

FOOT AND SYLLABLE IN SOUTHERN PAIUTE

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This paper shows that Southern Paiute may assign adjacent, tautosyllabic vowels to separate feet. This violates Syllable Integrity, which disallows foot boundaries from bisecting syllables: (see (1)). Southern Paiute counts vowels, not syllables, in its stress system, yet syllables are necessary to account for phonotactics and some morpheme alternations. I will show that the syllables we need to account for these phenomena do not always respect the foot structure that's part of the stress system, resulting in violations of syllable integrity.

Everett (1996) has shown evidence that Banawá, an Amazonian language, also violates syllable integrity. This, the Southern Paiute evidence, and perhaps evidence from other languages cinche the case that UG must be able to accommodate representations where a single syllable may be split between two feet. However, many scholars disagree. Hayes, for example, says that no language may treat tautosyllabic vowel sequences differently, depending on whether the first or the second vowel is stressed. He says that the syllable is universally the stress bearing unit; he is forced to argue away the Southern Paiute phenomena, claiming that every vowel heads its own syllable.

The evidence here helps choose between two theories of representation: The Prosodic Hierarchy and Halle/Idsardi's "Three-dimensional Phonology."

I will proceed as follows: First, I sketch the theoretical issues. Then, to show that Southern Paiute violates syllable integrity, I first show that the syllable structure is as I claim it to be; I then show that the foot structure is as I claim. Finally, I adduce a crucial example that cinches the case that Southern Paiute violates syllable integrity. I then offer a few concluding remarks.

The theory of the Prosodic Hierarchy generates syllables as constituents of feet; according to this theory, it appears mathematically impossible to generate a single syllable with two vowels, such that the left one is the head of the left iambic foot and the right one the weak member of the right iambic foot.

Halle's theory of three dimensional representation, by contrast, places syllables and feet on orthogonal planes. Feet are defined as constituents of marks on a metrical plane, not as constituents that literally gather syllables and, ultimately, elements on the timing tier.

Halle's theory allows for syllables to be misaligned with respect to metrical feet. Of course, we must also account for the apparent rarity of syllable integrity violations in languages of the world; we will return to this issue in the conclusion.

How might violations of syllable integrity be represented in these competing theories? The Prosodic Hierarchy might propose an "ambifooted syllable" analysis, as shown in (2a) on the handout. The problem with (2a) is that it does not clearly specify that the left vowel of the shared syllable is the head of the left foot, and the right vowel in the same syllable is the weak member of the right foot. It merely says that the syllable in question is shared by two feet. (2b) overcomes these infelicities of (2a) but has other serious problems. Let's assume without further argument that UG does not compute (2b).

The Halle & Idsardi theory would represent structures that violate syllable integrity with a three dimensional graph, as in (3). This is three dimensional in the sense that there are several half planes radiating from a central axis, the timing tier. The diagram to the right is an attempt to reveal the three dimensional properties of this theory of representation -- you can see the metrical tier on one half plan radiating out from the timing tier, and the syllable and feature tiers, each on their own planes, each also radiating out from the timing tier. The right hand diagram is perhaps a bit more perspicuous in revealing how syllable integrity is violated.

In (3), a foot on the metrical tier is any string of marks (asterisks) to the left of a right bracket (or to the right of a left bracket), until reaching either another bracket or the edge of the graph. There are two feet on Line 0, in our example. The heads of feet are represented on Line 1; the Southern Paiute iambic foot pattern is shown by the Line 1 asterisks above the right members of the Line 0 feet.

The Southern Paiute evidence suggests that the theory of representation in (3) is superior to that in (2a), because it clearly designates the left-hand of the two tautosyllabic vowels as a head of the foot. To show this, I must first prove that the syllable structure is as I claim it to be.

Sapir describes Southern Paiute syllables as in (4) on your handout. To paraphrase, Southern Paiute syllables have optional onsets. Each syllable contains one or two vowels, each mora bearing. Both long and short syllables may be closed (except word finally --all words end in a vowel); the consonant closing a syllable is always either a nasal (homorganic to the following consonant), or the first half of a geminate.

Sapir provided evidence from three sources that suggest that, in general, long vowels and diphthongs had to be tautosyllabic. The first was his report of “direct phonetic observation,” alluded to in the quote in (4).

Second, Sapir provided phonotactic arguments: No long vowel may appear as the left half of a tautosyllabic diphthong. Sapir accounts for this distributional constraint by ruling out trimoraic syllables.

Sapir’s third piece of evidence concerned the behavior of vowel sequences across morpheme boundaries. When short stem final vowels and suffix initial vowels meet across a morpheme boundary, both are always preserved. The examples in (5) illustrate this phenomenon.

However, if the stem ends in a long /a/, and the suffix begins with /i/, the result was [ai]; that is, the first vowel shortened; see example (6a). This is readily accounted for by Sapir’s trimoraic constraint on Southern Paiute syllables, assuming of course that we analyze the resulting shortened /a/ and /i/ as tautosyllabic.

If the stem ends in a long /a/, and the suffix begins with /u/, however, Sapir said that the result is a disyllabic long /a/ followed by /u/. Had /a/ shortened and a tautosyllabic /au/ sequence resulted, the form in (6b) would have been as illustrated in (6c), as we will see when we turn to the process of vowel devoicing. So, the syllabification algorithm must assign underlying /aai/ to a single syllable, with concomitant vowel shortening. The sequence /aau/, on the other hand, is syllabified as two syllables, as illustrated in (7).

The fact that Southern Paiute distinguishes between environments where shortening is obligatory, like (6a), and those where it does not occur, like (6b), shows that Southern Paiute differentiates between vowel sequences which are tautosyllabic and sequences which are heterosyllabic. Hayes’ conjecture would perforce analyze all vowel sequences as heterosyllabic, rendering us unable to harness Sapir’s insights about syllable structure to explain the shortening in (6a).

So, to conclude this section, we now know at the very least that the vowel sequence /ai/, as in (6a), is tautosyllabic. This is important because our crucial example uses an /ai/ sequence.

Turning now to Southern Paiute stress, the handout has a slightly abbreviated quotation of a paragraph in Sapir. (See (8).)

To paraphrase into a contemporary framework, Sapir said that stress was assigned by an iambic process that iterates from left to right. This process -- however we decide to characterize it -- targets nonfinal vowels; notably, **not** syllables.

The examples in (9) illustrate the accentual laws described by Sapir. For example, (9e) shows that the second half of a diphthong becomes devoiced if it both appears as the weak member of an iambic foot and precedes a geminate obstruent. (9f) demonstrates that when the second mora of a diphthong bears stress, it preserves voicing.

Pursuing the argument that Southern Paiute violates syllable integrity, we now move on to a discussion of spirantization, vocalic devoicing, and degemination. Spirantization is straightforward: Singleton obstruent stops spirantize postvocally. The reflexes of this are shown in (10).

The basic generalization governing the occurrence of degemination and vocalic devoicing is this: Whenever a geminate is internal to a foot, the weak vowel of that foot devoices, and the geminate appears as a sequence of an “untimbered” [h] followed by a singleton obstruent.

What are the input and output representations of the degemination/devoicing process? Again skipping a lot of argumentation, it seems reasonable to assume that (11) depicts plausible structures, making minimal theoretical assumptions. These details are not essential to this paper, so in the interests of time I will go directly to the main point.

With this background, we now turn to an example that clearly demonstrates that a tautosyllabic vowel sequence with stress on the first member is distinct from one with stress on the second member. (12) is a good example of such a case.

The verbal stem meaning ‘to look for’ ends in /ai/ which, as we have seen, constitutes the nucleus of a single syllable. The suffix for ‘remote past’ begins with a geminate /pp/. In (12a), the /i/ which is the second member of the diphthong attains status as head of foot, thus exempting it from devoicing. In (12b), however, a monomoraic element has been incorporated to the left of the stem. This shifts the vowel count throughout the word one mora to the left. Now the stem final /i/ is assigned a role as a weak member of a foot. Because it also precedes a geminate obstruent, it devoices.

You cannot ask for a more clear case of a violation of syllable integrity! In Southern Paiute tautosyllabic vowel sequences are treated differently, depending on whether the first or the second vowel is stressed. This is shown by their behavior before a geminate obstruent.

To conclude, using standard, relatively theory-neutral mode of argumentation for foot and syllable structures, I have shown that Southern Paiute presents a clear case of a violation of syllable integrity.

The literature has only a handful of examples where syllable integrity is violated. Of course, UG must accommodate every human language, so one example is enough to make the case. However, there must be some explanation as to why syllable integrity violations are rare, if indeed they are.

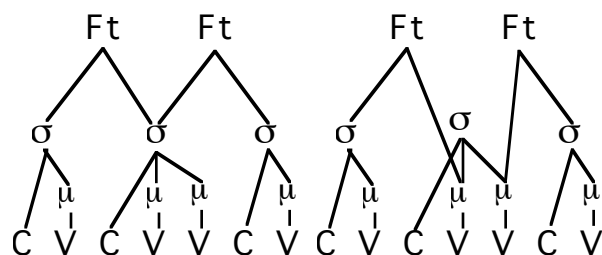
It is reasonable to expect that it is marked for syllables to be misaligned with feet; perhaps alignment constraints apply to the timing tier. Such a constraint might be high ranking in most languages that have been studied so far, but is violated in Southern Paiute. Of course, this begs the question how the structures on the various tiers come into being in the first place, and all sorts of other important questions as well.

Before concluding, it is of some interest to conjecture on how Southern Paiute acquired this system. Sapir speculated that singleton, intervocalic /s/ and nasals all dropped out between protoShoshonean and Southern Paiute. Maybe before this happened, there were no violations of syllable integrity. Then, after the consonants deleted, stress remained on the same vowels as before, but the preexisting syllabification algorithm incorporated the now adjacent vowels into the same syllable. This would explain the Southern Paiute violations of syllable integrity as historical baggage.

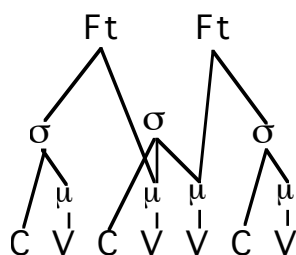
I want to emphasize that this shows that UG must sanction grammars that have historical baggage and other productive processes that do not reflect a drive toward unmarked representations. For example, it is not obvious that the Southern Paiute degemination/devoicing phenomena yield a phonetic representation that is less marked than the input, yet it is a highly productive aspect of the language.

Thank you.

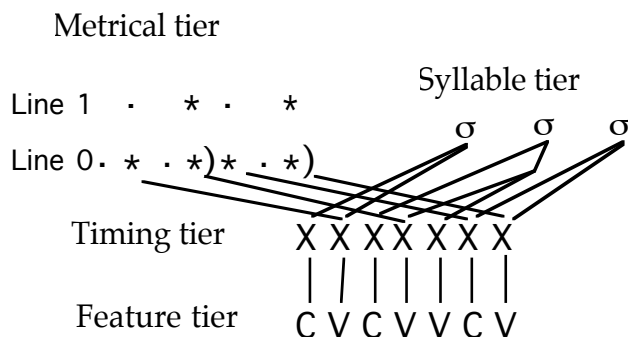
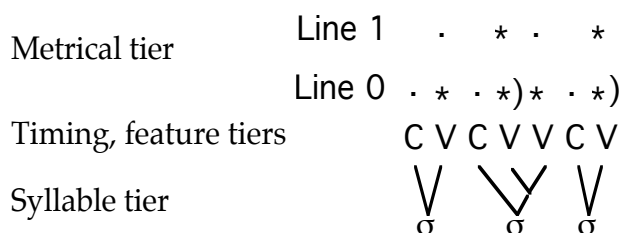
(2a) "Ambifooted" Representation



(2b) "Line-crossing" representation



(3) Three dimensional representation:



(4) Sapir's description of SP syllables (37):

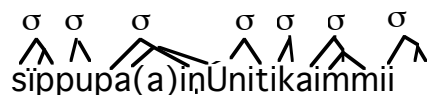
Every Paiute syllable consists, properly speaking, of a vowel (long or short) or diphthong preceded, or unpreceded, by a consonant (e.g. *u-*, *o:-*, *ai-*, *pī-*, *to:-*, *pai-*); or of such a primary syllable stopped by a nasal consonant (*m*, *n*, *°*) that is itself followed by a stopped consonant or *w* (e.g., *a°-qa-*, *ain-tsi-*, *tī°-qa-*, *va:n-tī-*, *nī°-wi-*). It is somewhat doubtful whether vowels followed by geminated consonants are to be considered as ending their syllable or not (e.g. *ap:īi-* as *a-p:īi* or *ap-pīi-*). Morphology and the unvoicing of vowels suggests the former; direct phonetic observation apparently the latter.

	Underlying	Phonetic	Gloss
	tmpa+ya+aNa	tmpayaNA	his mouth (obj)
	suuk+ini+ni	suugininl	my sugar
	kuna+ini+a+taN wa	qunainarNWA	our (inclus) fire (obj)
	ma+up:a	maup:aa	in that way

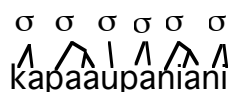
(6) Vowel shortening vs. hiatus across a morpheme boundary (P 17)

	Underlying	Phonetic	Gloss
	sp:upaa+inni+ti +kaim:ii	slhpuvan:incgam:ih	is wont to have cold water
	kapaa+up:ania+ ni	qapaa.p:ananl	I am like a horse
		*qapaUpàninl	

(7) Syllable structure of (6a)



Syllable structure of (6b)



(8) Sapir's description of stress:

In Southern Paiute accentuation is governed primarily by moras, not syllables. The fundamental law of accentuation is a *law of alternating stresses*. According to this all odd moras are “weak” or relatively unstressed, all even moras are “strong” or relatively stressed. The theoretically strongest stress of the word comes on the second mora. Hence, all words beginning with a syllable containing an organic long vowel ... are accented on the first syllable; ... On the other hand,

Halle, Morris and William Idsardi (1995), "General Properties of Stress and Metrical Structure." In J. A. Goldsmith (ed.), *The Handbook of Phonological Theory*. (Chap 6). Cambridge, MA: Blackwell Publishers, Inc. (403 - 443)

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Hayes, Bruce (1995), Metrical Stress Theory: Principles and Case Studies. Chicago: University of Chicago Press

Sapir, Edward (1930), Southern Paiute: a Shoshonean Language. Proceedings of the American Academy of Arts and Sciences, 65.