Relativised Contiguity and Word-Final Deletion in Catalan*

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ABSTRACT. The aim of this paper is to provide an OT account for the Catalan word-final rhotic deletion and its interactions with two morphosyntactic processes: plural formation and cliticisation. It is shown that the deletion of the word-final posttonic rhotics is due to the sonority restriction on the marginal position of a stressed syllable and is accounted for by the positional markedness constraints that are specific to stressed syllables. It is also shown that the different interactions of the rhotic deletion with two morphosyntactic processes are attributed to the difference in morphosyntactic boundaries: deletion is allowed across a morpheme boundary but not across a word boundary. The difference is accounted for by relativising the JUNCTURE-CONTIGUITY constraints to morphosyntactic boundaries.

Keywords: deletion, positional markedness, morphosyntactic boundaries, relativised contiguity

1. Introduction

Catalan has a process of word-final rhotic deletion which deletes word-final $r$ if it is preceded by a stressed vowel. In this process, stress on the preceding vowel and word-finality of rhotics are crucial: $r$ is not deleted if its preceding vowel is not stressed or if it is not underlingly final. Given that the word-finality of rhotics is a crucial requirement for the deletion process, this process shows interesting interactions with morphosyntactic processes which concatenate morphemes after stems. In this paper, I examine two morphosyntactic processes that interact differently with the word-final rhotic deletion: plural suffixation and cliticisation. After proposing the analysis of the rhotic deletion based on the positional markedness constraints on stressed syllables, it will be shown that the different interactions of the rhotic deletion with two morphosyntactic processes are accounted for by the JUNCTURE-CONTIGUITY constraints that are relativised to morphosyntactic boundaries.

2. Catalan Word-Final Deletion and Its Interactions with Morphosyntactic Processes

2.1. Catalan word-final rhotic deletion

In Catalan, there is a process that deletes word-final $r$ which is preceded by a stressed vowel (Mascaró 1976, Wheeler 1979, Hualde 1992, Bonet and Lloret 1998):

(1) a. primer [primé] 'first (m.sg.)'
clàr [klá] 'clear (m.sg.)'
sencer [sənsé] 'whole (m.sg.)'
voler [bulé] 'to want'
b. primera [priméɾa]¹ 'first (f.sg.)'
clara [kláɾa] 'clear (f.sg.)'
sencera [sənséɾa] 'whole (f.sg.)'
The feminine forms in (1b) shows that the nominal stems in (1a) lexically have a rhotic consonant in its final position, although it is deleted in the masculine forms.

In Catalan rhotic deletion, stress on the preceding vowel and the word-finality of rhotics are crucial. Therefore, $r$ is not deleted when its preceding vowel is not stressed or it is not underlyingly word-final, as shown in (2) and (3), respectively.

(2) miser [mízəɾ] 'miserable'
mortífer [murtíɾəɾ] 'deadly'
(3) curt [kúɾ(t)] 'short'
matern [məɾtəɾn] 'material (m.sg.)'

2.2. Opaque rhotic deletion in plural forms

It is inconsistent with the observation above that there is one environment where a rhotic that is not word-final is deleted. The opaque deletion of non-word-final rhotic is observed in plural forms of $r$-ending masculine nominals:

(4) primers [primés] 'first (m.pl.)'
clars [klás] 'clear (m.pl.)'
sencers [sənsés] 'whole (m.pl.)'

In (4), the stem-final $r$ is deleted in plural forms, although it is followed by the plural suffix -s and is not word-final. The rhotic deletion in this case cannot be attributed to syllable structure restrictions because Catalan generally allows the word-final $rs$ cluster (e.g. curs [kúɾs] 'course').

2.3. Non-deletion of rhotics in cliticised forms

The other morphosyntactic process that shows a contrast with the case of the plural formation is the cliticisation of object pronouns to verbal infinitives. When a verbal infinitive is followed by enclitics², the infinitive-final rhotic is not deleted (Wheeler 1979, Hualde 1992, Bonet and Lloret 1998):

(5) a. voler [bulé] voler-ho [buléɾu] 'to want' 'to want it'
tirar [tiráɾ] tirar-ho [tiráɾu] 'to throw' 'to throw it'
b. voler [bulé] voler-te [buléɾtəɾ] 'to want' 'to want you'
saber [səɾbeɾ] saber-la [səɾbeɾla] 'to know' 'to know it'
Examples in (5) show that \( r \) is not deleted in cliticised forms regardless whether the enclitic begins with a vowel (5a) or a consonant (5b).

Catalan rhotic deletion introduced above offers interesting issues both theoretically and empirically. For the rhotic deletion process, it is unclear why word-final posttonic rhotic is deleted. Previous analyses based on rule-based approach (Mascaró 1976, Wheeler 1979, Morales 1995) assume the deletion rule or filter, such as (6), which excludes rhotics from word-final posttonic position. However, this rule/filter does not explain why rhotics must be excluded from the given environment.

\[
(6) \quad r \Rightarrow \emptyset /'V_{(+ C)}\#
\]

The different interactions of the deletion rule with plural formation and cliticisation are also problematic for the rule-based approach. The deletion rule (6) contains "parenthesised" heteromorphemic consonant to account for the deletion in plural forms, but the reason why rhotics are deleted before the plural suffix remains unexplained.

There is a possible rule-based analysis where the cliticisation precedes the deletion rule, which itself precedes the plural suffixation. However, the rule ordering like this is implausible, because, as suggested by the cliticisation to gerunds where the gerundial suffix precedes a clitic (e.g. pintant-los /pint-ant # los/ 'painting them'), cliticisation cannot precede inflection.

In the following sections, I propose an analysis within the framework of Optimality Theory (OT; Prince and Smolensky 1993) based on positional markedness constraints and contiguity constraints relativised to morphosyntactic boundaries.

### 3. Analysis

#### 3.1. The word-final rhotic deletion

In this section, we will address the issue of why word-final \( r \) is deleted in posttonic position by reviewing the OT analysis proposed by Kikuchi (2003). The basic idea of the analysis is that \( r \) is deleted in a coda position of a stressed syllable, because it is too sonorous to be in that position. Within the OT framework, Kikuchi (2003) proposes an analysis where the sonority-based restriction on stressed syllables is accounted for by the interaction between faithfulness constraints and the positional prosodic markedness constraints originally proposed by de Lacy (2001):

\[
(7) \quad \text{Prosodic markedness constraints in prominent positions}
\]

Prosodic markedness constraints are relativised to phonologically prominent positions: initial syllables, stressed syllables, etc.

The proposal is that there are markedness constraints which are violated only by the elements in phonologically prominent positions. The relevant constraint to the analysis is a margin sonority constraint against coda liquids in stressed syllable:

\[
(8) \quad \text{a. } *\text{MARGIN}(\delta) / \text{liquid } [*\text{M}(\delta) / L]:
\]

Liquids must not be parsed as a marginal position of a stressed syllable.
b. *MARGIN/liquid [*M/L]:

Liquids must not be parsed as a marginal position of a syllable.

The constraint (8b) is a part of the margin sonority hierarchy (Prince and Smolensky 1993) which states that less sonorous segments are favorable to syllable-margin position. Positional prosodic markedness constraint (8a) is a position-specific version of the constraint (8b).

Catalan word-final rhotic deletion is accounted for by the ranking where the anti-deletion faithfulness constraint MAXIO is ranked between positional and general markedness constraints:

\[(9) \quad {*M(\sigma@)/L} >> \text{MAXIO} >> {*M/L}\]

Notice that *M(\sigma@)/L universally dominates *M/L, because they are in a stringency relationship: violations of the former are always a subset of those of the latter. Under the ranking in (9), word-final \(r\) cannot be parsed to a coda position of a stressed syllable, because it violates the highest-ranked *M(\sigma)/L. Contrastively, \(r\) is allowed to be parsed if it is in an unstressed syllable because *M/L is dominated by MAXIO. Candidate evaluations by the ranking in (9) are illustrated in tableaux (10-11):

\[
\begin{array}{|c|c|c|c|}
\hline
\text{Candidate} & \text{*M(\sigma@)/L} & \text{MAXIO} & \text{*M/L} \\
\hline
/klár/ & ! & - & - \\
\hline
klár & ! & * & - \\
\hline
\text{\(\sigma\)} klá & - & * & - \\
\hline
/\text{mís}er/ & - & - & - \\
\hline
\text{\(\sigma\)} mí.zər & - & * & - \\
\hline
\text{mí.zə} & - & * & - \\
\hline
\end{array}
\]

3.2. (Non)-deletion in plural forms and cliticised forms

Let us now turn to the analysis of the interactions of the rhotic deletion with the morphosyntactic processes. As it is noted in section 2, the stem-final \(r\) is opaquely deleted in plural forms, while it is not deleted in cliticised forms. The question is what is the difference between plural forms and cliticised forms that causes the different applications of the rhotic deletion. If we compare the morphological structures of these forms, the difference between them becomes clear:

\[
\begin{array}{|c|c|c|}
\hline
\text{Form} & \text{Clipping} & \text{Boundary} \\
\hline
\text{Plural forms: clars} & /klar + s/ & \\
\hline
\text{Cliticised forms: tirar-ho} & /tirar # u/ & \\
\text{Saber-la} & /saber # la/ & \\
\hline
\end{array}
\]

In plural forms illustrated in (12a), the boundary that lies between the stem and the plural suffix is a morpheme boundary (denoted by "+"), they form a single grammatical word but they are different lexical items. In cliticised forms (12b), on the other hand, the verbal infinitive and the enclitic are divided by a word boundary (denoted by ";#"), they are different grammatical words, but they form a single phonological word. Given the different
morphosyntactic boundaries, the generalisation is that the deletion across a morpheme boundary is allowed, while the deletion across a word boundary is not. In order to account for this generalisation, I propose JUNCTURE-CONTIGUITY constraints (cf. Lamontagne 1997) that are relativised to morphosyntactic boundaries:

(13) **JUNCTURE(+)-CONTIGUITY** [J(+)-CONTIG]:

If the elements in the input are contiguous across a morpheme boundary, their output correspondents must be contiguous.

(14) **JUNCTURE(#)-CONTIGUITY** [J(#)-CONTIG]:

If the elements in the input are contiguous across a word boundary, their output correspondents must be contiguous.

As well as the case of positional markedness constraints discussed in 3.1, there is a stringency relationship between J(+)-CONTIG and J(#)-CONTIG, because a word boundary always coincides with a morpheme boundary but not vice versa. Thus, J(#)-CONTIG universally outranks J(+)-CONTIG.

The facts that the final $r$ is deleted in plural forms but not in cliticised forms indicates that the trigger constraint of the rhotic deletion, *$M(\sigma)/L$, is ranked between J(#)-CONTIG and J(+)-CONTIG:

(15) Deletion of the stem-final $r$ in plural forms:

<table>
<thead>
<tr>
<th>/klâ1r2 + s3/</th>
<th>J(#)-CONTIG</th>
<th>*$M(\sigma)/L$</th>
<th>J(+)-CONTIG</th>
</tr>
</thead>
<tbody>
<tr>
<td>klâ1r2s3</td>
<td>*!</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*r</td>
<td>klâ1s3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(16) Non-deletion of infinitive-final $r$ in cliticised forms:

<table>
<thead>
<tr>
<th>/sâbê1r2 # l1a/</th>
<th>J(#)-CONTIG</th>
<th>*$M(\sigma)/L$</th>
<th>J(+)-CONTIG</th>
</tr>
</thead>
<tbody>
<tr>
<td>*r</td>
<td>sêâbê1r2l1a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>sêâbê1l1a</td>
<td>*!</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>/tirâ1r2 # u3/</th>
<th>J(#)-CONTIG</th>
<th>*$M(\sigma)/L$</th>
<th>J(+)-CONTIG</th>
</tr>
</thead>
<tbody>
<tr>
<td>*r</td>
<td>tirâ1r2u3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>tirâ1u3</td>
<td>*!</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As shown in (15), the deletion across a morpheme boundary incurs a violation of J(+)-CONTIG. However, this J(+)-CONTIG violation is necessary to avoid the violation of *$M(\sigma)/L$, which is ranked higher than J(+)-CONTIG. Thus, the deletion candidate is selected as optimal. In cliticised forms (16), by contrast, the deletion across a word boundary incurs a violation of J(#)-CONTIG. Since J(#)-CONTIG dominates *$M(\sigma)/L$, the deletion is not allowed.
In Catalan, tautomorphemic rs sequence is allowed. This is accounted for by the dominant \textsc{domain-contiguity} constraint which militates against the deletion within a morphological domain:

\begin{equation}
\text{DOMAIN-CONTIGUITY} \ [D\text{-CONTIG}] \ (\text{cf. Lamontagne 1997}):
\end{equation}

If the elements in the input are contiguous in a morphological domain, their output correspondents must be contiguous.

As tableau (19) shows, D-\textsc{contig} also accounts for the non-deletion of word-internal r.

As a summary, the constraint ranking proposed in this analysis is shown in (20):

\begin{equation}
\text{J(#)-contig, D-CONTIG} \gg \text{*M(σ)/l} \gg \text{J(+)-CONTIG, MAXIO} \gg \text{*M/L}
\end{equation}

\section*{3.3. Residual Issues}

So far, we develop the analysis which accounts for the word-final rhotic deletion in Catalan including its interactions with morphosyntactic processes, and we see that the positional markedness constraints and the relativised contiguity constraints can provide a simple explanation to this previously unexplained phenomena. However, a couple of issues still remains. First, the ranking of \textsc{maxio} within the margin sonority hierarchy in stressed syllable (21) wrongly predicts that laterals and glides are also deleted in word-final posttonic position.

\begin{equation}
\text{M(σ)/vowel} \gg \text{M(σ)/glide} \gg \text{M(σ)/liquid} \gg \text{M(σ)/nasal} \gg \text{MAXIO} \gg \text{*M(σ)/obstruent}
\end{equation}

According to Walsh Dickey (1997), the difference between rhotics and liquids is that rhotics have a non-primary laminal node, whereas laterals have a secondary dorsal node. If we assume that glides also have a dorsal node, non-deletion of laterals and glides can be accounted for as the preservation of their dorsal node. But I leave this problem to the future research.

The second issue is the non-deletion of the stem-final r in -ment adverbs shown in (22). Adverbs with the suffix -ment show the same phonological properties as compounds: the fact that the stem mid vowel [o] in (22a) is not reduced in -ment adverb in (22b) shows that the phonological secondary stress falls on the stem (cf. \textit{majoria} [mawʃurja] 'majority'). The non-deletion of the stem-final r in (22b) shows that the boundary between the stem and -ment is a word boundary but not a morpheme boundary as opposed to the morphological
status of -ment as a suffix. The comprehensive study of the rhotic deletion in compounds is another issue for the future studies.

(22) a. major [mɔʒɔ] 'major'
    b. majorment [mɔʒɔrmɛn] 'mainly'

4. Conclusion

The purpose of this paper was to provide an OT account for Catalan word-final rhotic deletion and its interactions with plural formation and cliticisation. Following Kikuchi (2003), it has been shown that the deletion process is accounted for by the positional markedness constraints to stressed syllable. It has also been shown that the difference between plural forms and cliticised forms with respect to its interaction with the rhotic deletion is attributed to the difference in morphosyntactic boundary that lies between the stem and the following morpheme: deletion is allowed across a morpheme boundary but not across a word boundary. The difference in morphosyntactic boundaries is accounted for by the JUNCTURE-CONTIGUITY constraints relativised to morphosyntactic boundaries that are ranked according to their stringency relationship. Although some theoretical and empirical issues are still remained, the proposed OT analysis would contribute to the deeper understanding of the rhotic deletion in Catalan.

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Notes

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1 In Catalan, rhotics are pronounced as flap in intervocalic position.

2 In Catalan, clitics are enclitic, if they attach to infinite verbs, whereas they are proclitic when they attach to finite verbs (Wheeler, Yates and Dols 1999).
3 Non-deletion of onset rhotics is accounted for by Domain-Contiguity (see 3.2.) and the alignment constraint that requires the left-edge of a stem to coincide with the left-edge of a prosodic word.

4 Catalan has a word-final posttonic nasal deletion which suggests the ranking *M(σ)/nasal >> MAXIO. See Kikuchi (2003) for detailed analysis of the nasal deletion.

5 I would like to thank Dylan Herrick for pointing me this possibility.

References