Issues in the Phonology and Morphology of the Major Iberian Languages

Edited by
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1 Introduction

Perhaps the most important development in phonological theory in recent years has been a shift from rules and derivations to declarative models based on constraints. Proposals along this line include work such as Bird (1990), Scobbie (1991a, 1991b), Paradis (1988), Calabrese (1988, 1991), and the papers in Goldsmith (1993a), among others. However without a doubt the most influential model, if we judge by the amount of work that is being produced within this framework, is Optimality Theory (henceforth OT, cf. McCarthy and Prince 1993a, 1993b, Prince and Smolensky 1993, and a rapidly growing bibliography).

The reanalysis of some set of phonological data using a constraint-based or nonderivational approach may be motivated by the author’s basic assumptions about the nature of the phonological component of languages. For anyone who holds the view that phonological derivations with ordered rules are cognitively implausible, the demonstration that facts that had been analyzed as requiring rule ordering can also be analyzed without ordered rules may be enough of a reason to justify presenting a reanalysis. The reanalysis need not be simpler or superior in any manner; simply showing that it is possible may be sufficient. But, of course, anyone who does this cannot expect other researchers with different views about what is cognitively plausible or implausible to immediately accept the reanalysis as improving on previous work. Some work that is being produced within OT falls into this category. In such cases, the goal of the author is to show that some phenomena that had been previously analyzed using certain derivational devices can also be accounted for in the OT framework. This type of work is necessary in any transition. However, the more interesting results are those which show us that we can obtain a deeper understanding of the facts by viewing them in a certain
way rather than in another; in this case, why it is preferable to interpret phonology as being based on constraints rather than on ordered rules. This is what I intend to do in this paper. What I will try to demonstrate is that there are cases where a constraint-based approach provides a better analysis in terms of simplicity and insightfulness than is possible in a rule-based approach.

This paper discusses a set of facts in Basque which, in a rule-based analysis, appears to require a complex order of rules, with one rule applying both before and after another rule. That is, when the facts are analyzed in terms of rules, one must postulate that a rule A is sandwiched between two distinct and separate applications of another rule B, producing an order BAB. What I want to show in this paper is that if we instead adopt a constraint-based approach, the complexity of the analysis disappears. I will argue that an analysis in terms of constraints is not only simpler than a rule-based analysis but also more satisfactory in that it allows us to gain a better understanding of the phenomenon. The facts that I will be concerned with involve the interaction between the processes of Nasal Assimilation and Palatalization in some Biscayan Basque varieties. These facts were analyzed as involving a complex interaction of lexical and postlexical applications of rules in Hualde (1991a).

2 Palatalization and Nasal Assimilation in Lekeitio Basque: A rule-based analysis

Certain Basque varieties have a process whereby coronal consonants are palatalized after a front high vocoid. As the examples in (1) show, in Lekeitio /n/, /l/, and /l/ are palatalized after nuclear or non-nuclear /i/:1

<table>
<thead>
<tr>
<th>(1)</th>
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</thead>
<tbody>
<tr>
<td>/bi-na/</td>
<td>bi[n]a</td>
<td>'two for each'</td>
<td></td>
</tr>
<tr>
<td>/3akin/</td>
<td>3aki[n]</td>
<td>'to know'</td>
<td></td>
</tr>
<tr>
<td>/min-a/</td>
<td>mi[n]a</td>
<td>'the pain'</td>
<td></td>
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<tr>
<td>/mutil-a/</td>
<td>muti[λ]a</td>
<td>'the boy'</td>
<td></td>
</tr>
<tr>
<td>/abil/</td>
<td>ab[iλ]a</td>
<td>'skillful'</td>
<td></td>
</tr>
<tr>
<td>/amai-tu/</td>
<td>amai[c]u</td>
<td>'to finish'</td>
<td></td>
</tr>
<tr>
<td>/mendi-tik/</td>
<td>mendi[c]ik</td>
<td>'from the mountain'</td>
<td></td>
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</tbody>
</table>

The consonant /d/ shows more complex behavior. This consonant is palatalized when a lateral or a nasal intervenes between the trigger /i/ and /d/, as

\[ (2a) /ein dau/ \rightarrow /i1 da/ \]
\[ /indar/ \rightarrow /martin/ \]
\[ /pinta/ \rightarrow /bide/ \]

The lack of palatalization clearly has to do with the continuant segment /d/ or sequences /ND/, /nd/, /l/.

The single coronal nod specification from a precursive palatalization.

\[ (3) \text{Palatalization in} \]

\[ \text{i n} \quad \sqrt{\text{o o}} \]

The rule of Nasal structures upon which P language, as can be seen

\[ (4) \text{Nasal}\]  
\[ /egu[m]/ \]
\[ /egu[s]/ \]
\[ /egu[g]/ \]
José Ignacio Hualde

preferable to interpret phonology red rules. This is what I intend to is that there are cases where a lysis in terms of simplicity and reach.

which, in a rule-based analysis, a one rule applying both before e analyzed in terms of rules, one tween two distinct and separate BAB. What I want to show in -based approach, the complexity alysis in terms of constraints is also more satisfactory in that it enomenon. The facts that I will tween the processes of Nasal n Basque varieties. These facts tion of lexical and postlexical

Basque: A rule-based analysis

hereby coronal consonants are plies in (1) show, in Lekeitio /hu/, ear /h/.1

| 'two for each' |
| 'to know' |
| 'the pain' |
| 'the boy' |
| 'skillful' |
| 'to finish' |
| 'from the mountain' |

behavior. This consonant is tween the trigger /i/ and /d/, as

<table>
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<th>Rules vs. constraints</th>
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<tr>
<td>in (2a) (a context in which /l/ also undergoes Palatalization), but not when it is directly preceded by /i/, as shown in (2b):</td>
</tr>
</tbody>
</table>

| (2) a. | /ein dau/ | ei[ŋ]au |
| /il da/ | i[ŋ]a |
| /iandar/ | i[ŋ]ar |
| /martin da/ | M[ŋ]a |
| /pinta/ | pi[ŋ]a |
| b. | /bide/ | bi[ŋ]e, bi[ŋ]e,*bi[ŋ]e, |
| /idi/ | i[ŋ]i, i[ŋ]i, *i[ŋ]i, |

The lack of palatalization in the case where /d/ is found directly after /i/ clearly has to do with the fact that in this intervocalic context it is realized as a continuant segment [ŋ] or [r]. To explain the palatalization of /d/ and /l/ in the sequences / ét/, /indl, /ildl, /iltl, in Hualde (1991a) I proposed that the rule of Palatalization applies to the output of a rule of Nasal and Lateral Assimilation, which produces homorganic clusters sharing a single point of articulation node. The single coronal node shared by the two consonants receives a dorsal specification from a preceding high front vocoid producing the apparent result of iterative palatalization. This is illustrated in (3):

| (3) Palatalization in homorganic clusters |
| i n d |
| | \ |
| o o-[cor] PA |
| [dors] |

The rule of Nasal (and Lateral) Assimilation which creates the complex structures upon which Palatalization applies is a general, obligatory rule in the language, as can be seen in the examples in (4):

| (4) Nasal Assimilation |
| egu[m] bat |
| egu[n] dának |
| egu[n] gorri |

| 'one day' |
| 'all days' |
| 'red day' |
Before pause or a vowel, word-final nasals (and laterals) are also neutralized, being realized as alveolar, unless they are preceded by a high front vocoid, in which case they surface as palatal:

(5) **Nasal Neutralization**

- esa[n] ‘to say’
- emo[n] ‘to give’
- artu[n] ‘to take’
- 3aki[n] ‘to know’
- *-m

The process of Nasal (and Lateral) Assimilation also conditions the realization of /d/ (and the other voiced obstruents) as noncontinuant. As in standard Spanish, in Basque, voiced obstruents are realized as stops precisely in those contexts where homorganic clusters are created: after a nasal and, in the case of /d/, also after a lateral. We thus must postulate an ordering of rules as in (6):

(6) **Rule ordering**

1. Nasal Neutralization and Assimilation
2. Palatalization

However, the ordering of the rules postulated in (6) raises some serious problems. To begin with, whereas Nasal Assimilation applies freely across word boundaries, as the examples above in (4) show, Palatalization is a lexical rule, restricted to certain morphological environments. As shown in (7), Palatalization does not take place across word boundaries:

(7) **Palatalization is a lexical rule**

- saldi [n]ekatu, *[n] ‘tired horse’
- amabi [n]eska, *[n] ‘twelve girls’

The only case where Palatalization applies across syntactic word boundaries is in cases of cliticization. Thus Palatalization (optionally) applies with the copula *da ‘is’, which behaves like a clitic, (8a); but not when the copula carries a complementizer (8b), in which case it is an independent phonological word. Nor does the rule of Palatalization apply with other finite verbal forms, (8c):

(8) **Rules vs. constraints**

- a. /martín
- b. /martín
- c. /martín

Clitic groups (in the is, sequences of morphological words) are restricted to the word-phonological word, including their syntactic status. We therefore must postulate an ordering of rules that we have established as:

(9) **1st problem for Palatalization**

- Palatal
- Nasal

Another problem is that Assimilation could apply to forms that take precese postlexical rules Palatalization and Nasal Assimilation:

(10) **2nd problem for Palatalization**

<table>
<thead>
<tr>
<th>Palatalization</th>
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<tr>
<td>a.</td>
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From the considerations above:

(11) **Rule ordering for Palatalization**

1. Palatal
2. Nasal
(8) a. /martin da/ Marti[n]a 'it is Martin'
b. /martin da-la/ Marti[n][d]ala 'that it is Martin’
c. /martin dator/ Marti[n][d]ator ‘Martin is coming’

Clitic groups (in the sense given to this term in Nespor and Vogel 1986; that is, sequences of morphological word + clitic) constitute single word domains for the application of phonological rules (i.e., phonological words), independently of their syntactic status. We can thus maintain the generalization that Palatalization is restricted to the word-internal domain, where by word we must understand a phonological word, including clitic groups.

As mentioned, Nasal Assimilation, on the other hand, is a postlexical rule, which applies across the board. Under the standard assumption that lexical rules precede postlexical rules in their application, the lexical and postlexical status of Palatalization and Nasal Assimilation, respectively, is at odds with the ordering that we have established above in (6).

(9) 1st problem for ordering in (6):
- Palatalization is a lexical rule, cf. (7), (8)
- Nasal Assimilation is a postlexical rule, cf. (4)

Another problem is that, when both rules of Palatalization and Nasal Assimilation could apply in a given example producing different outputs, the process that takes precedence is Nasal Assimilation, as shown in (10c). It therefore appears that Nasal Assimilation can override the effects of Palatalization:

(10) 2nd problem for ordering in (6): Nasal Assimilation overrides Palatalization:

\[
\begin{align*}
a. & \quad \text{Marti[n]} \\
b. & \quad \text{Marti[n] etorri da} & \text{‘Martin has come’} \\
c. & \quad \text{Marti[m] bakarrik} & \text{‘only Martin’}
\end{align*}
\]

From the considerations in (9) and (10) we arrive at the order in (11):

(11) Rule ordering required from the facts in (9) and (10)
1. Palatalization
2. Nasal Assimilation
The ordering in (11) is, of course, the opposite of that assumed above in (6) as being necessary for the correct analysis of Palatalization in consonant clusters. Now, within the Theory of Lexical Phonology, this situation is not as contradictory as it may seem. The Lexical Phonology model allows the application of the same rule in several components, which may produce situations in which a given phonological rule applies both before and after some other rule. In Hualde (1991a), where this theoretical model is assumed, it is thus proposed that, whereas Palatalization is a purely lexical rule, Nasal Assimilation applies both lexically and postlexically. Within the lexicon, Nasal Assimilation is ordered before Palatalization, as indicated in (12):

(12) Rule ordering (final)

<table>
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<tr>
<th>Lexical:</th>
<th>Nasal Assimilation</th>
<th>Palatalization</th>
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</thead>
<tbody>
<tr>
<td>Postlexical:</td>
<td>Nasal Assimilation</td>
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Given the order in (12), we can account for all the facts that have been mentioned. Some sample derivations are given in (13):

(13) kanpo bina indar min danak egun bat

Lexical
N Assim kampo -- iqdar -- --
Pal -- bina ipjar min --

Postlexical
N Assim miq danak egun bat

ka[m]po bi[n]a i[ŋ]jar mi[ŋ] danak egu[m] bat

In this derivation, the postlexical application of Nasal Assimilation can undo the effects of Palatalization, as the following examples make clear:

(14) martin
Lexical
N Assim --
Pal martin
Postlexical
N Assim --

Marti[p]

In the derivation in (15), the contrast between ‘it is Martin’ and the absence of this analysis, which produces the correct analysis, obviously this is a very obvious that the complexity is not yet visible; however, the theoretical model disappears once we replace the constraint-based one.
José Ignacio Hualde

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assume, it is thus proposed Nasal Assimilation applies Nasal Assimilation is ordered

all the facts that have been seen: 

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In the derivation in the right column of (14), a word-final nasal which becomes palatal lexically loses this point of articulation postlexically adopting the bilabial point of the following consonant. Let us now consider the examples in (15). The contrast between the palatalization of the sequence /nd/ in Martín a ‘it is Martin’ and the absence of palatalization in Martín dator ‘M is coming’ is explained by the fact that the /nd/ sequence is present lexically in the first example, which constitutes a single phonological word (a clitic group), but not in the second example. In /martín-da/, Nasal Assimilation in its lexical application creates a homorganic dental cluster which serves as a target for the rule of Palatalization. In /martín dator/, on the other hand, the nasal undergoes Palatalization in the sequence /in/ at the lexical level, where the following /d/ is not yet visible; however the palatalization is erased at the postlexical level, by the application of Nasal Assimilation at this level:

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This analysis, which I defended in Hualde (1991a), works in the sense that it produces the correct mappings between inputs and outputs. Nevertheless, quite obviously this is a very complicated analysis by any standards. My view, now, is that the complexity is not in the facts, but rather it is forced onto the analysis by the theoretical model within which it is cast. Furthermore, the complexity all but disappears once we replace the rule-based approach that has been employed by a constraint-based one.
3 A constraint-based analysis

In Lekeitio Basque, nasals in a rhyme (which are always phonologically neutralized, cf. (5)) are subject to two potentially conflicting output constraints. On the one hand, they must be realized as palatal after a front high vocoid (within word domains). On the other, they must agree in point of articulation with a following consonant. Well-formed outputs in the language must obey these constraints. Thus the examples in (16a) are well-formed, but those in (16b) are not:

(16) a. ka[m]po ‘outside’, a[I]go ‘of there’, Marti[n]

Now, there are cases where these two constraints are in conflict. This is the case when the nasal is both preceded by /i/ and followed by a consonant, as in the examples in (17a). It is clearly impossible for the syllable-final nasal to obey both constraints simultaneously. In this kind of situation, which work in OT has shown is not at all uncommon, the language must solve the conflict by giving priority to one of the incompatible constraints over the other. The fact that, in our case, the correct outputs are as in (17b) shows that in Lekeitio Basque Nasal Assimilation dominates Palatalization:

(17) a. ai/n/ka ‘leg’ Marti/n/ bakárrik ‘only Martin’
b. ai[I]ka Marti[m] bakárrik

The constraints that we are dealing with and their ranking are thus as in (18):

(18) Constraints:
   PAL: In word domains (including clitic groups), noncontinuant coronals are palatal after /i/ (shared [dorsal] node)
   N-ASSIM: A nasal shares a PA node with an immediately following consonant.

   Ranking:
   N-ASSIM dominates PAL

Rules vs. constraints

In case of conflict Assimilation, as shown in:

(19) [Rule 1]

Let us consider now as in (20a) /indar/ ‘strength’ in (17) above, in this case

This is because the consonant relevant sequence is included the nasal to surface as a following consonant. And

(20) a. *indar
    b.

In (21), the first Palatalization, which is the only solution, however, there is a better candidate which satisfies both constraints.

(21) [Rule 2]

So far, we have considered phonological word domain PAL constraint is not relevant. Irrelevance of a constraint constraint. In our particular case, more important to keep a


which are always phonologically conflicting output constraints. After a front high vocoid (within 1 point of articulation with a language must obey these formed, but those in (16b) are

\[ \text{Mart[i][n]} \]
\[ \text{Mart[m]} \]

Constraints are in conflict. This is the followed by a consonant, as in the /i/-final nasal to obey both which work in OT has shown conflict by giving priority to The fact that, in our case, the upper Basque Nasal Assimilation 'only Martin'

\[ \text{Pal} \]

Their ranking are thus as in (18):

\[ \text{Pal(nodal), noncontinuant (oral) node) node with an immediately} \]

Rules vs. constraints

In case of conflict, the preferred input is the one that obeys Nasal Assimilation, as shown in (19):

<table>
<thead>
<tr>
<th>N-ASSIM</th>
<th>PAL</th>
</tr>
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<tbody>
<tr>
<td>ai[n]ka</td>
<td>*</td>
</tr>
<tr>
<td>ai[n]ka</td>
<td>*!</td>
</tr>
<tr>
<td>ai[n]ka</td>
<td>*!  *</td>
</tr>
</tbody>
</table>

Let us consider now the case of a phonological-word-internal /ind/ sequence, as in (20a) /i/ndar/ 'strength' or /martin-da/ 'it is Martin'. Unlike in the examples in (17) above, in this case, it is possible for the output to satisfy both constraints. This is because the consonant following the nasal is a palatalizable one and the relevant sequence is included within a single word domain. It is thus possible for the nasal to surface as palatal after /i/ and simultaneously as homorganic with a following consonant. And this is what the surface forms show, (20b):

<table>
<thead>
<tr>
<th>a. i/nd/ar 'strength'</th>
<th>b. i[n]dar 'it is Martin'</th>
</tr>
</thead>
</table>

In (21), the first form given satisfies Nasal Assimilation but not Palatalization, which is the solution for the example in (19) above. In this case, however, there is a better solution: namely, the third form that is given, which satisfies both constraints. This form is thus preferred:

<table>
<thead>
<tr>
<th>N-ASSIM</th>
<th>PAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marti[n] da</td>
<td>*!</td>
</tr>
<tr>
<td>Marti[n] da</td>
<td>*!</td>
</tr>
<tr>
<td>Marti[n]a</td>
<td>*!</td>
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</table>

So far, we have considered the treatment of sequences arising within phonological word domains, including clitic groups. As mentioned above, the PAL constraint is not relevant outside of this domain. Within an OT analysis, the irrelevance of a constraint is obtained by ranking this constraint below another constraint. In our particular case, we can interpret the facts as indicating that it is more important to keep a word-initial consonant unaltered across contexts than to
palatalized this consonant. The higher ranking constraint would thus be a member of the family of constraints known collectively as Faithfulness (FAITH). This is a universal constraint which requires inputs and outputs to be identical. This general constraint can be expanded into a family of constraints requiring identity in specific positions or specific features. In our case, we are concerned with the invariability of word-initial consonants. The specific instantiation of the FAITH constraint that we must rank above PAL can be defined as follows:

(22) FAITH-WIC:

A word-initial consonant in a given lexical item has an invariable feature composition.

The ranking of FAITH-WIC above PAL determines that the initial consonant of neska 'girl' should remain an alveolar nasal in bi [n]eska 'two girls' where it is preceded by a palatalizing segment in a different word:

(23)

<table>
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<tr>
<th></th>
<th>FAITH-WIC</th>
<th>PAL</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>bi [n]eska</td>
<td>*</td>
</tr>
<tr>
<td></td>
<td>bi [n]eska</td>
<td>*</td>
</tr>
</tbody>
</table>

In a word-internal example such as /bi-na/ 'two by two', on the other hand, PAL is undominated by any other relevant constraints and bi[n]a is selected as the best output.

It was pointed out before that /inC/ sequences are treated identically word- internally and across word boundaries in some cases but not in all cases. When the consonant following the nasal is not a palatalizable one (a noncoronal), the results are the same in both contexts: the nasal takes the point of articulation of the following consonant, as shown above in (17). When the word-initial consonant is a coronal, on the other hand, the output is different in phonological word-internal environments (including clitic groups) and across word boundaries, as was also mentioned above (cf. (8)). In lexical domains i[n]a 'strength' is preferred over */i[qd]a* and with cliticization of the copula we obtain Marti[i[n]a] 'it is Martin'. Across phonological word boundaries, in contrast, we have realizations such as Marti[qd]ator and not *Marti[i[n]a]tor 'Martin is coming'. The palatalization of the /d/ is prevented when this is a word-initial consonant. This is a consequence of FAITH-WIC being ranked above PAL. The relative

Rules vs. constraints

ranking of the constraints N-ASSIM are undominated by PAL.

(24)

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None of the candidate of FAITH-WIC. Since the requirement vacuously, a constraint is chosen. 

This analysis is in terms of operations which is not on in that it allows us a de possible within the rule-I believe we can speak of

4 Interdialectal variation

It has often been en ranked and violable constraints cross-linguistic variation (1991a), the palatalization interdialectal variation.
constraint would thus be a member of Faithfulness (FAITH). This is a case where outputs to be identical. This concerns the specific instantiation of the FAITH defined as follows:

A given lexical item has an output that satisfies the constraints. This determines that the initial consonant in *bi[n]eska* 'two girls' where it is a word:

\[
\begin{array}{|c|c|c|}
\hline
& \text{FAITH-WIC} & \text{N-ASSIM} \\
\hline
\text{i[n]ar} & *! & * \\
\hline
\text{i[nd]ar} & *! & * \\
\hline
\end{array}
\]

FAITH-WIC and N-ASSIM are unranked, since they do not conflict with each other. They are both ranked above PAL:

\[
\begin{array}{|c|c|c|}
\hline
& \text{FAITH-WIC} & \text{N-ASSIM} \\
\hline
\text{Marti[nd]ator} & *! & * \\
\hline
\text{Marti[n]ator} & *! & * \\
\hline
\end{array}
\]

None of the candidates in the first set of examples in (24) incurs in a violation of FAITH-WIC. Since there is no word-initial consonant, all of them satisfy this requirement vacuously. As in (21), the candidate that satisfies the remaining two constraints is chosen. The candidates in the second set in (24) contain two phonological words. The presence of a word-initial consonant makes FAITH-WIC relevant for this example. The preferred candidate is the one which does not violate either of the two top-ranked constraints, FAITH-WIC and N-ASSIM.

This analysis in terms of constraints eliminates the need for a complex order of operations which is required in a rule-based approach. However, the advantage of this analysis is not only one of simplicity. The analysis is also more insightful in that it allows us a deeper understanding of the facts of the language than is possible within the rule-based analysis given above in section 2. In a case like this, I believe we can speak of true progress in the analysis of phonological facts.

4 Interdialectal variation

It has often been emphasized in the OT literature that analyses in terms of ranked and violable constraints offer a more appropriate means for accounting for cross-linguistic variation than rule-based approaches. As was shown in Hualde (1991a), the palatalization phenomenon in Basque is subject to some degree of interdialectal variation. At least certain aspects of this variation are more
insightfully characterized in terms of constraint interaction. Let us consider the following examples in the dialects of Lekeitio and Getxo, in (25):

(25) Lekeitio Getxo

mi[p] mi[n] ‘pain’
mi[n]a min[n]e ‘the pain’
mi[n] andi mi[n] andi ‘great pain’
muti[λ] muti[l] ‘boy’
muti[λ]a muti[λ]e ‘the boy’
muti[λ] andi muti[λ] andi ‘big boy’

As shown, Getxo differs from Lekeitio in that a word-final /i/ or /u/ is not palatalized unless the following word starts with a vowel (cf. Hualde and Bilbao 1992:22-26). The same situation is obtained in the dialect of Donostia-San Sebastián studied in Iverson and Oñederra (1985) and Hualde (1991a:120-121). In Hualde (1991a) this interdialectal variation is captured by proposing somewhat different rules for each of the two dialects. In Getxo, the rule of Palatalization would make reference to syllable structure, applying only when the target segment is in onset position. In Lekeitio, the position of the segment in the syllable would not be included in the description of the environment for the rule of Palatalization. If we consider the facts in terms of constraints, however, what seems to happen is that the two dialects differ in the way they solve a conflict between Palatalization and a Place Neutralization constraint (P-NEUT) that requires coda sonorants to be coronal, cf. (5) above (an instantiation of the Coda Condition of Prince and Smolensky 1993, McCarthy and Prince 1993a, 1993b):

(26) P-NEUT:
sonorants in a coda are coronal.

In Getxo P-NEUT is ranked higher than PAL. In Lekeitio, the opposite ranking prevails:

(27) Ranking of P-NEUT and PAL

a. Getxo: P-NEUT » PAL

<table>
<thead>
<tr>
<th></th>
<th>P-NEUT</th>
<th>PAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>/i/ mi[n]</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>mi[n]</td>
<td>*!</td>
<td></td>
</tr>
</tbody>
</table>

b. Lekeitio: PAL »

In both dialects, P- will assimilate in place

5 Interaction with syllable boundaries

We may now ask example mi[n] andi ‘great pain’ (word-final lateral). The fact that we find sonorants depending on word-boundaries. The facts are all relevant respects to amount of attention):

(28) a. Basque
le.ku
a.zu.kre
amak esan → amak lotu →

b. Spanish
so.fa
chi fla, *chi fla
chef alto →
chef loco →
Interaction. Let us consider the Getxo, in (25):

'pain'
'the pain'
'great pain'

'boy'
'the boy'
'big boy'

a word-final /l/ or /n/ is not a vowel (cf. Hualde and Bilbao for the dialect of Donostia-San and Hualde (1991a:120-121)).

Captured by proposing somewhat the rule of Palatalization only when the target segment in the syllable would not for the rule of Palatalization. However, what seems to happen is a conflict between Palatalization and requires coda sonorants to Coda Condition of Prince and (3b):

5 Interaction with syllabification

We may now ask why, in Getxo, the word-final nasal palatalizes in the example mi[n] andi 'great pain' (third example in (22), and similarly for the word-final lateral). The answer obviously has to do with the fact that, in this case, the word-final consonant syllabifies in an onset with the following word-initial vowel. But why do we find syllabification across word boundaries? To answer this question we need to examine syllabification in Basque in some detail. A first approach might be to assume that phonological phrases of the relevant type constitute single domains for syllabification. But this position would not explain the fact that we find some differences in the syllabification of certain sequences of segments depending on whether they are word-internal or occur across word boundaries. The facts are the same in all Basque dialects and are also identical in all relevant respects to the Spanish facts (which have received a considerable amount of attention):

<table>
<thead>
<tr>
<th>(28) a. Basque</th>
<th>PAL</th>
<th>P-NEUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>le.ku</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a.zu.kre</td>
<td></td>
<td></td>
</tr>
<tr>
<td>amak esan →</td>
<td>a.ma.ke.san</td>
<td></td>
</tr>
<tr>
<td>amak lotu →</td>
<td>a.mak.lo.tu</td>
<td></td>
</tr>
<tr>
<td></td>
<td>*a.mak.lo.tu</td>
<td></td>
</tr>
</tbody>
</table>

b. Spanish

| so.fá          |     |        |
| chi.fl.a, *chi.fl.a |     |        |
| chef alto →   | chef.fl.to  |        |
| chef loco →   | chef.lo.co  |        |
|                | *chef.lo.co  |        |

In both dialects, P-NEUT is dominated by N-ASSIM, since a nasal in a coda will assimilate in place to a following consonant.
As the examples in (28) show, a consonant is always syllabified with a following vowel, both word-internally and across word boundaries. On the other hand, onsets are maximized word-internally, but not across word boundaries. That is, a sequence of consonants that can constitute a well-formed onset cluster (which both in Basque and Spanish can only be a group of oral stop or /l/ plus liquid) is syllabified as an onset cluster word-internally, but the same sequence is heterosyllabic when a word-boundary intervenes between both consonants.

In a rule-based approach to syllabification, such as that of Levin (1985), onset maximization is obtained by ordering all onset-building operations before all rules that incorporate segments to the coda. The Spanish facts in (28b) are analyzed in Harris (1983, 1989) and Hualde (1991b) within such a rule-based framework. In particular, in Hualde (1991b) it is postulated that at the lexical level both a CV-rule that adjoins a coda to a following nucleus as onset and an Onset Cluster rule that incorporates a second consonant to the onset if the result is a well-formed onset group apply before any adjunctions in coda position. This ensures the correct syllabification of sofá and chi.jl.a. Consonants that cannot be added to the onset are incorporated into the coda as in the case of both nasals in can.tan ‘they sing’ or the final consonant in chef. Postlexically, however, a word-final consonant is moved from the coda to the onset of the following syllable if it is followed by a vowel. This is done by a second, postlexical, application of the CV-rule. On the other hand, the Onset Cluster rule must not reapply postlexically, since onset clusters are not maximized across word boundaries. That is, the order in (29) is proposed:

(29)  

**Lexical level:**
- Nucleus projection
- CV-rule
- Onset Cluster rule
- Coda rules

**Postlexical level:**
- CV-rule

This order of operations gives us derivations like those in (30), where, to save space, syllabified segments are enclosed within parentheses, instead of using the Levin-style N-bar trees employed in Harris (1989) and Hualde (1991b):

(30)  

a. Spa.
- LEXICAL
- Nucleus proj
- CV-rule
- Onset Cluster
- Coda rule
- lexical output:

b. Bas.
- LEXICAL
- Nucleus proj
- CV-rule
- Onset Cluster
- Coda rule
- lexical output:

In this account of
situation in which a co
approach. Rules must a
both lexically and postl
rules. Again, even thou
said that it gives us a p
they are. The analysis d
motivate this particular
recognized that syllabif
To begin with, the
V.CV is a manifestati
syllables (16's 1986 u
undominated in language
José Ignacio Hualde

It is always syllabified with a word boundary. On the other hand, it is never syllabified across word boundaries. That is, it forms a well-formed onset cluster internally, but the same sequence is not formed across word boundaries. The Spanish facts in (28b) are from Levin (1985), which postulates that at the lexical level, following nucleus as onset and an antecedent to the onset if the result is a well-formed onset cluster. Consonants that cannot be syllabified as in the case of both nasals in (28b) within such a rule-based approach. Rules must apply in a specific order and one of the rules applies twice, both lexically and postlexically, both before and after some other rules. Again, even though the analysis can account for the facts, it can hardly be said that it gives us a profound understanding of the reasons why the facts are as they are. The analysis does not reveal the universal principles and tendencies that motivate this particular array of syllabification facts. However, it is widely recognized that syllabification obeys universal principles.

In this account of syllabification in Spanish and Basque, we again find a situation in which a complex order of operations is required in a rule-based approach. Rules must apply in a specific order and one of the rules applies twice, both lexically and postlexically, that is, it applies both before and after some other rules. Again, even though the analysis can account for the facts, it can hardly be said that it gives us a profound understanding of the reasons why the facts are as they are. The analysis does not reveal the universal principles and tendencies that motivate this particular array of syllabification facts. However, it is widely recognized that syllabification obeys universal principles.

To begin with, the CV-rule which forces a VCV sequence to be syllabified as V.CV is a manifestation of a universal principle of avoidance of onsetless syllables (Levin’s 1986 Onset Principle (ONSET)). This principle appears as undominated in languages such as Arabic and Farsi where onsetless word-initial

<table>
<thead>
<tr>
<th>Rules vs. constraints</th>
<th>93</th>
</tr>
</thead>
<tbody>
<tr>
<td>(30)</td>
<td>a. Spanish</td>
</tr>
<tr>
<td></td>
<td>sofa</td>
</tr>
<tr>
<td>LEXICAL</td>
<td>Nucleus proj</td>
</tr>
<tr>
<td>CV-rule</td>
<td>(s0)(fa)</td>
</tr>
<tr>
<td>Onset Cluster</td>
<td></td>
</tr>
<tr>
<td>Coda rule</td>
<td>lexical output:</td>
</tr>
<tr>
<td>POSTLEXICAL</td>
<td>CV-rule</td>
</tr>
</tbody>
</table>

b. Basque

| | azukre | amak# esan | amak# lotu |
| LEXICAL | Nucleus proj | (a)z(u)kr(e) | (a)m(a)k (e)s(a)n | (a)m(a)k l(o)(tu) |
| CV-rule | (a)(zu)k(re) | (a)(ma)k (e)(sa)n | (a)(ma)k (lo)(tu) |
| Onset Cluster | (a)(zu)(kre) | | |
| Coda rule | lexical output: | (a)(zu)(kre) | (a)(mak) (e)(san) | (a)(mak) |
| POSTLEXICAL | CV-rule | | (a)(mak) (lo)(tu) |

In this account of syllabification in Spanish and Basque, we again find a situation in which a complex order of operations is required in a rule-based approach. Rules must apply in a specific order and one of the rules applies twice, both lexically and postlexically, that is, it applies both before and after some other rules. Again, even though the analysis can account for the facts, it can hardly be said that it gives us a profound understanding of the reasons why the facts are as they are. The analysis does not reveal the universal principles and tendencies that motivate this particular array of syllabification facts. However, it is widely recognized that syllabification obeys universal principles.

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syllables are given an epenthetic onset, namely a glottal stop. In Basque and Spanish, the Onset Principle is violated when the only way to satisfy it would be to insert or delete (unparse) a segment. Thus these principles against inserting or unparsing material (collectively known as Faithfulness (FAITH) in the Optimality literature) have a higher status in Basque and Spanish than ONSET:

(31) Constraints:
   ONSET: every syllable must have an onset.
   FAITH: do not insert or unparse phonological material.

Ranking:
   FAITH » ONSET

(32)

<table>
<thead>
<tr>
<th>Word</th>
<th>FAITH</th>
<th>ONSET</th>
</tr>
</thead>
<tbody>
<tr>
<td>/ama/</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a.ma</td>
<td>*!</td>
<td></td>
</tr>
<tr>
<td>a.ma</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>am.a</td>
<td></td>
<td>**!</td>
</tr>
</tbody>
</table>

The second and third candidates in (32) incur in, at least, one violation of ONSET, since the word starts with a vowel. The candidate with the fewest number of violations of constraints is chosen.

ONSET is a strong enough constraint in these languages to force the syllabification as a single syllable of CV sequences across word boundaries. This syllabification is in violation of another universal principle, Alignment (ALIGN), which demands that the boundaries of morphological domains and syllables must coincide (McCarthy and Prince 1993b):²

(33)

<table>
<thead>
<tr>
<th>Word</th>
<th>FAITH</th>
<th>ONSET</th>
<th>ALIGN</th>
</tr>
</thead>
<tbody>
<tr>
<td>/zuk esan/</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>zuk. c.san</td>
<td>*!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>zuk. ?e.san</td>
<td></td>
<td>*!</td>
<td></td>
</tr>
<tr>
<td>zu.k c.san</td>
<td></td>
<td></td>
<td>*</td>
</tr>
</tbody>
</table>

In languages without syllabification across word boundaries, ALIGN is ranked higher than ONSET.

Now we can understand why syllabification across word boundaries takes place in examples such as zuk esan 'you say' but not in zuk lotu 'you tie'. In the

Rules vs. constraints

first of these two examples, ONSET. In the second, onset would result in considered an effect of avoided. This principle

Now we can go back to the word 'great pain', ONSI PAL requires the word-final constraints in this dialect. ONSET and PAL. P-NE is not syllabified in the case.

(34)

a.zuk.re³
a.zu.kre
zu.klo.tu
zu.klo.tu

6 Universal principles:

A final issue that we constraints or principles hypothesis within OT is grammars can differ only. That is, in the analysis of universal principles as a f
José Ignacio Hualde

In Basque and in most other languages, there is a glottal stop. In Basque and in many other languages, the only way to satisfy it would be to break the prosodic principies against inserting or crossing word boundaries (FAITH) in the Optimality Theory model. However, in Basque a glottal stop can only be avoided by inserting a syllable, thus creating an onset.

In the Optimality Theory framework, the candidate with the fewest violations is the best. However, in some cases, it may be necessary to insert or cross word boundaries. This can be achieved by using the principle Alignment (ALIGN), which requires that prosodic domains and syllables must not be split at word boundaries.

In the example of the Basque words "a.zuk.re" and "a.zu.kre", the first word is syllabified across the word boundary in order to avoid violating FAITH. In the second word, the pronunciation "a.zu.kre" is preferred because it avoids violating ALIGN.

The table below shows the candidates and their violations:

<table>
<thead>
<tr>
<th>Candidate</th>
<th>FAITH</th>
<th>ONSET</th>
<th>ALIGN</th>
<th>NO-CODA</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.zuk.re</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a.zu.kre</td>
<td></td>
<td>*</td>
<td></td>
<td>**!</td>
</tr>
<tr>
<td>zuk.lo.tu</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>zu.klo.tu</td>
<td></td>
<td></td>
<td></td>
<td>**!</td>
</tr>
</tbody>
</table>

Rules vs. constraints

In the second example, the pronunciation "zuk.lo.tu" is preferred because it avoids violating ALIGN. Onset maximization can be considered an effect of NO-CODA, a principle that states that codas must be avoided. This principle is ranked lower than ALIGN in Basque and Spanish.

Now we can go back to our palatalization example in Getxo Basque. In "min ani 'great pain'", ONSET requires syllabification across the word boundary and PAL requires the word-final nasal to be palatal. Given the particular hierarchy of constraints in this dialect, "mi.[n] an.di" is the best output, since it satisfies both ONSET and PAL. P-NEUT is vacuously satisfied since the word-final consonant is not syllabified in the coda.

6 Universal principles and language-specific constraints

A final issue that we should address is that of the nature of the phonological constraints or principles that we have used in our analysis. The strongest hypothesis within OT is that all constraints are universal and that individual grammars can differ only in their ranking. I consider this only as a desideratum. That is, in the analysis of phonological facts one should have the identification of universal principles as a final goal. It is, however, my view that together with
universal principles, one must also recognize the existence of language-particular constraints. Nevertheless, one should also strive to identify the universal aspects of language-specific constraints (cf. McCarthy 1993). In our analysis of syllable structure in Spanish and Basque, all constraints that have been put to use are of a universal character. Certain aspects of phonological structure such as syllabification and stress are undoubtedly guided by universal principles to a very large extent, as has long been recognized. Long-distance assimilatory phenomena (harmonies) also fall into this category (cf. Cole and Kisseberth 1994). In the realm of purely segmental alternations, on the other hand, we find much more cross-linguistic variation, which I very much doubt could be reduced to different rankings of a set of universal constraints. Nevertheless, as mentioned, the universal principles involved in particular alternations should still be identified.

In this paper, we have dealt primarily with two segmental phonological phenomena in Basque: Nasal Assimilation and Palatalization. Nasal Assimilation is a phenomenon whose frequency in human languages warrants a universal characterization. Indeed, the amount of cross-linguistic variation that Nasal Assimilation presents appears to be reducible to a limited amount of parametrization (or differences in the hierarchies among constraints that are established, in OT terms), as Padgett (1994) shows. As for Palatalization, although in the particular form that it presents in Basque, is a much more peculiar process, we were able to reduce some variation between dialects to a different interaction between constraints. The way Palatalization works in Basque is certainly specific to this language. It is more common, for instance, to have palatalization of consonants triggered by a following vocoid, rather than a preceding one (Iverson and Oñederra 1985); the palatalizing segments may be the velars instead of the coronals, etc. But it is also true that there are certain universal constraints limiting the variation that is possible among palatalization processes. For instance, there appears to be a hierarchy of triggers [j] » [i] » [e], such that if vocalic [i] triggers palatalization, nonvocalic [j] does too, and if [e] triggers this process so do [i] and [j]. To the extent that they are universal, these constraints should be recognized as such. In any event, I hope to have shown that, for the cases that we have examined, even language-particular processes are better understood as wellformedness constraints than as rules. That is, (some) phonological phenomena may be analyzed more insightfully in terms of constraints that in terms of rules even if those constraints are not universal.

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existence of language-particular processes are universal, as mentioned, the constraints should still be identified. For two segmental phonological processes, Nasal Assimilation and a universal-linguistic variation that Nasal Assimilation works in Basque is common, for instance, to have following vocoid, rather than a palatalizing segments may be the also true that there are certain possible among palatalization: a trigger {i} > {j} > {e}, concordic {j} does too, and if {e} ment that they are universal, these event, I hope to have shown that, language-particular processes are s than as rules. That is, (some) more insightfully in terms of constraints are not universal.

Notes

* For comments, I want to thank Eulália Bonet, Jennifer Cole, Gorka Elordieta and Jorge Guitart. I am also thankful to audiences at USC and at the January 1994 LSA Meeting, where oral versions of parts of this paper were presented.

1 Younger speakers produce prepalatal affricates [tl], [d3] instead of the palatal stops [e], [j]. /sl/ also palatalizes under similar (but not identical) conditions. The phonology of Lekeitio Basque is discussed in detail in Hualde, Elordieta and Elordieta (1994).

2 ALIGN is, more precisely, a family of constraints.

3 This is essentially the analysis proposed in Hualde (1994, 1995) and, independently, in Colina (1995). A somewhat similar analysis which employs language-particular constraints is found in Morales-Front (1994).

4 Both candidates contain one violation of ONSET since the first syllable of the word is vowel initial.

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Edinburgh.

Estimada amiga Esperanza,

Agradeceríamos, si nos pudiéses conseguir fotocopia de los siguientes artículos:

  
  J.Hualde: Rules vs. constraints: palatalization in biscayan basque and related phenomena.

Sin otro particular, agradeciéndotelo de antemano, recibe un cordial saludo,

Carmen Gómez
Directora Técnica