

*ɨ / e IN PROTO UTO-AZTECAN

The two major works presently available concerning the reconstruction of Proto Uto-Aztecan (PUA) are in substantial agreement with regard to the major outlines of the PUA sound inventory. In initial position, both Voegelin, Voegelin, and Hale (henceforth VVH) and Wick Miller reconstruct the proto consonants *p, *t, *c, *k, *k^w, *ʔ, *s, *h, *m, *n, *w, and *y, and the essential validity of this reconstruction is easily confirmed by an examination of cognate sets.¹ Moreover, both VVH and Miller reconstruct a five vowel system for PUA and agree on *i, *a, *o, and *u to represent four of the proto vowels. For the fifth vowel, VVH reconstruct *ɨ (high central or back unrounded), while Miller reconstructs *e. The question to which we address ourselves is whether it is possible to choose non-arbitrarily between *ɨ and *e to represent this fifth vowel.²

Let us begin by examining the vowel correspondences to which cognate sets in the daughter languages attest. We will restrict our attention to nine daughter languages, Comanche (CM), Tübatulabal (TU), Cahuilla (CA), Luiseño (L), Hopi (H), Papago (P), Yaqui (Y), Cora (CR), and (Classical) Aztec (A). With the exception of Cahuilla and Luiseño, which belong to the same subfamily, each language represents a subfamily of Uto-Aztecan, and each major subfamily is represented just once.³

The basic vowel correspondences are represented in the following table:

	<u>*i</u>	<u>*a</u>	<u>*o</u>	<u>*u</u>	<u>*ɨ / e</u>
CM	i	a	o	u	ɨ
TU	i	a	o	u	ɨ
CA	i	a	i	u	e
L	i	a	e	u	o
H	i	a	ʊ	o	ɨ
P	i	a	o	u	ɨ
Y	i	a	o	u	e
CR	i	a	u	ɨ	e
A	i	a	o	i	e

Since ample documentation of these correspondences is provided by VVH and by Miller, the following cognate sets are offered more as illustration than as verification of them. The two numbers given after the rough gloss for each PUA form are the numbers of the cognate set in VVH and Miller respectively. The vowel being compared is underlined.

- *cipu 'bitter' 13-43: L čivut H ci:vo P siw Y či:bu
CR cihi A čiči:k
- *pi 'breast' 6-58: CM pi TU pi:l CA pi? L pi?
H pi:hi P wipi Y pipim
- *naka 'ear' 47-148a: CM naka TU naⁿhal CA naq
L naq H na:qa P na:k Y nakka A nakas
- *waki 'dry' 99-143: TU wa:g CA waxiš L waxaq
H la:ki P gaki Y wa:ke CR wahči A waki
- *wo 'two' 103-509a: TU wo: CA wih L we:x
H lö:yöm P go:k Y wo:yi A o:me
- *?oŋa 'salt' 63-359: CM ?ona:vi TU ?oŋal L ?eŋla
H ?öŋa P ?on Y ?o:na CR ?unah
- *pusi 'eye' 5-160a: CM pui TU puⁿzil CA puš L pu:šla
H po:si P wuhi Y pu:si CR hi?isi A i:š
- *ku 'fire' 137-170a: CM ku TU kut L ku:t H ko:
P ku:
- *tika/teka 'put down' 18- : CM tiki P či:k Y te:ka
A te:ka
- *tiw/tew 'name' -300a: CA tew H tiŋ^wa P či:gig
Y teawa
- *piti/pete 'heavy' 3-223: TU pii? H piti P wi:č
Y vete CR tihete A eti:k
- *tipa/tepa 'mortar' 169-287: L to:pal P či:ppa

There is little difficulty in choosing a proto vowel to underlie each of the first four correspondences; *i, *a, *o, and *u are the obvious reconstructions, and few linguists would hesitate to make these selections. It is interesting and pertinent to note, however, that a linguist who re-constructs these four vowels on the basis of their systematic reflexes

can do so only by making some rather strong assumptions regarding language universals, especially (but not exclusively) in the area of diachronic linguistics. For example, he tacitly assumes that it is possible for o to develop to ɔ historically, as it apparently did in Hopi; if he were to make some other assumptions, say that ɔ > o is a possible historical development but not o > ɔ he would be led to posit a different proto vowel system. There is no way to avoid such implicit assumptions in doing linguistic analysis, and there is no reason to be disturbed by them. This merely demonstrates that linguistic theory and linguistic analysis are interdependent.

While the first four correspondences present little difficulty, the fifth is problematic. Either *ɪ or *e could reasonably be reconstructed given only the reflexes in the nine daughters. Four of the daughters display ɪ for this vowel, and four display e. Since each of the eight daughters with ɪ or e represents a different subfamily, the two vowels are found in the same number of subfamilies. If no further information were available, one could hardly make a motivated choice between *ɪ and *e.

In the sections that follow, it will be argued that *ɪ is the correct reconstruction. The four arguments that will be presented are of various sorts; they involve general linguistic considerations, simplicity considerations regarding the sound changes of individual languages, and considerations of simplicity in the sense that it is desirable for a hypothesis of genetic relationship that the sound changes posited for closely related languages should be as similar as possible. None of the four arguments is particularly strong in itself. The strength of the case lies in the fact that all four arguments converge to favor the reconstruction of *ɪ.⁴

I

Whatever formalism is proper to represent the facts and intuitions that have led linguists to develop the notion of markedness, there is no doubt that ɪ is more highly marked than e or u. In some sense it is normal for a front vowel to be unrounded (e) and for a high back vowel to be rounded (u). It is comparatively unusual for a high back vowel to be unrounded (ɪ). Since we are considering e and ɪ as candidates for the fifth vowel of PUA, we may be able to draw some conclusions from their differing degrees of markedness.

The direction of language change is in general from marked to unmarked. The change of ɲ to n, for instance, is quite common, but n > ɲ would be rather unusual.⁵ To take another example, Paul Kiparsky

has argued quite convincingly that synchronic rule order often changes from marked order to unmarked order (the order of maximum rule applicability), while the opposite development seldom if ever takes place.⁶

If $*\dot{\pm}$ is reconstructed for Proto Uto-Aztecan, we must postulate that $*\dot{\pm} > e$ in Cahuilla, Yaqui, Cora, and Aztec. Such a sound change is very plausible. For one thing, it is in the marked-to-unmarked direction, as sound changes tend to be. Moreover, this development leads from a vowel system that is relatively cluttered in the high back region to a more symmetrical one:

i	$\dot{\pm}$	u		i	u
			o =====>	e	o
	a				a

There is nothing implausible in the view that such a natural change could occur in four separate subfamilies.

Suppose, on the other hand, that $*e$ were reconstructed. In this case, one would have to posit the change $*e > \dot{\pm}$ in Comanche, Tübatulabal, Hopi, and Papago. Counter to general linguistic expectations, this change is clearly in the unmarked-to-marked direction. Moreover, it converts a symmetrical vowel system into one that is asymmetrical in favor of the high back region, which is not a very usual phenomenon. Consequently, $*e > \dot{\pm}$ seems less plausible as a sound change to postulate for four subfamilies than $*\dot{\pm} > e$. Other things being equal, $*\dot{\pm}$ should thus tentatively be reconstructed. However, we still have much to learn regarding markedness and language change, so that the force of this argument should not be overestimated.

II

Geographically, the Uto-Aztecan languages fall in two major groups. Of the languages being considered here, Comanche, Tübatulabal, Cahuilla, Luiseño, and Hopi are spoken north of Mexico. Papago, Yaqui, Cora, and Aztec, on the other hand, are located in Mexico; Papago reaches as far north as southern Arizona, while Aztec is situated far to the south, in the area of Mexico City. When the daughters are compared with PUA, it is found that the northern languages are in general much more conservative than the southern languages. That is, noticeably fewer sound changes have to be posited for the northern than for the southern languages. In

Comanche, to take the extreme case, no sound changes whatsoever have to be posited to handle initial consonants and the four non-problematic vowels.⁷ A long series of consonantal changes have taken place in Papago, by way of contrast.

It is interesting in this context to observe that Comanche and Tübatulabal, both of which are quite conservative, have ɪ rather than e as the reflex of PUA *ɪ/e. Even if we restrict our attention to the vowel system, we find that the conservative languages tend to have ɪ and the others to have e. Comanche, Tübatulabal, Papago, and Yaqui have preserved the four non-problematic vowels without change; in these languages, i, a, o, and u reflect *i, *a, *o, and *u respectively. Three of these languages have ɪ for the fifth vowel, and only one (Yaqui) has e. Cahuilla, Luiseño, Hopi, Cora, and Aztec have undergone vocalic changes in the development of *o and/or *u; of these five languages, only one (Hopi) has ɪ as the reflection of the fifth proto vowel, while three (Cahuilla, Cora, and Aztec) have e. The tendency of the more conservative languages to have ɪ, and of the others to have e, points to *ɪ as the more likely reconstruction for PUA. By itself, of course, this is not a very convincing argument. Its significance is that it corroborates the choice of *ɪ that is made on several other grounds.

III

With the exception of Comanche, the northern Uto-Aztecan languages considered here have all undergone a sound change affecting *k before low vowels; specifically, *k became a post-velar in this environment.⁸

$$*k > q / \text{ } __\text{ } V^{\text{low}}$$

The term low vowel will be used here to designate any non-high vowel; e, a, and o are thus low vowels in the intended sense. The following cognate sets illustrate this development:

*ku 'fire' 137-170a:	CM	ku	TU	kut	L	ku:t	H	ko:
	P	ku:						
*ki 'house' 44-240a:	CA:	kiš	L	ki:ča	H	ki:hɪ	P	ki:
*kɪ(?) 'bite' 43-42:	CM	kɪh	TU	kɪ:?	H	kɪ:	P	kɪ?i
*katɪ 'sit' 42-381a:	CM	kari	TU	*qal?>hal?	L	qalo		
	H	qati	P	ka:č				

*ka(n) 'willow' -461: TU *qa:l>ha:l CA qa:nkiš

H qaha:vi

*koʔi/koya 'kill, die' 45-129a: CM koʔi L qeʔ H qö:ya

P koʔi

Note that Comanche (which is a northern language) and Papago (which is not) did not undergo the change; they retain k throughout. Note also that the Hopi form ko: does not contravene the rule as stated, because the low vowel o: reflects the high proto vowel *u. The Hopi forms ko:, ki:h:, ki:, qaha:vi, and qö:ya provide the fullest illustration of the sound change; *k remains before the high vowels u, i, and ɛ but becomes q before the non-high vowels a and o.

Since ɛ is a high vowel while e is a low vowel, the widespread sound change of k to q before low vowels may shed some light on the choice of *ɛ or e for the fifth PUA vowel. It is of course not sufficient to observe that this fifth vowel behaves as a high vowel with respect to the consonantal change; ɛ is the reflex of this fifth vowel in most of the daughters where the consonantal change occurs, and it would be conceivable to postulate that *e>ɛ preceded the consonantal change. Lacking an independent argument concerning the ordering of these sound changes, we must turn to Cahuilla and Luiseño. Cahuilla and Luiseño are the crucial languages because the consonantal change does take place in them and because the reflex of *ɛ/e is not a high vowel but a low vowel; these are the only languages under consideration in which both conditions are met. However, since the crucial cognates from Cahuilla are not available, the argument will be made in terms of Luiseño alone.

With regard to the four non-problematic vowels, initial k in Luiseño behaves just as we would expect; it remains k before the high vowels u and i but becomes q before the low vowels a and e (from *o): ku:t, ki:ča, qalo, qeʔ. The Luiseño reflex of *ɛ/e is o (cf. the cognate set for 'mortar'), and the reflex of *k/ke is ko.

*kɛ(?)i 'bite' > L koʔy(qa)

Now, if *ɛ is chosen to represent the fifth PUA vowel, there is no problem. From the reconstructed *kɛʔi 'bite', the Luiseño form koʔy- can be derived by the sound change *ɛ>e that is needed for other forms. By ordering the change of *k to q before low vowels so that it precedes the vowel shift, we can account for the k of koʔy- not becoming q. When the consonantal change takes place, the vowel is still the high vowel ɛ. Thus

we can posit two ordered sound changes for Luiseño, yielding the following three derivations:

	*kɿ?i	*ko?i	*katɿ
*k > q / __V ^{low}	. ----	qo?i	qatɿ
*ɿ > o	ko?i	----	qato
Other changes	ko?y-	qe?	qalo

The environment for the consonantal change can be stated quite simply, and the Luiseño development of *k is seen to be identical to its development in other northern languages.

Suppose, on the other hand, that we were to reconstruct *e for the fifth PUA vowel. The reconstructed form for 'bite' would then have to be *ke?i, and the sound change *e>o would have to be substituted for the change *ɿ>o in order to account for its Luiseño reflex. Assuming the same chronological order,⁹ one would have to posit for Luiseño the following sound changes and derivations:

	*ke?i	*ko?i	*kate
*k > q / __V ^x	----	qo?i	qate
*e > o	ko?i	----	qato
Other changes	ko?y-	qe?	qalo

The problem that arises is how to specify the environment of the *k>q shift. What is the specification of V^x? The change must occur before o and a, but not before e, so it will not suffice to specify V^x as a low (non-high) vowel. Nor will it suffice to specify it as a back vowel, since *k remains in Luiseño before *u (*ku 'fire' > L ku:t). The best one can do is say that *k became q in Luiseño before a low back vowel. The change is then claimed to be less general than the change required when *ɿ is reconstructed rather than *e.

It is of course not maintained that this difference in simplicity and generality is a dramatic one; the specification of low back vowels involves only one more feature than the specification of all low vowels. Nevertheless, the greater generality of the sound change would lead us to favor *ɿ as the reconstruction, other things being equal.

IV

The fourth argument in favor of *i concerns the development of vowels in Cahuilla and Luiseño, which are members of the same sub-family. Since these languages are relatively closely related, we would like the sound changes we postulate for them to look as much alike as possible (and secondarily, as similar to the changes in other Uto-Aztecan languages as possible). In other terms, we would prefer our total picture of the historical development of Uto-Aztecan to be as simple as possible and yet consistent with the facts.

Suppose first that *i is reconstructed for the fifth PUA vowel. The resulting vowel system, and the sound changes necessary for Cahuilla and Luiseño, are given below.

	<u>*i</u>	<u>*a</u>	<u>*o</u>	<u>*u</u>	<u>*i</u>
CA	i	a	i	u	e
L	i	a	e	u	o

Cahuilla

*o>i

*i>e

Luiseño

*o>e

*i>o

At first glance, the sound changes in Cahuilla and Luiseño do not seem very similar; two changes took place in each language, but no changes are shared.

However, these changes can be said to be dissimilar and unrelated only if one assumes that each change took place in a single step (e.g. that *o>i in Cahuilla without passing through any intermediate stages). But there is no reason at all to make this strong assumption. In fact, it would be rather implausible to assume that changes such as *o>i or *i>e came about in a single jump. On the basis of general linguistic expectations, it is more likely that, say, *o>i by the route *o>ö>e>i, and that *i>e.¹⁰

Reinterpreting the vocalic development of Cahuilla and Luiseño in this more reasonable manner, we arrive at the following scheme, in which several sound changes are shared.

<u>Shared</u>	
*o>ö	
ö>e	
*ɨ>ə	
<u>Cahuilla</u>	<u>Luiseno</u>
e>i	ə>o
ə>e	

These changes may be taken as applying in the order given, though not every ordering relation is functional.

This scheme has a number of advantages other than its greater phonological plausibility. For one thing, it makes the vocalic development of Cahuilla and Luiseno look very much alike; the shared changes outnumber the individual changes of either daughter. In particular, this scheme accounts for the fact that the vocalic shifts in these two languages are significantly similar in ways that go well beyond what one would expect on the basis of chance. In both daughters, sound changes affecting precisely two proto vowels have occurred (not one or three or four). In both daughters, the affected vowels are *o and *ɨ (not *o and *a or *ɨ and *i or any other combination). In both daughters, *o becomes an unrounded front vowel (not a rounded front vowel or a back vowel). Finally, in both daughters, *ɨ has become a relatively unmarked mid vowel (not another high vowel or a low vowel). These similarities are in a sense explained by the revised scheme--they result automatically from the assumption of shared innovations. With the former scheme, all these similarities would have to be considered coincidental.

Moreover, there is other, more concrete justification for two of the three intermediate stages that have been postulated. *o is assumed to have passed through the intermediate stage ö in developing to Cahuilla i and Luiseno e. Partial justification for this assumption is found in Hopi, in which ö is the regular reflex of *o (e.g. *?oŋa 'salt' > H ?öŋa). Evidence for the intermediate stage e in the development of Cahuilla i from *o is provided by the somewhat problematic form for 'beads', qenxat. Miller gives the following entry for 'beads':¹¹

28 beads *koka. Mayo koóka-m; Yaqui koóka-m;
Huichol kuuka. --Cf. also Mono qahki, Cahuilla
qénxa-t, perhaps from *kanVk or *kenVk (V=syncopeated
vowel).

Although the vocalism of the Mono form might lead one to set up a special proto form beginning *ka, it is unnecessary to do the same for the Cahuilla.¹² Starting from *ko, the rule that backs *k to q before low vowels will derive qo. By the *o>ö and ö>e changes, qo becomes qe. Now, if it is possible to claim that the normal development of *o into Cahuilla i was blocked at the intermediate stage e, we will have explained the initial portion of Cahuilla qenxat. But it is perfectly plausible to assume that the e>i change was blocked in qe by the presence of the postvelar consonant. In general linguistic terms, peripheral consonants such as p and q seem to bear some special affinity to low vowels, while non-peripheral consonants such as č and k are affiliated with high vowels.¹³ (Cahuilla and other northern Uto-Aztec languages are an excellent illustration, since *k became q before low vowels.) Consequently, the fact that the qe of qenxat did not become qi is easily accounted for. Notice, however, that qe remains unexplained if we do not assume that *o developed to i in Cahuilla through the intermediate stage e.

To summarize, reconstructing *i leads to a rather satisfying picture of the development of the PUA vowels in Cahuilla and Luiseño. The sound changes can be broken down into series of small, phonologically plausible steps. The bulk of the changes involved are shared by Cahuilla and Luiseño, and one is further attested in Hopi. The significant similarities in the vowel changes in Cahuilla and Luiseño are explained. And finally, some of the postulated intermediate stages can be justified by fairly direct evidence.

Suppose, on the other hand, that *e were reconstructed. We would then have the following situation:

	<u>*i</u>	<u>*a</u>	<u>*o</u>	<u>*u</u>	<u>*e</u>
CA	i	a	i	u	e
L	i	a	e	u	o

Cahuilla

*o>i

Luiseño

*o>e

*e>o

At first it might seem that this scheme is preferable because it involves

only one (possibly complex) change in Cahuilla, whereas the former scheme required two ($*\underline{o}>\underline{i}$ and $*\underline{i}>\underline{e}$). However, this is not a valid argument, because reconstructing $*\underline{e}$ entails a corresponding complication of the sound changes needed for other languages. Four of the daughters under consideration have \underline{e} as the reflex of the fifth PUA vowel, it will be recalled, and four have \underline{i} . Thus, no matter which vowel we reconstruct, four daughters will have a sound change shifting \underline{e} to \underline{i} or vice versa.

Another initially tempting feature of this scheme is the possibility of collapsing the two Luiseño changes into one, i. e. claiming that \underline{o} switched to \underline{e} and \underline{e} to \underline{o} simultaneously by the addition of a single rule to the phonology. However, this hypothesis has a number of drawbacks. First, it is not at all certain that it is linguistically possible for a sound change of this type to occur.¹⁴ Second, assuming that such a change is indeed possible, treating $*\underline{o}>\underline{e}$ and $*\underline{e}>\underline{o}$ as a single development of Luiseño leaves us unable to explain the similarity of the development of $*\underline{o}$ in Cahuilla and Luiseño; the fact that $*\underline{o}$ became a front unrounded vowel in both languages is treated as just a coincidence. Third, the parallelism with the $*\underline{o}>\underline{\ddot{o}}$ change in Hopi is lost.

To overcome these difficulties, one might postulate that the $\underline{e}/\underline{o}$ interchange in Luiseño came about in several stages. Perhaps $*\underline{o}>\underline{\ddot{o}}$ was the initial development; $\underline{\ddot{o}}$ then became \underline{e} ; as the result of a subsequent generalization of the $\underline{\ddot{o}}>\underline{e}$ rule, \underline{e} became $\underline{\ddot{o}}$; and finally, the new $\underline{\ddot{o}}$ switched to \underline{o} . The first development could be shared with Hopi and Cahuilla, and the second with Cahuilla.

Shared

$*\underline{o}>\underline{\ddot{o}}$

$\underline{\ddot{o}}>\underline{e}$

Cahuilla

$\underline{e}>\underline{i}$

Luiseño

$\underline{\ddot{o}}>\underline{e}$ generalized
to $\underline{\ddot{o}}>\underline{e}/\underline{e}>\underline{\ddot{o}}$

$\underline{\ddot{o}}>\underline{o}$

This is apparently the best one can do, but even here there are problems.

For one thing, the postulated sequence of changes in Luiséño is not very convincing; it looks contrived. Leaving this rather subjective argument aside, however, we find a more serious problem. Namely, the changes posited for Cahuilla cannot be correct.

When *ɨ is set up for PUA, the Cahuilla development *o>ö>e>i is perfectly conceivable (and well motivated, as we saw); it is only necessary to order the changes so that ə, from *ɨ does not change to e until after the e>i change has taken place. This ordering is necessary because *ɨ and *o do not merge in Cahuilla. When *e is reconstructed, on the other hand, we cannot postulate *o>ö>e>i for Cahuilla. Since *e is present from the start and never changes, *o cannot pass through e in becoming i without merger, which did not occur. Consequently, *o must have developed to i in Cahuilla by some other route, the best alternative in the present context being *o>ö>i. We have arrived at the following picture:

<u>Shared</u>	
*o>ö	
<u>Cahuilla</u>	<u>Luiséño</u>
ö>i	ö>e/ e>ö
	ö>o

For a number of reasons, this scheme is less desirable than the one obtained by reconstructing *ɨ. First, the direct change of ö to i is phonologically less likely than a change mediated by e. Second, the qe of Cahuilla qenxat, related to *koka 'beads', cannot be explained as it was before; since *o does not pass through e in becoming i, the qe cannot be attributed to the retention of an intermediate stage in a particular environment. Finally, the vocalic developments in Cahuilla and Luiséño have much less in common than they do when *ɨ is reconstructed.

Conclusion

Four different kinds of arguments have been advanced for reconstructing *ɨ rather than *e as the fifth vowel of Proto Uto-Aztecan. Each point taken individually is rather weak, but it is highly suggestive that all four considerations dovetail in favoring *ɨ. Unless stronger arguments should be brought forth to justify the choice of *e rather than *ɨ, *ɨ must therefore be regarded as the proper reconstruction.

Notes

1. C. F. Voegelin, F. M. Voegelin, and Kenneth L. Hale, Typological and Comparative Grammar of Uto-Aztecan: I (Phonology), supplement to IJAL, Vol. 28, No. 1, 1962; Wick R. Miller, Uto-Aztecan Cognate Sets, University of California Publications in Linguistics, Vol. 48, 1967.

We will restrict our attention to initial syllables, which have been the most stable in the development of the daughters from PUA. VVH reconstruct *r, *l, and *ŋ in addition to the consonants listed, but these hardly occur at all initially. It should be noted that Miller, who was primarily interested in providing cognate sets in order to facilitate comparative work, does not claim to have made "a reconstruction in the usual sense"; rather, "the starred forms in this monograph represent a shorthand notation to enable the reader to see what phonemes have been compared" (p. 6-7).

2. Neither VVH nor Miller offers any argument for choosing one vowel or the other; but the question of choosing between *ɨ and *e of course remains regardless of whether or not they intended to make a serious claim as to the quality of the fifth PUA vowel by their symbolism. Stress and vowel length, claimed to be distinctive for the daughters, have not been worked out for PUA; we will ignore them here.

3. See Sydney M. Lamb, "The Classification of the Uto-Aztecan Languages: A Historical Survey", in William Bright (ed.), Studies in Californian Linguistics, University of California Publications in Linguistics, Vol. 34, 1964, p. 106-125.

4. The strongest evidence in favor of one vowel or the other would be likely to emerge from full generative phonological analyses of the daughter languages together with the diachronic conclusions that could be drawn by comparing them. Except for Papago, however, little or no work has been done along these lines. See Kenneth Hale, "Some Preliminary Observations on Papago Morphophonemics", IJAL, Vol. 31, No. 4, 1965, p. 295-305.

5. Within Uto-Aztecan, *ŋ > ɲ in Comanche, Papago, Yaqui, Cora, Aztec, and in other daughters not being considered (see the cognate set for 'salt'); *n > ɲ does not occur. Markedness is of course relative to specific environments. Whereas n is less marked than ɲ in neutral environments, this may not be true before high vowels. Similarly, n is probably more marked than ɲ before velar stops.

If change in individual segments is in general in the marked-to-unmarked direction, one might ask how highly marked segments can ever arise in languages. A possible answer is that they arise through merger of separate segments. KW is a natural source for k^w , for instance, and \pm might easily result from ui or iu. A theory of phonological change must allow merger as a normal development, since it so often occurs in languages.

6. "Linguistic Universals and Linguistic Change", read at the Texas Conference on Language Universals, Austin, 13-15 April 1967.

7. A number of consonantal changes have occurred in medial position, but not significantly more than in the other languages.

8. In Tübatulabal, $*k$ is reflected as h before low vowels. It is assumed that $*k > q$ occurred first, with q being subsequently changed to h; nothing crucial hangs on this assumption. In Mono, another northern language, the rule was generalized to apply to both $*k$ and $*k^w$. That is, $*k > q$ and $*k^w > q^w$ before low vowels.

9. This assumption does not prejudice the case, since a perfectly analogous argument could be given assuming the opposite order.

10. This position is not to be confused with the classical view of sound change, which holds that sound change is the result of indefinitely many successive minuscule increments of articulatory slippage. Rather, it is claimed that a small, finite number of discrete changes (two or three) may underlie a change such as o > i, each originating as the addition of a rule to the phonological system.

11. P. 19. I have written out in full the names of the daughter languages.

12. It is equally plausible that the second syllable of $*koka$ is the source of the initial part of Mono qahki. In any event, there seems to be no real reason for treating the Mono and Cahuilla forms in the same manner, since they present different problems; Mono has the wrong vowels, and Cahuilla an extra consonant. Note that the postulated n and V of $*kanVk/kenVk$ do not lead in any obvious or automatic way to a full explanation of the daughter forms. The unexpected n of Cahuilla qenxat remains a problem for anyone, but the initial qe can reasonably be derived from $*ko$.

13. Cf. James D. McCawley, "Le Rôle d'un Système de Traits Phonologiques dans une Théorie du Langage", Langages, Vol. 8, 1967, p. 112-123. Patrick Brogan of UCSD first pointed out to me the relevance of Cahuilla qenxat.

14. It is not being denied that languages can contain rules which interchange segment types; the existence of "alpha switching" rules seems fairly well established. Typically, however, such rules are integrated in the morphophonemics of the language and involve the switching of only one feature; more often than not, two adjacent vowels in the front series or in the back series are switched. What would have to be posited for Luiseño is a rule that is apparently independent of morphophonemic processes (hence quite sweeping in its effects), that operated between the front and back series, and that flips two features (gravity and rounding) instead of one. It is not asserted that such rules are impossible, only that their possibility is not obvious and has yet to be demonstrated. I have profited from a discussion with Sanford Schane on this point (which is not to imply that he would agree). Schane and Margaret Langdon have made helpful comments on the manuscript.

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