*!					
b. $a_{α}l_{α}$	*!									
c. $j_{β}ɛ_{β}l_{α}$					*!				*	
☞ d. $j_{β}a_{α}l_{α}$					*				*	
e. $j_{β}ɔ_{α}l_{α}$					*		*		*	
f. $j_{β}e_{β}l_{α}$					*!				**	
g. $w_{α}a_{α}l_{α}$	*!						*		*	

Tableau 4: Mid-Low Front Unrounded Vowel with Alveolar

Input [œl]	Align-L Faith[FRONT]	Ident-IO Cor[±BACK]	Match (Cor,V, αBACK)	Ident-IO Round	Ident-IO HEIGHT
a. œβlα			*!		
b. ɔαlα	*!				
c. jβɛβlα			*!	**	*
d. jβœβlα			*!	*	*
e. jβaαlα			*	**	*
☞ f. jβɔαlα			*	*	*
g. jβeβlα			*!	**	**
h. wαɔαlα	*!				*

Tableau 5: Mid-Low Front Rounded Vowel with Alveolar

Both Tableaux 4 and 5 indicate that the native Align-L Faith[FRONT] must outrank the borrowed Match constraint or else the correct candidates would both lose. Additionally, the borrowed Match constraint must be ranked higher than the native Ident-IO ROUND. If Ident-IO ROUND were ranked higher than Match, then Candidate A, the original input, would win in Tableau 5. This gives us the relative constraint ranking Align-L Faith [FRONT]>>Match (Cor,V, αBACK)>> Ident-IO ROUND. There is no indication of a relative ranking of Ident-IO ROUND and Ident IO-HEIGHT.

The pattern that emerges from the constraint rankings is that a native constraint favoring faithfulness to the LG input vowel outranks the Lechitic constraint which mediates the quality of the output vowel. Even scholars who do not work in OT can appreciate the generalization captured by the constraints: Even though the Lechitic pattern of vowel assimilation has been replicated into PLG, it has not overridden the core features of this LG variety. PLG still favors preservation of rounding and frontness of the original input vowel.

The finding that some LG constraints still outrank the borrowed Lechitic constraint also runs counter to what we might expect of Source

Language Agentivity. We would generally expect that changes triggered by Source Language Agentivity are due to the fact that speakers of the source language (Lechitic) are imperfect speakers of the recipient language (LG). Instead, we find that speakers of the source language exhibit sensitivity to features of recipient language, including features which are absent in the Slavic source (i.e., front rounded vowels). This indicates that the contact situation in the Posen region is not as simple as the type of contact scenarios frequently explored in the OT contact literature.

5 Conclusion

The rise of PLG SP is an artifact of diphthongization which developed due to replication of a Lechitic VC co-articulation constraint into LG. Slavic-dominant bilinguals most likely introduced the constraint into LG because diphthongization relies on a non-native [±BACK] contrast to be triggered. Even though LG does not have this contrast, Slavic-dominant speakers could make an equivalence mapping between their conditioning phonemes and the alveolar phonemes of PLG.

Although there is strong evidence that Lechitic-speakers introduced the change into LG, the outcomes of the change differ in the two sets of languages. These differences can be modeled as differences in constraint ranking which suggests that Slavic-speakers who introduced the change into PLG were already sensitive to phonemic properties of LG absent in Lechitic. It is not clear if this is typical of Source Language Agentivity, but the typology of constraint ranking in language contact has not been addressed in OT contact literature and deserves more attention.

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