Two verbal roots in Hiaki (Yaqui):
A morphological classification˙
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This paper presents a classification of Hiaki word formation in terms of the morpho-phonological properties of its (lexical) roots. The presentation is organized as follows:

A. Some background with basic examples
B. Stems and inflectional vs. derivational suffixes
C. Bound stems: classification
D. What's the source of the alternation? Is it all phonological?
E. Alternations are not exclusive of nouns
F. Conclusion

A) Background
1. Many syntactic operations are morphological in Hiaki
Hiaki is an SOV language that exhibits a rich morphological system. That means that syntactic operations that involve the combination of different verbs in languages like English and Spanish are resolved in Hiaki by means of affixation. For instance, syntactic causation is resolved in Spanish by combining the verb *hacer* 'make' with the lexical verb *correr* 'run' to derive a sentence like (1a). In Hiaki, this same operation is resolved by adding to the lexical stem *vuiti-* 'run' the causative suffix *–tua*, which derives the sentence in (2).

(1) Juan hizo correr a María
     'John made Mary run'
(2) Hoan Maria-ta   vuiti-tua
     John Mary-ACC run-CAU
     'John made Mary run'

2. Bound stems exist
Unlike other SOV rich morphological languages such as Japanese that stick affixes onto invariant roots, Hiaki exhibits an interesting stem alternation depending on whether they appear as free or bound. For instance, many Hiaki stems undergo truncation when combined with derivational suffixes like *–tua* (causative, (3a)), *-la* (a derivational participial suffix), or the passive suffix *–wa*. This is shown in (3) for the verb *poona* 'pound'; compare the bound form to the free form in (3d).

(3) a. Hoan Maria-ta   pueta-ta   pon-***tua***
    John   Mary-ACC door-ACC pound-CAU
    'John made Mary knock on the door'
  b. matat wakh-ta po-pon-***la***
    matat beef-ACC RED-pound-PPL
    'The matate beef (machaca) is already pounded'
  c. aman po-pon-***wa***
    there RED-pound-PASS
    'There is pounding going on'
  d. Maria   pueta-ta   poona
    Maria   door-ACC   knock
    "Maria is knocking on the door."

B) Suffixes differ in which form of the stem they require

Whether Hiaki verbal stems undergo the free-bound alternation depends on the inflectional vs derivational nature of the suffixes. That is, inflectional suffixes such as the past tense suffix *–k,* the imperfective suffix *–n,* or the participial suffix *–ka,* take the free verbal stem. Derivational suffixes such as those seen in (3) plus other suffixes such as the future suffix *–ne* take the bound form. Verbal compounding and clause fusion also operate on bound stems. The sentences in (4) and (5) show this contrast. The morphemes in (6) show a list of inflectional vs. derivational suffixes in Hiaki.

(4) *Inflectional morphemes take free stems*
    a. Hoan pueta-ta poona-***k***
       John door-ACC pound-PRF
       'John knocked on the door'
    b. uka'a   yuku-ta   vicha-***kai.***
       the.ACC rain-ACC see-ppl
       '(while) seeing the rain'
    c. he'e-***me***
       drink-rel
       'drinker'   (D&C 1999: 122[29])
    d. wikitch-im mu-muhe-***n***
       bird-pl   red-shoot-imperf
       'He was shooting birds'   (D&C 1999: 260[13])

(5) *Derivational morphemes take bound stems*
    a. Maria Heidi-ta   koomim vit-***ria***-k
       Maria Heidi-ACC arms   see-ACC-PAST
       'Maria saw Heidi's arms'
    b. Maria koomim vit-***tevo***-k
       Maria arms   see-CAUS.IND-PAST
       'Maria had her arm seen'

    c.   Ume   <u>yi'i-**reo**-m</u>   va'a   <u>hi'i-**pea**</u>
         The.PL dance-AG.NOM-PL   water   drink-DESID
         'The dancers feel like drinking water'
    d.   <u>muhi-**ri**</u>
         shoot-PPL
         'one who has been shot'

(6) Morpheme lists
    a. ***Inflectional morphemes:*** -k (past), -n (imperf), -ka (ppl), -o (if/when), -me (s.rel), -'u (o.rel), -kan, -ta (acc)
    b. ***Derivational morphemes:*** -wa (pass), -ne (fut), -na (fut pass), -ri (ppl), -la (ppl), -tua (caus.dir), -tevo (caus.ind), -roka, -ria (appl), -su (compl), -vae, -pea, -mahta, -sae, -le, -'ea, -se, -vo[1], as well as compounding (see section F below)

C) Types of bound stems
There are other forms of alternation between free and bound stems. They seem to fall within three main classes regarding their bound formation behavior:

Class I – truncation: The final (vocalic) segment disappears
(7) a. poona → pon- 'pound'
   b. miika → mik- 'give'
   c. bwase → bwas- 'cook (intr.)

Class II – echo-vowel: the final vocalic segment is augmented with an intervening glottal stop:
(8) a. bwasa → bwasa'a- 'cook'
   b. kiima → kima'a- 'bring(pl)'
   c. yoore → yore'e- 'heal'

Class III – no change:
(9) a. kivacha → kivacha- 'bring(sg)'
   b. hamta → hamta- 'break'
   c. koko → koko- 'die'
   d. kowikte → kowikte- 'get crooked'

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[1] Some of the suffixes in this list were taken from the list in Dedrick & Casad (1999: 259).

Besides these three main classes, bound stem formation in Hiaki also exhibits a few subclasses. They mainly involve vowel changes.

Subclass (i) -e → -i
This subclass is part of main class III, as the free stem does not undergo major changes besides final vowel raising from –e (or sometimes –a) to –i:

(10) a. hamte → hamti- 'break, intr.'
      b. chihakta / chihakte → chihakti- 'smash'
      c. yaha → yahi- / yai- 'arrive(pl)'
      d. yu'e → yu'i- 'undo'

Subclass (ii) –e'e → -i'i
This subclass is also part of main class III, as the free stem does not undergo any truncation operation, but it undergoes raising of its vocalic segments. This class may also be argued to also have to do with main class II, the echo vowel class, especially if one considers 'echo vowels' as the result of a purely phonological operation, which, in this case affects the final segments of both the free stem –e'e and its bound counterpart i'i-.

(11) a. he'e → hi'i- 'drink'
      b. ne'e → ni'i- 'fly'
      c. ye'e → yi'i- 'dance'

Subclass (iii) –u → -oe[2]
This subclass also forms part of main class III:

(12) a. kiimu → kimoe- 'bring(pl)'
      b. vaasu → vasoe- 'soak'

Subclass (iv) –o'a / -oa → -o'o / -oo[3]
(13) a. hi'ivoa → hi'ivoo- 'cook'
      b. hovoa → hovo'o- 'get full'
      c. ko'a → ko'o- 'chew'
      d. to'a → to'o- 'pour, lay down(pl)'

Subclass (v) –e'a → -e'e
(14) a. eo'otea → eo'ote-e- 'be nauseated'
      b. ea → -ee 'feel'
      c. mea → me'e- 'kill(sg)'

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[2] Alternatively, these subclasses could be described as (iv) a → o-; (v) a → e-; (vi) e → a-; (vii) a → u-; (viii) e → u-.
[3] The subclasses in (iv), (v), (vi) and (viii) could also be treated as cases of truncation plus echo vowel.

Subclass (vi) –*a'e* → -*a'a* (just 1!)
(15) a. bwa'e → bwa'a- 'eat'

Subclass (vii) –*ia* → -*iu*-
(16) a. hia → hiu- 'vocalize'
    b. ho'otia → ho'otiu- 'snore'

Subclass (viii) *u'e / u'a* → *u'u*-
(17) a. nu'e → nu'u- 'get, acquire'
    b. yu'a → yu'u- 'push'

Subclass (ix) exceptions!

(18) a. yepsa → yevih- 'arrive (sg)'
    b. suulu → suluu- 'slip'
    c. yoore → yore'e- 'heal'
    d. sevea → seve- 'get cold'
    e. suawa → sua*n*- 'be watched'
    f. kepe → k*u*p- 'shut eyes'

D) Purely phonological alternations
Besides the stem alternations just observed, Hiaki verbal stems exhibit a few more alternations regarding:

  a) Internal vowel shortening:
Within Class I (truncation): All stems containing a long vowel exhibit internal vowel shortening when they are suffixed with derivational morphology, regardless of what other operations the bound stem undergoes:
  (19) a. aane → an- 'do, be, act'
      b. kaate → kat- 'walk, go (pl)'
      c. teeka → tek- 'lay across'

Within Class II (echo-vowel):
  (20) a. kiima → kima'a- 'bring(pl)'
      b. yoore → yore'e- 'heal'
      c. maya → ma'a- strike by'

  b) Consonant changes:
      (i) Whenever the stems exhibit truncation, certain final consonants undergo phonological changes:[4]

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[4] The examples in (21-23) probably at least diachronically, and perhaps synchronically, are cases in which an underlying stop in the stem undergoes lenition in the free form, rather than the other way around.

(21) v → p
    a. veeva → ve*p*- 'chase'
    b. hiveva → hive*p*- 'hit'
    c. tatave → tata*p*- 'knock down'

(22) ch → t
    a. koche → ko*t*- 'sleep(sg)'
    b. taiweche → taiwe*t*- 'have a fever'
    c. weche → we*t*- 'fall down'
    d. vicha → vi*t*- 'see'

(23) s → h
    a. tuuse → tu*h* (also tu*s*-) 'grind'
    b. bwise → bwi*h*- 'catch'
    c. yosia → yo*h*- 'warm up'
    d. yepsa → yevi*h*- 'arrive(sg)'[5]

(24) w → u[6]
    a. poposiwe → poposiu- 'rust'
    b. sukawe → sukau- 'warm one's self'

E) Suppletive stems can fall into different classes
Hiaki exhibits some verbs which supplete for number. Their singular and plural forms may fall into the same class:

(25) a. hahau → hahau- 'pick up(pl)'
    tovokta → tovokta- 'pick up(sg)'
    b. vuite → vuiti- 'run(sg)'
    tenne → tenni- 'run(pl)'

However, the norm is for suppletive stems to fall into different alternation classes:

(26) a. kivacha → kivacha- 'bring (sg)'
    kiima → kima'a- 'bring (pl)'

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[5] Actually the case of the alternation between ye*p*sa → ye*v*ih- is very interesting because in addition to the s → h alternation, this verb exhibits the alternation seen in (i) v → p but reversed (i.e., preconsonantal /p/ in the free stem surfaces as prevocalic /v/ in the bound stem)

[6] This is not a real change, though, and it doesn't always happen: *vaawe* → *vaw*- 'leak'; *yeewe* → *yew*- 'play', *reuwa* → *reuw*- 'loan, borrow' -- we're not sure whether this is due to orthographical convention more than it marks any real sound difference between semivowel or vowel.

b. muuke → muk- 'die (sg)'
   koko → koko- 'die (pl)'
c. siime → sim- 'go (sg)'
   saka → saka'a- 'go (pl)'
d. mea → me'e- 'kill (sg)'
   sua → sua- 'kill (pl)'

This suggests that these classes are connected to the stem form rather than to an abstract verb form.

F) Verb compounds take bound stem
Like derivational suffixation, compounding uses the bound stem of the first element and the free stem of the second element, which is the head of the compound form (provided there's no further derivational operations upon this second compound).

(27) a. wike 'pull' + siime 'go(sg)' → *wik-sime* 'to go pulling (sg)'
   b. yu'ee 'push' + siime 'go(sg)' → yu'u-sime 'to go pushing (sg)'
                     (D&C 1999: 160[25, 26])

Note that the second element in (27), *siime* 'go(sg)', exhibits internal vowel reduction, from long to short /i/. However, this form is an exclusively phonological reduction of the <u>free</u> form. The plural form of this compound, which takes the plural form of the verb 'to go', *saka*, is evidence for it.

(28) a. wike 'pull' + saka 'go(pl)' → *wik-**saka*** 'to go pulling (pl)'
   b. yu'ee 'push' + saka 'go(pl)' → *yu'u-**saka*** 'to go pushing (pl)'
                     (D&C 1999: 160[25, 26])

So far, we have concentrated exclusively on the free-bound stem alternation of Hiaki verbs. Even though many of the stem alternations exhibited have a phonological nature, it is clear the main divisions displayed by Hiaki verbal stems (truncation, echo-vowel, invariability) cannot be explained by invoking phonological processes alone.

Our final point concentrates on illustrating stem alternations in Hiaki that operate in non-verbal stems. We are lacking major data at this point, but the data we have observed also shows, even though to a lesser extent, three main tendencies: truncation, echo-vowels, and invariability. Also as in the case of verbal stems, noun stem alternations occur in cases of compounding as well as in cases of derivational morphology.

G) Nouns also exhibit stem alternations

(29) *Compounding*
   (i) Truncation
   a. yoeme 'man, Yaqui'
    yoem noki 'the Yoeme language'

    b. kawi 'mountain'
       ***kau*-**chuuna 'wild fig'
    c. maman 'hand'
       ***mam*-**pusiam 'fingers'   (D&C 1999: 119[2c])
    d. chuu'u 'dog'
       chu chae 'bark, lit. dog call'

    (ii) Invariant
     a. yuku 'rain'
        ***yuku*-**ve'oktia 'lightning'   (D&C 1999: 159[19])[7]
     b. masa 'wing'
        ***masa*-**voa 'feather'   (D&C 1999: 158[7])
     c. kooyo 'oyster'
        ***koyo*-**vea 'oyster shell'   (D&C 1999: 158[8])

(30) ***Derivation***
    (i) truncation
    a. aawam 'horn'
        ***awa*-**ka-me 'one who has a horn'
    b. ya'ut 'chief'
       ***yau*-**raa 'the authorities'   (D&C 1999: 124[53])

    (ii) echo vowels
     a. Chiiva 'goat'
        ***chiva'a*-**tu 'billy goat'[8]
     b. yeka 'nose'
        ***yeka'a*-**ra 'big nosed'

    (iii) invariant
    a. Hi'u 'greens'
        ***Hi'u*-**se 'collect greens'
    b. Hiapsi 'heart'
        ***Hiapsi*-**tua 'give life to'

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[7] In Dedrick & Casad (1999), these nouns exhibit a stress change, from the first syllable in a free form to the second syllable in the bound form. Also, we haven't found any cases of echo vowels in compounds.

[8] Contrast case: In this case, we also have a compound, *chiva kovam* 'bullhead', which does not exhibit an echo vowel – why can this be? Is the echo vowel in *chiva'atu* lexical in any sense? Similarly, *yuke'epo* is listed in Molina's dictionary to mean 'in the rain'. However, *yuku* is its nominal root and all the *yuku* compounds listed in the dictionary maintain this same stem. The verb 'to rain', on the other hand, is *yuke* and its bound stem is *yuk-*

H) Conclusion

In this paper, we have shown the free-bound stem alternation exhibited by Hiaki verbal as well as non-verbal roots whenever they undergo derivational processes, such as derivational suffixation and compounding. We have suggested a morphological rather than phonological classification of these alternations, in which the stems fall into three major groups: (i) truncation, (ii) echo-vowel addition to the stem, (iii) invariability (i.e. no change from free to bound form). Our motivation behind this proposal is based on the fact that, at least regarding verbs, phonology can't explain, for instance, that (i) for a given verb –that is, a free stem, one unique bound form is the only form that combines with suffixes (or other words) of all kind [as long as the operations are derivational]; (ii) derivational suffixes always take the free form and derivational suffixes always take the bound form.; we cannot think of any purely phonological properties that provide an explanation to (i) and (ii). More research is needed, however, to properly account for the alternation as it applies to non-verbal stems.

I. References

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