UTO-AZTECAN MORPHOPHONEMICS

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0. Introduction
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0. In my view, PUA split first into northern PNUA and southern PSUA. PNUA became Takić, Numic, Tu, and Ho. PSUA became Taracahitic, Tepiman, Corachol, and Az.

Some processes described below apply only to the *-na-class, a set of verbs with special thematic suffixes: causative *-na- and *-ca- (PSUA) or *l-na- and *l-ca- (PNUA), intransitive *-0- (PSUA) or *-ki- and *l-tai- (PNUA). I plan to deal with the history of this class in another paper.

1.1. Hill and Hill² reconstruct for Proto-Cupan a small set of mobile-stress stems best preserved in Cu, where stems like max-m to give (note superscript) have forms like CVC will do, cêm-CVC-ci us to do, CVC-á-nuk having done, CVC-i-va-?? of, CVC-qá-l was doing.

Ho CVCV verbs with extrashort vowel Y show a stress shift to CVCY- (CVCY- with simple short V before preaspirated stop) before suffix: ñiwa saw, future tiwá-ni, agentive tiwá-aqa.³ Ho CVCY-matches Cu CVC-á- since Cu augment -á- is a reinterpreted stem-final vowel (*CVCá-). Prefix stress is found with Ho nouns, provided the prefix causes preaspiration of stops: pá:sa field, ²i-bá:sa thy field, ²i-vá:sa my field.

Ho and Cupan suggest a minimal alternation of PNUA simplex *CVCV with presuffixal *CVCV- (for presuffixal i-ablauted *CVCi-, see 2.1 below). Prefix stress in some PNUA forms is also likely.

1.2. Tu preserves a vestige of *CVCV versus *CVCV-. Tu /-CVCV/- verbs normally become CV:CV-, reduplicated (henceforth rdp.) 2V:-CVCV-: by an


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³ I presented evidence for a genetic NUA/SUA split at the annual meeting of the American Anthropological Association, San Francisco, December 1975. I am grateful to the National Science Foundation and the University of Chicago Department of Anthropology for providing funding for this work. Personal acknowledgments are due to Norman McQuown and Calvert Watkins, among many others. Abbreviations: Az(tec), Ca(huilla), Cu(peño), Ho(pi), Hu(i chol), Lu(iseño), Mo(no), Pa(pago), Se(rrano), SoPa(Southern Paiute), Ta(rahumara), Tu(batulabal), Ya(qui).

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alternating-length rule. However, a few, such as */-wišiː-/* to be ripe (again note superscript), instead form CVCV-,: rdp. /iː-CVCV:/, for example, wišː-, rdp. */iː-wišː-:/ (secondarily shortened to */iː-wišː-:/*). A base-form */-wišː-:/ is not possible for reasons which I cannot go into here. I view this irregular lengthening to CVCV-:, instead of expected CV:CV-, as a reflection of PNUA presuffixal *CVCV-: with stem-final stress.

By comparing the actual stems in the Tu, Ho, and Cu verb classes (and with Lu and Ca correlated classes), we can reconstruct these PNUA mobile-stress verbs: *tiwaː-m to see, *nanaː-m or *nanaː-m to cry, *makaː-m to give, *katiː-m to sit, *pisaː-m to go out.

1.3. The PNUA *-na-class had similar stress alternations in its thematic forms. I reconstruct causative *CV*:CV-ki-na-: and *CVCYː-mi-na-. The latter shows expected presuffixal *CVCYː-:. Recessive stress in *CV*:CV-ki-na-: is due to morphophonemic hardening (3.1) of stem-medial *C to *C (geminated or preaspirated), creating a heavy syllable.

Ho CVYːCV-k-na and CVCYː-m-na preserve the alternation. Synchronically, however, instead of consonant-grade being morphophonemic (primary) and stress secondary and derivative, we probably now have uniform base-form /CVYːCV:/ with morphophonemic (primary) stress-shift in CVCYː-m-na and subsequent automatic deaspiration of nonpostonic stop.

Se shows corresponding forms like nib-ː-in(a-) and nibi-ːm-in(a-) to bury with loss of stem-final vowel in *CVːCV-: and preservation of it in *CVCV-:, presumably because of the stress difference. This confirms my PNUA reconstructions.

Curious Cu alternations such as sālak*- (punctual) versus salāk*- (durative) to scratch, though involving originally trisyllabic *CVːCVCV-: stems, may be obscurely related to these *-na-class alternations, since hardened stem *CVːCV-: was punctual and unhardened *CVCYː- was nonpunctual, but details behind this Cu type are difficult to work out.

1.4. It appears that all PNUA *CVCV-: (not *CVːCV-, *CVNCV-, etc.) verbs were in the mobile-stress class, and no others were. Combining this with the information in 1.3, I conclude that the PNUA stress rule gave *CVCV-: stems *CVːCV stress without suffix, and *CVCYː-: presuffixally (except *ČVI-: with i-ablaut suffix). *CVːCV-: (and *CVNCV-) stems with heavy initial syllable, on the other hand, had invariable initial stress (*CVːCV-:).

PNUA stress was probably low-level and automatic. This rule is also consistent with the treatment of prefixes in Ho */iː-ːpasa thy field versus */iː-vása my field, since prefix stress correlates with preaspiration (hardening) and hence with heavy prefixal syllables.

1.5. Taracahitic evidence suggests that the PSUA stress rule was similar, except that *CVːCV-: and *CVNCV-: had merged with *CVCV-: as PSUA *CVCV-, whereupon all bisyllabic stems came to show the alternation *CVːCV-: (suffixless) versus *CVCYː-: (i-ablauted *ČVI-:).

This is basically the Ya situation, and such alternations have extended to newly created CVCCV-: stems: ʔómte enojarse, ʔómte-kai siendo enojado.

1.6. Both Ho and Ya have compounds or “nexus” constructions which may show stress shifts: Ho qāle strong and mása wing form “loose nexus” qalé-masa strong wing.
and (frozen) compound qalé-msa primary
wing: Ya ?illi chico and ?uusi muchacho
form ?illi-?uusi muchachito. Ho “infinitive”
combinations, for example, k-class
intransitive CVcV-k (followed by a sort of
auxiliary verb) are formally similar.

Note, however, that Ho extends stress
shifts in such forms to CVcV (not just
CYCV) stems like qále. This is a Ho
innovation vis-à-vis PNUA.

2.1. An example of i-ablaut is PNUA
*ta’pa- to split plus suffix *-na- (note
superscript) becoming *ta’pi-na- (Ca -áp-
in-). I-ablaut is triggered by certain suffixes,
but affects the final vowel of the preceding
morpheme.

In Tu, SoPa, etc., this is all there is to
i-ablaut. However, there are indications
that i-ablaut in the protolanguages was
more complex. It was probably originally a
reduction (including destressing of an
otherwise stressable vowel) bordering on
synone. Vowel-quality of *u and *o was
unaffected, but *a, *i, and *i merged as a
weak *i. Ablauted *i (unlike ordinary *i)
also avoids palatalization of preceding
*t to *c (or *ç, if distinct from *s; if so,
*c similarly became *ç and *s became *s).
Thus, *mati to know became *maci-, etc.

2.2. Ya provides evidence that *o and
*u did not become *i: *etého- to write plus
passive 1-wa- becomes *etého-wa-, not
*etéhi-wa-. Stem-final *a also avoids
ablaut if preceded by w (u) or t (tewu-
decir, ya?a- hacer).

Some Ho i-ablaut suffixes, for example,
passive 1-li, ablaut only a, i, and i, while ô
(*o), o (*u), and the new phoneme e are
unaffected. This Ho/Ya correspondence,
crossing the NUA/SUA division, suggests
the proper PUA reconstruction.

Because stem-final *i was rare, and since
i-ablaut of *i became largely vacuous as
*t → *c alternations became leveled out,
through minor developments a simple
stem-final *a/*i alternation could be
achieved, with *a having only a tentative
claim to underlying primacy on the basis
of the suffixless *CVcA form. Thus in Ta,
I am inclined to segment -a- and -i- as
stem augments added to -CVc- roots. This
segmentation is even clearer in Cupan
(Cu, Lu, Ca), where suffixless *CVcA has
become *CVc, contrasting with prefixed
*CVc-á-Sff and *CVc-i-Sff.

2.3. Examples of *t → *c before ablauted
*i are: Ho ?i:ci-li it’s closed up (< ?i:ta):
Pa wiho */wiho:si-0/ vomit (< */wiho:ta/)
(Pa s < PUA *c); Hu -sa:ci-ka platicar
(< *sa-ata-); Az maçi-liya to know about
(< mati-). Ta preserves no alternations,
but maçi- saber has generalized the old
palatalized form. Ta does show s/s and c/c
alternations (os-á- versus os-i- escribir),
also found in Aztec (a:si to reach, passive
a:si-wa).

2.4. Ho and Ya provide the clearest
evidence that i-ablaut involved reduction
(destressing with possible syncope). In Ho,
i-ablaut suffixes generally produce syncope,
except where syllabic conditions prevent
this. In the k-class (*-na-class), transitive
theme CVbCV-k-na /CVbCV-ki- plus *na/
and its derivatives, such as CVbCV-k-na-
ma, show syncope of the i-ablauted vowel.
In the example CVbCV-ki-n-va with
future 1-va, 1-na- is itself i-ablauted and
syncopated to 1-n-, creating a cluster nv
which prevents the preceding i-ablauted
vowel from being syncopated. Another
i-ablaut suffix, distributive 1-ta, almost
always syncopates the preceding vowel.
Syncope of unablauted vowels is un-
common.

The i-ablauted forms of Ya verbs seem
ever to permit stem-final stress (*CVcI-)
even in conditions favoring this stress
and showing it with unablauted vowel (CVcA-,
CVcE-). Furthermore, many stems show
underwent initial This iteratively, resulting in ablaut: buika *cantar becomes buik-, while buit İz correr becomes buit-ı-. The choice depends on the consonant(s) preceding the stem-final vowel.

2.5. In PNUA, i-ablaut could apply iteratively, so if future *i-pai- followed causative *ı-na-, both the stem and *ı-na- underwent ablaut (e.g., *CVCi-ni-pai-). This is clearly the case in Tu and Ho; the Numic and Takic data are inconclusive but do not contradict this. The PSUA situation is not clear, however. Ya and Ta permit i-ablaut only of the stem-final vowel, not of any suffix-final vowels. Tepiman seems to permit iterative i-ablaut, but more information from Az and Corachol is needed before the PSUA situation can be reconstructed.

2.6. Ta has undergone a number of analogical developments. I-ablaut survives only with a few -CVCa- stems (i.e., it is far less productive than in Ya), and as indicated in 2.2, I prefer to write -CVCa- and -CVCi- with segmented augment. The Proto-Taracahític paradigm of such stems, based on Ya, is shown in Table 1.

The segmentation of -a- and -i- was actually a Ta innovation, but for simplicity, I reconstruct it here for the protolanguage. Note the stress patterns. Ta first lost the initial stress in form 5 (i-ablauted form with bisyllabic suffix or suffix complex), resulting in *CVC-i-CVCV. By analogy to this, form 4 then became *CVC-i-C¥V with final stress. Then suffixless form 1 became *CVC-á by analogy to forms 2 and 3. This resulted in generalization of augment stress in unablauted *CVC-á- and of suffix-initial stress with i-ablauted *CVC-i-'. This is the situation with attested Ta stems like os-á-/oš-i-’ *escribir (os-á, os-á-re, os-á-e, oš-i-méa, oš-i-rá, oš-i-méé, etc.).

Furthermore, many bisyllabic stems which lack or have lost *a*/i alternations preserve these stress patterns, for example, ča’pi-/ča’pi-’ *coger (ča’pi, ča’pi-re, ča’pi-rá, etc.). Ta has even extended the stress alternation to other verbs like kapóna *trozen. On the pattern ča’pi-’ : ča’pi-’, we get kapóna- : x, and solving for x, we get kaponá- with stress shifted one syllable to the right (kapóna, kapóna-re, kaponá-ra, etc.).

2.7. Proto-Cupan, unlike PNUA, permitted stressing of i-ablauted vowels, probably only with mobile-stress stems, thus *CVC-á- alongside *CVC-a-. When the augments were unstressed, they were deleted (e.g., Cu cá-m-CVC-pi us to do, CVC-qál was doing), except when reint-

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* For the Ta data, see especially David Brambila, *Gramática Rarámuri* (Mexico City, 1953), chaps. 11 and 14. Brambila’s “primera conjugación, primer modelo” and “tercera conjugación” basically have fixed stress. The “primera conjugación, segundo modelo” (e.g., kapóna-) and “segunda conjugación” (e.g., ča’pi-) show mobile stress and differ only in that the kapóna-type has underlying stem-penultimate stress, while the ča’pi-type has underlying stem-final stress. Brambila’s “tiempos primarios” are the ones which show rightward stress shift for all mobile-stress verbs and the -i- augment for stems like os-, while the “tiempos secundarios” retain recessive stress and show the -á- augment.
interpreted as part of the following suffix (Lu future -an from *-ni, causative Lu -i, Cu and Ca -in from *li-na-, etc.).

Cu basically preserves this situation. In Lu, *CVC-i- survives as CVC-i-:, for example, qal-i:-vu-k-t-um former inhabitants from qal-m (note that CVC-i-: must be distinguished from thematic CVC-i- with stem stress). Lu generally abandons the *CVC-á-form, replacing it with *CVC-i- or *CVC-:, but traces survive: mon-m to go has a by-form mon-á-, and tow-m to see (*tiwa-m) forms past usitative tuw-ók (*tiwá- plus *u-ka-, cf. 2.12).

Ca has regularized stem-initial stress, but preserves augments -a- and -i- with former mobile-stress stems in positions where the augments were stressed. Thus kA¿2-m (Proto-Cupan *kA¿2-m) has subordinated forms kA¿2-a-nuk and kA¿2-i-ve matching Proto-Cupan *kA¿2-á-nuk and *kA¿2-i-ve (preserved in Cu). 6

Among reconstructible Proto-Cupan mobile-stress stems are *tiw-m to see, *nán-m to cry, *yax-m to say, *tav-m to put down (and derivatives), *kA¿2-m to eat, and *na2-m to burn. Subordinating suffixes *a-nuk and *a-pi required the *á-augment, subordinator *-li the *-i-augment.

Not only does Ca distinguish *CVC-m from fixed-stress *CVC- (only the former takes augments), it also distinguishes CVCVC-m from CVCVC- (in the same way): -chéxen-tóien, gerund -chéxen-a-nuk, but -chéxen- tanzen, ger. -chéxen-nuk. It is possible that this correlates with an earlier *CVCVC- versus *CVCVC- opposition, with the former allowing stressed or semi-stressed augments (*CVCVC-á-, etc.). Cu preserves both stress patterns (CVCVC- and CVCVC-), though neither permits suffix stress and neither shows augments. Lu has generalized CVCVC-stress.

2.8. Both Ya and Ta show minor vowel-harmony processes in conjunction with i-ablaut. Ya Céé- stems, such as hépé-beber, comer, form i-ablauted Ci'i-. Ta CeCá- stems like wepá- azotar become CiCi'- (wipi-) under i-ablaut.

2.9. Two PUA i-ablaut suffixes can be reconstructed with confidence. Passive *i-wa- is well attested (Ho, Ya, Tu, Az; Az allomorph -lo- reflects *a-li-wa- with syncope of *i and postconsonantal *wa → o-). Desiderative-future *i-pai- (ending unclear) survives in Ya 1-bae, Tu 1-ba:a-, Se -ib, and Ho 1-va.7

PUA had punctual *i-na- and distributive *i-ca- as causative *na-class thematic suffixes; *i-na- is well attested (Lu -i-, Ca and Cu -in-, Ho 1-na-, Tu 1-na-, SoPa 1-na-), while *i-ca- survives in SoPa. PSUA, however, had nonablauting *na- and *ca- preserved in Pa (-n, -s), Ta, and Az.

PUA has mediopassive distributive participial suffix *i-pii, surviving with various grammatical specializations in Ho 1-vi, Tu 1-bi:-, Se subordinator -ib(i) (distinct from fut. -ib < *i-pai-), Cu 1-va-?ac, Ca 1-ve-, and Lu 1-ve-. The corresponding punctual form *-pi- did not show i-ablaut. I know of no SUA cognates of either form.

PUA intransitive distributive *i-na-class suffix *i-tai- survives in SoPa 1-cai- and Ho 1-ta. No SUA cognates are known.

PSUA causative-indirective *Iya- is found in Az 1-ya-, Hu 1-ya-, Pa /-ida/-, etc. I know of no NUA cognates. PSUA causative-indirective *I-li- and its extension *I-li ya- (Az 1-li-ya, Ya 1-rai-, Ta 1-ri-, Hu 1-ri-) match PNUA nonablauting *-ni-(with regular *I → *n) found in SoPa indirect

7 Ya e at the end of a verb stem or verbal suffix can reflect *i as well as *i (e.g., future *ne from *-ni). Final *i in a Tu verb stem or verbal suffix becomes a, see 2.13. Ho 1-va can reflect *-p, note distrib. 1-ta from *-tai- (SoPa 1-cai-).
causative -ni-, Tu benefactive */-na/* (2.13), and Ca causative allomorphs -an- and -ani-.

PSUA causative */-tu(w)a-/ or */-tu-ya-/ found in Ya 1-tua-, Pa */-tuda-/ (2.10), and Az 1-ti-ya- is well attested, but there are no certain NUA cognates (SoPa -ttu'/i- and Ho 1-toy- in CVC-toy-na are possibilities). PSUA future */-ni- in Ya 1-ne- and Pa */-ni/ matches PNUA nonablauting */-ni- (Ho -ni, Lu -an).

I see no way to predict i-ablaut in PSUA on phonological or grammatical grounds. In PNUA, on the other hand, i-ablaut seems to be regular with suffixes beginning in */-Ca or */-Ci with unhardened consonant, while others (including */-Ca and */-Ci) avoid ablaut. Because of serious discrepancies between PSUA and PNUA in this regard, PUA reconstruction is very difficult.

2.10. There was also a suffixless stem-final i-ablaut producing nominalized verbs; Pa wihoš /wiho:si/ vomit from /wiho:ta/ to vomit; Ho tiki cut (noun) from tiki to cut; Ya nökök palabra from nöko khablar (some Ya verbs take suffix -i or -?i). Tu and Takic also have such forms. This nominalization is often a product-of-action or instrumental nominal. Nominal suffixes such as absolute */t may be added, but the i-ablaut is not triggered by these suffixes.

2.11. It is important to distinguish i-ablaut and stem-final */-i/- alternations in Ta and Cupan, which reflect reinterpretation of i-ablaut patterns, from a historically unrelated alternation of stem-final */a (usually transitive) and */i (usually intransitive). This is productive in Az, where, for example, causative thematic suffix -na- has developed an intransitive form -ni-. Some SoPa stems such as *op-(hair) to fall out show intrans. -i-, and punctual variant -aa-, versus trans. -a-(op-i-, -op-aa-, -op-i-). In both languages, the form with */a is semantically the causative (or factitive) of the intransitive stem */i.

Ya alternations like köpta olvidar algo versus köpte olvidar (with e from */i in this position) show a different semantic relationship; the form in */a, rather than adding a (causal) agent, adds a direct object to the intrans. form in */i. Ta has a more complex alternation distinguishing simple trans. in *-á from a form with "incorporated" third-person pronominal in *-é and one with incorporated indirect-object pronominal in *-i: (úč-á- colgar, úč-é- colgarlo, úč-i- colgarle).

The historical relationships among these Az, SoPa, Ya, and Ta alternations are complex, but the main point here is that none of them is related historically to true i-ablaut.

2.12. A minor u-ablaut process is perhaps reconstructible for PUA. Lu stem-final a or e usually become u before past -k(a-), for example, bíču-k and múhu-k from bíča- ver and múhu- tirar. Lu generally ablauts stem-final a (including -a- reduced from thematic -ax- < */-ki-) to u before past usitative -k, for example, néč-u-k from néč-ax- to be paid. This suggests PUA */u-ka/- ablauting *a and perhaps */i to *u. Tu past 1-wkarj, probably cognate, may preserve an indirect vestige of u-ablaut in its initial w.

2.13. Tu shows an innovative a-ablaut with benefactive */-na/-, reflecting PNUA */-ni-. A-ablaut here arose as a device to prevent ambiguity between */-ni/- and causative */-ni-. In PNUA, there were a large number of verbs ending in */i. For these stems, benefactive */CVCi-ni/- and */CVCi- were distinguished only by the suffix vowel. However, Tu shows word-final truncation (as do Takic and, to some extent, Numic languages), so in the
suffixed forms (like modern Tu past
punctual), both merged as *CVCi-n. Also,
since i-ablaut is iterative in Tu and PNUA,
when an i-ablaut suffix like future *
was added, the two merged as *CVCi-ni-
( modern Tu CVCi-iba? a-).

The other common stem-final vowel was
*a, and for these verbs, there was no ambigu-
ity: benefactive *CVCa-n(i-) versus
causative *CVCi-n(a-), future forms
*CVCa-ni-pai- versus *CVCi-ni-pai.- By
analogy, stems in final *i altered their
benefactive form to *CVCa-n(i)-, distin-
guishing this from causative *CVCi-
n(a-). A-ablaut had been created. It applied
clearly to *CVCi-stems and could be
considered as applying (vacuously) to
*CVCa-stems. It then spread to *CVCi-,
*CVCiCo-, and *CVCiCu-stems by analogy.

At a later period, Tu changed all final
*i's in verb stems and verbal suffixes to
another vowel, usually *a. Thus *CVCi-
stems are now CVCa-, and benefactive
*ni-(PNUA *-ni-) is now */na-. Con-
sequently, a-ablaut can be clearly
seen only with morphemes ending in i, o,
or u. It no longer has any disambiguating
function.

3.1. Hardening, as I use the term, is a
morpheme-internal process (gemination,
preaspiration, rarely glottalization) asso-
ciated with punctual aspect, generally
confined to *na-class verbs. The symbol 'C
represents a hardened consonant.

I want to emphasize that the processes
described here have absolutely nothing to
do historically with junctural "geminating
power," by which a suffix -CV- becomes
'CV- after certain stems (i.e., CVCV-
plus -CV- → CVCV-'CV-).

SoPa thematic verbs in -kki-/na-
distinguish punctual -CVCV- (i.e., -CV-
CV-) from durative -CVCV- if the medial
C is a stop: paka-kki- (punctual) versus
paka-kki- (durative) to tear. The -CVCCV-
type is matched by Mo, for example,
qwahca-?i to fall, though Mo has
replaced the old durative *CVCV-
by a reduplication (qwaca-ca). Clearly,
Proto-Numic distinguished punctual
*CVCV- from durative *CVCV- at least
with medial stop.

We have seen above that Ho and to
some extent Se reflect PNUA *-na-class
causative themes *CVCV-ki-na- (punctual)
and *CVCV-mi-na- (distributive). Ho also
preserves traces of this stem-alternation in
intransitives: punctual CVCV (*CVCV)
versus distrib. (CV-)-CVC- *CVCi-tai (CVCi-tai).

Lu themes in -ax/-i- often show
vowel-length alternations, for example,
punctual xé:p- to miss a little, durative
steady, barely miss. These reflect
*CVCV- and *CVCV-, respectively. The
*CVCV- stem with stressed vowel in open
syllable underwent originally automatic
vowel lengthening. Then the consonantal
alternation was leveled out and the vowel-
length distinction became morphophon-
emic.

We can thus safely reconstruct the
*CVCV-/CVCV- alternation for the
PNUA *-na-class (to which all of
the thematic classes mentioned here are
related), at least for medial stops. For
other medial consonants it is not certain
that a phonemic *C/*C opposition was
possible. Lu CVC-/CV:C-
alternations occur with any second C, but an alter-
nation originally restricted to vowels before
stops might have extended to other stems
by analogy. Ho distinguished CVCV
versus CVCV with medial nonstop (parallel
to CVCV versus CVCV with medial stop).
We might reconstruct CVCV as *CVCV-
and CVCV as *CVCV, with a *C/*C
opposition like that with stops. Since all
k-class (*-na-class) Ho stems are CVCV
(with stop CVCV), never CVCV, we can
posit hardening of stems like láña to be

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pulled (*la’ŋa-) as well as stems like yi’ti to run (pl.) (*yi’ti-i). However, again we have the possibility of analogical extension of vowel-length pattern from the type yi’ti to the type lâŋa.

3.3. Some leveling of expected consonant-quality oppositions reflecting *C versus *C has taken place. Ho ri⁶pa to be separated would be expected to form caus. distrib. *rivä-m-na with regular intervocalic *p → v, but instead we get ri⁶pa-m-na with analogical restoration of consonant quality (preaspiration is not possible except after stressed vowel). Similarly, Lu might be expected to show alternations like CVt- versus CV:1- (or CV:Δ), CVp-versus CV:v-, etc., but in fact, the consonantism is always leveled one way or the other (e.g., CVt- versus CV:1- or CVI-versus CV:1-).

3.4. No *CV’CV/-*CVCV- alternations occur in SUA, but this is primarily due to the fact that *C and *C have generally merged in all these languages. Only *p and *p have distinct reflexes. Theoretically, we could look for traces of a *CV’pV-/*CVpV- opposition, but we rather expect such a restricted alternation to be leveled out, and this seems to be what has happened. PUA *ta’pa/-tapa- to split (CA -çap- is the only clear NUA reflex) shows up in SUA languages as reflexes of the hardened form *ta’pa- (Ta rapá-na-, Az lapa-na-, Pa tá:pa-n).

3.5. In PNUA and the attested NUA languages, there are some instances where punctual hardening applies to *-na-class thematic suffixes as well as to the stems. PNUA mediopassive participles, punctual *-pï- and distributive or durative *l-pï- (both preserved in Ho and Tu, *pï- also in Takic, *-pï- also in Numic), show a clear *C*/C opposition as well as an i-ablaut difference.

SoPa distinguishes trans. thematic suffixes *-n?ä- (punctual) and *-na- (durative). This is certainly a recent innovation. Since SoPa does not distinguish nn from n, it has used glottalization as a substitute for gemination.

Similarly, PNUA intransitive thematic suffix *-ki- (Lu -ax-, Se -q(i)-, Ho -k(i)-) has two Numic reflexes, -ki- and secondarily hardened -’ki- (SoPa -kk-ī-, Mo -hki-). This suffix is primarily punctual, so -ki-can be seen as reflecting an extension of punctual hardening like that in SoPa *-n?ä-.

Mo repetitive -hpa?i- is now productive but was once restricted to the -?i-/-hi- thematic class (*-na-class). I would analyze this as repetitive *-pï- (cf. Se -aba-) and thematic -.?i-. This -.?i- is usually added to a hardened stem (e.g., qwahca-.?i- to fall). Thus *-pï- was probably hardened to *.pï- by a similar process. Morphologically, repetitive aspect is often associated with the punctual in Numic.

4.1. In my view, PNUA had three major verbal reduplications: punctual *C₁V₁-, distributive *C₁V₁-, and iterative C₁V₁C₂V₂- (or full stem reduplication). The punctual type survives in SoPa, Lu (past punctual), Se (perfective), and Tu. The distributive type is found in SoPa, Ho, Ca, Lu, Tu, etc. Though formally identical, these two types were not confused since only a minority of stems had a punctual reduplication, and these stems could not form the distributive reduplication. This complementarity can be seen in SoPa, Lu, and Tu, where apparently no single stem can form both types.

4.2. The PNUA iterative is less securely reconstructible. However, Tu has a clearly archaic full-stem iterative type, and several
Takic languages (e.g., Lu, Se) have similar bisyllabic or full-stem types for iterative and similar categories. The Takic types show archaic consonantal alternations, for example, p/v, t/ð, and cannot be recent innovations.

The Ho final -C₂V₂– type, for example, ripá-pa-(tà) was slipping, can reflect a full-stem type *CVCV-CVCV-. If considered as a compound phonologically, this would regularly become CVCV-CCV, note qalémsa (1.6). A minor simplification produces the final -C₂V₂– type.

At first sight, Numic data do not support the full-stem reconstruction. SoPa has an initial iterative C₁V₁- type, while Mono has a final -C₂V₂– type, for example, qwaca-ca- (hi-) keeps falling. However, both of these can be taken as contractions of a former full-stem *CVCV-CVCV- type, SoPa by eliminating the second syllable, Mono the third. Thus a full-stem type in Proto-Numic is as good as any other reconstruction.

Actually, Proto-Numic probably had *CVCV-CV'CVC- with hardening of the final consonant if this was a stop. SoPa often distinguishes the iterative from the punctual or distributive by gemination in the former, for example, iterative -tïppi- from ipi- to drink. In Mo, the intermittent iterative with suffix -hki/-ki- takes the form -CVCV-'CV-ki- with the -t/i-/-hi-class, where 'i is a preaspirated stop, geminated nasal, or the like (tani-ni-ki- from tani- to ring). There is no conclusive evidence from other NUA branches as to whether the PNUA iterative had such hardening.

4.3. PSUA seems to have had a rather different set of verbal reduplications. Tepiman preserves a C₁V₁(·)- punctual type (kú:-kum from kú:m to gnaw), matching the PNUA punctual type and like it restricted to a small set of stems.

A PSUA *C₁V₁?- distributive type with glottal stop occurs in Pa with adjectival stems, for example, só'ò-spolk from šópolk short. In Az, this type is also found with verbs, for example, te'-teki- to cut something up into pieces. I am not certain whether this type was verbal, adjectival, or both in PSUA.

PSUA also had one or more *C₁V₁- types (possibly with long vowel in some instances) for iteration, intensiveness, etc. Az has intensive-habitual C₁V₁- for example, te'-teki- to slice, and a similar C₁V₁- type restricted to the -ni-/na-thematic class. Pa usitative forms like /bi-bihii-/- from /bihi:/- to take, get, and Ya initial-syllable reduplications like iterative-intensive čep-čépte- brincar varias veces can also be mentioned in support of this PSUA reconstruction.

4.4. A plural reduplication with noun stems took the form *C₁V₁- in PNUA, probably *C₁V₁- in PSUA. This formation competed with addition of pl. suffix *-mi- or *-ti- (the latter preserved in Ho and Hu). NUA examples are Ho má:na girl, multiple ma-man-t(i?):i); Lu šuná:-l woman, pl. šu-šna-l-om; Tu kò:yó:-t- turtle, collective ó:-gó:yó:-t; SoPa poo:- trail, distrib. po-poo-. SUA examples are Pa bán coyote, pl. bá:-ban; Az k*eya frog, pl. k*ey:-k*eya-7; Hu pl. kin terms like (ne-)má:-má?-:(ma) (my) grandsons.

In Pa, some verbs also show this pl. reduplication, for example, -wákon- to wash, pl. obj. -wá-pkon-. Outside of Tepiman, the only verbal example of this sort that I know of involves NUA reflexes of *tiwa- to see. Ho téwa has a unique pl. subj. form tî-twa (*ti-tiwa). This must go back to PNUA, since Cu tástwi(ñ)- to look around (cf. Cu taw-~m to see) matches the Ho reduplication, although it has been specialized semantically.

4.5. Some apparently irregular Ta stop
alternations and the like require comment. Consider baki-’ *entrar, frequentative a-pagi-. The latter is historically a reduplication *(C)V₁ - which has lost its consonant (this also happened in Tu). Generally speaking, PUA stops become lenis b, ō, etc. word-initially in Ta (and other SUA languages), fortis t, etc. medially. In alternations like baki-’/a-pagi-, the reduplicated segment protects the stem-initial C from lenition, so we get p rather than b in a-pagi-. In this and some other examples, the lenis/fortis alternation of stem-initial C is compensated for, as it were, by a reverse dissimilatory fortis/lenis alternation of a following stop, hence the k/g alternation in this example. Note also that reduplication may involve stress-shift one syllable leftward, as it does here.

Looking at other examples, we find that these secondary changes (stress-shift, fortis/lenis alternations) may survive whether or not the reduplicated segment has been lost: ōari-’ *comprar, freq. tarā-; nire-hacerse, freq. i-nire-; note also nominal plurals like kapóra bola, pl. kabóra; čábóči araňa, pl. i-čápocí.

We thus have a messy situation synchronically, but have some hope of explaining the various alternations historically by assuming *(C)V₁ - reduplication and some originally automatic secondary changes. In particular, I would caution against trying to explain fortis/lenis alternations (p/b, t/ō, k/g, etc.) in terms of morphophonemic *C versus *C alternations.

5. PUA, PNUA, and PSUA all had a truncation process by which stem-final *CV was deleted in a (past) perfective form. In SUA, this is best preserved in Tepiman, for example, Pa húd/ huruni/ to descend, past perf. húd/ huru/. A few Pa stems show instead truncation plus -i (ná:d to kindle, past perf. ná:i) or loss of ? or h (hi:a to urinate, past perf. hía).

To the north, Se shows perfective truncation with or without punctual reduplication: k*u:man to sleep versus perf. k*u-k*u: m, mimi?-q(i-) to die versus perf. mimi?. Historically, this is a final *CV truncation (e.g., *k*u:manV becoming *k*u:ma). Note that in mimi?, truncation has affected the thematic suffix -q(i-).

Ho k-class intransitive punctual forms like ?iwi a flame occurs are notable in lacking thematic -k(i-) or its distributive form ?i-ta, which otherwise occurs in all k-class themes. I regard the type ?iwi as a reflex of a PNUA truncated stem *CVCV (or *CV*C) from thematic *CVCV-kí. Synchronically, we can simply say that -k(i-) is omitted word-finally.

It is important to distinguish these instances of true morphophonemic truncation affecting base-forms from low-level automatic elision of word-final *V found in several UA languages (Tu, Cupan, Se, sometimes in Numic, often in Tepiman and Ya, sporadically in Az). In Se and Pa, for example, the two can be clearly contrasted, since low-level elision may apply to the output of truncation.

I am not sure whether Az preterit forms like -či:w from -či:wa to make are best considered as reflexes of PUA morphophonemic truncation or as reflecting later low-level elision; I suspect the latter, in view of other instances of elision such as preterit -k from *u-’ka, etc.