More on Nez Perce: On Alternative Analyses

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In an important series of articles,[1] a number of writers have considered the vowel systems of Nez Perce and several Sahaptin dialects, and the historical derivation of these systems from Proto-Sahaptian. The focus of interest has been the character and origin of vowel harmony in Nez Perce. To recapitulate the facts that have been clarified in the discussion: Nez Perce has a five-vowel system

i	u
	o
æ	ə

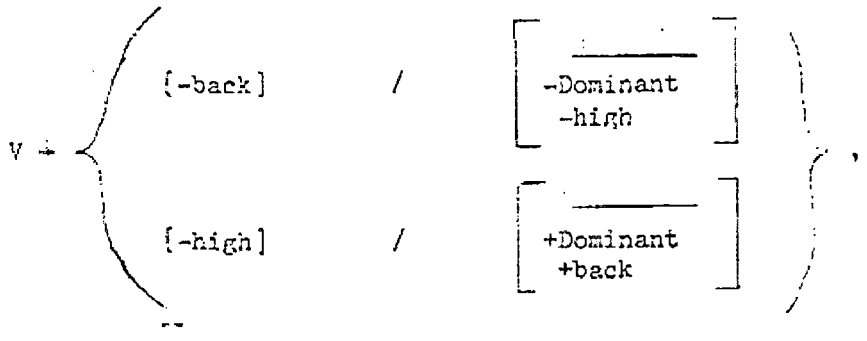
divided into two classes, a dominant class i o ə and a recessive class i u æ, with the vowels paired as follows: i-i, o-u, ə-æ. If a word contains a dominant morpheme (one with dominant vowels), all vowels in the word are dominant. Some morphemes with the vowel i are dominant, some recessive.

The first problem in analyzing these facts is whether the division between dominant and recessive morphemes should be accomplished by an (abstract) feature associated with morphemes as wholes, or by a (presumably phonological) feature associated with the individual vowels within the morphemes. Aoki's 1966 article, which opts for morpheme-sized features, summarizes his objections to a purely phonological

explanation: "A solution which involves segment-sized phonological features as the conditioning factor requires (1) postulation of a non-occurrent phonological entity or entities in order to distinguish Ai [dominant i] from i, (2) assignment of a phonological feature in the non-occurrent element as the triggering mechanism, and (3) inclusion of irrelevant elements, such as intervening consonants, in the rules. Furthermore, if Ai (or i) is to be represented by a non-occurrent phoneme X which is different from /i/, we need an additional rule to rewrite X as /i/" (p. 764f.). Jacobsen (p. 820) points out that the abstract analysis has the advantage of not requiring the investigator to make an arbitrary decision as to whether a dominant morpheme like cík'i destroy has the underlying shape cíkXí, cXk'i, or cXkXí. In their contribution to this discussion, Chomsky and Halle stress the fact that "the sets of vowels in the two classes of words... are not natural classes in any reasonable phonetic framework,"[2] thus refining and expanding Aoki's second objection.

None of these objections is unassailable; note that non-occurrent phonological entities are fairly common in insightful analyses,[3] that, as Rigsby and Silverstein (p. 48) observe, the problem of irrelevant elements must be solved in both the abstract and the purely phonological analyses, and that difficulties in determining the complete details of underlying representations are general in phonological analyses.[4]

The prime defect of the Aoki 1966 treatment is its totally unilluminating nature. The rule



which operates on the underlying vowel system a i u to shift a to æ in recessive words, u to o in dominant ones, has no phonetic plausibility at all. Moreover, if totally abstract features like Dominant can be employed in this fashion, we would predict that thousands of additional harmony systems with underlying a i u would be as likely as the Nez Perce system; these can be obtained by substituting different feature names (high, low, back, round, nasal, tense, etc.) and different feature values (+, -, α, -α) for the ones that appear in Aoki's rule, and it cannot be argued that any of these systems is inherently more implausible than the system postulated for Nez Perce.

Another criticism of the abstract analysis has been put forth by Jacobsen, who points out that this treatment is incoherent with respect to the historical developments: "There is a temptation to fall into the anachronism of continuing to use the 'plus Dominant' feature (or the dominant prosody A) as an environment for the sound changes leading to vowel harmony. But these features (or prosodies) are morphophonemic entities that show themselves only in the vowel harmony alternations; if vowel harmony is not present, they cannot exist either" (p. 821).

What is required is an underlying six-vowel system, with a harmony rule couched entirely in terms of phonological features. Consider first

the set of logical possibilities. On the assumption that the six underlying vowels are chosen from the 12 vowels which can be distinguished by the features high, low, back, and round (three heights, times two backness specifications, times two specifications for rounding) there are 305,280 possible underlying systems. Each such set of six vowels can be divided into two subsets with three vowels apiece in 120 different ways. Next, for each such division there are six distinct ways in which the vowels of one set can be paired with the vowels of the other, times two possible assignments of dominance to these sets. Finally, for each such assignment, there are six ways in which the underlying vowels can be made to correspond to the five actual vowels of Nez Perce. There are consequently between two and three billion logically possible analyses of vowel harmony in Nez Perce. Many of these are sufficiently preposterous to be excluded on a priori grounds; I do not believe that anyone would favor the suggestion that the underlying vowels of Nez Perce are ü e ɔ̈ ɨ a ɔ, arranged into dominant-recessive pairs as ü-a, e-ɨ, ɔ-ɔ̈ and realized phonetically as i (< ɔ and ɔ̈), æ (< ɨ), u (< a), o (< ü), and a (< o). On the other hand, many of the logically possible analyses are fairly plausible. At least four sorts of considerations bear upon the plausibility of an analysis: (a) the character of the underlying vowel system; (b) the naturalness of the classes of dominant and recessive vowels; (c) the extent to which the shift of the recessive vowels to their dominant counterparts can be rationalized, especially as some type of assimilation; and (d) the plausibility of the rule or rules required to realize the underlying system as the Nez Perce five-

vowel system (including the merger of one pair of underlying vowels into the single vowel i). The preposterous example above fails on every count: the underlying system is odd, neither the class of dominant vowels (enclosed in figure 1)

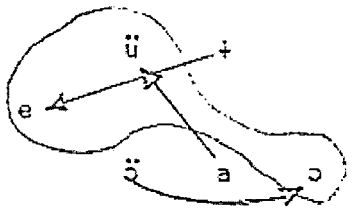


Figure 1. A Preposterous Harmony System.

nor the harmony rule (indicated by the arrows in figure 1) is natural, and the process of realization (indicated by the arrows in figure 2)

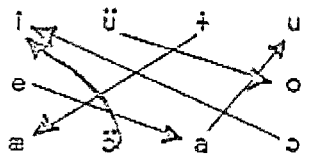


Figure 2. A Preposterous Realization Process.

is chaotic.

One has no assurance in general that the four sorts of plausibility considerations will tend in the same direction. Indeed, in many cases there is a conflict between an emphasis on natural underlying systems (for example, the 'canonical' six-vowel system i e æ a o u), in the manner of Chomsky and Halle,[5] and attempts to restrict the arbitrariness of analyses, in the manner of Postal, who proposes that underlying representations be identical to phonetic representations,

except insofar as universal principles of phonology are operative and except insofar as required by the existence of otherwise justifiable language-particular rules.[6] Thus, in a recent analysis of Mandarin Chinese,[7] it is proposed, on the basis of the phonetic qualities of the vowels (slightly modified to rationalize the function of the vowels with respect to phonological rules), that the language has the underlying vowel system

i ü ɨ u

ə

a

This analysis conforms closely to Postal's naturalness condition, but posits a six-vowel system wildly different from the canonical one. On the other hand, in the principal dialect of the New Guinean language Rotokas, as reported recently by Firchow and Firchow,[8] there are six consonants, with phonetic norms

p t k

b ɾ̆ g

Although in the closely related Aita dialect the phonetic norms of the voiced consonants are the nasals m n ŋ, the Firchows report that the nasal allophones are rarely heard in Rotokas Proper; on the basis of Postal's naturalness condition, it would be very difficult to argue that the Rotokas Proper voiced consonants were underlying nasals, despite the intuitively satisfying nature of this proposal.

In the case of Nez Perce, the two underlying six-vowel systems that have been proposed in the literature both employ what is in essence the naturalness principle. Rigsby and Silverstein, and also

Jacobsen, assume that Nez Perce has five underlying vowels identical to its five output vowels (i æ a o u), plus a sixth vowel that merges with i. Rigsby and Silverstein propose as well to achieve the canonical six-vowel system[9] (illustrated in figure 3),

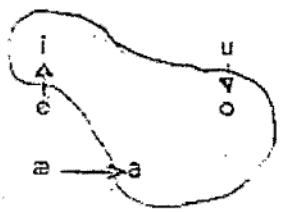


Figure 3. Nez Perce Harmony à la Rigsby-Silverstein

while Jacobsen seeks a phonetically natural[10] dominant-recessive distinction and manages, in addition, to rationalize the harmony rule as an assimilation[11] (see figure 4).

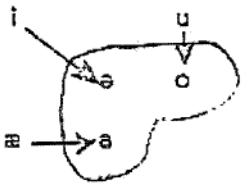


Figure 4. Nez Perce Harmony à la Jacobsen

The Rigsby-Silverstein analysis can be revised to rationalize the harmony rule in a similar fashion, if e, rather than i, is taken to be the dominant vowel (figure 5).

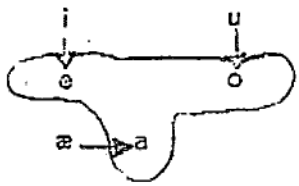


Figure 5. Rigsby-Silverstein Revised.

The realization rules needed are simple in both cases: for Rigsby-Silverstein, e → i; for Jacobsen, ə → ɨ. Another possibility would be to take ɨ (or ü) as the sixth (dominant) vowel (figure 6).

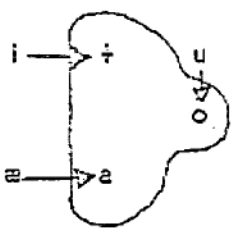


Figure 6. A Variant of Rigsby-Silverstein.

in which case the harmony is a kind of o-umlaut.

Still other analyses involve mild violations of the naturalness principle, with a concomitant gain in the rationality of the harmony process. For example, in the system illustrated in figure 7,

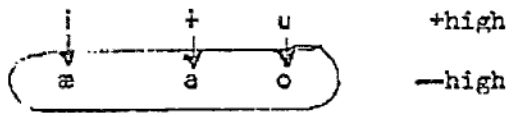


Figure 7. Harmony as Assimilation to Lowness.

two underlying vowels are displaced from their output values, with underlying ɨ realized as ɐ, and underlying æ realized as i; but the harmony rule is then a straightforward assimilation to the feature [-high]. One might even exercise ingenuity while holding fast to the canonical six-vowel system, say by adopting the definitely non-patent analysis summarized in figure 8,

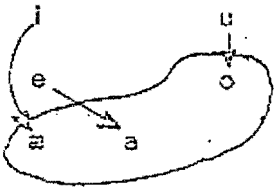


Figure 8. Another Double-Displacement Analysis.

together with the realization rules e → ɐ and æ → i. Although these analyses appear to be vastly different, when expressed in standard notations of generative phonology they differ by relatively few features (five at the most--fewer markings than occur in almost any single rule in The Sound Pattern of English). If the four types of plausibility considerations are weighed intuitively, probably the analyses of figures 4 through 7 are to be preferred to the others. But additional evidence of some sort is necessary if any further decision is to be reached.

Rigsby and Silverstein have, in fact, adduced some relevant evidence, namely the palatalization of k and k̓ in Sahaptin. They find that the occurrence of palatals in Sahaptin can be explained if it is assumed that these dialects have essentially the same system of vowels and vowel harmony as Nez Perce. The Sahaptin vowels

which condition palatalization correspond to the (regressive) Nez Perce vowels e and æ in the analysis of figure 3. The distinction between dominant i and recessive e, postulated entirely on a priori grounds above, is thus confirmed by the differential behavior of these vowels in Sahaptin.

Far from supporting the analysis of figure 3, however, the Sahaptin palatalizations suggest that Jacobsen's treatment (figure 4) is essentially correct. The difficulty is that the Rigsby-Silverstein analysis has k palatalizing to č in position before e and æ, but not before i--despite the fact that i is the characteristic palatalizing influence. One expects that if any vowel conditions palatalization, that vowel is i; that if e conditions palatalization, so does i; and that if æ conditions palatalization, so do e and i. Inasmuch as palatalization is a kind of assimilation of consonants to an i articulation, these universal claims have enough intuitive plausibility for me not to defend them here.[12] It is sufficient to note that both the original Rigsby-Silverstein analysis and the revision of figure 5 (with palatalization after i and æ, but not e) are counterintuitive. This difficulty is avoided in Jacobsen's analysis, where the (recessive) front vowels i and æ correspond to the palatalizing vowels of Sahaptin; the related dominant vowels (o and ə, respectively) are back vowels, hence would not be expected to condition palatalization. Jacobsen's underlying vowel system is (perhaps) less natural than the Rigsby-Silverstein system, and Jacobsen's ə → i rule is slightly more complex, in terms of feature markings, than Rigsby and Silverstein's e → i rule; but Jacobsen's treatment permits the rationalization of both processes involved, harmony and palatalization, hence is clearly preferable.

Footnotes

[1]Aoki, Haruo. 1962. Nez Perce and Northern Sahaptin: A Binary Comparison, IJAL 28.172-82; Rigsby, Bruce J. 1965. Continuity and Change in Sahaptian Vowel Systems, IJAL 31.306-11; Aoki. 1966. Nez Perce Vowel Harmony and Proto-Sahaptian Vowels, Language 42.759-67; Jacobsen, William H. 1968. On the Prehistory of Nez Perce Vowel Harmony, Language 44.819-29; Rigsby, Bruce J. and Michael Silverstein. 1969. Nez Perce Vowels and Proto-Sahaptian Vowel Harmony, Language 45.45-59.

[2]Chomsky, Noam and Morris Halle. 1968. The Sound Pattern of English. New York, Harper & Row, p. 377.

[3]There is a particularly nice discussion of the necessity for such entities in Charles W. Kisseberth. 1969. On the Abstractness of Phonology: the Evidence from Yawelmani, Papers in Linguistics 1. 248-82.

[4]Many examples can be found in Chomsky and Halle's The Sound Pattern of English, and the general issue has been clearly and briefly treated by Sanford Schane. 1968. On the Non-Uniqueness of Phonological Representations, Language 44.709-16.

[5]The Sound Pattern of English, pp. 408-11.

[6]Postal, Paul M. 1968. Aspects of Phonological Theory, New York, Harper & Row, chapter 4.

[7]Cheng, Chin-chuan. 1968. Mandarin phonology, unpublished Ph. D. dissertation, University of Illinois, chapter 2.

[8]Firchow, Irwin and Jacqueline Firchow. 1969. An Abbreviated Phoneme Inventory, AL 11.271-6 (1969).

[9]They say, "We are appealing here to a condition of naturalness of an underlying six-vowel system... in accordance with conventions of markedness as proposed in Trubetzkoy's Grundzüge, or other Prague-inspired works" (p. 49); among the Prague-inspired works referred to is The Sound Pattern of English.

[10]That is, ə was chosen as the sixth vowel, instead of ɨ (or æ), "merely in order to give more phonetic homogeneity to the class of dominant vowels" (p. 322).

[11]In which, as R. P. V. Kiparsky observes in an unpublished paper, the vowels move toward the low back position--an a- (or ɔ- or o-) umlaut analogous to the i-umlaut of Germanic.

[12]They do, however, require defense, by means of a survey of palatalization processes throughout the languages of the world. Such a survey would have to take up many important problems avoided here--for example, the relationship between palatalization as a shift in position of articulation (the sense of the discussion in the text) and palatalization as the assumption of a secondary articulation, and the relationship between palatalization of velars (as in Sahaptin) and palatalization of dentals.