

CONSTRAINTS ON MULTIPLE FEATURE OCCURRENCE

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Multiple feature occurrences, cross-linguistically attested as undesirable phonological configurations, may be resolved in at least two ways. One is by imposing a requirement that at most one feature of a given type may occur in a linguistic form. Another is by restricting the distribution, rather than the number, of features within a linguistic form; that is, by imposing like distributions on multiple features.

The formal device originally posited for regulating cases of multiple feature occurrence is the Obligatory Contour Principle, or the OCP (Leben 1973, Goldsmith 1976, McCarthy 1986, Itô and Mester 1986, Yip 1988). Cast in a geometrical frame of reference, OCP bans a configuration like (1), which contains two occurrences of feature **F**.

$$1. \quad \begin{array}{cccc} [R_i & R_j & R_k & R_l]_{\delta} \\ & F_j & & F_k \end{array}$$

Both (2) and (3) are reconfigured versions of (1) admitted by the OCP: (2) by virtue of feature deletion, whose effect is dissimilatory in nature, and (3) by so-called feature fusion, which we will refer to as an assimilatory OCP effect.

$$2. \quad \begin{array}{ccc} [R_i & R_j & R_k]_{\delta} \\ & F_j & \end{array}$$

$$3. \quad \begin{array}{cccc} [R_i & R_j & R_k & R_l]_{\delta} \\ & & F_{j,k} & \end{array}$$

The geometrical interpretation of the OCP and its repairs have recently given place to a different perspective, developed within the OT framework (Itô and Mester 1998, also Alderete 1997). Under this view, dissimilatory OCP effects have been construed as a special case of markedness adjustments. For every feature **F** the grammar contains a markedness constraint ***F**. Multiple occurrences of **F**, however, constitute a more serious violation than do single occurrences. This calls for a more austere constraint intervention than that achieved by the cumulative effect of multiple ***F** violations, and is

formally captured by the mechanism of constraint conjunction proposed in Smolensky 1995; in particular, by the self-conjoined constraint $*F^2_{\delta}$, restricted to a local domain, which ranks higher than its simplex version. Multiple feature occurrences are thus construed as a special case of single feature occurrences, subject to the same types of constraints, which however are imposed with greater rigor in the former case than in the latter.

This perspective, developed for dissimilatory OCP effects, will be extended here to assimilatory OCP effects. While the dissimilatory OCP effects lead to the reduction of markedness in linguistic forms, assimilatory OCP effects, I argue, lead to the reduction of syntagmatic contrast. Free distribution of some feature **F** in linguistic constituents maximizes syntagmatic contrast; positional restrictions of various sorts, however, minimize syntagmatic contrast by making the distribution of **F** predictable. Constraints relevant in this case are positional constraints, those that regulate the distribution of features, and have the general form **POSITION-F**. Multiple occurrences of feature **F** will be subject to the same positional constraints as are single occurrences of **F**. These constraints, however, are enforced with greater rigor if more than one **F** is present in a local domain. Constraint conjunction will again be the formal mechanism of choice, with **POSITION-F²_D** playing a crucial role in the evaluation of multiple occurrences of **F**.

In this paper we focus on a language which engenders both the dissimilatory and assimilatory OCP effects: Bulgarian employs different strategies to resolve multiple feature occurrence in different prosodic constituents, a situation excluded in Fukazawa 1999. Within the syllable, multiple features are resolved by virtue of feature deletion, that is, dissimilation which, as already noted, is plausibly interpreted as a reduction of markedness. Within the foot, however, multiple feature occurrences are resolved by reduction of syntagmatic contrast. In the latter case, multiple occurrences of a feature are tolerated only if their distributions are mutually synchronized in a predictable fashion. In both the syllable and the foot, the achieved result is an increase of redundancy, which presents an important general aspect of the phonological organization of linguistic constituents.

The study is couched in Optimality Theory (McCarthy and Prince 1993, 1995; Prince and Smolensky 1993), and organized as follows. Section 1 provides background information about the Bulgarian phonological system. In section 2, I focus on the dissimilatory OCP effect within the syllable; and in section 3, on the assimilatory OCP effect within the foot. Section 4 provides concluding remarks.

1. Relevant aspects of the Bulgarian phonological system

The phonological property we focus on in this study is the distribution of a feature shared by three classes of segments: front vowels, and palatalized and palato-alveolar consonants. This feature, to be referred to here as π , corresponds roughly to “coronal” in Clements and Hume’s 1995 model of segment structure.¹ In order to determine the place

¹ I am assuming minimal segment internal featural organizations, as for example in Padgett 1995.

of this feature in the phonological system of Bulgarian, we present the Bulgarian segment inventory, starting with the inventory of vowels:

4. Vowels:

	front	back	
		unrounded	rounded
high	i		u
mid	e	ɪ	o
	<i>JAT</i>		
low		a	

All Bulgarian vowels are short. The inventory in (4) is a six vowel system, with two front and four back vowels; two of the back vowels are unrounded, the low vowel *a*, and the schwa-like vowel *ɪ*. An additional vocalic segment is *JAT*, a complex low back vowel with a front component. *JAT* is an abstract vowel which, depending on the context, neutralizes with either *a* or *e*.² The vocalic segments associated with the feature π are the front vowels *i* and *e*, as well as the abstract vowel *JAT*.

The set of consonants includes two major classes, palatalized and non-palatalized segments. As shown in (5), labial and coronal consonants (with the exception of the coronal affricate *c*) possess palatalized counterparts, characterized by the feature π . Additionally, palato-alveolar consonants contain a palatal component, again characterized as π .

5. Consonants:

	non-palatalized	palatalized
Labial	p b f v m	pʲ bʲ fʲ vʲ mʲ
Coronal	t d s z c n l r	tʲ dʲ sʲ zʲ nʲ lʲ rʲ
Palato-alveolar	š ž č dž	
Palatal	j	
Dorsal	k g x	

Multiple occurrences of π call for an OCP resolution in both the syllable and the foot, yet as shown in sections 2 and 3, different phonological devices are employed for this purpose in the two prosodic constituents.

2 Syllable-related interactions, or dissimilatory OCP effects

Dissimilatory OCP effects within the Bulgarian syllable bear close resemblance to what has already been established for such cases in the literature (Itô and Mester 1998). The

² *JAT* is a phoneme in reconstructed Common Slavic, with most diverse reflexes in modern Slavic languages (Samilov 1964, Shevelov 1965).

central aspect of the distribution of π within the syllable is that palatalized consonants may not be tautosyllabic with front vowels. If this combination arises due to morpheme concatenation, the palatalization of the consonant is lost, as shown by the alternations in (6)-(8) (as reported in Aronson 1968, Bernard 1957, Maslov 1956, Scatton 1984, Tilkov 1982). In other words, at most one occurrence of π is tolerated within the syllable although, as will be shown, this requirement is not absolute.

2.1 Prohibition against multiple π 's

The lexical forms in (6)-(8) all contain stem-final palatalized consonants. Palatalization on the stem-final consonant survives before suffixes that begin in back vowels, as in the (a) examples of (6)-(8), but is lost before suffixes that begin in a front vowel, as in the (b) examples. Additionally, palatalized consonants may not occur syllable-finally, as in the (c) examples of (6)-(8).³

6. lexical form: *pItj-*

- a. *pÍtjIt* 'the road'
pÍtja 'the roads'
- b. *pIték* 'footpath'
pÍten 'travel (adj.)'
pÍtišta 'roads'
- c. *pIt* 'road'
pÍtnik 'traveler'

7. lexical form: *konj-*

- a. *kónjIt* 'the horse'
kónjo 'horse (voc.)'
- b. *koné* 'horses'
kónen 'equestrian'
- c. *kon* 'horse'
kónski 'horse-like'

³ Stems ending in a non-palatalized consonant do not exhibit alternations of the type exemplified in (6) – (8). The stem in (6), *pItj-*, contrasts with the lexical form *brat-*, which ends in a non-palatalized *t*. This consonant is realized as unpalatalized in all environments: before suffixes beginning with a front vowel (*bráte* 'brother (voc.)', *brátec* 'brother' (dim.)), and before those that begin in a back vowel (*brátIt* 'the brother', *brátov* 'brother's'), as well as in word final position (*brat* 'brother'). The stem in (7), *konj-* contrasts with the stem *ston-* (*stónIt* 'the moan', *stóna* 'the moans', *stónove* 'moans', also *ston* 'moan'); and the stem in (8), *kralj-* with *stol-* (*stóllIt* 'the chair', *stolóve* 'chairs', also *stol* 'chair'); in both cases the final consonant is realized as unpalatalized in all environments.

8. lexical form: kral̩|
- a. král̩|It ‘the king’
král̩|ja ‘the king’
 - b. kralé ‘kings’
kralíca ‘queen’
 - c. kral ‘king’

That this is indeed a case of syllable-bounded distributional restriction, rather than a prohibition against adjacency, is shown by (9), in which the front vowel *e* and the palatalized consonant *nʲ* may occur next to each other, precisely because they are heterosyllabic:

9. denʲ|It ‘the day’

2.2 Constraints on palatalized consonants

Prohibition against multiple π 's within the syllable is plausibly viewed as a dissimilatory OCP effect. Multiple feature occurrences are subject to the same types of constraints as are occurrences of single features; in this case, to markedness constraints. The considerably stronger markedness effect in the case of multiple features is captured formally by the mechanism of constraint conjunction.⁴

In order to account for the alternations in (6)-(8), two markedness constraints on the feature π are invoked: the simplex constraint in (10), which registers any instantiation of π as increase in markedness, and the self-conjoined version of this constraint, with the syllable as its domain in (11), which registers violations incurred by multiple, in this case, two, occurrences of π . Here we recapitulate the argument for positing both (10) and (11) presented in Itô and Mester 1998.

10. Simplex markedness constraint: $*\pi$
11. Self-conjoined markedness constraint: $*\pi^2(\sigma)$

Interpretation: $*\pi^2(\sigma)$ is violated if and only if each simplex constraint is violated within the domain of the syllable.

⁴ The mechanism of constraint conjunction is defined as follows in following Itô and Mester 1998:

Local conjunction of constraints

- a. Definition: If **P** and **Q** are members of the constraint set CON, then their local conjunction **P&_δQ** is also a member of CON.
- b. Interpretation: **P&_δQ** is violated if and only if both **P** and **Q** are violated in some domain **δ**.
- c. Ranking (universal): **P&_δQ** >> **P, Q**
- d. Domain: **P&_δQ** is assigned some domain **δ** which corresponds to a constituent in the grammar (phonological or morphological)

The special relation between (10) and (11) is captured by the ranking in (12) (see note 4), according to which a violation of (11) is of greater consequence than a dual violation of (10).

12. Ranking: $*\pi^2(\sigma) \gg * \pi$

This effect becomes obvious through interaction with a faithfulness constraint ranked higher than $*\pi$, and lower than $*\pi^2(\sigma)$. The relevant faithfulness constraint is **IDENT- π** in (13), which requires that any π bearing segment in the input have a faithful correspondent in the output (McCarthy and Prince 1995):

13. **IDENT- π** Correspondent segments have identical specifications for the feature π .

We focus first on the interactions of **IDENT- π** with the simplex markedness constraint $*\pi$. The ranking **IDENT- π** \gg $*\pi$ gives the desired result if the form under evaluation contains only a single occurrence of π , as in (14), but not if the evaluated form contains two such occurrences, as in (15). In the latter case, the selected output form, which contains two occurrences of π , does not correspond to the actual output, which should be (15a).

14. **IDENT- π** \gg $*\pi$

kón]It	IDENT-π	$*\pi$
L a. kón]It		*
b. kónIt	*!	

15. **BUT: IDENT- π** \gg $*\pi$ gives a wrong result:

kón]e	IDENT-π	$*\pi$
7 a. koné	*!	*
L b. kon]é		* *

This brings in the self-conjoined version of the markedness constraint on π . As shown in (16), the correct result is achieved with the self-conjoined markedness constraint ranking

higher than the simplex one; and the faithfulness constraint **IDENT- π** ranking lower than the former, and higher than the latter.

16. *** $\pi^2(\sigma)$** >> **IDENT- π** >> *** π**

konjé	* $\pi^2(\sigma)$	IDENT- π	* π
L koné		*	*
konjé	*!		**

Thus far, we have shown that at most one π is permitted within the syllable, at the cost of loss of faithfulness. Next, we need to ensure that the optimal output form is *koné* rather than **konjó*, that is, that the rightmost π survives. Thus, what needs to be encoded in the grammar is that the preferred locus for π is to coincide with the syllable nucleus. To capture this, we invoke the positional constraint on π in (17), of the type proposed in Zoll 1996.⁵

17. **COINCIDE (π, σ_{NUC})**

Each occurrence of π should be associated with a syllable nucleus.

In (18), this constraint selects the winner among candidates (18a) and (18b), which both satisfy *** $\pi^2(\sigma)$** but tie on **IDENT- π** , which they both violate. Candidate (18c) is eliminated by virtue of violating the self-conjoined markedness constraint.

18. *** $\pi^2(\sigma)$** >> **IDENT- π , COINCIDE (π, σ_{NUC})**

konjé	* $\pi^2(\sigma)$	IDENT- π	COINCIDE (π, σ_{NUC})
L a. koné		*	
b. konjó		*	*!
c. konjé	*!		*

⁵ This constraint could equally well be stated as **COINCIDE (π, μ)**, since all Bulgarian syllables are light, and the only mora within the syllable necessarily corresponds to the nucleus. The phonological contrast between light and heavy syllables is not relevant for the Bulgarian phonological system: the Bulgarian vowel inventory includes only short vowels, and consonants do not contribute to weight.

In tableau (19) we establish the mutual ranking of **IDENT- π** and **COINCIDE (π, σ_{NUC})**: the positional constraint ranks lower than the faithfulness constraint and, therefore, does not have the power to alter the featural content of a segment. Thus, if only one π -bearer occurs within the syllable, its π will be realized in the output at the cost of violating the positional constraint, as in the winning candidate (19a):

19. **IDENT- π >> COINCIDE (π, σ_{NUC})**

kónjo	IDENT-π	COINCIDE (π, σ_{NUC})
L a. kónjo		*
b. kóne	* ! *	

In sum, the positional constraint **COINCIDE (π, σ_{NUC})** crucially affects the selection of the winner only when some higher ranked constraint, in this case $*\pi^2(\sigma)$, overrides the effect of **IDENT- π** , as in tableau (18).

2.3 Constraints on palato-alveolar consonants

The generalizations presented thus far are relevant only for the set of palatalized consonants. Palato-alveolar consonants (š, ž, ě) are not subject to comparable distributional restrictions. They may be tautosyllabic with both back and front vowels, as shown in the (a) and (b) examples of (20) and (21), and may occur in syllable-final position, as in the (c) examples:

20. lexical form: *mIž*

- a. mIžít ‘the man’
- b. mIžéc ‘man (dim)’
- c. mIž ‘man’

21. lexical form: *pljuš*

- a. pljušIt ‘the velvet’
- b. pljušen ‘made of velvet’
- c. pljuš ‘velvet’

In order to accommodate these cases, **IDENT- π** needs to be split into two constraints, (22) and (23), the former affecting primary, and the latter, secondary place of articulation in consonants (Clements and Hume 1995). While (23) is relevant for both front vowels and

secondary consonantal articulations, i.e., palatalized consonants, (22) is relevant only for the set of palato-alveolar consonants.

22. **IDENT- π [C-place]** relevant for palato-alveolar C's

23. **IDENT- π [V-place]** relevant for palatalized C's

Faithfulness of π as primary place, captured by constraint (22), outranks the markedness constraint $*\pi^2(\sigma)$ and, as a result, the set of palato-alveolar consonants may combine with front vowels, as shown in (24):

24. **IDENT- π [C-place] >> $*\pi^2$ >> IDENT- π [V-place]**

mIžé	IDENT-π[C]	$*\pi^2(\sigma)$	IDENT-π[V]	$*\pi$
L a. mIžé		*		**
b. mIžé	*!			*

But, faithfulness of π as a secondary consonantal place, captured by (23), is outranked by the markedness constraint $*\pi^2(\sigma)$ and, as a result, palatalized consonants may not be tautosyllabic with front vowels, as shown in (25):

25. **IDENT- π [C-place] >> $*\pi^2$ >> IDENT- π [V-place]**

konjé	IDENT-π[C]	$*\pi^2(\sigma)$	IDENT-π[V]	$*\pi$
L a. konjé			*	*
b. konjé		*!		**

2.4 Summary

Constraints crucial for regulating the distribution of π within the syllable are the simplex and self-conjoined markedness constraints, as well as faithfulness constraints, on π . To complete the picture, we add the coda constraint in (26), which affects consonants characterized by π :

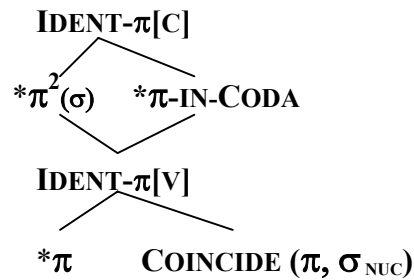
26. **$*\pi$ -IN-CODA**

A [+consonantal] segment bearing the π feature is prohibited in the coda.

By ranking this constraint higher than **IDENT- π [V-place]** but lower than **IDENT- π [C-place]** we achieve the desired effect: that only those consonants in which π corresponds to the secondary place lose this feature in the coda.

The summary of constraint rankings established thus far is given in (27):

27. Constraint rankings established by now:



The effect of these constraints is to prevent multiple occurrences of π within the syllable when π functions as a vocalic, but not as a consonantal, place feature.

3 Foot-related interactions, or assimilatory OCP effects

We now turn to the distribution of multiple π 's within the foot, which in Bulgarian is of the trochaic type.⁶ In this prosodic constituent, multiple π occurrences are constrained in a markedly different way from what has been evidenced for the syllable. While at most one (vocalic) π may occur within the syllable, multiple π 's are tolerated within the foot. The co-occurring π 's, however, are subject to the assimilatory OCP effect, whose impact is to enforce mutually synchronized distributions on phonologically similar segments. Its overall effect, as will be shown, is a reduction of syntagmatic contrast within the foot.

The special positional effect triggered by the co-presence of multiple π 's within the foot is of a fairly limited scope. It is evidenced in one specific case: in those forms which contain the abstract vowel JAT (listed in the vowel inventory in (4)), which possesses a π component. It is only when a JAT shares a foot with another π -bearing segment that the positional effects to be detailed here are manifest. When two regular π -bearing segments share a foot, their distributions are not subject to such special positional effects.

⁶ Bulgarian syllables are all monomoraic (see note 4) and, as a consequence, trochaic feet are minimally disyllabic. In words that correspond to a single syllable or bear final stress, we do have to posit monosyllabic feet; these, however, have to be analyzed as subminimal, monomoraic feet. While stress in Bulgarian is associated with trochaic feet, which are headed by the stress-bearing syllable, the distribution of stress is not of the predictable type. The place of stress is to a large extent lexically governed.

3.1 Positional restrictions on JAT's π

That heavier positional restrictions are imposed on multiple, than on single occurrences of π within the foot is demonstrated by the phonological alternations to be presented below. The central player is, of course, the abstract vowel JAT which, depending on the context, is realized as either *a* or *e*. We digress briefly to expound on the representation of this abstract segment. JAT will be treated here as a degenerate diphthong, consisting of two components, one corresponding to a segment, and the other to a floating π co-indexed with it:

28. Representation of JAT: a_i
 π_i

In (28), the low vowel component is to be characterized as back, since the only low vowel in the Bulgarian vocalic inventory is back (as in (4)). The floating feature π has to be characterized as front. What makes JAT a diphthong is that it includes both a front and a back component; what makes it an abstract diphthong is that only one may be realized on the vowel itself.

Forms listed in (29) – (31) illustrate the realization of JAT (Maslov 1956, Aronson 1968, Bernard 1957, Maslov 1956, Scatton 1984, Tilkov 1982).⁷ In the (a) and (b) examples, the subsegment is the only π in the form, and therefore, also the only π in the foot. Where this abstract segment is realized in the string is governed entirely by the place of stress: π is realized on the vowel it is co-indexed with, making it front, if that vowel is unstressed, as in the (a) examples of (29)-(31); and on the onset of the preceding consonant, making it palatalized, if that vowel is stressed, as in the (b) examples.

In the (c) examples of (29)-(31), JAT's π is invariably realized on the nucleus. Of central relevance, here, is the fact that the π 's docking site is sensitive to the presence of another π -bearer: a front vowel as in *léten* in (29c); a palatalized consonant as in *méri'a* (30c); and a palatal consonant as in *slépčō* in (31c).

29. lexical form: l a_i t
 π_i
 a. letá 'summers (N, Pl)'
 b. l'áto 'summer (N, Sg)'
 c. léten 'summer (Adj, Sg, Masc)'

30. lexical form: m a_i r
 π_i
 a. merílo 'measuring standard (N, Sg)'

⁷ A comment is in order at this point regarding the representation of JAT. Since JAT may appear in a non-initial syllable of the root, as in (32), co-indexing in the lexical form is unavoidable. A further example with JAT in the second syllable of the root is *kol'áno* 'knee-Sg', *koléni* 'knee-Pl', *kolená* 'knee Pl/Collective'.

- b. mǎra ‘measure (N, Sg)’
- c. mǎra ‘(I) measure’

31. lexical form: s l a_i p

- a. slepotá ^{π_i} ‘blindness (N, Sg)’
- b. slǎpa ‘blind (Adj, Sg, Fem)’
- c. slépčo ‘blind man (N, Sg)’

In all forms in the (c) set, JAT is the bearer of stress. An unstressed JAT may also co-occur with another π -bearer, and in this case as well, JAT’s π is realized on the nucleus. One such case is (32a), in which stress falls on the syllable immediately preceding JAT. In (32b) JAT is stressed, and therefore its π is realized on the preceding consonant; and in (32c), JAT’s π is realized on the nucleus because a stressed JAT is followed by a palatal consonant.

32. lexical form: b e l a_i g

- a. béleg ^{π_i} ‘mark (N, Sg)’
- b. belǎzax ‘(I) marked’
- c. belězka ‘note (N, Sg)’

To complete the set of cases with an unstressed JAT sharing a foot with another π -bearer, we turn to verbal paradigms. In one particular conjugation class JAT figures as a theme vowel in the imperfect tense. In verbs with stress on the theme vowel, the JAT theme is realized as *a*, as in *letǎx* ‘I flew’, or as *e*, if another π -bearer follows as in *letése* ‘he flew’. In verbs with stress on the root, the JAT theme, being unstressed, is realized as *e*, as in *nósex* ‘I carried’, *nóseše* ‘he carried’ (Pashov 1966, Hauge 1999). Relevant for us are cases of verbs of the latter shape, with stress on the root; and additionally, with a π -bearer in the first syllable. We list three such cases: (33), with a front vowel in the first syllable, and (34) and (35), with a palatalized and palatal consonant, respectively. In all three cases, JAT’s π is realized on the nucleus.

33. lexical form: b é l a_i

- a. bélex ^{π_i} ‘(I) whitened’
- b. béleše ‘(he) whitened’

34. lexical form: l’ú b a_i

- a. l’úbex ^{π_i} ‘(I) loved’
- b. l’úbeše ‘(he) loved’

35. lexical form: $\check{c} \acute{u} d a_i$
- | | | |
|----|---------------------------------------|-----------------|
| | π_i | |
| a. | $\check{c} \acute{u} d e x$ | ‘(I) wondered’ |
| b. | $\check{c} \acute{u} d e \check{s} e$ | ‘(he) wondered’ |

The relevant domain for special effects brought about by the co-presence of two π -bearing segments is the foot, rather than some larger domain, as shown by the contrast in (36):

36. a. $l \acute{e} t e n$ ‘summer (Adj, Sg, Masc)’
 b. $l \acute{í} a t o \check{s} e n / *l \acute{e} t o \check{s} e n$ ‘of last summer (Adj, Sg, Masc)’

While in (36a) the *a/e* alternation proceeds as expected, with JAT’s π realized as *e* in the presence of another π -bearer, this is not so in (36b). This is because the second π -bearer shares a foot with JAT in (36a) but not in (36b), as explicitly shown in (37):

37. a. $(l \acute{e} t e n) \phi$
 b. $(l \acute{í} a t o) \phi \check{s} e n$

All alternations presented here are restricted only to JAT. Forms with a regular *a* do not exhibit such alternations, as shown in (38)-(39). Thus in (38a), the initial sequence corresponds to a palatalized consonant followed by a stressed *a*; this sequence remains unaltered if stress shifts to a following syllable, as in (38b). That is, the resulting form is not **devolít*, as would be the case if this form contained a JAT.

38. lexical form: $d \acute{í} a v o l$
- | | | |
|----|-----------------------------------|----------------------|
| a. | $d \acute{í} a v o l$ | ‘devil’ (N, Sg)’ |
| b. | $d \acute{í} a v o l \acute{í} t$ | ‘the devil’ (N, Sg)’ |

Likewise, a stressed low vowel preceded by a palatalized consonant in *pol’ána* ‘meadow’ in (39a) remains unaltered when, due to morphological alternation, a π -bearer appears in the following syllable, as in (39b). Again, the resulting sequence is not **poléni*, as would be expected in JAT forms.

39. lexical form: $p o l \acute{í} a n$
- | | | |
|----|-------------------------|------------------|
| a. | $p o l \acute{í} a n a$ | ‘meadow (N, Sg)’ |
| b. | $p o l \acute{í} a n i$ | ‘meadow (N, Pl)’ |

To conclude, a regular π is not sensitive to the presence of another π -bearer, while JAT’s π is. This is because JAT’s π escapes the effect of the **IDENT- π** constraints, which preclude any arrangement of π -bearers in the foot that inflicts faithfulness violations on segments. JAT’s π , which is affiliated with a segment by virtue of co-

indexing, is subject to an idiosyncratic faithfulness constraint, distinct from the **IDENT- π** family, as will be detailed in section 3.2.

3.2 Analysis

In the account to be proposed here, we clearly differentiate between those cases in which JAT's π is the only π in the form, and those in which it co-occurs with another π -bearer. In both cases, the distribution of JAT's π is governed by the set of positional constraints on π . Just like markedness constraints, positional constraints are subject to self-conjunction. Thus, strengthened positional effects on π in the case of multiple π occurrences will be captured by virtue of constraint conjunction.

In 3.2.1 we address the mechanism for including JAT's π into the output. The distribution of JAT's π in the case of single π occurrences is captured in 3.2.2, and in the case of multiple π occurrences, in 3.2.3.

3.2.1 The inclusion of JAT's π into the output

As represented in (28) above, the complex segment JAT consists of two components, one corresponding to a segment, and the other, to a floating π co-indexed with it. The π component of JAT will be analyzed here as a subsegment, in the sense of Zoll 1996. Subsegments differ from linked features by virtue of different faithfulness requirements. Thus, while a linked π feature is subject to the **IDENT- π** constraints proposed in section 2, the inclusion of subsegment π into the output is regulated by the following constraint (Zoll 1996):

40. **MAX- π (SUBSEG)** Every subsegment π in the input has a correspondent in the output.

Subsegment π obligatorily appears in the output; that is, the constraint **MAX- π (SUBSEG)** is undominated. Moreover, this constraint interacts only with the markedness constraint *** π** . Subsegment π is included into the output at the cost of a markedness violation since, as shown in (41), **MAX(SUBSEG)** ranks higher than the markedness constraint *** π** :

41. **MAX- π (SUBSEG) >> * π**

l a _i t á π_i	MAX-π (SUBSEG)	*π
L a. letá		*
b. latá	*!	

But while this constraint enforces the output realization of subsegment π , it in no way fixes its position in the string. As already documented, subsegment π exhibits some, albeit limited, measure of mobility: while it does not have to be realized on the segment it is co-indexed with, it does have to be realized in its close proximity. If subsegment π is not realized on the segment it is co-indexed with, that is, on JAT itself, it must dock on a segment tautosyllabic with JAT. The options thus are: the syllable's nucleus (that is, JAT), its onset, or its coda. The coda is excluded, due to the constraint *** π -IN-CODA**, posited in (26), which prohibits palatalized consonants in the coda, and is surface true. The remaining positions then are the onset and the nucleus; the former is favored in the (b) set, and the latter in the (a) and (c) sets of (29)-(31), as well as in (33)-(35). This will be captured in sections 3.2.2 and 3.2.3, by positing positional constraints responsible for the distribution of this feature.

In sum, the docking site of subsegment π , while circumscribed by co-indexing, is controlled by the set of positional constraints on this feature.

3.2.2 Single occurrences of π in the foot

The distribution of subsegment π , as already noted, is governed by positional constraints on π , those which minimize syntagmatic contrast. The (a) and (b) forms in (29) – (31) provide crucial insight into the role of prosodic constituents, the syllable and the foot, in the positioning of π . We first focus on the (a) forms, those in which the syllable, but not the foot, steers the distribution of π , and then turn to the (b) forms, which elucidate the role of the foot. In addition to positional constraints, two other types of constraints need to be invoked: the faithfulness and markedness constraints on π .

The constraint responsible for regulating the distribution of π within the syllable is the positional constraint **COINCIDE (π , σ_{NUC})**, which we have already seen at work in section 2. In tableaux (18) and (19), it selects as optimal the candidate with a π -bearing segment in the syllable nucleus, and eliminates the candidate with a π -bearer in the onset.

In tableau (42), the evaluated form is *letá* in (29a). The winner has to satisfy both the faithfulness and the positional constraint; that is, **COINCIDE (π , σ_{NUC})** and **MAX- π (SUBSEG)** do not interact with each other.

42. **MAX- π (SUBSEG)** and **COINCIDE (π , σ_{NUC})** do not interact:

$l a_i t \acute{a}$ π_i	MAX-π (SUBSEG)	COINCIDE (π, σ_{NUC})
L letá		
l̥atá		*!
latá	*!	

The (b) forms in (29) – (31), those in which JAT is stressed, shed light on the influence exerted by the foot on the docking site of subsegment π . The fact that, in a stressed syllable, subsegment π docks on the onset will be interpreted as a requirement for the π -marking of the foot's left edge. This is encoded by positing an alignment constraint, as in (43):

43. **ALIGN (π , ϕ_{LEFT})**

Align π with the left edge of the foot.

Tableaux (44) and (45) show that the positional constraint **ALIGN (π , ϕ_{LEFT})**, which makes reference to the foot, outranks the positional constraint **COINCIDE (π , σ_{NUC})**, which makes reference to the syllable. The evaluated forms are *l̥áto* in (29b) and *míara* in (30b):⁸

⁸ **ALIGN (π , ϕ_{LEFT})** is not observed by forms like *koné* in (7b) above, in which a regular π is eliminated from the syllable onset rather than the nucleus, under the pressure of $*\pi^2(\sigma)$. However, the form **kon'á*, while satisfying **ALIGN (π , ϕ_{LEFT})**, incurs more faithfulness violations than does *koné*. While **kon'á* violates both **IDENT- π [V]** and **IDENT[high]**, *koné* fares better by violating only the former. Thus, **ALIGN (π , ϕ_{LEFT})**, which ranks below any **IDENT-F** constraints, can affect the distribution of JAT's π , but not the distribution of a regular π . Moreover, forms like *s'lápa* in (31b) fare better than **s'lápa* because **ALIGN (π , ϕ_{LEFT})** is overridden by a constraint prohibiting palatalized consonants in any position other than the prevocalic one; *** π -IN-CODA** in (26) is a special case of this more general constraint.

44. **ALIGN** (π , ϕ_{LEFT}) >> **COINCIDE** (π , σ_{NUC})

l á _i t o π_i	ALIGN (π , ϕ_{LEFT})	COINCIDE (π , σ_{NUC})
L a. (lájato) _ϕ		*
b. (léto) _ϕ	*!	

45. **ALIGN** (π , ϕ_{LEFT}) >> **COINCIDE** (π , σ_{NUC})

m á _i r a π_i	ALIGN (π , ϕ_{LEFT})	COINCIDE (π , σ_{NUC})
L a. (májara) _ϕ		*
b. (méra) _ϕ	*!	

Unlike JAT's π , regular π features do not exhibit mobility in response to the requirement imposed by **ALIGN** (π , ϕ_{LEFT}), or by **COINCIDE** (π , σ_{NUC}) for that matter. The forms in (46) (same as (37)) contain only regular π features, and their distribution is governed entirely by the **IDENT- π [V]** constraint, which ranks higher than any positional constraints on π .

46. lexical form: dǎvol
 a. dǎvol 'devil' (N, Sg)
 b. dǎvolít 'the devil' (N, Sg)'

The two forms listed in (46) fully adhere to **IDENT- π [V]**. While (46a), incidentally, also satisfies **ALIGN** (π , ϕ_{LEFT}), which requires π -marking of the foot's left edge, the form in (46b) does not meet either of the two positional constraints on π . In the initial syllable, which is unstressed, the presence of π on the onset rather than the nucleus violates **COINCIDE** (π , σ_{NUC}); and the final, stressed syllable, while containing a π -bearing nucleus, in compliance with **COINCIDE** (π , σ_{NUC}), fails to have a π -marked onset, and thus violates **ALIGN** (π , ϕ_{LEFT}). Yet any adjustments that would lead to better satisfaction of the positional constraints (e.g. **devolít*, **devol'át*) would lead to fatal violations of **IDENT- π [V]**.

However, the two positional constraints which govern the distribution of single occurrences of π in syllables and feet are not sufficient to account for the distribution of subsegment π in the presence of another π -bearer. Constraints introduced thus far do not

yield the correct result in this case. This is shown in the following tableau, figuring *mérja* in (30c):

47. **ALIGN** (π , ϕ_{LEFT}) >> **COINCIDE** (π , σ_{NUC}) gives a wrong result:

m á _i r ^j a π_i	ALIGN (π , ϕ_{LEFT})	COINCIDE (π , σ_{NUC})
7 a. (mérja) _φ	* !	
L b. (mjárja) _φ		*

In the next section we turn to characterizing special effects in forms in which JAT's π co-occurs with another π -bearing segment. These effects, I argue, are brought about by the self-conjoined version of the positional constraint **COINCIDE** (π , σ_{NUC}).

3.2.3 Multiple occurrences of π in the foot

Before presenting an account of how the locus of JAT's π is affected by the presence of another π -bearer, we first inspect the relevant cases. Listed in (48) are forms in the (c) set of (29) – (31). In each, JAT occupies the initial syllable of the foot, and coincides with stress. In column A, which lists the actual forms, JAT's π docks on the nucleus. Forms in column B, with JAT's π on the onset, are all ill-formed. Yet, if a stressed JAT is the only π -bearer in the foot, its π docks on the onset, as we saw in the previous section. From this I conclude that the positional constraint **COINCIDE** (π , σ_{NUC}) operates with greater strength when more than one π is present in the foot.

48. JAT in the foot's 1st syllable

	input form	A. JAT's π in nucleus	B. JAT's π in onset
a. (29c)	l á _i t e n π_i	(l é _π t e _π n) _φ	*(l ^j _π á t e _π n) _φ
b. (30c)	m á _i r ^j a π_i	(m é _π r ^j _π a) _φ	*(m ^j _π á r ^j _π a) _φ
c. (31c)	s l á _i p č o π_i	(s l é _π p č _π o) _φ	*(s l ^j _π á p č _π o) _φ

Next, we turn to cases with an unstressed JAT in the second syllable of the foot, presented in (49). The form in (49a) corresponds to (33a) above, and has a front vowel in the first syllable; (49b), with a palatalized consonant in the first syllable corresponds to (34a), and (49c), with a palatal consonant, to (35a).

49. JAT in the foot's 2nd syllable

	input form	A. JAT's π in nucleus	B. JAT's π in onset
a. (33a)	b é l a _i x π_i	(b é _{π} l e _{π} x) _{ϕ}	*(b é _{π} l ^j _{π} a x) _{ϕ}
b. (34a)	l ^j ú b a _i x π_i	(l ^j _{π} ú b e _{π} x) _{ϕ}	*(l ^j _{π} ú b ^j _{π} a x) _{ϕ}
c. (35a)	č ú d a _i x π_i	(č _{π} ú d e _{π} x) _{ϕ}	*(č _{π} ú d ^j _{π} a x) _{ϕ}

In this set, again, JAT's π docks on the nucleus, as in column A. This positioning is consistent with attributing greater strength to **COINCIDE** (π , σ_{NUC}) when the foot contains multiple occurrences of π .

Thus, in order to account for the distribution of multiple π 's in the foot, I posit the following self-conjoined constraint, with the foot as its domain:

50. Self-conjoined positional constraint: **COINCIDE** (π , σ_{NUC})²(ϕ)

Interpretation: **COINCIDE** (π , σ_{NUC})²(ϕ) is violated if and only if each simplex constraint is violated within the domain of the foot.

This constraint is interpreted disjunctively: it is satisfied when at least one π within the foot coincides with a syllable nucleus. By ranking this self-conjoined constraint below any **IDENT- π** constraint, as in (51), we ensure that it induces adjustments in only those forms in which one of the co-occurring π 's originates from JAT.

51. **IDENT- π** >> **COINCIDE** (π , σ_{NUC})²(ϕ)

This self-conjoined constraint will of course be ranked higher than its simplex version. It will also rank higher than **ALIGN** (π , ϕ_{LEFT}), whose effect it crucially neutralizes when the foot contains multiple π 's. These rankings are given in (52):

52. **COINCIDE** (π , σ_{NUC})²(ϕ) >> **ALIGN** (π , ϕ_{LEFT}) >> **COINCIDE** (π , σ_{NUC})

The functioning of the self-conjoined positional constraint is shown in tableaux (53) and (54) which present, respectively, the evaluation of *mérja* in (48b) and *slépčo* in (48c). Note that the pattern of evaluation for *mérja*, which contains a palatalized consonant, is identical to that for *slépčo*, which contains a palatal consonant. In these tableaux, candidate (a) wins over candidate (b) by satisfying **COINCIDE** (π , σ_{NUC})²(ϕ): while one of the two π 's coincides with the nucleus in the (a) candidates, neither does in the (b) candidates. The remaining two constraints are not relevant for evaluating these forms.

53. **COINCIDE** $(\pi, \sigma_{\text{NUC}})^2(\phi) \gg$ **ALIGN** $(\pi, \phi_{\text{LEFT}}) \gg$ **COINCIDE** $(\pi, \sigma_{\text{NUC}})$

m á _i r̥ ^j a π_i	COINCIDE $(\pi, \sigma_{\text{NUC}})^2(\phi)$	ALIGN $(\pi, \phi_{\text{LEFT}})$	COINCIDE $(\pi, \sigma_{\text{NUC}})$
L a. (mér̥ja) _ϕ		*	*
b. (már̥ja) _ϕ	* !		**

54. **COINCIDE** $(\pi, \sigma_{\text{NUC}})^2(\phi) \gg$ **ALIGN** $(\pi, \phi_{\text{LEFT}}) \gg$ **COINCIDE** $(\pi, \sigma_{\text{NUC}})$

s l á _i p ě o π_i	COINCIDE $(\pi, \sigma_{\text{NUC}})^2(\phi)$	ALIGN $(\pi, \phi_{\text{LEFT}})$	COINCIDE $(\pi, \sigma_{\text{NUC}})$
L a. (slépěo) _ϕ		*	*
b. (slápěo) _ϕ	* !		**

We now turn to the evaluation of forms in (49), in which JAT is unstressed. In (55) we present the selection of the winning candidate for (49a). Both (55a), with JAT's π in the nucleus, and (55b) with JAT's π on the preceding onset, satisfy the self-conjoined positional constraint: candidate (a) by incurring no violations, and candidate (b) by incurring a single violation, of this constraint. This creates a tie, which is replicated by **ALIGN** $(\pi, \phi_{\text{LEFT}})$, and eventually resolved by the simplex **COINCIDE** constraint.

55. **COINCIDE** $(\pi, \sigma_{\text{NUC}})^2(\phi) \gg$ **ALIGN** $(\pi, \phi_{\text{LEFT}}) \gg$ **COINCIDE** $(\pi, \sigma_{\text{NUC}})$

b e l a i g π_i	COINCIDE $(\pi, \sigma_{\text{NUC}})^2(\phi)$	ALIGN $(\pi, \phi_{\text{LEFT}})$	COINCIDE $(\pi, \sigma_{\text{NUC}})$
L a. (bélex) _ϕ		*	
b. (béljax) _ϕ		*	* !

Tableau (56) evaluates the form in (49b), with a palatalized consonant in the first syllable. This form exhibits the same evaluation pattern as (49c), which has a palatal consonant in the first syllable.

56. **COINCIDE** (π , σ_{NUC})²(ϕ) >> **ALIGN** (π , ϕ_{LEFT}) >> **COINCIDE** (π , σ_{NUC})

$\overset{i}{\pi}$ ú b a _i x	COINCIDE (π , σ_{NUC}) ² (ϕ)	ALIGN (π , ϕ_{LEFT})	COINCIDE (π , σ_{NUC})
L a. ($\overset{i}{\pi}$ úbex) _{ϕ}			*
b. *($\overset{i}{\pi}$ úbax) _{ϕ}	* !		**

The crucial role of the self-conjoined positional constraint is to override the effect of **ALIGN** (π , ϕ_{LEFT}), and this is precisely what we saw in tableaux (53)-(54). Tableaux (55)-(56) present candidates whose stressed syllable contains a regular π which, due to the agency **IDENT- π** constraints, cannot be regulated by the positional constraints **ALIGN** (π , ϕ_{LEFT}). Due to this, the self-conjoined positional constraint either repeats the effect of its simplex version, as in (56), or leaves the ruling to the simplex constraint, as in (55).

However, the self-conjoined constraint is not sufficient to override the effect of **ALIGN** (π , ϕ_{LEFT}) in the case of *léten* in (48a), as shown in tableau (57). Here, both candidates satisfy the self-conjoined positional constraint: candidate (a) by incurring no violations, and candidate (b) by incurring a single violation. Due to this tie, the effect of the self-conjoined constraint is neutralized, and the winner is selected by the next lower-ranked constraint, **ALIGN** (π , ϕ_{LEFT}), which favors candidate (b), with π -marking on the left edge of the foot. Yet, the winner should be candidate (a), with JAT's π in the syllable nucleus.

57. **COINCIDE** (π , σ_{NUC})²(ϕ) >> **ALIGN** (π , ϕ_{LEFT}) >> **COINCIDE** (π , σ_{NUC})

l á _i t e n (32c)	COINCIDE (π , σ_{NUC}) ² (ϕ)	ALIGN (π , ϕ_{LEFT})	COINCIDE (π , σ_{NUC})
7 a. (léten) _{ϕ}		* !	
L b. (ljáten) _{ϕ}			*

This calls for a further constraint on the distribution of multiple π 's in linguistic forms, one which evaluates the relative harmony of those candidates which satisfy **COINCIDE** (π , σ_{NUC})²(ϕ). The dispreferred configuration is that with a back vowel nucleus intervening between two π -bearers. This is captured by the constraint in (58) (following Ellison 1995, also Zoll 1996), which further strengthens the general tendency to maximize π -bearing syllable nuclei:

58. **NOINTERVENING**

A segment corresponding to a back vowel syllable nucleus may not intervene between two π -bearing segments.

With **NOINTERVENING** ranking higher than **ALIGN** (π, ϕ_{LEFT}), *léten* becomes the winning candidate, as in (59). The crucial violation incurred by its competitor **lǎten* is that of **NOINTERVENING**.⁹

59. **COINCIDE** (π, σ_{NUC})²(ϕ) >> **NOINTER** >> **ALIGN** (π, ϕ_{LEFT}) >> **COINCIDE** (π, σ_{NUC})

$l \acute{a}_i t e n$ (32c) π_i	COINCIDE (π, σ_{NUC}) ² (ϕ)	NOINTER	ALIGN (π, ϕ_{LEFT})	COINCIDE (π, σ_{NUC})
L a. (léten) _{ϕ}			*	
b. (lǎten) _{ϕ}		* !		*

The **NOINTERVENING** constraint rules against a special case in configurations generally admitted by the self-conjoined positional constraint. The two constraints relevant for forms with multiple π 's cannot be ranked, and are left unranked in (59).

Single occurrences of π escape the effect of the self-conjoined constraint **COINCIDE** (π, σ_{NUC})²(ϕ). A single π -bearing segment within a foot invariably complies with the self-conjoined positional constraint, since it can incur at most one violation. The winning candidate in (57), for example, satisfies both **COINCIDE** (π, σ_{NUC})²(ϕ), and **NOINTERVENING**. The selection of the winner then falls on those constraints that are active players in forms with single π -occurrences, as was established in section 3.2.2.

⁹ This constraint is interpreted as non-gradient: one intervening back syllable nucleus is sufficient for this constraint to be violated. Under this interpretation, we can assume that this constraint operates across the board, that is, that it need not be associated with a specific domain of operation. In (36b), for example, with two π -bearing segments that do not share a foot, both *lǎtošen* 'of last summer (Adj, Sg, Masc)' and **létošen* violate this constraint, allowing for *lǎtošen* to be selected by the next lower constraint, **ALIGN** (π, ϕ_{LEFT}).

60. COINCIDE (π, σ_{NUC})²(ϕ) >> NOINTER >> ALIGN (π, ϕ_{LEFT}) >> COINCIDE (π, σ_{NUC})

$l \acute{a} t o$ π_i	COINCIDE (π, σ_{NUC}) ² (ϕ)	NOINTER	ALIGN (π, ϕ_{LEFT})	COINCIDE (π, σ_{NUC})
L a. (l \acute{a} to) ϕ			*	
b. (l \acute{e} to) ϕ				* !

In sum, the self-conjoined positional constraint plays a crucial role in the distribution of multiple π 's, triggering the assimilatory OCP effect in the case of JAT's π . As already noted, regular π 's exhibit no positional adjustments due to the presence of another π -bearer. Hence the form in (38), repeated in (61), which contains only regular π -bearers, exhibits no alternations characteristic for JAT's π .

61. lexical form: pol \acute{a} n

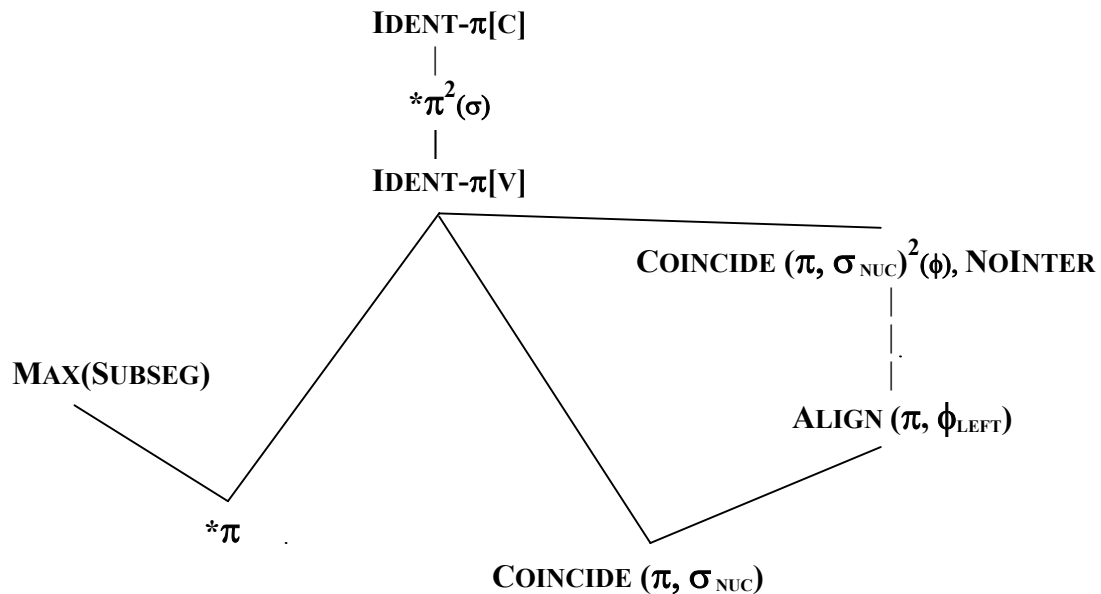
- a. pol \acute{a} na 'meadow (N, Sg)'
- b. pol \acute{a} ni 'meadow (N, Pl)'

Here, the underlyingly palatalized segment \acute{l} has the same realization in (61a) and (61b): it retains its palatalization when sharing a foot with another π -bearer at the cost of violating positional constraints on π ; the form *pol \acute{e} ni which complies with positional constraints is eliminated because it violates IDENT- π [V].

3.3 Multiple π 's and faithfulness constraints

In (62) is given the overall ranking of constraints responsible for the distribution of the feature π in both the syllable and the foot:

62. Overall ranking



The positioning of this feature within the foot is controlled in crucial ways by the place of faithfulness constraints in constraint ranking. This ranking accounts for the divergence in compliance with positional constraints on π between regular π -bearing segments and those whose π originates from JAT. Because segments and subsegments are subject to different faithfulness conditions, the positional constraints strongly take effect in forms which contain subsegment π , that is, a JAT vowel, but weakly, if at all, in forms which contain a regular π . In the former case, the constraint **MAX(SUBSEG)**, while ensuring the realization of JAT's π in the output (due to its undominated status), does not fix its position in the string, leaving the positioning of JAT's π to the set of positional constraints on π and their mutual interactions. In sum, only because of the peculiar faithfulness status of JAT's π is it possible to detect the agency of positional constraints on π in the first place; and to capture the special, and important, positional effects arising when JAT's π co-occurs with another π -bearer, as shown in section 3.2.3.

Forms which contain only regular π -bearers exhibit extremely weak positional effects in the case of single π -occurrences, and none at all, in the case of multiple π -occurrences. This is due to the agency of the set of **IDENT- π** constraints which dominate all positional constraints on π , and thereby preclude positional effects on regular π features, whose faithfulness they crucially regulate. As a result, a regular π feature exhibits no mobility of the sort manifested by JAT's π .

Moreover, we observe a discrepancy in the way different types of π -bearing segments interact with each other syllable internally on the one hand, and foot internally, on the other. Within the foot, all types of π -bearing segments – front vowels, palatal and palatalized consonants – function alike as triggers of assimilatory OCP effects. Within

the syllable, however, the dissimilatory OCP effect is manifested by front vowels and palatalized consonant, but not by front vowels and palatal consonants. Yet neither the self-conjoined markedness constraint, $*\pi^2(\sigma)$, nor the self-conjoined positional constraint, $\text{COINCIDE}(\pi, \sigma_{\text{NUC}})^2(\phi)$, distinguishes between different types of π -bearing segments. Any differences that arise, as in the case of syllable internal interactions, are solely due to the interference of the two **IDENT- π** constraints. These constraints do distinguish between palatal consonants on the one hand, and front vowels and palatalized consonants, on the other; the latter two segment types are regulated by **IDENT- π [V]**, and the former is regulated by **IDENT- π [C]**. These constraints bear primary responsibility for the nature of multiple π interactions within the syllable. Only segments under the jurisdiction of **IDENT- π [V]**, which crucially dominates $*\pi^2(\sigma)$, participate in syllable internal dissimilatory OCP effects; palatal consonants may share a syllable with front vowels because their faithfulness is evaluated by **IDENT- π [C]**, which ranks higher than $*\pi^2(\sigma)$. Within the foot, however, all three types of π -bearers affect the positioning of JAT's π in identical fashion. This is because the constraint that crucially regulates interactions among multiple π 's within the foot, $\text{COINCIDE}(\pi, \sigma_{\text{NUC}})^2(\phi)$, ranks lower than any of the **IDENT- π** constraints.

3.4 The role of JAT in the vocalic inventory

A remark is in order regarding the abstract nature of JAT, and consequently, of the lexical forms that contain this segment, in light of recent accounts in which allomorphy based analyses have been favored over abstract and intractable phonology, as for example in Kager 1999, and Rubach and Booij 2001. Since the positional effects attributed to the abstract segment JAT could be equally well captured under a stem allomorphy analysis, the central claim of this study would not be affected by the choice of one of these alternative analyses over the other. However, the analysis proposed here is superior, for the following reasons.

First, as has been demonstrated, the abstract segment JAT follows a straightforward phonological pattern, and as such is to be captured by regular phonological devices. The fact that the realization of JAT varies with context makes this case of absolute neutralization detectable for the learner, and is reminiscent of the realization of another abstract vocalic element in Slavic languages, the YER, which has alternant realizations in the output (see Rubach and Booij 2001, and the references therein). The high measure of phonological regularity associated with the realization of JAT thus makes alternative analyses, such as an allomorphy based analysis, less than attractive.

Crucial evidence in favor of the proposed analysis comes from a group of eastern dialects of Bulgarian (Maslov 1956, Tilkov 1982), in which the alternation characteristic for the JAT forms in standard Bulgarian extends beyond the stems which contain a historical JAT. Thus the form in (39) above, *pol'ána/pol'áni* 'meadow (sg/pl)' which exhibits no alternation in standard Bulgarian, does alternate in the eastern dialects, as in *pol'ána/pol'eni* 'meadow (sg/pl)'. Under the JAT analysis, the difference between standard

Bulgarian and the eastern dialects amounts to a minimal difference in constraint ranking: while in standard Bulgarian the positional constraint **COINCIDE** (π , σ_{NUC})²(ϕ) ranks lower than any of the **IDENT- π** constraints, as in (62), in the eastern dialects this ranking will have to be reversed, with **COINCIDE** (π , σ_{NUC})²(ϕ) outranking at least **IDENT- π [V]**. Thus, what appears to be a limited harmony effect in the JAT forms of standard Bulgarian becomes a more general harmony process in the eastern dialects, ultimately leading to a neutralization between JAT's π and regular π features, and possibly, also to a disappearance of JAT from their vocalic inventory. But if the alternating JAT forms in standard Bulgarian were analyzed as, say, a case of stem allomorphy, the situation in the eastern dialects would then need to be interpreted as a massive spread of stem allomorphy, and the corresponding reconstruction of a portion of the lexicon. Thus, the allomorphy based analysis would miss an important generalization: the simplified, and less abstract, nature of the vocalic inventory in the eastern dialects as compared to that of standard Bulgarian.

4. Conclusion

The markedness and positional constraints, which have been shown to play an important role in the distribution of the feature π in Bulgarian, are driven by organizational principles that govern the shapes of lexical entities, requiring predictable arrangement of phonological material. Crucially, these constraints respond with greater rigor to multiple, than to single, feature occurrences. We have identified two types of special phonological effects in Bulgarian, brought about by the pressure to resolve multiple feature occurrences within prosodic constituents: the dissimilatory OCP effect within the syllable leads to a reduction of markedness, while the assimilatory OCP effect within the foot leads to a reduction of syntagmatic contrast. Both target the feature π , shared by front vowels, palatal and palatalized consonants. The only obstacle to the agency of markedness and positional constraints is the significant function of phonological features to create lexical contrasts, which is protected by the set of faithfulness constraints.

In the analysis proposed here, the distribution of segments, in this case, the distribution of π -bearers, is regulated solely by phonological tools. It has been proposed, however, that phonetically grounded principles are the sole regulators of the distribution of phonological material (e.g., Flemming 2001, Steriade 2000). In this regard, it is of particular interest that the distribution of JAT's π differs from that of regular π -bearers. While all lexical π 's are affected by the dissimilatory OCP effect, only one type of π , namely JAT's π , is affected by the assimilatory OCP effect. Thus, within the foot, JAT's π and regular π 's differ in the observance of positional constraints in general, and of the self-conjoined positional constraint, in particular. This strongly suggests that the predictable arrangement of segments in linguistic forms, while most likely consistent with phonetic considerations, cannot be motivated solely by those considerations. Another force that needs to be recognized is grammar internal pressure that linguistic units exhibit a minimal degree of syntagmatic contrast. It is due to the lexically idiosyncratic status of JAT's π in the grammar of Bulgarian that its distribution exhibits a

lower degree of syntagmatic contrast than do the distributions of regular π -bearers. As a consequence, the positioning of subsegment π exhibits a much lower degree of syntagmatic contrast than do regular π -bearers. Yet, if JAT's π and regular π -bearers are indistinguishable phonetically, then distributional regularities cannot be left entirely to phonetically motivated organizational principles. The case presented here provides a strong argument that specific feature arrangements may well be equally motivated by structurally oriented principles that govern the internal organization of linguistic units. Moreover, I have shown that a configuration of the same type, that with multiple π -bearers within a given domain, is interpreted as offensive if targeted by a self-conjoined markedness constraint, yet as compliant if targeted by a self-conjoined positional constraint. This, too, strongly suggests that abstract, structural principles are at work together with those that belong to the physical realm.

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