

[Review]

Locality in Vowel Harmony


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1. Introduction

In the course of linguistic research, phonology seems to have traveled a different path from another core linguistic module, i.e. syntax. Surprisingly, the middle of the 1990s saw the emergence of two new paradigms in the two areas: Optimality Theory (Prince and Smolensky (1993)), and the Minimalist Program (Chomsky (1995)). It is obvious that the principles-and-parameters approach to phonology has been around since Sound Pattern of English (Chomsky and Halle (1968)), but this new book may be a minimalist pioneer in the field of phonology, at a time when there have already been a fairly large number of attempts at optimality-theoretic syntax (Legendre, Grimshaw and Vikner (2001)).

The goal of Nevins’s book, which is based on the Ph.D. dissertation he submitted to MIT in 2004, is to examine vowel harmony systems in various languages and to manifest evidence for Crossmodular Structural Parallelism, whereby both the syntactic process (e.g. Agree in Chomsky (2000)) and the phonological process (e.g. vowel harmony) can be accounted for using mechanisms that are nearly identical, differing only in their alphabet.

In this book, Nevins begins with an overview of vowel harmony systems and a review of previous analyses in Chapter 1, and introduces how his principle provides accounts for harmony processes in Chapter 2. In the following chapters, Nevins adds some devices as a source of crosslinguistic variation: feature contrastiveness/markedness (Chapter 3), conditional re-

* In writing this review, I have greatly benefited from discussion with Shin-ichi Tanaka, my supervisor, and members of his seminar. Of course, any errors in this review are my own.
quirements on donors (Chapter 4), and domain limitations (Chapter 5). The last chapter concludes this book with applying the principle to other assimilatory/dissimilatory processes and examining its learnability using a learning paradigm.

As a phonologist, I will use this review to not only give an overview of this ambitious and challenging book, but also discuss the significance of the author’s hypothesis. Section 2 introduces the themes of the book, vowel harmony and locality, before reviewing Nevins’s analysis in section 3. Section 4 provides an overall discussion, and section 5 is the conclusion.

2. Vowel Harmony and Locality

Vowel harmony, which is defined by Nevins (p. 1) as “a set of restrictions that determine the possible and impossible sequences of vowels within a word,” requires every vowel occurring in one phonological word to share the same feature value in terms of language-specific harmonic constraints. There are, however, two types of exception: ‘transparent (neutral)’ vowels and ‘opaque’ vowels. See the following examples from Yoruba:

(1) Yoruba tense/lax harmony (p. 7, lax vowels are italicized by the reviewer)

<table>
<thead>
<tr>
<th>Ifẹ Yoruba</th>
<th>Standard Yoruba</th>
<th>English Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. ɔrukɔ</td>
<td>orukɔ</td>
<td>‘name’</td>
</tr>
<tr>
<td>b. elubɔ</td>
<td>elubɔ</td>
<td>‘yam flour’</td>
</tr>
<tr>
<td>c. ewure</td>
<td>ewure</td>
<td>‘goat’</td>
</tr>
<tr>
<td>d. ɔdide</td>
<td>odide</td>
<td>‘parrot’</td>
</tr>
<tr>
<td>e. ɔtiti</td>
<td>otiti</td>
<td>‘truth’</td>
</tr>
</tbody>
</table>

Although both Ifẹ Yoruba and Standard Yoruba lack lax counterparts of [i, u] in their vowel inventories, these vowels in Ifẹ Yoruba seem to be skipped in the computation of vowel harmony. In comparison, they behave as blockers of the harmony process in Standard Yoruba. The former type of vowel is called a transparent vowel; the latter type an opaque vowel.

Nevins emphasizes that the behavior of these vowels involves locality in their computation (p. 8): “what counts as closest.” In Ifẹ Yoruba, the vowel harmony process regards only contrastive vowels as participants, while all vowels are important to vowel harmony in Standard Yoruba. One of

1 Another dialect, Ijeṣa Yoruba, has the lax high vowels [i, u] in its inventory, and then all the vowels undergo tense/lax harmony.
the key notions in this book is relativized locality, as seen in Ifẹ Yoruba, in which the closest relevant element is dealt with. Moreover, cross-linguistic variation in vowel harmony can be accounted for with what is relevant in each language. This book formalizes relativized locality as parameter settings of the Search-and-Copy procedure, which will be overviewed in the next section.

3. The Search Principle

The Search-and-Copy procedure for vowel harmony adopted in this book seems to be isomorphic to that for Agree in Chomsky (2000):

(2) Harmonic Search-and-Copy procedure, in two steps: (τ, δ, F) (p. 26)
   a. Find: x = the closest τ to the recipient y in the direction δ
   b. Copy: the value of F on x onto y, where x, y are segments, F is a feature, τ is a predicate over segments.

There are three parameters for this procedure: predicate τ (restrictions on feature-donor segments), direction δ (left, right, or both), and feature F (harmonic feature). The relation closer is defined as a derivation of precedence:

(3) Definition of closer (p. 26)
   Given a, b, c: b is closer to a than c if either (i) a precedes b and b precedes c or (ii) b precedes a and c precedes b, where a, b, c are segments.

For example, Turkish accusative case /-i, -i, -u, -ü/ requires feature values for [±back] and [±round]. Nevins assumes that this suffix has the following lexical specification:

(4) Turkish accusative case morpheme suffix must (p. 27):
   Back- and Round-Harmonize: δ = left, F = [±back, ±round]

See the following illustrations (5), (6) and (7), where each X-slot (x₁, x₂, x₃) represents the Root node. Here, an arrow (←) indicates the segment where the search is traversing, and an arrow with corner (–↓) points the segment being copied from. In (5), accusative suffix x₃ begins the search for [±back] and [±round] leftward, and finally finds the closest [–back] and [–round] on x₁ in (6). Then, x₃ copies these feature values to itself and realizes as [i] in (7):
(5) Accusative suffix begins Back-Harmonize in [ip-i] (p. 27)

\[
\begin{bmatrix}
  x_1 \\
  +\text{voc} \\
  +\text{high} \\
  -\text{back} \\
  -\text{rd}
\end{bmatrix} \rightarrow \begin{bmatrix}
  x_2 \\
  -\text{voc} \\
  \text{lab} \\
  -\text{cont} \\
  -\text{nas}
\end{bmatrix} \rightarrow \begin{bmatrix}
  x_3 \\
  +\text{voc} \\
  +\text{high}
\end{bmatrix}
\]

(6) Accusative suffix finds [−back] and [−round] on \(x_1\) (p. 27)

\[
\begin{bmatrix}
  x_1 \\
  +\text{voc} \\
  +\text{high} \\
  -\text{back} \\
  -\text{rd}
\end{bmatrix} \leftarrow \begin{bmatrix}
  x_2 \\
  -\text{voc} \\
  \text{lab} \\
  -\text{cont} \\
  -\text{nas}
\end{bmatrix} \rightarrow \begin{bmatrix}
  x_3 \\
  +\text{voc} \\
  +\text{high}
\end{bmatrix}
\]

(7) Accusative suffix copies [−back] and [−round] to itself (p. 28)

\[
\begin{bmatrix}
  x_1 \\
  +\text{voc} \\
  +\text{high} \\
  -\text{back} \\
  -\text{rd}
\end{bmatrix} \rightarrow \begin{bmatrix}
  x_2 \\
  -\text{voc} \\
  \text{lab} \\
  -\text{cont} \\
  -\text{nas}
\end{bmatrix} \rightarrow \begin{bmatrix}
  x_3 \\
  +\text{voc} \\
  +\text{high} \\
  -\text{back} \\
  -\text{rd}
\end{bmatrix}
\]

There are two essential differences from existing phonological analyses: a ‘target-centric’ procedure and specification in individual morphemes. Most traditional analyses in phonology are ‘trigger-centric,’ i.e., the harmony process begins with a fully specified vowel in search of lexically unspecified, ‘needy’ vowels, and the starting point is determined by the phonological features or the prosodic positions (word-initial/final) of vowels. On the contrary, the Search-and-Copy procedure begins with the needy vowels in search of a fully specified donor. Here, all needy vowels become starting points of the procedure.

Transparent vowels and opaque vowels (see (1)) can be incorporated into this procedure by adding some parameter settings: feature contrastiveness/markedness and conditional requirements on donors. Vowel harmony in Ifẹ Yoruba, mentioned above, involves contrastiveness of the [±ATR] feature, which is morphologically specified as in (8).

(8) Ifẹ Yoruba nonfinal mid vowels must (p. 104):

\[
\text{ATR-Harmonize: } \delta = \text{right}, \ F = \text{[contrastive: ATR]}
\]

With this specification, [i, u] are ignored by the procedure because their [+ATR]’s are noncontrastive in this dialect. Another parameter setting refers to feature markedness. In Altai rounding harmony (p. 101), [o, ö, ü] can be donor vowels but [u] cannot. In vowel systems, [+round] itself is
not so marked, but it becomes more marked when it co-occurs with [−back] or [−high]. In Altai case, [+round] in high back [u] is less marked than in non-high [o, ö], and front [ü]. Thus, the procedure of rounding harmony in Altai regards only marked [+round] as a licit target of the Find procedure as in (9).

(9) Altai locative suffix must:
Round-Harmonize: \( \delta = \text{left}, F = [\text{marked: round}] \)

In addition to contrastive/markedness specifications, conditional requirements on donors are described as conditional requirements \( R = [\alpha F] \), or \( R = [+F/−F] \) in morphemic specifications. \([\alpha F]\) means that the donor segment must have the same value of feature \( F \); \([+F/−F]\) refers to the feature value requirement on the donor. The most important characteristic of these requirements is that once a donor is found and it violates the requirement, neither does the Copy procedure work nor does the Find procedure restart (p. 123): “No Second Chances after Search Fails.” Instead, the default feature value is inserted into needy vowels in order to avoid them being phonetically uninterpretable. For example, ATR vowel harmony in Standard Yoruba requires the donor vowel to have [−high] as in (10). Although intervening [i, u] have [+ATR] specifications, they are [+high] vowels and thus the vowel harmony process is blocked.

(10) Standard Yoruba nonfinal mid vowels must:
ATR-Harmonize: \( \delta = \text{right}, F = [\pm\text{ATR}], R = [−\text{high}] \)

One more parameter of the Search procedure is mentioned in this book: domain limitation on search. This limitation is categorized into two types: distance and sonority barrier. Both serve to provide a good explanation for variations in Hungarian back harmony shown in (11) and (13). One variation occurs when two transparent [i]’s exist between other vowels: these [i]’s can behave either as transparent vowels (11a) or as opaque vowels (11b), whereas a single [i] is always transparent (11c):

(11) Variation in Hungarian back harmony (\( \rho: [+\text{back}], \varepsilon \) and i: [−back]):
   a. \( \text{o.nõ.li.ziff-nõk} \) ‘analysis-Dative’ (p. 161)
   b. \( \text{o.nõ.li.ziff-nek} \) ‘analysis-Dative’ (p. 159)
   c. \( \text{kõvifj-nõk} \) *\( \text{kõvifj-nek} \) ‘pebble-Dative’ (p. 159)

Nevins’s proposal is to set the distance parameter \( \beta \) with possible values: 1 segment, 2 segments, 1 syllable, 2 syllables, and no limitations. The Search procedure cannot find the donor segment beyond this set distance. In (11a), \( \beta = \text{no limitations} \), while in (11b), \( \beta = 2 \) syllables as in (12) because there are 2 syllables between [õ] and disharmonized [ε]:
 Hungarian ML (more local) dative suffix must (p. 160):
   Back-Harmonize: $\delta = \text{left}, \beta = 2$ syllables, $F = [\text{contrastive: } \pm \text{back}]$

The other type of variation in Hungarian back harmony seems to be caused by a sonority barrier. Nevins defines the sonority threshold parameter $\zeta$ as the sonority height which prevents the vowel harmony process. The values given in Parker’s (2002) sonority level (e.g. $[\varepsilon] = 6$) are adopted for this parameter, and the Search procedure is blocked by a segment whose sonority level is the same as or lower than $\zeta$. See the following example:

(13) Variation in Hungarian back harmony (p. 183)
   a. $\text{ɒŋneʃ}-\text{nɛk} \text{ ‘Agnes-Dative’}$
   b. $\text{ɒŋneʃ}-n\text{ɒk} \text{ ‘Agnes-Dative’}$

In (13a), the dative suffix successfully copies $[-\text{back}]$ from the stem-final vowel $[\varepsilon]$, whereas the harmony process fails in (13b). This is because the dative suffix in (13b) has the specification $\zeta = 6$ (or greater) as in (14).

(14) Hungarian TS (tolerant sonority) dative suffix must (p. 184):
   Back-Harmonize: $\delta = \text{left}, F = [\text{contrastive: } \pm \text{back}], \zeta = 6$

4. Discussion

4.1. Comparison with Optimality Theory

Optimality Theory (hereafter OT) is an established framework and oft-cited in most recent phonological studies regardless of whether it is being adopted or rejected. However, Nevins does not claim that the Search-and-Copy procedure has an advantage over OT, although he refers to a limitation of traditional rule-based phonology in Woleaian bidirectional harmony. This Micronesian language has a thematic formative affix whose value of $[\pm \text{low}]$ is determined by the values of its surrounding vowels. When both vowels are $[-\text{low}]$ ([ü, i]), the thematic vowel realizes as $[-\text{low}]$ ([e]): $/\text{ülüm-a-ji}/ \rightarrow [\text{ülümej}]$ ‘drinking object-1sg.’ Otherwise, even when the surrounding vowels have different values for $[\pm \text{low}]$, a default $[+\text{low}]$ vowel ([a]) occurs as the thematic vowel: $/\text{mat-a-ji}/ \rightarrow [\text{metaj}]$ ‘eye-1sg.’ The Search-and-Copy procedure formalizes this process by specifying bidirectionality in the thematic morpheme as in (15), while traditional rule-based phonology, as Nevins points out, requires two processes which spread $[-\text{low}]$ leftward and rightward with an additional condition (p. 41): “each could only apply if the other did.”
(15) Woleaian thematic formative morpheme must (p. 45):
  a. Low-Harmonize: $\delta = \text{left and right}, F = [\pm \text{low}]$
  b. Failure results in default insertion of $[+\text{low}]$

In contrast with the rule-based, serial theories of phonology which preceded it, OT basically defines grammatical computations as constraint-based parallel evaluation.² The grammar in OT consists of three components: GEN, EVAL, and CON. GEN functions as the generator of output candidates from input, and the evaluator EVAL determines the optimal output according to a language-specific constraint ranking of the universal set of violable constraints, i.e. CON. Linguistic universality is ensured by these invariant components, and linguistic variation is represented by constraint rankings (for details, see Kager (1999), McCarthy (2008)).

In the framework of OT, phonological processes are mere generalizations of relations between the input and the output, and these relations are determined by computation using a constraint ranking. Here, constraint ranking involving the thematic vowels in Woleaian is tentatively assumed as shown in (16). This (partial) constraint ranking consists of three constraints: AGREE[low], IDENT[low], and *LOW. AGREE[low] favors a low-harmonizing output by requiring agreement of $[\pm \text{low}]$ values of adjacent vowels (Baković (2000)). IDENT[low] requires $[\pm \text{low}]$ values in the input to remain unchanged in the output, i.e., it favors faithful output candidates in terms of $[\pm \text{low}]$ and *Low bans marked $[+\text{low}]$ in the output.

(16) A constraint ranking in Woleaian

AGREE[low] >> IDENT[low] >> *LOW

The following tableaux (17) and (18) demonstrate that this constraint ranking can successfully predict the harmony pattern in Woleaian without additional stipulations. In these tableaux, a pointing finger ($\uparrow$) means that the indicated candidate is optimal, and is chosen as the output because it has the fewest violations of higher-ranked constraints. An asterisk (*) refers to one violation of a constraint, and an exclamation mark (!) means a critical violation for a losing candidate.³

² Although recently modified OT introduces a combination of serial and parallel computations (see McCarthy (2010)) whose basic concept is originally mentioned in Prince and Smolensky (1993/2004), parallelism remains one of the fundamental concepts in OT.
³ Actual outputs in Woleaian involve opacity: problematic processes for parallel computations (e.g. deletion [i]l[ümej(i)] or raising [me]taj of triggering vowels). Most modifications of OT focus on a search for the solution of these processes, but this topic is outside the scope of this review.
Although most of Nevins’s criticisms of rule-based phonology do not hold for this solution in OT, the book takes little note of this point. One reason is that the most important advantage of the theory in this book is not its descriptive superiority but its isomorphism with syntax.

As a linguistic theory, its typological prediction always needs to be tested. In OT, typology is understood as the production of different orders in constraint rankings. This is called factorial typology, because a finite number \( n \) of well-grounded constraints produce the factorial of the number \( (n!) \) of possible languages (for the factorial typology of rounding harmony, see Kaun (2004)). It is true that the predictions of Nevins’s theory do not conflict with attested languages presented in this book, but there is still a question whether this theory predicts no unattested languages. Although Nevins devotes the last section of this book to examining the learnability of the predicted languages, the adequacy of the prediction does not seem to be sufficiently evaluated.

In addition to the above comparison with OT, there are two arguable features in Nevins’s theory: relativization of locality and morphemic specification.

4.2. Relativization of Locality

As seen in the title of the book, Nevins emphasizes a focus on the concept of locality and adopts relativized locality in order to analyze vowel harmony processes. His minimalistic formalization of relativized locality is worthy of consideration, since not a few phonologists have found that it is difficult to provide a sufficient analysis for long-distance processes such as
vowel harmony by adopting strict locality.

There is another problem related to relativized locality in this book. There is some difference between relativized locality in syntax and that in phonology: the former is computed as closeness in dominance relations whereas the latter involves precedence relations. In other words, skipping of syntactic processes is mainly caused by structural factors; skipping of phonological processes is caused only by segmental specifications. It is to be more clarified where the difference comes from since phonology also has structure in terms of prosody.

4.3. Morphemic Specification

Nevins writes (p. 21) that, “morphemes that acquire a harmony value must be morphologically specified as needing such a value,” and that “morphemes that do not harmonize simply lack [this specification].” It is true that there are more or less exceptional vowels or morphemes in any vowel harmony systems, but the harmony process of all the other vowels can easily be generalized. In fact, every language exemplified in this book exhibits its own consistent harmony pattern. As quoted above, Nevins’s theory requires all the vowels or morphemes to have their harmonizing rules such as (4), whereas traditional analyses requires only specifications of the exceptional vowels or morphemes. Consequently, Nevins’s theory can impose superfluous descriptions on a grammar, i.e., it can deviate from economy of representation, an aim of the minimalist program.

Furthermore, as is also mentioned in Finley (2011), Nevins’s theory seems to allow completely different specifications on morphemes in a language. In the other words, this principle can predict the existence of such languages whose vowel harmony processes exhibit different patterns depending on what specifications the morphemes have. However, harmony processes in most languages have consistency in terms of their harmonic features, directions, and other restrictions. The open question here is what guarantees this consistency within a language in Nevins’s theory.

5. Conclusion

Although some problems have been pointed out in this review, the significance of this research has not been undermined. Moreover, this theory contains some notions which have been more or less overlooked in phonological studies, e.g. a target-centric algorithm. Therefore, even if Nevins’s theory is not entirely accepted, this book will probably have sufficient influ-
ence on phonological research.

Throughout the book, Nevins discusses locality and vowel harmony processes based on an epoch-making hypothesis: Crossmodular Structural Parallelism. The success of the Search-and-Copy procedure in analyzing vowel harmony processes may not immediately cause phonologists to convert to minimalism by itself, but it seems likely that subsequent research of other processes will reinforce the validity of this hypothesis and the Minimalist Program in phonology.

REFERENCES


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