Rule Order and Rule Compatibility

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The notion of rule ordering has played a key role in the development of modern phonological theory. From the earliest days of generative phonology, the ordering of phonological rules has been added to account for morphophonemic derivations and to point out the interrelatedness of forms within a given language. Based on the analogy of chronological ordering of diachronic rules, the notion of extrinsically ordered synchronic rules has seemed to many investigators to place an undue strain on the credibility of phonological descriptions, and, while remaining within the domain of generative phonological theory, several recent studies have sought alternatives to the extrinsic ordering of phonological rules. The well-known studies of Ringen (1972), Koutsouvas (1973), and Koutsouvas, Sanders, and Noll (1974), among others, explored the arguments previously adduced in favor of extrinsic rule ordering and proposed alternative analyses which permitted simultaneous application of rules, allowing only for intrinsic ordering, i.e., ordering based on the inherent characteristics of the rules themselves. While subsequent studies have offered various refinements for the unordered rule hypothesis (URH), few have challenged the basic premise of the hypothesis, since simultaneous application, aside from often being empirically more defensible, provides, in most cases, simpler and more manageable phonological descriptions. Recently, however, several studies have discussed apparent counterexamples to the URH, and to its major corollary, the Obligatory-Optional Precedence Relation, which states that when the structural description of both an obligatory and an optional rule are met by the same form, the obligatory rule must necessarily apply first. The most recent of such attempts is the work of Horn (1974), who produces evidence from a dialect of Portuguese in order to reject both the URH and its corollary. The purpose of the present note will be to reexamine the data discussed by Horn, and in the process to offer an alternative characterization which does not necessitate rejection of the URH.

The goal of this reexamination is not merely to provide another round in the sparring match between proponents of the URH and its opponents, which would be a trivial enough concern, but also to offer additional reflections on the basic notions of obligatory and optional rules and the constraints governing their use in phonological descriptions.

Horn’s data are derived from the Mirandese dialect of continental Portuguese, although they apply almost integrally to other continental dialects and to a few Brazilian dialects, such as that of Rio de Janeiro. In essence, her discussion concerns the interaction of three rules. The first, a general rule of vowel nasalization, nasalizes vowels followed by a tautosyllabic nasal consonant, roughly:

\[ V \rightarrow \{ \text{nas} \} \]

The second rule deletes the corresponding nasal consonant if followed by a contiguous or a word boundary:

\[ N \rightarrow \phi \]

Finally, there is an optional rule of resonant syllabification which changes a sequence of unstressed vowel plus resonant consonant into a syllabic resonant:

\[ \tilde{V} \rightarrow C_{+son} \rightarrow \phi \rightarrow 2_{+syl} \]

Vowel nasalization is obligatory in all dialects of Portuguese; in fact, in most dialects nasalization (although not nasal deletion) also occurs before nasal consonants in the following syllable (cf. Lipski 1975). Rule 2 is presumably also obligatory in the dialect under discussion (but cf. the discussion below), thus removing surface sequences of nasal vowel plus nasal consonant plus resonant plus continuant; e.g., /pensẽ/ → [pẽsẽ] ‘I thought’ but /entrar/ → [ẽt̠ɾ̠ar] ‘to enter’. One might in fact wish to collapse 1 and 2 into a single rule of vowel nasalization, except that, in Horn’s analysis, rule 3 must be applied between 1 and 2 in order to correctly account for alternative forms with a syllabic resonant, such as [pẽsẽ], [pẽsẽ], etc.:

\[ /pensẽ/ \rightarrow /entrar/ \]

Examination of the rules as presently formulated reveals in fact that if rule 2 is ordered before 3, forms like [pẽsẽ] cannot be generated, since the environment for 3 is destroyed; on the other hand, the order 3-2 provides vacuous application of 2, since all its environments are bled by 3. Finally, simultaneous application is ruled out because of the mutually contradictory nature of 2 and 3 when applied to the same forms. Superficially, then, the analysis as sketched above appears to provide a counterexample to both the URH and the obligatory-optimal precedence order. Further examination, however, reveals several points at which the description can be improved, thus altering the eventual conclusions.

Rule 1 seems, for the most part, to be beyond reproach. While it is conceivably possible to analyze Portuguese as exhibiting phonemic nasal vowels, the number of morphophonemic alternations occurring between
nasal vowels and nasal consonants tips
the balance in favor of an underlying
representation containing only oral
vowels. This is especially true since
most dialects of Portuguese appear to
be headed toward partial or total
implementation of the most general
rule of vowel nasalization, namely the
universal tendency of vowels to nasalize
when followed by a nasal consonant (cf. Lipski 1975).

Rule 3 is also well motivated, par-
ticularly in the continental dialects of
Portuguese, where severe reduction of
unstressed vowels often causes loss of
syllabicacy in syllables containing non-
sonorant consonants, and syllabifica-
tion of resonants. This phenomenon
occurs not only in Mirandese, but in
other European dialects, and occasionally
also in Brazil, extending at times even
even to stressed vowels, especially in the
word uma [i̞ma] ~ [i̞̊a] ‘one’.

As might be suspected, the problem
lies in the formulation of rule 2, deleting
nasal consonants before non-
continuants and word boundaries. The
latter part of the rule, deleting word-
final nasals, is unobjectionable, since
word-final nasal consonants do not
naturally occur in Portuguese, al-
though frequently the nasal offglide
accompanying most word-final nasal
vowels assumes some consonantal
characteristics (cf. Nobiling 1913).
However, word-internally, matters are
much more complex, regardless of the
dialect being considered. In the first
place, both in the Mirandese dialect
and in other Portuguese dialects, nasal
consonants may or may not appear
before following noncontinuants; thus,
for example, entrar may be [entrɐ] or
[ɐ̃trɐ], and so forth. Psycholin-
guistic considerations also enter into
play at this point, since the literacy of
the individuals involved often deter-
mines the perception of nasal conso-
nants. As an example, Morais-Barbosa
(1961) reports conversations held in
Lisbon, where speakers aware of the
spelling of words like campo ‘country’
“heard” five sounds, i.e., claimed to
perceive a nasal consonant, while illit-
erate speakers, presented with an iden-
tical pronunciation, perceived only
four sounds. In any case, the nasal
consonant which precedes noncon-

(la branca [i̞̊mbrɐnˈka]
‘white wool’

dem sensível [i̞̊mbrɐnˈsẽsiwɐ]
‘sensitive man’

 bom dia [bɔ̃dɐ]
‘good day’

In phonetic terms, it appears more
feasible to analyze the nasal ‘transition
sounds’ which appear between nasal-
ized vowels and following consonants
in terms of prenasalization of the oral
consonants in contact with a nasal
vowel, i.e., a form of progressive as-
similation. Head (1965), in a series
of experimental observations, noted that
this prenasalization also occurs be-
tween nasal vowels and following con-

(4) \( V \ N \begin{cases} \# \end{cases} \rightarrow V \phi \ 3 \)

1 2 3

Whether in fact rule 4 should be
broken into two separate rules is at the
moment immaterial, although under
the proposed solution there is no
evidence which suggests splitting it;
thus, application of Occam’s Razor
dictates a single rule.

Prenasalization of consonants fol-
lowing nasal vowels would be handled
by a rule of the general form:

\( \phi \rightarrow \begin{cases} N \end{cases} / \tilde{\nu} \)

In addition, some provision must eventu-
ally be made to indicate the weakly
articulated and transitory nature of
the inserted nasal sound, to distinguish
it from a full nasal consonant.

At first glance, replacing 1 and 2 by
4 and 5 appears to be an arbitrary
reshuffling of rules to arrive at the
same output, since in most cases the
phonic result will be identical regard-
less of which pair of rules is applied. It
should be noted, however, that while
proposed rule 4 is considered obliga-
tory, the corresponding rule 5 may, in
many instances, be optional, thus ac-
counting for the less than totally
regular appearance of the nasal trans-
ition sounds. Most importantly, con-
consider the results of examining the pair
4-5 under the criterion of the URH. As presently formulated, 5 cannot apply until 4 has operated, since Portuguese presumably exhibits no underlying nasal vowels. Thus, 4 and 5 are intrinsically ordered and may consequently be applied simultaneously to produce results like:

\[ /pɛsɛi/ /en\text{\text{\text{e}}}/ /pɛsɛi/ /en\text{\text{\text{e}}}/ \]

(4) [pɛsɛi] [en\text{\text{\text{e}}}] (5) [pɛsɛi] [en\text{\text{\text{e}}}]

So far, the URH allows for production of all the standard variants. We must now face the question of how to incorporate rule 3, resonant syllabification, in order to produce the alternate forms like [pʊsəɾ], [pʊtɾəɾ], etc. It is at this stage that there arises a need to reexamine the concepts of obligatory and optional rule application and ordering precedence. As presently stated, the "optional" rule 3 must apply before the "obligatory" 4, since 4 destroys all the environments to which 3 could potentially apply. However, it makes no sense to speak of "ordering" 3 before 4, since 3 equally effectively bleeds off all the environments to which 4 and 5 might apply. It is in fact obvious that rules 3 and 4 are mutually contradictory, that is, both potentially apply to the same environments, and each destroys the environments for the other. In such a case, the requirements of scientific precision render it unacceptable to speak in terms of vacuous application of rule ordering, regardless of the so-called obligatoryness of one or the other of the rules in other circumstances. Rather, it should be accepted that, in this special case of rule interaction, the native speaker of Portuguese actually has a choice between two alternative derivations:

\[ A/B \]

(4) [pɛsɛi] (3) [pɛsɛi]

In other words, choice of rule 3 precludes application of 4, and vice versa. What is obligatory in this situation is the application of either 3 or 4-5, since without application of either rule set, unacceptable outputs would result.

In cases of mutually contradictory rules, it is therefore suggested that strict notions of optional vs. obligatory, referring to rules acting in isolation, be replaced by constraints referring to the mutual interaction of phonological rules in a single derivation, since only in this fashion will the empirical choices available to the native speaker be most accurately reflected. It may moreover be proposed that the Obligatory-Optional Precedence Relation be amended (if not replaced) to include the following provision, which may be termed the Contradictory Rule Hypothesis (CRH):

CRH: Whenever two rules \( x \) and \( y \) potentially apply to a single form \( F \), and when \( x \) and \( y \) are mutually contradictory (that is, application of \( x \) destroys all environments for \( y \) and vice versa), then at most one of the pair \( (x, y) \) may apply to \( F \). Moreover, if failure to apply either \( x \) or \( y \) would result in unacceptable output, then one and only one of the pair \( (x, y) \) may apply to \( F \).

It is apparent that the CRH may be extended to any number of mutually contradictory rules. This hypothesis, as tentatively stated above, makes no mention of obligatory or optional rules in isolation, since in conditions of mutual interaction such notions are meaningless. A form to which resonant syllabification has been applied, yielding, for example, [pʊtɾɛɾ], cannot be further subject to vowel nasalization, regardless of the status of vowel nasalization in other positions. Therefore, the CRH redefines the notions of optional and obligatory as pertaining to the interaction of rules, i.e., the overall form of the phonological derivation, rather than to individual rule applications.

What has been suggested is by no means a definitive statement regarding rule ordering. In particular, the suggestions offered are based on examination of a single case (but cf. Lipski 1974 for a similar example, also from Portuguese). The notion of derivational constraints is not new to linguistic theory, and within phonology many examples have been discussed where failure to consider constraints on the overall derivation yields incomplete or inaccurate results. By further considering situations involving choices between mutually exclusive rules, it may be possible to further generalize such hypotheses as the URH and thereby salvage phonological investigation from the seemingly endless stream of examples and counterexamples to which it has been subject.

REFERENCES


Hall, Robert A., Jr. 1943. The Unit Phonemes of Brazilian Portuguese. Studies in Linguistics 1, 15-16.


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