The phonological opposition between the two mid back rounded vowels [ɔ] and [o] of Standard French, e.g., *sotte* [sɔt] vs. *saute* [sɔt], is neutralized in word-final position, where only the tense vowel [ɔ] occurs, as in *sot* [sɔ] and *saute* [sɔt].

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1. We will assume here that the opposition between [ɔ] and [o] is basically one of tenseness, the difference in height being a correlate. More precisely, we adopt Redenbarger's articulatory features for vowels (1981:85):

<table>
<thead>
<tr>
<th>Feature</th>
<th>+back</th>
<th>+low</th>
</tr>
</thead>
<tbody>
<tr>
<td>back</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>low</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>high</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>round</td>
<td>-</td>
<td>+</td>
</tr>
</tbody>
</table>

In modern Standard French tense vowels are phonetically long in closed stressed syllables. The vowel [ɔ] is defined as tense, front, and lower than lax [e] (for the former symbol see Pullum & Ladusaw 1986:52). It is seldom observed in modern varieties of Standard French, but a three-way distinction between the reflexes of [e], [ɛ], and [ɔ] in word-final position is still noted by Haudricourt & Thomas (1968). The specific choice of articulatory features is not crucial for our presentation (Lindau 1978 proposes "peripherality" as a more descriptive denomination than "tenseness"), provided that it allows for the definition of the class of segments {[ɔ], [ɔ]}, which would be represented here as [+syll, +high, +low, +back], and for which we will use the abbreviation O.
This neutralization is relatively recent. Though recorded at the beginning of the 19th century, it only became the official norm a century later (cf. Straka 1981:208–9). A recent survey of regional French (Walter 1982) revealed that it has not yet affected—at least systematically—most varieties of regional French in northern France (both west and east of Paris). If we exclude areas (mainly Picardy) where [ɔ] : [o] do not appear to be in phonological opposition, it is only in Île-de-France that it is regular.3

The change of [ɔ] to [o] is often assumed to be the result of a regular sound change referred to as the loi de position. In this paper, we shall re-examine and justify another explanation put forward by Rousselot & Laclotte (1913), who suggested that this change results from the generalization of plural forms. Their analysis would imply the existence of a sound change initiated by morphology. Although such cases have been reported, e.g., Rochet (1974) or Malkiel (1976), this last author later recognized that “a purely morphological motivation of a sound shift has yet to be demonstrated” (1982:248).

Hooper (1976:91) makes similar observations and claims that phonologization—the loss of morphological conditions on morphophonological rules—is not a possible evolutionary development in the history of languages (cf. Hooper 1976:91).

1. Word-final O-tensing in Modern French. The lack of word-final [ɔ] in Modern French can be attributed to the existence of a synchronic rule (1) which tenses mid back rounded vowels in word-final position:

(1) O → [+tense] –

The effects of this rule can be observed in word-formation processes and borrowings. Whenever [ɔ] becomes word-final in truncated forms, it shifts to [o], e.g., métropolitain [metropolite] > métro [metro], vélomètre [velosiped] > vélo [velo]. A like shift occurs in any extracted syllable used in an echo word, e.g., dormir [dormir] > dodo [dodo] or [dodo] (cf. Morin 1972), or when a syllable becomes word final in verlan (a secret language), e.g., jobard

2. Sound change or analogy? According to the prevalent view, the synchronic rule (1) is the result of a general historical sound change known as the loi de position (cf. Fouche 1913:46–47, Straka 1981:208). Although there are serious reasons to doubt that one can give a single simple explanation for all the changes the loi de position is supposed to cover (cf. Morin 1983), the regularity with which [ɔ] becomes [o] in word-final position certainly suggests a regular sound change. In a small three-line paragraph at the end of a note, however, Rousselot & Laclotte took a completely different tack. They observed that their older informants in Paris distinguished the singular and plural of nouns and adjectives, e.g., un marmouset [ɔ] vs. des marmousets [ɔ], un doigt [ɔ] vs. des doigts [ɔ], and that a similar distinction obtained outside of Paris for other vowels, e.g., gigot [ɔ] vs. gigots [ɔ]. Their


4. The singular ending [ɔ] in Rousselot & Laclotte’s description is restricted to the French spoken outside of Paris (159); the plural ending [ɔ] given earlier (137) concerns Paris, but the absence of specific mention implies that it is also used elsewhere, as is indeed the case in most northern regional French, except in the East. The changes of vowel quality in the plural, whereby [ɔ] > [ɔ] and [ɔ] > [ɔ], are the reflexes of earlier changes to be discussed later.
younger Parisian informants, however, appear to have generalized one of the two allomorphs for both numbers: "Mais ces distinctions [entre le singulier et le pluriel] s'effacent, et l'unification se fait entre le singulier et le pluriel. C'est le singulier qui l'a emporté dans les mots en -at, -a. Le pluriel triomphe dans tous les autres cas" (1913:137–38). It is clear for them that (1) is not the result of a sound change, but rather of a generalization of the plural forms ending in [ö]. They do not discuss, however, how such a change could also have affected invariable words.

3. Vowel length and tension in the plural. Prior to (1), there existed a morphophonological rule in the language which tensed the final [ö] of nouns and adjectives to mark the plural. This rule is the consequence of three distinct historical changes: (1) lengthening of stressed vowels in the plural, (2) loss of word-final consonants, and (3) tensing of long non-high vowels; we will summarize them here.

After the loss of case marking in Old French, the suffix [-s] was generalized as a plural marker for nouns and adjectives. This suffix was responsible for at least two internal sandhis: loss of a preceding stem-final obstruent, and lengthening of the preceding vowels, e.g., *croco* [krɔk], pl. *crocs* [krɔs], or *amis* [ami], pl. *amis* [amis]. When this suffix was the reflex of an earlier [-ts], however, the preceding vowel remained short, e.g., *pot* [pɔt], pl. *pos* [pɔs], *pie* [pi], pl. *pies* [piʃ] (cf. Morin & Desaulniers Forthcoming).

In the 16th century, Lanoue (1596) described a language which reflected rather precisely this earlier stage, except that word-consonants were often restored in the plural with concomitant lengthening of the stressed vowel, and plural [-s] had become optional (and was soon to disappear from youger Parisian informants, however, appear to have generalized one of the two allomorphs for both numbers: "Mais ces distinctions [entre le singulier et le pluriel] s'effacent, et l'unification se fait entre le singulier et le pluriel. C'est le singulier qui l'a emporté dans les mots en -at, -a. Le pluriel triomphe dans tous les autres cas" (1913:137–38). It is clear for them that (1) is not the result of a sound change, but rather of a generalization of the plural forms ending in [ö]. They do not discuss, however, how such a change could also have affected invariable words.

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Words ending in [t], with very few exceptions, lost this consonant in the singular, e.g., *pot* [pɔt] > [pɔ]. The distribution in Modern French reflects the first of these two treatment of final consonants, e.g., *pot(s)* [pɔ], *crocs* [krɔ] vs. *coq(s)* [ko]. The second change, lengthening of stressed vowels in plural nouns and adjectives, probably took place slightly later. In particular, it affected all nouns and adjectives which ended with a [t], e.g., *pot* [pɔ], pl. *pos* [pɔ] > [pɔ].

The third historical change, tensing of long non-high vowels, affected the vowels [ö] > [ö], [a] > [a] and [e] > [e]. Tensing was accompanied with non-uniform changes in the articulatory gestures: long [ö] was raised, long [a] was backed, and long [e] lowered. Conflicting explanations for this puzzling state of affairs have been offered by Martinet (1955:245–56) and Straka (1981:208, n. 227; 209, n. 233; 214, n. 245). Its dating is also controversial. Martinet and Straka assume that tenseg took place before or while [ö] was reduced word-internally before a consonant, i.e., probably during the 12th century. Under this assumption, the lengthening of the stressed vowel in plural nouns and adjectives was always accompanied by a change of articulation for the vowels [ö], [a] and [e]. Martinet, however, later assumed (1969:178) that the changes in the articulatory gestures only became important during the 18th century. In any case, there existed in the synchronic grammar of French at the beginning of the 18th century a morphophonological rule (2) for the plural of nouns and adjectives—which we shall not try to formalize completely.

9. The evidence gathered by Morin & Desaulniers (Forthcoming) shows that this generalization was gradual. The lower short vowels [a, ə, ɔ] were affected sooner than the higher ones.

10. According to Millet (1933), Lancelot was the first grammarian to mention (in 1660) a difference in vowel quality between a short lax [ə] and long tense [ö] which corresponds to the modern distinction. Grammarians before this time observed only distinctions of length in those two vowels.

11. In this paper we adopt Hooper's (1976:15) definition of morphophonemic or morphophonemeric rules: "Morphophonemic rules (MP-rules) change phonological features in environments described in morphosyntactic or lexical terms." Klausenburger (1979:29–35) suggests a further distinction between what he calls "semi-morphological" and "morphological" rules.

The status of rule (2) as a morphophonological rule also depends on specific theories. In models where the lexicon is fully specified and includes all inflected forms, e.g., Lexical Phonology (Ripinsky 1985), or Lexical Functional Grammar (Bresnan 1982), rule (2) may be interpreted as a template for the formation of new plurals, as well as a well-formedness condition on plural nouns and adjectives and on singular/plural pairs. Exceptions such as *numéro* are specifically learned as violations. Most other models postulate a lexicon which does not contain predictable forms nor, in particular, most inflected forms, e.g., Generative Phonology (Chomsky & Halle 1968) or Hooper's (1976) version of Natural Generative Phonology. For instance, the specifications for the noun *pot* could include an underlying form /pɔt/ with no overt mention of number. Specific rules mark this noun as either [-plur] or [+plur]. In the first case, no rule modifies the underlying representation, which is thus realized as /pɔt/. In the second, rule (2) applies, so as to yield *[pɔ]. An invariant noun such as *numéro* is lexically specified as an exception to the rule: *(rule (2)). Because such concepts as "rule loss," "rule inversion," "morphophonologization"—which we use later—have been developed and defined within models with incompletely specified lexicons, we will assume this kind of organization in our presentation.

12. The evolution of mod. Fr. [e] and [ə], corresponding to [a] and [e] in (2), is not yet well understood. The solution adopted here is only tentative. The formulation (2) also restricts lengthening to nouns and adjectives where the stressed vowel is followed by at most one consonant; the evidence seems to indicate that words such as *fix* and *par* were invariable when both consonants were pronounced in the plural.
When length disappeared in word-final position (a phonetic change which probably began at the end of the 18th century), e.g., saut [sô] > [so] vs. sot [sô], the differences in vowel quality—which originally were redundant—became the only overt marks for number. In the grammar of French, rule (2) was replaced by rule (3): 14

(3a) N and A ending with [i, y, e, o, a] are invariable.

(3b) [e, ë, é, ù, ô] > [e, ë, é, ù, ô]

Rule (2)—and later, rule (3)—had some exceptions: learned borrowings—mostly from Latin and Italian—were often invariant and usually kept a short (later lax) vowel in the plural. For instance, Lévizac (1797, but cited dant—became the only overt marks for number. In the grammar of French, invariable nouns, contrary to the practice of many dictionaries of the same

Table 1. Vowel length and tension in the plural

<table>
<thead>
<tr>
<th>sound change</th>
<th>grammar</th>
<th>examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>complex plural</td>
<td>gris f f</td>
<td>gros 5 5</td>
</tr>
<tr>
<td>formation</td>
<td>ami i i</td>
<td>croc 5 5</td>
</tr>
<tr>
<td>16th century</td>
<td>lit i i</td>
<td>sot 5 5</td>
</tr>
<tr>
<td>vowel lengthening for plural</td>
<td>gris i i</td>
<td>gros 5 5</td>
</tr>
<tr>
<td>17th century</td>
<td>lit i i</td>
<td>sot 5 5</td>
</tr>
<tr>
<td>early 18th century (or earlier?)</td>
<td>rule (2)</td>
<td>gris i i</td>
</tr>
<tr>
<td>rule (3)</td>
<td>ami i i</td>
<td>croc 5 5</td>
</tr>
<tr>
<td>late 18th century</td>
<td>lit i i</td>
<td>sot 5 5</td>
</tr>
<tr>
<td>word-final length</td>
<td>no plural marking</td>
<td>gris i i</td>
</tr>
<tr>
<td>neutralization</td>
<td>rule (1)</td>
<td>ami i i</td>
</tr>
<tr>
<td>19th century</td>
<td>lit i i</td>
<td>sot 5 5</td>
</tr>
</tbody>
</table>

4. Phonologization of a former morphophonological rule. The preceding historical sketch allows us to understand better Rousselot & Laclotte's proposal (1913). We can abstract from (3) two rules (4) and (5) applying respectively to nouns and adjectives in [a]/[o] and in [i]/[e]:

(4) [+low] —> [+tense, +back]/—

(5) Õ—> [+tense]/—

Rousselot & Laclotte (1913) argued that the singular form of nouns and adjectives ending in [a] was generalized to the plural: doigt, formerly pronounced [da], became identical to the singular doigt [da]. No systematic sound change was involved, since word-final [a] was normally retained elsewhere. In particular, gras 'fat' remained [gra] both in the singular and the plural. This is a typical case of analogical change frequently referred to as rule loss, i.e., a change in two consecutive stages of the grammar of a language

13. It is likely that nouns and adjectives ending with a consonant were then invariable, except for a small class, e.g., sauf, heurp, where the final consonant is deleted in the plural.

14. Eventually, when graphic s ceased to mark lengthening or vowel quality, the orthographic rule excluding it in the plural of some learned borrowings remained in force as just another orthographic intricacy.
Tensing of Word-Final [ɔ] to [o] in French

such that "the changed grammar lacks a rule or part of a rule of the original grammar" (Kiparsky 1971a: 30 [1965]). The lexicon in the original grammar contained an underlying form /dwa/ common to both singular and plural from which the plural [dwa] was derived by applying the morphophonological rule (4); the default form [dwa]—directly derived from /dwa/—was used for the singular. When (4) disappeared from the grammar, the default realization [dwa] of underlying /dwa/ extended to both numbers.

Rousselot & Lacotte also claimed that a similar process was involved in the passage of [ə] to [o] in word-final position, which they analyze as a generalization of the plural form to the singular. This change, however, cannot simply result from the loss of rule (5), similar to the loss of (4) in the case of [a]/[a]. The formulation of rule (5) assumes that the underlying form of [sot] is /so/ with an etymological lax /o/; if rule (5) were to disappear from the grammar, the default form [sot] would be incorrectly generalized to the plural. Two grammar-internal changes can be invoked: either a generalization of rule (5) by simplifying the morphological conditions—as we will argue later—or a more complex procedure of rule inversion followed by rule loss. Rule inversion is a specific form of restructuring, i.e., a "revision in the [underlying] phonological representations" (Kiparsky 1971a: 3 [1965]), accompanied by an inversion of the directionality of the rule (Kiparsky 1971b: 597, Venneman 1972a, 1972b, Hooper 1976:96, Klausenburger 1979:76). An inversion of rule (5) means that the alternating forms [sot] [so], [sot] [so], for instance, have been reanalyzed as deriving from a common underlying /so/ ending with the non-etymological tense /o/, and that the singular is now derived from this underlying form by the inverted rule (5):

\[(5') O \rightarrow [+\text{tense}] / NA\]

The default form [so]—directly derived from /so/—is used for the plural. Nothing distinguishes this analysis from the non-inverted one. The results of the inversion can only be perceived after the rule is lost: if (5') were to be eliminated from the grammar, the default realization [so] of underlying /so/ would now extend to both numbers, as expected.

There are many reasons to reject this reanalysis, which implies that [ə] is the expected singular ending of nouns and adjectives ending in [o] in the plural. One may assume that a morphophonological reanalysis is possible only if it is relatively regular. At the time when the inversion is supposed to have occurred, there were a large number of nouns and adjectives—such as baton, nouveau, saut, courant, impôt or gros—with a final [o] for both numbers which did not conform to this generalization. It is thus unlikely that a restructuring could have taken place which would have suffered so many exceptions at its inception. Furthermore, the restructuring immediately diminishes the phonological relationship between lexical items such as sot [sot], soette [sot] and soffit [sofit]: the masculine now contains an underlying /o/, while the feminine and derivatives retain the etymological /o/. Finally, the inversion hypothesis implies a markedness reversal: the default form of nouns and adjectives is now the plural—the marked form for number (cf. Tiersma 1982).

We claim that Rousselot & Lacotte's proposal is best interpreted as a generalization of rule (5) to (6) through simplification of the morphological conditions (loss of the feature [+plur]). This generalization, as we noted above, does not account for the eventual tensing of word-final [ə] in adverbs, for instance, and must have been followed by a further simplification to become (1).

\[(6) O \rightarrow [+\text{tense}] / NA\]

This analysis has none of the flaws discussed above. In particular, it does not imply any markedness reversal: at the time when rule (5) was simplified to become (6), the lexical representation of the singular sot probably remained /so/, at least for a while (later sg. sot /sɔ/ which was regularly realized as [so], could have been reanalyzed as underlying /so/ in accordance with the phonetic representation of the singular). The fact that the singular forms of nouns and adjectives which ended in [ə] at the end of the 18th century have become identical to their plural forms does not, of course, necessarily imply a form of markedness reversal: it is so only when a restructuring occurs in which the new underlying form is revised to conform to the phonetic representation of a marked form—not when it results from the application of new or generalized (morphto)phonological rules that presuppose no change in underlying lexical representation.

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16. Some 18th-c. grammarians note a phonetic distinction for number in nouns and adjectives ending with graphic -au and -eau, e.g., tombeau [tombo], pl. tombeaux [tombo] in Duclos (1830: 108 [1754]). This development is specific to the reflexes of former word-final diphthongs [au] and triphthongs [eau] (cf. Dagenais 1988) and is not observed with nouns and adjectives such as sottise, courant, impôt or gros which ended with a consonant. It is thus not related to the purative rule inversion examined here. Furthermore, this distinction does not appear in the dictionaries examined in our survey, where the reflexes of word-final [au] and [eau] are tense [o] for both numbers, except in Féraud (1768) and Garet (1819),

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17. Actually, (6) is also the rule which would have expressed the distribution of mid back rounded vowels after the loss of the purative inverted rule (5'). Once the final [ə] of singular nouns and adjectives has been replaced by [o] in the plural, the opposition between [o] and [ə] is virtually neutralized in word-final position for nouns and adjectives; the only possible exceptions are the former invariable nouns and adjectives such as numéro. The transition from (5) to (6) is certainly more complex than it appears here. It is possible that initially word-final [ə] in nouns and adjectives became [o] only at the end of a major constituent and not within a phrase, e.g., un pot [po], but un pot vert [pov]. Only later would the variant [ə] have been generalized to all contexts. We have not yet found any direct evidence for such a syntactically conditioned alternation in the evolution of Standard French, but a similar development has been observed in Marais Vendéen French (Svenson 1989), where the opposition between [ə] and [o] is now neutralized at the end of major constituents, but retained within phrases, e.g., un gars failli [e go faAIL 'a sickly boy' and un chat noir [e fa wver], vs. un gars [e go] and un chat [e fə]).
Actually, rule (6)—which like (1) is both a feature-changing and a lexical redundancy rule—was not maximally descriptive. It turns out that there already were very strong lexical restrictions on the quality of word-final vowels in French. In particular, no verb ended with a vowel [o]—and actually only three with the vowel [o]: clôre, éloire, and clore, as in je cle (OFr. [klo] > [klo] and OFr. il clest [klð] > [klo]). Consequently, as the neutralization of word-final [o] and [o] affected nouns and adjectives, it matched a preexistent neutralization in verbs—which, however, was probably not the object of a rule, due to the scarcity of pertinent forms. Thus, as soon as the [+plural] condition was removed from rule (5), the new generalization was not (6), but rather (7), which applies to all major syntactic categories, adverbs excepted.  

(7) \( O \rightarrow [+\text{tense}] \)  

The domain of (7) is very large and includes most lexical items in the language. The extension of (7) to (1) involves the removal of the categorial constraints limiting (7) to nouns, adjectives, and verbs so that it applies to words from all categories, including adverbs.  

We can summarize as follows the evolution we propose for word-final O-tensing: it began as a rule (5) of plural O-tensing, and was successively generalized as rule (7) and later as rule (1) through simplification of the morphological conditions. It must also be recalled that rule (5) had some lexical exceptions, in particular learned borrowings such as numéro; as we shall see later, some exceptions may have remained even as the rule was generalized, for instance, numéro may have constituted an exception to rule (7) as well as to rule (1). Only when rule (1) is further generalized to cover all earlier lexical exceptions can it be said to be fully phonologized.  

The process we have described can be called “phonologization,” the progressive generalization of a morphophonological rule through deletion of the morphological specification limiting its range of application. This is the inverse of “morphologization,” where a formerly simple allomorphic distribution becomes governed by non-phonological properties—often morphological in character, cf. Hooper (1976: 84-91) and Klausenerberger (1979). These authors, however, assume that phonologization is not possible:  

The typical progression of rules through grammar is as follows: P[nonphonetically conditioned]-rules are modified to produce new alternations; these may lead to restructuring or the development of M[orpho]P[honological]-rules and via-rules; these in turn may be modified or lost. Other theoretically possible types of changes never occur: MP-rules do not become P-rules; via-rules do not become MP-rules or P-rules. (Hooper 1976: 91; similar statements can be found in Klausenerberger 1979: 82)  

Before we can conclude that “phonologization” is indeed a possible evolutionary development, we must show that our analysis of word-final O-tensing not only is possible—as we have attempted to do here, but also that it is the only reasonable solution.
Table 2. Word-final O-tensing

<table>
<thead>
<tr>
<th>Native words</th>
<th>Non-native words</th>
</tr>
</thead>
<tbody>
<tr>
<td>Féraud</td>
<td>1 %</td>
</tr>
<tr>
<td>Gattell</td>
<td>2 %</td>
</tr>
<tr>
<td>Catineau-Laroche</td>
<td>2 %</td>
</tr>
<tr>
<td>Rolland</td>
<td>0 %</td>
</tr>
<tr>
<td>Noël &amp; Chapal</td>
<td>69 %</td>
</tr>
<tr>
<td>Landais</td>
<td>85 %</td>
</tr>
<tr>
<td>Nodier</td>
<td>91 %</td>
</tr>
<tr>
<td>Dic. des dictionnaires</td>
<td>99.6%</td>
</tr>
<tr>
<td>Félène</td>
<td>*100%</td>
</tr>
<tr>
<td>Littre</td>
<td>0.5%</td>
</tr>
<tr>
<td>Hatzfeld &amp; Darmesteter</td>
<td>98.5%</td>
</tr>
<tr>
<td>Michaud &amp; Passy</td>
<td>*100%</td>
</tr>
<tr>
<td>Barbeau &amp; Rodhe</td>
<td>*100%</td>
</tr>
<tr>
<td>Martinet &amp; Walter</td>
<td>*100%</td>
</tr>
</tbody>
</table>

(*trop not included)

In both dictionaries, the proportion of words ending in lax [a] is higher at the beginning of the dictionary, both among learned and non-learned words. Their decreasing relative frequency in the latter portions of the dictionary may correspond to a change in the official norm as perceived by the authors while they were compiling their lexicon.

24. Here also there is a marked difference between the beginning and the end of the dictionary. Words beginning with the letter A constitute 53% of the learned forms ending in [a] (but only 26% in Landais's dictionary, for instance). In any case, the historical change is apparent, since only 33% of the learned words beginning with A have retained [a] in word-final position in the Dictionnaire des dictionnaires as compared to 70% in Landais's dictionary.

25. The lexicographer's orthography does not distinguish common and proper nouns; in any case, the common noun pierre 'kind of bird' is derived from the name.
that one essential factor in the early stages of word-final O-Tensing was the existence of plurals ending in [ό]. The first words affected were those to which rule (5) of plural O-Tensing had also applied; ergo, word-final O-Tensing is best explained as a generalization of plural O-Tensing. Two kinds of generalization were possible: (1) loss of the morphological conditions attached to the rule itself and (2) loss of the lexical exceptions. The evidence gathered here shows that both generalizations proceeded simultaneously, and in particular that lexical exceptions to rule (5) may still be exceptions to the new generalized rule (1): in some of our dictionaries the adverbs τροχος or ab intrans have acquired a final [ό], but not yet the noun concerto, which still ends in [ό].

6. The history of τροχος. The evolution just examined concerns principally words which belong to large syntactic classes. It is not surprising, therefore, that the word τροχος—which is both very common and syntactically isolated—should have had a peculiar development. Although traditionally classified as an adverb, like the learned loanwords subito, presto, primo, secondo, incognito, illico, ex abrupto, which also ended in [ό] (new formations on this model, such as molo or reglo, are too recent to concern us here), its syntactic distribution is quite different. The learned adverbs show the same development as other learned (invariable) nouns and adjectives. The adverb τροχος, however, sometimes keeps its final [ό] though all other lexical items have acquired final [ό].

Τροχος with final [ό] is found not only in Féline (1851) where word-final O-tensing is almost complete, but also in later dictionaries where the change is otherwise uniform: Michaelis & Passy (1897), Barbeau & Rodhe (1930), and Martinet & Walter (1973). In the first two, the pronunciation [τρο] is also given as a possible variant, but the authors clearly favor [τρο] in all positions. Martinet & Walter (1973) is based on the speech of 17 informants, 3 of whom use [τρο] in all positions. Walter (1977:41) mentions that “chez les 17 informateurs, on ne rencontre que des réalisations fermées [ό] et [ό] dans cette position finale absolue (feu, mce).” This is only true if one excludes the exceptional word τροχος. Straka (1981:209, n. 229) claims that “la prononciation [τρο] de τροχος (Féline; Passy, Les sons, § 156, 3; Grammont, p. 21; etc.) n'est pas une survivance d'un ancien [ό] ouvert, mais la forme inaccentuée, cf. vous êtes trop aimable (avec liaison de -p) en regard de c'en est trop.” Straka overstates the case. He correctly interprets Grammont (1914:21), who explicitly distinguishes two pronunciations for τροχος, [τρο] when it is “unstressed,” i.e., more accurately, “proclitic,” and [τρο] when it is “stressed,” or more precisely, at the end of a major syntactic constituent: “à l'[ό] de «il en a un [ό](p)», s'oppose l'[ό] de «il en s[τρο] am[ό](p) tard, vous êtes trop [ό] honnète».” Féline (1851) and Passy (1932:154), however, give the pronunciation [τρο], without suggesting that it could not be used in all contexts. Both authors, furthermore, provide independent evidence showing that they really meant to say that [τρο] was the normal pronunciation for stressed τροχος. Féline adds at the end of his dictionary a series of exercises where τροχος is always transcribed [τρο] or [τρό], even in stressed position. Thus, besides proclitic τροχος in Trop (τρό) de crédulité mène à la stupidité and il est trop [τρό] étourdogne, we also find Nous crions beaucoup trop [τρό] (p. 12 of the exercises). Passy (1932:154) clearly opposed trop [τρό] to other stressed words, among them to τροχος, and only mentions that [τρο] is a possible variant. Michaelis & Passy’s dictionary (1897) gives [τρό] and [τρό] as two possible pronunciations, again without suggesting that one was limited to certain contexts. Passy’s exercise book (1897) transcribes vous aimes trop à rendre service as [vuz c:me tro’ a rôd servis], where τροχος is explicitly marked as stressed [ό] and followed by a pause before the remainder of the utterance. Finally, the fifth edition of Jean Passy & Adolphe Rambeau’s chrestomathy (1926) was revised by Paul Passy, brother of the first author, “en corrigeant toutes les fautes que j’ai pu découvrir” (viii). This book contains the following transcriptions: c’est trop (at the end of a sentence) [setro] (32–33), … quand il dépense trop (also at the end of a sentence) [kért i dépê: trop] (94–95); in both instances, [τρο] is given in bold characters to indicate stress. Barbeau & Rodhe specify that the variant [τρο] can only be found in stressed position, but clearly prefer [τρό]. The specific examples they give are: trop grand [trogô], trop habile [tropabil], trop haut [trop], and j’en ai trop [sâmetro] or [sâmetro].

The resistance of τροχος to word-final O-tensing is quite strong. It clearly indicates that rule (1) is still not an exceptionless phonological rule for those speakers who say [τρο], even if it is entirely isolated. This further supports the analysis of word-final O-tensing as a generalization of a morphophonological rule: τροχος is an exception because it belongs to an invariable category to which plural O-tensing did not apply and it remained an exception because of its high frequency. It is well known that frequently used words are less susceptible to regularization. On the other hand, if word-final O-tensing had resulted from a uniform phonetic shift, it would be much more difficult to explain why it failed to affect a frequent word.

The evolution of the adverb τροχος perhaps also reflects its ability to appear in various syntactic positions, i.e., at the end of a major syntactic constituent (where it may be stressed and followed by a pause) as in c’en est trop, but also as a proclitic element before a stressed head as in τροχος cher or τροχος important. All the observations we made before concern τροχος at the end of a major constituent. Elsewhere, its evolution may have been different. We find three typical patterns:

<table>
<thead>
<tr>
<th>end of a major constituent</th>
<th>proclitic before C</th>
<th>proclitic before V</th>
</tr>
</thead>
<tbody>
<tr>
<td>conservative</td>
<td>τροχος</td>
<td>τροχος</td>
</tr>
<tr>
<td>intermediate</td>
<td>τροχος</td>
<td>τροχος</td>
</tr>
<tr>
<td>innovative</td>
<td>τροχος</td>
<td>τροχος</td>
</tr>
</tbody>
</table>
In all the descriptions where [tr3] may appear at the end of a major constituent, it also occurs in the other environments (as noted in Passy's, Pélissier's, and Barbeau & Rodhe's examples above; this is also true for Martinet & Walter's informants); this represents the original situation. In some varieties of Standard French, which we label “intermediate,” trop with tense [o] is found only at the end of a major constituent, but with lax [ə] elsewhere (Hatzfeld & Darmesteter 1890–1900, Grammont 1914: 21, Fouché 1959: 75, and four of Martinet & Walter's informants). In the last pattern—which appears to be the most innovative and now no doubt also the most common (it is documented in the response of the remaining 11 of Martinet & Walter's informants)—trop has a tense vowel [o] everywhere.26

7. The phonological status of word-final O-tensing. Against our claim that the development of word-final O-tensing constitutes a genuine case of phonologization, it could perhaps be argued that this rule is still morpho-phonological. Indeed, we argued earlier that it is not completely phonological for conservative speakers, if only because it had a single exception, trop, which they pronounce as [tr3].

Word-final O-tensing for intermediate and innovative speakers satisfies most criteria for phonetically conditioned phonological rules (as defined, e.g., by Hooper 1976: 13–22). It is quite regular, transparent, automatic, and productive. We have seen how it applies in word truncation, as in métropolitaín [metroplei] > métro [metro], in echo-word formation, as in dormir [dormir] > dodo [dodo] or [dodo], and in secret languages. The rule is unsuppressable in loans. Most innovative Parisian French speakers find it very difficult to pronounce vélo [velo] with a final lax vowel, even after considerable prompting.27

8. The evolution of word-final O-tensing. The passage of plural O-tensing (repeated below as 8) to word-final O-tensing (repeated below as 9) is a development apparently restricted to the lexicon. Plural O-tensing was a lexical rule which applied to nouns and adjectives independently of their syntactic environments, and so is word-final O-tensing for innovative speakers of Standard French.

Rule (9) is also lexical for conservative speakers, trop being simply an exception. Thus, in the grammar of intermediate speakers, i.e., those who pronounce trop as [tro] at the end of a major constituent and [trop] in proclitic position, e.g., in trop cher or trop important? One may propose that the underlying representation of trop in their grammar contains a lax [o] which undergoes a post-lexical rule of O-tensing sensitive to the syntactic environment.

Yet the grammar of intermediate speakers also contains a lexical rule of word-final O-tensing which applies to all words except trop, independently of the syntactic context. For instance, word-final [o] does not alternate with [ə] when unstressed and followed by an enclitic as in set idiot-la, pronounced [seti dol] and not [seti dol]. In other words, if their grammar contained a rule of O-tensing sensitive to syntax, it would apply only to the word trop. The grammar would be simpler if we assumed a lexical split, such that trop has several variants: (1) proclitic /trop/ and /tropa/, the latter being lexically marked
as an exception to word-final O-tensing, and (2) tonic \textit{tro} elsewhere. Such lexical splits are not uncommon in French, cf. the pronoun \textit{le} which is /la/ with a deletable vowel when proclitic as in \textit{tu le formes} [tyl(o)form], but /læ/ with a stable vowel when enclitic as in \textit{dix-le fort} [diləfɔr]; *[dilɔr] would be ungrammatical.

To explain the change from conservative to intermediate dialects, one cannot simply argue that \textit{trop} lost its exceptional status in the grammar, as this would generalize \textit{[tro]} to both proclitic and tonic variants. The first speakers of the intermediate dialects must have assumed that proclitic and tonic \textit{[tro]} of conservative dialects were somehow different though phonetically similar, as they generalized rule (9) only to the latter. The innovative dialects represent a further step in generalization.

Word-final O-tensing also extended to forms not normally analyzed as words, which we will call here “quasi-adjectives.” Traditional descriptions classify them as prefixes; they include \textit{pseudo}, \textit{micro}, \textit{macro}, \textit{crypto}, \textit{co}, etc. They are syntactically and semantically close to prenominal adjectives, and, like some of them, do not occur in predicate constructions, e.g., \textit{un pseudo-agent ‘a pseudo-policeman’} is normal but not *\textit{est agent est pseudo ‘that agent is a pseudo’}. The adjective \textit{ancien ‘former’} has the same syntactic property: \textit{un ancien agent ‘a former policeman’} is grammatical but not *\textit{agent est ancien ‘that agent is former’}, unless the adjective means ‘old’. Furthermore quasi-adjectives may be followed by a socially stigmatized plural liaison [-z-], e.g., \textit{des pseudos-agents, des micros-ordinateurs, les co-accusés}; compare the socially acceptable liaison in \textit{des anciens[z]-agents ‘former policemen’}. Many innovative speakers thus distinguish \textit{micro} with a lax [ə] when it is an ordinary prefix, as in \textit{microscope} [mikroskop] (a ‘microscope’ is not some kind of ‘small scope’), and a tense [o] when it is a quasi-adjective, as in \textit{microscope} [mikroskop].

This distinction is found between \textit{cryptogramme} [kritɔgram] and \textit{cryptocommuniste} [kriptɔkɔmunist], or between \textit{pseudonyme} [psodonim] and \textit{pseudo-prophète} [psedoprefet]. O-tensing in quasi-adjectives probably results from an extension of word-final O-tensing to smaller units within the word. The fact that it does not apply uniformly to all prefixes indicates that they do not have the same status in the grammar. These differences can be associated with specific internal structures, e.g., \textit{cryptogramme} [kritɔ+gam] versus \textit{cryptocommuniste} ([kritɔ]+[kɔmunist]) (cf. Chomsky & Halle 1968: 364–71), who propose three different word-internal morpheme boundaries. Rule (9) will only apply in the second case where underlying /o/ is followed by a constituent bracket. More generally, Walter (1976: 258–70) notes a tendency to use [o] at the end of other prefixes, and not only quasi-adjectives, “lorsque le préfixe est senti comme une unité de sens indépendante,” as in \textit{broncho-pneumonie or

9. Conclusion. Word-final O-tensing is not the result of a regular sound change. Rousselot & Laclette proposed that it represents an extension of the plural of nouns and adjectives. This conjecture is fully justified if we interpret it as a generalization of plural O-tensing. The passage of plural O-tensing to word-final O-tensing constitutes the phonologization of a morphophonological rule, a development ruled out by Hooper (1976: 91). Plural O-tensing was restricted to words belonging to specific syntactic categories and having specific morphological markings; furthermore, it had many lexical exceptions. The modern rule of word-final O-tensing for most modern speakers (those we have called innovative) is now a completely regular sandhi (as defined in Hooper’s model), very similar to many phonetically conditioned rules. We are left with no doubt that the evolution examined here is a genuine example of a change in which a morphophonological rule was progressively stripped of its morphological and lexical conditioning, so as to become maximally general on the phonological level. We suspect that close study of other apparently regular sound changes might reveal a similar pattern, i.e., phonologization of a morphophonological rule through progressive simplification.

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