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Abstract

This article reviews a number of different cases where languages show forms which are morphologically inappropriate. The reason for this turns out to be phonological. Thus the hypothesis which suggests that phonology is invisible to morpology is too strong. Instead adopting a framework formulated in terms of Optimality Theory allows for just the right amount of interaction. Phonological constraints can drive morphological choices, but the interactions are minimized.

A common assumption enshrined in various linguistic models to some degree holds that syntactic phenomena are not sensitive to phonological features. So for instance GB style syntax typically proposes that phonology happens 'after' syntax at a level called Spell Out. The strongest version of this position however seems clearly wrong. In this paper I consider a variety of different cases, where it can be argued that the behavior and realization of syntactic features is subordinated to phonological requirements.

The point to be made here is not however complete revision of the linguistic enterprise. I do not wish to suggest that phonology and syntax interact willy-nilly. Rather I will argue that a framework such as Optimality Theory (Prince & Smolensky, 2004), which permits constraints to be differently ranked with each other, such that higher ranking ones force violation of lower ranking constraints, allows for just the right kind of limited interaction that we see in language. As a simple example consider the following English question:

(1) Aren't I allowed to sit here?

Generally in English the form of the verb *be* that occurs in the first person is *am.* Auxiliary forms in English have a reduced form with the negative, giving rise to forms like *isn't, haven't, don't, can't*, etc. The *am* form is an exception, and the reason seems to be prosodic: the non-existent form **amn't* is illformed since it creates two adjacent nasals with differing place of articulation inside a trochaic foot structure. A different requirement limits the auxiliaries that can be preposed to forms which consist of a single prosodic word. Thus the following is ungrammatical:

(2) *Am not I allowed to sit here?

Apparently one way around these two strictures is to simply switch the form, i.e, replace a 1st person singular form, with a 2nd person singular / plural form. The mismatch in syntactic features is subordinated to a constraint on prosodic well-formedness.

In the remainder of this paper I will a consider a number of cases, where it seems that syntax, or at least the realization of syntactic features is subject to the strictures of prosody.

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1. French Liaison

A first example comes from French. The particulars of this analysis were first presented in a paper by Tranel (1994) from which this analysis draws extensively.

French exhibits a set of common alternations traditionally referred to as Liaison, which literally means *linking*. Many words have latent final segments which are realized depending on the phonology of the following segment. The latent segments are coronal consonants and they are absent if the following word is consonant initial, but make an appearance before vowel initial words. A set of representative example words is given in (3).

(3) Liaison

C-initial	curé, table
V-initial	abbé, arme

In example (4) we can now see what happens when these words follow the plural determiner *les,* which has a final latent segment [z]. With consonant initial words such as *curé* 'priest' or *table* 'table' the latent segment is left unrealized. On the other hand with vowel initial words such as *abbé* 'abbot' or *arme* 'weapon' the final [z] appears. This is a typical hiatus effect. Analytically speaking the [z] functions as an onset for the following syllable, helping to avoid an onsetless syllable, a cross-linguistically marked structure.

(4) with determiner *les* [le<z>]

le kyʀe	lez abe
le tabl	lez aʀm

This analysis can be made explicit in a framework such as Optimality Theory (OT). Following Zoll (1998) we assume that a latent segment is a feature bundle lacking a root node. This root node can be provided, but at a cost. This cost is signified through the notation of an asterisk on the constraint Dep(Root node). In the case of a consonant initial word this constraint violation is entirely gratuitous, and therefore a structure without the violation is preferred. In tableau (5) the non-realization of the latent segment is indicated by the angled brackets.

(5) *les curé* 'the priests (pl.)'

		Onset	Dep (Root node)
☞	le<z> kyʀe		
	lez kyʀe		*!

On the other hand with vowel initial words the separate constraint Onset provides a more powerful requirement, which overrides the cost of adding a root node to the structure. As a result the form with liaison is the outcome. This type of occurrence is common in French, as many determiners and adjectives have such latent segments, which are then realized depending on the phonotactics of the following element, typically a noun.

(6) *les abbé* 'the abbots (pl.)'

		Onset	Dep (Root node)
	le<z> abe	*!	
☞	lez abe		*

The point of interest here however is in the interaction of this general phonotactic phenomenon with other linguistic factors. One such factor is morphological agreement. In French all nouns fall into one of two morphological categories traditionally called gender, i.e., all nouns are specified as being either masculine or feminine. These groups are so named since typically terms which specify males are uniformly in one group while terms for females are in the other. The genders for the nouns introduced in (3) are given in (7).

(7) Gender of nouns

masculine:	curé, abbé
feminine:	table, arme

The importance of this grouping is that French requires various elements that appear together with nouns to show agreement with respect to this feature. Many determiners come with two forms; one masculine and one feminine. Which form is to be used with any given noun depends on the gender category of the noun. This can be seen in (8).

(8) Gender agreement with determiners and adjectives

mon curé	[mɔ̃ kyʀe]	*ma curé	*[ma kyʀe]
mon table	*[mɔ̃ tabl]	ma table	[ma tabl]

Since *curé,* a term for a human male of the relevant occupation is masculine it will call for a determiner in its masculine form. The first person singular possessive determiner 'my' has two forms *mon* and *ma*, with the former being the masculine. A further point illustrated in (8) is that using the 'wrong' determiner form is not acceptable. A second example shows the word *table,* which is idiosyncratically feminine, and the choice of determiner form is made accordingly.

Now we come to the point of interest. As may have been noticed the two determiners forms are not only distinguished by their gender, but also have different final segments; the feminine ends in a vowel [a], while the masculine form has a final latent segment [n]. This kind of pairing is in fact quite typical. But what this also means is that the two forms will not match vowel initial nouns equally well. The masculine form with its final latent segment will be in a good position to provide an onset consonant for the following noun, while the feminine form will lead to hiatus. Example (9) illustrates this state of affairs and at the same time shows how this issue is resolved.

(9) Gender agreement overridden with V-initial words

mon abbé	[mɔ̃ nabe]	*ma abbé	*[ma abe]
mon arme	[mɔ̃ naʀm]	*ma arme	*[ma aʀm]

As shown here an interesting thing happens. In the case of *abbé*, a masculine noun, the masculine determiner leads to a euphonic outcome, as the determiner can provide a consonant as onset for the noun's initial syllable. The noun *arme* is feminine and therefore should really have the matching feminine determiner form, but this is not what happens. Instead the masculine form is chosen even though this causes a feature mismatch with the noun.

A tableau showing how this case can be anlyzed in OT is provided below.

(10) *mon arme* 'my weapon'

		Onset	Realize[Gender]	Dep (Root node)
	ma aʀm	*!		
☞	mɔ̃ naʀm		*	*

Included among the set of candidates to realize this particular expression are some which use either form of the determiner. Normally the constraint which requires the proper matching of the gender feature will rule out the possibility of a feminine noun combining with a masculine determiner form. However the Onset constraint is ranked higher, and this leads to a choice of determiner based on prosodic rather than morphological considerations.

It should be noted that this is truly a case of opting for the 'other form' and cannot be reanalyzed in purely phonological terms as epenthesis. A phonological analysis would be unable to explain both the choice of linking consonant and the form of the determiner. A survey of different determiners and pre-nominal[1] adjectives also shows that vowel initial nouns consistently occur with the wrong determiners, depending only on which leads to an avoidance of hiatus. A few representative examples are provided below.

(11) Other determiners and adjectives[2]

le (l') / la	[l<ɵ>, la]	'the'
ton / ta	[tɔ̃<n>, ta]	'your'
ce / cet(te)	[sɵ, set]	'that'
beau / bel(le)	[bo, bel]	'beautiful'
nouveau / nouvel(le)	[nuvo, nuvel]	'new'

As seen earlier feminine vowel initial nouns, such as *arme,* will opt for a masculine determiner or adjective, if the form has a final consonant segment. In return masculine vowel intial nouns, such as *abbé,* will choose consonant final feminine forms, whenever this helps to avoid hiatus. What is more this effect is strictly local. Thus we have:

(12) a. cet abbé [set abe] 'this abbot'
b. ce nouvel abbé [sɵ nuvel abe] 'this new abbot'

As seen in (12) the switch to the feminine form of the determiner is dependent entirely on it being in immediate pre-nominal position. Since in (12b) there is an intervening consonant initial adjective, the determiner reverts to the form of the appropriate gender. On the other hand the pre-nominal adjective switches to the feminine form, since this form has a final consonant, which can now provide the onset for the noun.

Since in OT violations are minimized, the analysis presented above will always choose the correct form. Gender violations are limited to the extent that they improve the phonotactics.

To summarize the discussion so far, we note that in the case of the alternation seen here, while the conditioning is phonological, the realization of the form is not phonological. A consistent pattern which emerges in the following examples is that the realization of a morphological feature is violated to satisfy a phonotactic constraint.

2. Latin 'dative'

Another example of a somewhat different kind. Traditionally Latin is characterized as having two oblique cases: dative and ablative. The distinction between the two is purely morphological, and is made more murky by the fact that for all nouns some of the forms and for some

[1] In French the most common placement for adjectives is after a noun. A smallish set of common adjectives typically have a preference for being used in pre-nominal position. These adjectives participate in liaison-triggered gender switching in the same way as determiners.

[2] French spelling to a certain extent reflects the opportunistic nature of the gender switch. For example the determiner *cette* 'this (fem.)' is spelled *cet* when the form is used with masculine nouns. The same is true for other cases, so *belle* 'beautiful (fem.)' has the spelling variant *bel* with masculine nouns, etc. This purely orthographic change should not detract from the fact that the determiner is nevertheless the same.

nouns all of the forms are in fact identical. A proposal first made by Emonds (1985) and further elaborated in Emonds and Spaelti (2005) reanalyzes the dative as a marked alternative realization of Ps of Goal. This realization, which is limited to the singular, takes the form of a suffix -*ī* for most types of nouns, as can readily be attested (13). The full specification of this form is shown in (14).

(13) Dative vs. Ablative singular

Stem	*Dative*	*Ablative*	*Gloss*
labōr-	labōrī	labōre	'work'
ōrātiōn-	ōrātiōnī	ōrātiōne	'speech'
turri-	turrī	turrī	'tower'
rē-	reī	rē	'thing'
passu-	passuī	passū	'step'
stella-	stella[i]	stellā	'star'

(14) **Latin dative singular nouns:**
+N, +N__, P, −PLUR, +GOAL \\ –*ī*, __

An obvious problem for this analysis is however that one large group of nouns, the nouns with a stem ending in [o], do not show any sign of this suffix.

(15) o-final stems

servo- servō servō 'slave'

The reason for this it turns out are purely phonological. Suffixing an [ī] to a final [o] would result in a diphthong in an unstressed position, a diphthong of a type which is not favored in Latin. To avoid such an outcome a number of options are available, including the possibility of simply deleting the stem final vowel, a strategy which is on display in the similarly challenged genitive form (realized as [servī]). In the case of the dative however it is the morphology that gives.

(16) Dative with [o] stems.

		Avoid [oi]	Realize[Case]	Max-V	Realize[Goal]
a.	servoī	*!			
b.	servo		*!		*
c.	servī			*!	
d. ☞	servō				*

The analysis in (16) shows that a candidate with the the [+GOAL] marker directly affixed to the stem creates an impermissible [oi] diphthong. Simply leaving out the case marker would avoid the problem, but would leave the noun without an overt realization of Case. Deleting the stem final vowel would also remove the diphthong, and as pointed out earlier this is essentially the route taken with the genitive. But in this case another option is available. Since the [+GOAL] marker is also the overt realization of the oblique case, an alternative is to revert to the basic oblique form (the "ablative") instead. In effect the noun is realized as a "bare ablative".

In this case again we see avoidance of a marked prosodic structure leading to a sub-optimal choice of morphology.

3. Default segments in Doka Timur West Tarangan

Finally a third case where similar themes play out in a very different guise. As is typical for an Austronesian language, Doka Timur West Tarangan Nivens (1993), a language spoken on Aru in Southeastern Maluku makes heavy use of reduplicated forms. The full variety of closely related systems was analyzed in detail in Spaelti (1997). The pattern employed in this language however typically only doubles the consonantal segments, while the vowels in the reduplication always take a predictable shape. This is a prefectly common pattern Alderete et al. (1999). What makes this case somewhat remarkable however is that the reduplication uses not only one vowel pattern, but varies between two. And the choice of which to use is not made on phonological grounds, but rather on morphological ones.

In (17) we see the basic pattern of reduplicated forms in this language. The pattern is partial reduplication and copies either one or two consonant segments from the base in a predictable way. The vowel however is never copied. In the first pattern seen with plural forms the vowel used is always [a]. Since [a] is the most common vowel of the language, and is commonly realized as a centralized [ə], it is perfectly logical to view it as the default segment of the language. As such it is exactly the vowel we predict to see in such contexts.

(17) plural forms

tɔp-di	tap.tɔpdi	'short-3p'
lɔar-ay	la.lɔar	'clean-3p'

Now we move on to singular forms. The prosodic pattern of the reduplication is exactly the same, but the vowel that we see is different, being the high vowel [i]. Now while cross-linguistically it is quite common to see [i] used as an epenthetic vowel, arguing here that [i] is the default vowel of the language simply returns us to square one in our account of the plural forms. It should also be said that a fuller exposition of the language would quickly reveal that a much stronger case can be made for [a] being the default vowel of the language than for [i].

(18) singular forms

tɔp	tip.tɔp	'short'
lɔir	li.lɔir	'clean-3s'
ɛ-r-dɔam	ɛr.di.dɔam	'3s-pound'

A suggestion first made by Nivens offers a way out of this problem. Nivens notes that one possible interpretation is that this [i] could be the 3rd singular infix. This agreement infix can in fact be seen in the data here in the form [lɔir] 'clean-3s'. However a problem with this suggestion is that while the infix-[i] is restricted to statives in the 3rd singular, the range of the reduplicative [i] is considerably wider since it is used with all singular forms. For example it is used not only with (stative) adjectives such as [tip.tɔp] 'short' and [li.lɔir] 'clean', but also with non-stative verbs such as [ɛr.di.dɔam] '(to) pound'. With the latter type of form the 3rd singular marker is the prefix [ɛ].

The solution is to assume that when this affix is used in the context of reduplication, that the imperative to match all the syntactic features of the affix is relaxed. This is because in this context the vowel is not actually necessary for agreement purposes. The agreement function is already covered by the other affixes present in the form. The extra [i] is just going along for the ride, and it must only be judged again the other possible options.

To understand how this works out I will give a simple outline of an analysis formulated in OT. The basic plural case is exhibited in the tableau (19).

(19) a plural form

			*Copy-V	Real[num]	Dep	Real[stat]
a.		li.lɔar		*!		
b.	☞	la.lɔar			*	
c.		lɔ.lɔar	*!			

The most immediately relevant cases to consider are: case c. [lɔ.lɔar] with faithful reduplication of the vowel along with the consonant. This is the case which never occurs in Doka Timor, even though it is the exact form used in several of the neighboring dialects of West Tarangan. Candidate b. shows the form [la.lɔar] with a default vowel taking the place of the expected reduplication vowel. This is the strategy employed here despite the cost of epenthesis, indicated by the '*' on the anti-epenthesis constraint Dep. Candidate a. [li.lɔar] has the infix taking over the vowel duty. This candidate is not chosen. The problem is that the infix is singular which causes a mismatch with the overall plural form.

Now let's consider a singular form.

(20) a singular form

			*Copy-V	Real[num]	Dep	Real[stat]
a.	☞	li.lɔir				
b.		la.lɔir			*!	
c.		lɔ.lɔir	*!			

The situation that plays out here is quite similar to the one discussed above. The main difference here is that since the form is singular the infix no longer causes a mismatch. In fact since the form is also a stative, the match is complete, and therefore candidate a. is the winner.

Finally we consider the case of a non-stative verb.

(21) a non-stative form

			*Copy-V	Real[num]	Dep	Real[stat]
a.	☞	ɛr.di.dɔam				*
b.		ɛr.da.dɔam			*!	
c.		ɛr.dɔ.dɔam	*!			

Here again we see that full reduplication is rejected. The form with a default vowel offers some improvement, but utimately loses to the form with the infix, even though the latter has a mismatch on its featural content. Thus we see again a situation where a form which is morphologically 'imperfect' is chosen for prosodic reasons.

4. Conclusion

This discussion has surveyed a number of cases from a variety of different languages where the form chosen is not in fact the morphologically most appropriate form. The reason for choosing the 'wrong' form was shown to be phonological. But the extent to which phonology can force such changes is limited. An analysis in terms of Optimality Theory is able to illuminate why such influences are possible, and why they only occur where necessary.

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