applies generally. (The vowel of the ergative suffix must be exempted from apocope. In fact, all inflectional case suffixes systematically fail to apocopate; see Krause 1979 for discussion.) The ban on final clusters is enforced by the epenthesis rule stated in (35).

(35) ∅ → [ə] / C ___ C#

The word *wejem-ət* 'rivers' thus receives the derivation in (36).

(36)	/#wejem-ti#/	UR
	wejem-t	apocope (33)
	wejem-ət	epenthesis (35)

In sum, we assume the rules in (32), (33), and (35) with the restrictions that (33) does not affect case suffixes and that it fails to apply after a cluster of coronal consonants.

With this analysis as background, consider the nouns in (37).

(37)	abs.sg.	abs.pl.	erg.	
	imət	imti-t	imti-te	'load'
	ekək	ekke-t	ekke-te	'son'
	ceŋəl	cenle-t	cenle-te	'box'
	loŋəl	lonla-t	lonla-ta	'walrus fat'
	wiŋər	winri-t	winri-te	'hoe'

These stems end in an underlying VCCV sequence. Being vowel-final, they allow the consonant of the ergative suffix [-te] to escape deletion and permit the vowel of the plural suffix [-ti] to apocopate without creating a cluster. However, in the absolute singular, deletion of the final vowel of the stem does lead to a consonant cluster, which is broken by schwa. The point we are building up to is the proper underlying representation for the forms in (37) that show the [ŋ]≈[n] alternation. There are three reasons to suppose that [ŋ] underlies this alternation. First, with this underlying representation, the change to [n] can be characterized as the very natural process of nasal assimilation of the coronal point of articulation of the following consonant. Second, a rule assimilating [ŋ] to the point of articulation of a following consonant is needed anyway in Chukchee for other alternations not discussed here. Finally, on grounds internal to the description of Chukchee, if [n] were to underlie the alternation, then we would fail to explain why apocope applies to [cenle], since the deleting vowel would be preceded by a cluster of coronal consonants, which otherwise inhibit the loss of final vowels.

There is thus good reason to believe that the underlying representations are [ceŋle], [wiŋri], and [loŋla]. But notice that these representations never surface directly in Chukchee. If the final vowel fails to apocopate, then the velar nasal obligatorily assimilates to the following coronal. And if the final vowel does delete, then an inorganic schwa breaks up the final cluster, allowing the underlying [ŋ] to surface. The derivations in (38) illustrate this point.

(38)	/#ceŋle#/	/#ceŋle-ti#/	/#ceŋle-te#/	UR
	inappl.	inappl.	inappl.	allomorphy (32)
	ceŋl	ceŋle-t	inappl.	apocope (33)
	ceŋəl	inappl.	inappl.	epenthesis (35)
	inappl.	cenle-t	cenle-te	ŋ-assimilation

A theory that analyzes alternations in terms of phonological naturalness and plausibility thus treats [ŋ] as underlying and the schwa as inserted in the [ceŋəl]≈[cenle] multiple alternation. These analyses are reached independently of each other. The result is that sometimes an underlying representation takes shape that never surfaces directly. This leads to complexity and abstractness and thus is undesirable if one believes that the phonological structure is induced from the phonetic surface by general analytic procedures. From such a viewpoint, a requirement that the underlying representation be identical with one of its alternants makes sense as a way of limiting the hypothesis space. But if underlying representations are selected in order to simplify the individual rules and representations of the grammar, then the fact that this representation never surfaces directly should come as no particular surprise.

3.4.2 Abstract Underlying Representations

In this section we examine data from the Yawelmani dialect of Yokuts, an American Indian language of California, that bear directly on the thesis of the basic alternant. These data have played a prominent role in generative phonology, where they were discussed first by Kuroda (1967), later by Kisseberth (1969) and Kenstowicz and Kisseberth (1977, 1979), and then by Archangeli (1984, 1991). All these writers have relied on the original description of the language by Stanley Newman (1944).

As shown in (39), five short vowels and three long vowels are found in Yawelmani phonetic representations. (Our discussion abstracts away from a general rule that contracts the diphthongs [iy] and [uw] to [i:] and [u:] in closed syllables; see Kenstowicz and Kisseberth 1979 for details.)

(39)	short vowels		long vowels	
	i	u		
	(e)	o	e:	o:
		a		a:

The short nonhigh front vowel is shown in parentheses because it is a predictable variant of the underlying long [e:] and arises from a vowel-shortening process to be discussed momentarily.

Yawelmani: Some Basic Rules

Three vocalic alternations pervade Yawelmani phonological structure: vowel harmony, vowel shortening, and epenthesis. We will look at each in turn. The paradigms in (40) illustrate the fact that virtually all suffixes exhibit two variants as a function of the rounding of the root vowel. Suffixes such as the nonfuture [hin] and gerundive [mi] have the alternants [hun] and [mu] when the preceding root contains [u], while the dubitative and participative suffixes [al] and [xa] have the variants [ol] and [xo] when an [o] precedes.

(40)

xat-hin	xat-mi	xat-al	xat-xa
bok-hin	bok-mi	dub-al	giy-xa
xil-hin	xil-mi	xil-al	dub-xa
dub-hun	dub-mu	koˀ-ol	bok-xo

[xat] 'eat', [bok] 'find', [xil] 'tangle', [dub] 'lead by hand', [giy] 'touch', [koˀ] 'throw'

The most natural analysis posits a rule of vowel harmony that extends [+round] from one vowel to the next, but only when the two vowels have the same value for the feature [high].

(41)
$$\begin{array}{c} \text{V} \\ [\alpha\text{high}] \end{array} \rightarrow [+\text{round}] \;/\; \begin{array}{c} \text{V} \\ \begin{bmatrix} \alpha\text{high} \\ +\text{round} \end{bmatrix} \end{array} C_0 \_\_\_$$

The paradigm in (42a) shows two suffixes (the indirect [sit] and nonfuture [hin]) harmonizing to the root vowel in *tul-sut-hun* 'burns for'.

(42) a. max-sit-hin
koˀ-sit-hin
tul-sut-hun

b. bok-ko
bok-sit-ka

[max] 'procure', [koˀ] 'throw', [tul] 'burn', [bok] 'find'

There are two possible interpretations of this multiple harmony. Either each suffix harmonizes directly with the root vowel or the harmony is broken down into a series of steps such that the root first changes the suffix [sit] to [sut], which then in turn passes on the rounding to the next suffix [hin]. The paradigm in (42b) supports the second interpretation. Here the imperative suffix [ka] harmonizes to [ko] when immediately preceded by the root [bok]. But when [sit] intervenes, the imperative suffix may not change to [ko]. This point is explained if harmony is determined by the immediately preceding vowel. Since [sit] has a high vowel, the "same-height" requirement on harmony is not satisfied in [bok-sit-ka]. But if all vowels harmonize directly with the root vowel, then we incorrectly predict **bok-sit-ko,* since the nature of the intervening vowels should not matter.

A vowel-shortening rule underlies the alternation in length exhibited by the stems in (43a).

(43) a.

future	dubitative	imperative	nonfuture	
wo:n-en	wo:n-ol	won-ko	won-hin	'hide'
do:s-en	do:s-ol	dos-ko	dos-hin	'report'
la:n-en	la:n-al	lan-ka	lan-hin	'hear'
me:k-en	me:k-al	mek-ka	mek-hin	'swallow'

b. V: → V / ___ CC

The root vowel is long when the suffix begins with a vowel, but is systematically shortened when the suffix begins with a consonant. These roots contrast with those in (40), which have a constant CVC shape. By the logic of avoiding lexical exceptions, we must posit the CV:C shape as basic for (43) and invoke a rule to shorten a long vowel when two consonants follow. Choice of the short-vowel alternant CVC as underlying would fail to distinguish this class of roots from the nonalternating roots of (40) and thus would require a division of the roots into two arbitrary lexical classes. No such division is necessary if the CV:C alternant is underlying. The required shortening rule is stated in (43b). Shortening vowels before two consonants is a very common process. Indeed, as we will see later, it is what ultimately underlies the vowel quality alternation in English *deep* vs. *dep-th*.

Finally, epenthesis underlies the [i]≈∅ alternation found in the verbs of (44).

(44)

future	dubitative	gerundive	nonfuture	
paˀt-en	paˀt-al	paˀit-mi	paˀit-hin	'fight'
lihm-en	lihm-al	lihim-mi	lihim-hin	'run'
logw-en	logw-ol	logiw-mi	logiw-hin	'pulverize'
ˀugn-on	ˀugn-al	ˀugun-mu	ˀugun-hun	'drink'

These stems show the shape CVCC before vowel-initial suffixes but CVC*i*C before consonant-initial ones. While we could posit a rule of syncope that converts CVCVC-V to CVCC-V, we will treat the vowel as inserted instead. The reasoning behind this move is as follows. We have seen that suffixes contrast for vowel height. If CVCVC were the underlying shape, we would, other things being equal, expect to find stems whose second vowel is nonhigh ([o] or [a] depending on the rounding of the first vowel). However, such disyllabic stems are systematically missing. This gap is explained if we say that underlyingly Yawelmani stems are essentially monosyllabic and thus allow just one vowel phoneme. The CVCVC shape arises from a rule of epenthesis inserting an [i] in the context C ___ CC in order to break up clusters of three consonants. In this respect, Yawelmani resembles many other languages that avoid clusters of three successive consonants. If we accept this interpretation of the [i]≈∅ alternation, then the epenthesis rule must be ordered before harmony, because the epenthetic vowel harmonizes when preceded by a [u]. *ˀugun-hun* thus receives the derivation in (45a).

(45)

a.	b.	
/#ˀugn-hin#/	/#logw-xa#/	UR
ˀugin-hin	logiw-xa	epenthesis
ˀugun-hun	———	harmony (41)

By ordering epenthesis before harmony, we make an interesting prediction about the pronunciation of a C*o*CC stem plus a consonant-initial suffix containing a nonhigh vowel. If epenthesis precedes harmony, and if harmony is dependent on the immediately preceding vowel, then [Ca] suffixes should fail to harmonize when added to [CoCC] roots, because the intervening epenthetic vowel will have the opposite value for the feature [high]. This prediction is confirmed by a form such as *logiw-xa* 'let's pulverize'. It receives the derivation in (45b) in which epenthesis bleeds harmony.

We have not yet determined the ordering relation between epenthesis and vowel shortening. The data in (46) furnish the needed evidence.

(46)	dubitative	gerundive/ nonfuture	
	sonl-ol	so:nil-mi	'put on the back'
	ʔaml-al	ʔa:mil-hin	'help'
	moyn-ol	mo:yin-mi	'get tired'
	salk-al	sa:lik-hin	'wake up'

These stems participate in each of the three Yawelmani alternations we have discussed. When they contain a round vowel, they initiate harmony. They also show the alternation between long and short vowels: a long vowel appears when just a single consonant follows, while the corresponding short vowel occurs before two consonants. Finally, these stems participate in the [i]≈∅ alternation: the CVCC shape appears when the suffix begins with a vowel, while the CV:C*i*C alternant arises when the suffix begins with a consonant. We argued earlier that the long vowel underlies the long-short alternation, and that ∅ must underlie the [i]≈∅ alternation. Consequently, the most natural underlying representations have the canonical shape [CV:CC]. We obtain the correct derivations with the rules already at our disposal by simply ordering epenthesis prior to shortening. (47) shows how *sonl-ol* and *so:nil-hin* are derived.

(47)	/#so:nl-al#/	/#so:nl-hin#/	UR
	———	so:nil-hin	epenthesis
	so:nl-ol	———	harmony (41)
	sonl-ol	———	shortening (43b)

Epenthesis bleeds the shortening rule by breaking up the [V:CCC] string into [V:CiCC].

This analysis is precluded by a theory requiring that the underlying representation be identical with one of its surface alternants. The postulated [CV:CC] shape never emerges directly. When followed by a vowel-initial suffix, the long vowel shortens to yield CVCC. But when a consonant-initial suffix follows, the epenthetic vowel is inserted. In order to satisfy the thesis of the basic alternant (30), either CVCC or CV:C*i*C would have to be postulated as underlying. But either of these representations is a serious compromise that leads to a loss of generalization. If we start with CVCC, then the rule generating the long vowel will have many lexical exceptions: all the stems like those in (40) with a constant short vowel. If CV:C*i*C is basic, then a rule of syncope is needed to delete [i] in the set of contexts that exactly complement the range of environments where another rule inserts [i]. A grammar that seeks simple rules and simple representations must postulate [CV:CC] – in direct violation of the basic alternant requirement.

The Yawelmani data and the parallel example from Chukchee suggest that the "basic alternant" conjecture is too strong. We must allow the underlying representation to be pieced together on the basis of an independent analysis of each of the alternations it participates in.

Absolute Neutralization

A weaker constraint – but one that is compatible with all of the data discussed so far – is stated in (48). It simply requires that each segment in the underlying representation emerge in some phonetic alternant.

(48) Each segment in the underlying representation must appear in some phonetic realization of the morpheme.

(48) is a corollary to the procedure that resolves any alternation [x]≈[y] with an underlying [x] or an underlying [y]. It prohibits positing some [z] that is phonologically distinct from both [x] and [y] as underlying the alternation. However, a convincing case can be made for precisely this state of affairs in Yawelmani. Recall that under our interpretation of the vowel harmony, the [o] of a stem rounds nonhigh suffixal vowels but leaves high suffixal vowels unchanged. While a large number of roots behave this way, an equally large number do not. Examples of each type appear in (49).

(49)	do:s-ol	sonl-ol	co:m-al	woʔy-al
	dos-hin	so:nil-hin	com-hun	wo:ʔuy-hun

[do:s] 'report', [so:nl] 'pack on the back', [co:m] 'destroy', [wo:ʔy] 'fall asleep'

The "irregular" roots [co:m] and [wo:ʔy] are not simply exceptions to harmony. They do trigger the rule. But perversely so: only when the suffix contains a high vowel. A key to understanding this perplexing behavior lies in the observation that such irregular roots are drawn exclusively from the CV:C and CV:CC root shapes. They do not populate the CVC or CVCC classes. Recall the Yawelmani vowel inventory, which is repeated in slightly altered form in (50). There are four phonologically distinct short vowels and four phonologically distinct long vowels: [e:], [a:], and the two kinds of [o:].

(50)	short vowels		long vowels	
	i	u		
		o	e:	o:, o:*
		a		a:

Suppose that the irregular [o:*] derives from [u:]. Two immediate consequences ensue. First, we are able to explain why this vowel harmonizes high suffixal vowels and fails to harmonize nonhigh ones. At the point where harmony applies, it bears the feature [+high]. Second, the inventory of vowels becomes more symmetric. It now contains long and short vowels for each of the three back vowel qualities. In fact, we can make the system completely symmetric if we also derive [e:] from [i:], as depicted in (51a).

(51)	a.	i	u	i:	u:
				↓	↓
			o	e:	o:*, o:
			a		a:

b. V: → [−high]

A corollary of this analysis is a rule that lowers the long high vowels, which is stated in (51b). This is a rule of *absolute neutralization*. It merges the contrast between underlying [u:] and [o:] in all environments and is thus to be distinguished from the more familiar *contextual neutralization* rules that merge phonological contrasts in particular environments (e.g., the Yawelmani contrast in vowel length is neutralized before a consonant cluster). Rules of absolute neutralization are descriptively controversial and are typically not postulated unless a good deal of language-internal motivation can be mustered. It turns out that in addition to explaining the peculiar double exceptions to vowel harmony, the postulated long high vowels elucidate a number of other peculiarities in Yawelmani phonological structure. Let us look at two additional pieces of supporting evidence.

First, the language has a class of underlying disyllabic roots of the shape CVCV:C. Given that there are four distinct vowel qualities, we expect, other things being equal, sixteen possible patterns. Of course, other things are not equal, since the language has rounding harmony. But even when the harmony factor is removed, we will expect initial-syllable [i] to combine with [a:] or initial [a] to combine with [i:]. In fact, as the data in (52) show, only four root patterns are found: C*a*C*a:*C, C*i*C*e:*C, C*o*C*o:*C, and C*u*C*o:*C. Furthermore, note that C*u*C*o:*C behaves "irregularly" with respect to vowel harmony.

(52)	paxa:t-al	paxat-hin	yawa:l-al	yawal-hin
	hiwe:t-al	hiwet-hin	hibe:y-al	hibey-hin
	ʔopo:t-ol	ʔopot-hin	yolo:w-ol	yolow-hin
	sudo:k-al	sudok-hun	tuno:y-al	tunoy-hun

[paxa:t] 'mourn', [hiwe:t] 'walk', [ʔopo:t] 'arise from bed', [sudo:k] 'remove', [yawa:l] 'follow', [hibe:y] 'bring water', [yolo:w] 'assemble', [tuno:y] 'scorch'

Given that [e:] and "irregular" [o:] derive from underlying high vowels, we see that C*i*C*e:*C and C*u*C*o:*C roots parallel C*a*C*a:*C and C*o*C*o:*C in repeating the same vowel quality in both syllables. (Newman (1944) calls these "echo" verbs.) Vowel lowering transforms the postulated C*i*C*i:*C and C*u*C*u:*C roots into the surface C*i*C*e:*C and C*u*C*o:*C shapes. This rule is essential to capture the "echoing" pattern that underlies these roots.

The vowel-lowering rule must be ordered after vowel harmony, because the harmonic behavior of the two kinds of [o:] is our primary reason for postulating the difference. The lowering rule must apply before shortening, however, because it is the [− high] quality that shows up before a consonant cluster. Vowel lowering is thus another rule that must be defined on an intermediate level of representation. The derivations in (53) illustrate this analysis.

(53)	/#hiwi:t-hin#/	/#sudu:k-hin#/	/#yowo:l-al#/	UR
	inappl.	sudu:k-hun	yowo:l-ol	harmony (41)
	hiwe:t-hin	sudo:k-hun	inappl.	lowering (51b)
	hiwet-hin	sudok-hun	inappl.	shortening (43)

The other evidence that supports the long high vowels comes from various rules

of Yawelmani morphology that assign different canonical shapes to the stem. If a root with a basic long high vowel is assigned to a canon calling for a short vowel, then the postulated [+ high] feature emerges. As a brief illustration of one such case, consider the deverbal nouns in (54).

	underlying root	verbal noun	
(54)	[bo:k]	bok	'find'
	[logw]	logiw	'pulverize'
	[mo:yn]	moyin	'get tired'
	[ʔi:dl]	ʔidil	'gets hungry'
	[wu:ʔy]	wuʔuy	'falls asleep'

Deverbal nouns are formed by shortening the verb's root vowel (if long). For example, [bo:k] 'find' has the nominal *bok*. Underlying [logw] 'pulverize' nominalizes as *logiw* by virtue of epenthesis breaking up a final consonant cluster. The neutralization of length is illustrated by the root [mo:yn] 'get tired'. Its nominal form is *moyin*. This morphological shortening applies before vowel lowering and thus allows the underlying [+ high] postulated for the roots in *ʔe:dil-hin* 'gets hungry' and *wo:ʔuy-hun* 'falls asleep' to emerge phonetically. The fact that the [o:] of *wo:ʔuy-hun* 'falls asleep' alternates with nominal [u] while the [o:] of *mo:yin-hin* 'gets tired' does not is automatically explained by deriving the former from an underlying [u:].

Given the vowel-lowering rule, the distinctive features composing the [u:] never emerge as a phonetic ensemble. The lowering rule changes the [+ high] specification to [− high] in the context of length. As we have just seen, sometimes the morphology may shorten the vowel, allowing [+ high] to surface – but, crucially, only in the absence of [+ long]. Thus, for at least some roots, we can see both facets of the postulated long high vowels. But because of the vowel-lowering rule, they can never be seen simultaneously.

A similar state of affairs exists in other languages. For example, English has many alternations between the diphthong [ay] and the high lax vowel [ɪ]: for example, *five, divine* [ay] vs. *fif-th, divin-ity* [ɪ]. As we will see later (section 5.1), these vowels derive from an underlying long [i:]. Shortening rules, some completely analogous to the Yawelmani shortening before two consonants, produce [ɪ]. When [i:] is not shortened, it undergoes the so-called Vowel Shift rule, which transforms it into the diphthong [ay]. Thus, just as in Yawelmani, the underlying vowel quality of [fi:v] 'five' is revealed in the short vowel alternant *f*[ɪ]*fth*, while the underlying quantity is realized (obliquely) in the diphthong *f*[ay]*ve*. But because of the Vowel Shift rule, the length and quality features never surface together. Since well-motivated examples of this kind are found in several languages, we must abandon conjecture (48) and allow ourselves the freedom to postulate that a distinct [z] underlies an [x]≈[y] alternation when the evidence warrants.

In view of these examples we might weaken (48) to (55).

(55) Each distinctive feature in the underlying representation must emerge in at least one phonetic realization of the morpheme.

While this constraint permits the long high vowels to be posited for the Yawelmani material considered so far, there are other data for which it would deprive us of an internally well motivated explanation. For example, consider the alternation exhibited by the future suffix in (56).

(56)	bok-en	'find'
	dub-on	'lead by hand'
	xat-en	'eat'
	giy-en	'touch'

not how 43b

This alternation follows automatically from the rules discussed so far, provided the suffix is assigned the underlying shape [i:n]. Given that the vowel is high, it will round to [u:n] after a root containing [u] such as [dub]. Subsequent lowering and shortening transform [i:n] and [u:n] to the [en] and [on] found in (56). (In Yawelmani vowels systematically shorten before two consonants as well as before a single-word final consonant.) The problem here is that being an affix, the future suffix does not participate in the morphological processes that would shorten its vowel and thus allow the postulated [+high] to emerge. Furthermore, the morphology of the language is such that this suffix always appears at the end of a word. Its postulated length thus never emerges phonetically either. In this case a majority of the distinctive features composing this segment are never pronounced. Nonetheless, the harmonic behavior is precisely that of a high vowel. A theory that seeks the most economical grammar – one with the simplest rules and representations compatible with the data – would almost inevitably be led to postulate just such a vowel.

There is only one situation that could be argued to be more abstract: one in which none of the distinctive features constituting a segment surface directly because the segment is always deleted. The phonological literature – both generative and nongenerative – is replete with analyses that posit such "phantom" segments. Such analyses are generally viewed with some skepticism and are only postulated when strong internal evidence is available. One well-known example is found in English. Three nasal consonants contrast in final position: *su*[m], *su*[n], and *su*[ŋ] (*sung*). However, the velar nasal has a defective distribution. It does not appear morpheme-initially (*map, nap* but not **ŋap*) or morpheme-internally before a vowel (*smack, snack, *sŋack*). Furthermore, [n] and [ŋ] have largely complementary distributions. [ŋ] occurs to the exclusion of [n] before the velars [k,g] (e.g., *tha*[ŋ]*k, a*[ŋ]*gry*), the latter part of a larger generalization in which nasals assimilate the point of articulation of a following consonant. Finally, while we find final homorganic nasal plus voiceless stop clusters (*da*[mp], *wa*[nt], *tha*[ŋk]), final [ŋg] clusters are systematically missing (as are final [mb] clusters). This gap can be accounted for by postulating a rule that deletes [g] in the context [+nasal] ___ #. Putting all these facts together, we may postulate the underlying representation of [sɪŋ] 'sing' as [sɪng] and derive it as shown in (57).

(57)	/#sɪng#/	UR
	sɪŋg	nasal assimilation
	sɪŋ	*g*-deletion

3.5 Linguistic Reconstruction

The regularity of sound change makes it possible to reconstruct the earlier stages of a language and lies at the basis of the Comparative Method developed in 19th-century linguistics. Phonological reconstruction starts from the observation of systematic *sound correspondences* between words of the same or similar meaning in two or more languages that cannot reasonably be attributed to borrowing or chance. The hypothesis is that the related words descend from a common ancestor and that the differences arise from sound changes that the individual languages have experienced in the course of historical development. Words so related are called *cognates;* languages so related are known as *sister languages* with respect to one another and *daughter languages* of the ancestor or parent tongue. Application of the Comparative Method involves discovering the sound correspondences between presumed cognate words and trying to assign a unique protoform such that the individual daughter languages can be derived by plausible sound changes. The reconstructed form is marked with an asterisk to distinguish it from actually attested words, indicating its hypothetical (as opposed to attested) nature. The entire procedure is similar in certain ways to the discovery of a word's synchronic underlying representation on the basis of its phonetic alternants. This is not surprising since, as argued in the Introduction, systematic sound changes typically arise from the addition of phonological rules to the grammar of a given language or dialect. The underlying representations of the synchronic grammar thus often reflect earlier surface pronunciations. However, this is sometimes an oversimplification because the synchronic system is developed anew by each generation of language learners on the basis of data in the linguistic environment. This can lead to a reinterpretation or *restructuring* of the earlier historical state of affairs or indeed to creation of underlying representations that correspond to no earlier historical source (e.g., in the adaptation of loanwords). Finally, the synchronic order of the rules often reflects the actual diachronic sequencing of the sound changes. But again this is not always the case, as the discussion of Canadian Raising in section 3.3 made clear. Of course, the rules and representations of the grammar are justified solely on the basis of data in the synchronic linguistic environment since children do not have access to comparative evidence.

In this section we will see how the Comparative Method applies to two particular cases. We will begin by considering and amplifying Jeffers and Lehiste's (1979) discussion of data such as those in (58) from three closely related Balto-Finnic languages. Finnish and Estonian words are cited in the native orthography, where long vowels are geminates; *ä* is the low front vowel [æ]; *d* and g represent voiceless lenis (unaspirated) stops in Estonian.

(58)	Livonian	Finnish	Estonian	
a.	säv	savi	savi	'clay'
b.	tämm	tammi	tamm	'oak'
c.	säpp	sappi	sapp	'bile'
d.	lüm	lumi	lumi	'snow'
e.	sül	süli	süli	'womb'
f.	töb	topi	tobi	'sickness'
g.	ä:rga	härkä	härg	'ox'