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CAUSATIVES, STATIVES, MONOSYLLABICS - THE EVIDENCE FROM VOWEL HARMONY

Gerard M. Dalgish
University of Illinois

The vowel harmony process of OluTsootso,[1] a Bantu language of Kenya, affects vowels of certain suffixes according to the quality of the last vowel of the preceding root or suffix   Specifically, suffixal ı̲ appears when preceding vowels are high or low, while e̲ appears when preceding vowels are mid   In the five vowel system of OluTsootso, suffixal ı̲ therefore appears when preceding vowels are ı̲, u̲, or a̲, e̲ appears when e̲ or o̲ precedes The vowel harmony process then refers to the derivation of suffixal e̲ from underlying /ı/ when mid vowels precede

There are varying conditions on the vowel harmony process which are best stated morphologically   The vowel harmony process for the applied suffix /ıl/ ıs optional ın that ı̲l or e̲l may surface when preceding vowels are mid [2]

(1) /Bek/   'shave'   /Bek-ıl/ → Bech-el/ıl   'shave for'
     /loB/   'refuse'   /loB-ıl/ → loB-el/ıl   'refuse for'
     /xup/   'beat'   /xup-ıl/ → xup-ıl   'beat for'

In contrast, the vowel of the stative suffix /ıx/ ıs obligatorily governed by the vowel harmony conditions, so that e̲ must appear when preceding vowels are mid

(2) /yeeng/   'brew'   /yeeng-ıx/ → yeenj-ex/*ıx   'brewed'
     /tsom/   'prick'   /tsom-ex/ → tsom-ex/*ıx   'pricked'
     /xup/   'beat'   /xup-ıx/   → xup-ıx   'beaten'

But the causative suffix /ı/, unlike Swahili and Chı-Mwı nı,[3] never undergoes vowel harmony, and always surfaces as ı̲

(3) /met/   'blink'   /met-ı/   → met-ı/*e   'cause to
                                                   blink'
     /toong'/ 'remain'   /toong-ı/ → tooñ-ı/*e   'make remain'

It ıs the purpose of this paper to discuss how a knowledge of these conditions on vowel harmony can be used to describe and

explain otherwise ambiguous and confusing morphophonemic alter-
nations   It will be shown that vowel harmony provides evidence
which is crucial in determining the correct analysis of some
interactions   The causative construction is discussed in section
I, the stative in section II, and the behaviour of certain "mono-
syllabic" roots in section III   In these constructions, the
analyses which receive supporting evidence from vowel harmony
considerations can be generalized to provide some rather interest-
ing and explanatory accounts of the phenomena in question   These
analyses will involve discussions of additional evidence beyond
vowel harmony, but in each case, the vowel harmony considerations
provide the initial evidence in favor of the analysis   A summary
of the findings is presented in section IV

        I   The Causative Construction   The causative suffix /i/
conditions a process of 'liquid mutation' in which $\underline{l}$ and $\underline{r}$ become
$\underline{s}$ when the causative follows ^{4}

(4) /Bal/   'be warm'   /Bal-i/ → Bas-i   'make warm'
     /Bir/   'pass'   /Bir-i/ → Bis-i   'make pass'

        And when the reversive suffix /ul/ precedes the causative
suffix, liquid mutation again applies

(5) /Bis/ > Bis-ul,   /Bis-ul-i/ → Bis-us-i   'make uncover'
     'hide'   'uncover'

     /naB/ > naB-ul,   /naB-ul-i/   naB-us-i   'make rend'
     'sew'   'rend'

        2 1   If we next consider the causative-applied construc-
tion, we find data which conflicts with the above   The following
surface forms seem to indicate that the underlying sequence of
elements is /root-applied-causative/

(6) chiinj-il-i   'make carry for'   < ?/chiing-il-i/
     Baamb-il-i   'make sacrifice for' < ?/Baamb-il-i/
     xup-il-i   'make beat for'   < ?/xup-il-i/

Yet if these forms are underlyingly /root-il (applied)-i (causa-
tive)/, why isn't the $\underline{l}$ of the applied changed to $\underline{s}$ by the liquid
mutation rule, as was the case for the $\underline{l}$ of the reversive suffix?

2 2   Further complicating the issue are the surface forms
of underlying l- and r-final roots in this construction

(7)   /ɪkur/   ɪkus-ɪl-ɪ   <   ?/ɪkur-ɪl-ɪ/
      'be satisfied'   'make satisfied for'

      /m̃ɪr/   m̃ɪs-ɪl-ɪ   <   ?/m̃ɪr-ɪl-ɪ/
      'be unconscious' 'make unconscious for'

      /Bal/   Bas-ɪlɪ   <   ?/Bak-ɪl-ɪ/
      'be warm'   'make warm for'

      /ɪkal/   ɪkas-ɪlɪ   <   ?/ɪkal-ɪl-ɪ/
      'shut'   'make shut for'

The problem with these forms is that if the underlying sequence
of morphemes is assumed to be /root-applied-causative/, then we
must somehow account for these facts   (a) the root-final l's and
r's are affected by liquid mutation, even though the causative
suffix does not directly follow the root, (b) the l of the applied
suffix is not affected by liquid mutation

3   A proposal which might be advanced to account for these
facts is that the underlying sequence of morphemes is actually
/root-causative(ɪ)-applied(ɪl)/, and that a metathesis rule
changes the applied /ɪl/ to lɪ   This proposal is schematized by
the derivation below

(8)   /Bal - ɪ (causative) - ɪl (applied)/   underlying form
              Bas-ɪ-ɪl   liquid mutation
              Bas-ɪ-lɪ   metathesis
              Basɪlɪ   'make warm for'   surface form

In this way, the problems encountered above disappear, because
(a) the root-final liquids are changed to s because the causative
directly follows them, (b) the l of the applied suffix is not
changed to s because the causative precedes the applied

4   Although this proposal handles the data and clears up
the problems discussed, the evidence from vowel harmony shows it
to be incorrect   If we consider mid-vowel roots in this construc-
tion, we find the following

(9) /met ~/   'blink'   meteļı/metıļı ~   'make blink for'
     /chooñ/   'be tired'   chooñelı/chooñılı   'make tired for'
     /leer/   'bring'   leeselı/leesılı   'make bring for'
     /Bol/   'rot'   Boselı/Bosılı   'make rot for'

These forms show that the underlying sequence of elements must be
/root-applied-causative/, because it is only the vowel of the ap-
plied suffix /ıl/ which optionally harmonizes to e when mid vowels
precede   That is, the derivation exemplified in (8) cannot be
correct for these roots because it would require that the causative
vowel ı optionally surfaces as e, whereas elsewhere this never
occurs (cf forms in (3) above)   According to the vowel harmony
conditions, the vowel following these mid-vowel roots must be the
vowel of the applied suffix /ıl/, because it is only this vowel
which may surface as e when mid vowel roots precede   Thus, the
proposal advanced in 3 is invalidated by this evidence

        5   Since the evidence from vowel harmony establishes con-
clusively that the applied suffix is followed by the causative,
how do we account for the facts that (a) l- and r-final roots are
affected by liquid mutation, (b) the causative suffix does not
follow the root directly, (c) the causative suffix /ı/ follows
the l of the applied, and yet the applied suffix is not changed
to s?

        The following proposal is offered to account for these forms
A causative stem-formation process is involved in these causative-
applied forms   Briefly stated, a causative stem is analogically
formed from simple causatives (cf (4) above), and is then fol-
lowed by the applied and causative suffixes   It is claimed that
the causative suffix does not affect the l of the preceding
applied suffix, because once the final consonant of the stem has
been changed to s, there is no need to affect the final l of the
suffix as well

        Since the causative formation process is different for roots
followed by the applied suffix as opposed to roots followed by the
reversive suffix, I shall next discuss some differences between
the reversive and the applied constructions which may serve to
motivate a distinction between these suffixes in terms of the
proposal of causative stem formation

        5 1   We have seen that the l of the reversive becomes s when
the causative follows   /Bıs-ul-ı/ → Bıs-us-ı 'make uncover ' In

addition, the actual root-final liquid does not change to s, just
the l of the suffix   /fual/ 'dress,' /fual-ul/ 'undress,' /fual-
ul-i/ → fwaal-us-i 'make undress.' This development can be ac-
counted for in terms of a causative stem formation process by
considering certain aspects concerning the productivity of the
reversive suffix as compared to the applied, which behaves dif-
ferently

    The reversive suffix is limited in that not every verbal root
can be followed by it   In fact, it is impossible to predict which
roots will allow this suffix to follow, because there does not seem
to be a general semantic principle governing its appearance   This
means that the occurence or non-occurence of the reversive is
lexically determined, and turns out to be somewhat idiosyncratic
Thus, the reversive suffix is not productive derivationally, be-
cause there are rather severe lexical restrictions on its appear-
ance   So although morphemic analysis shows that the reversive
is a "suffix," its occurence is determined lexically   It is not
too surprising, therefore, that the causative formation process
treats these reversive forms as if they were "root-like" elements,
and thus changes the final l of the "compound root" to s

    The situation with respect to productivity of suffixes is
completely different for the applied suffix   This suffix can ap-
pear with almost every verbal root in the language, and its
occurence can probably be predicted by (perhaps) universal prin-
ciples   Its appearance is not idiosyncratic, or lexically deter-
mined, it must therefore be a "non-root" element, which should
not, of course, be subject to a stem-formation process

    5 2   This causative stem-formation analysis gains further
support from other causative constructions   When the limited and
non-productive "expansive"[5] suffix /ViVl/ appears after certain
roots, a causative form of the expansive may occur in which the
final l of the suffix (and not of the root) is affected

(10) /lual/   'be sick' > lwaal-ilil   'be very sick, sickly'
                 /lual-ilil-i/ → lwaal-ilis-i   'make sickly'

      /fuuts/   'spit'   > fuuts-ulul   'slobber'
                 /fuuts-ulul-i/ → fuuts-ulus-i   'make slobber'

      /tsux/   'pour(water)' > tsush-ilil   'sprinkle around'
                 /tsux-ilil-i/ → tsush-ilis-i   'splash around'

Much like the reversive, the expansive suffix idiosyncratically
occurs with certain verb roots   Also, its phonological shape is
non-predictable, in that the vowels must be determined lexically
Thus, like the reversive, this suffix is quite "root-like," and
so its final l undergoes liquid mutation when the causative follows

In contrast, the reciprocal suffix /an/ occurs fairly freely,
and is not limited idiosyncratically to certain roots (although
these roots must be transitive)   If we consider causative-reci-
procal forms, we find that although the causative suffix follows
the reciprocal, and does not follow the root, a causative stem
for the liquid-final roots is formed

(11) /Bir-an-i/ → Bisani, *Birani   'make e o pass'
      /kor-an-i/ → kosani, *korani   'make e o lose'
      /Bal-an-i/ → Basani, *Balani   'make e o warm'
      /Bol-an-i/ → Bosani, *Bolani   'make e o rot'

The low vowel of the reciprocal suffix never conditions consonantal
alternations, and thus cannot be responsible for the change of l
or r to s

5 3   Another distinction can be made concerning these suf-
fixes   It is striking that the causative stem-formation process
applies to roots which are followed by suffixes which effect syn-
tactic processes   In contrast, the causative stem-formation pro-
cess does not affect roots when followed by suffixes which have
no syntactic effect

5 3 1   For example, the applied suffix has an effect on syn-
tax which can be informally described as adding an (extra) object
to the simple verb root

(12) a   e-sikam-aanga   'I kneel'
          I-kneel-tense

      b   e-sikam-il-aanga Ombooko   'I kneel for Ombooko'
          I-kneel-applied-tense Ombooko

      c   *e-sikam-aanga Ombooko
          I-kneel-tense Ombooko

The reciprocal suffix can be characterized as a pronominal-
izing suffix for certain elements of conjoined sentences

(13) a   Keeyá a-xup-aanga aBa-saatsa   'Keeyá beats the men'
          Keeyá he-beat-tense plural-man

      b   aBa-saatsa Ba-xup-aanga Keeyá   ‚'The men beat Keeyá'
          men   They-beat-tense Keeyá

      c   Keeyá neende aBa-saatsa Ba-xup-an-aange
          Keeyá and   men   they-beat-reciprocal-tense
          'Keeyá and the men beat each other'

Sentence c is presumably a reduced version of a conjoined sen-
tence consisting of a and b

     When either of these suffixes is followed by the causative,
the causative stem-formation process affects liquid-final roots

     5 3 2   In contrast, the reversive and expansive suffixes do
not affect syntax - they simply change or enhance lexical meaning
Notice that this is another reason for considering these suffixes
to be "root-like" elements. Thus, it is not surprising that a
verbal form consisting of a root and a reversive or expansive
suffix is treated as a root in terms of causative formation

     5 4   The reduplicated verbal construction also provides evi-
dence for the causative stem-formation process   Reduplication
seems to involve copying the verbal stem to the left, and inserting
a between the two occurences of the root

(14) /chiing/   'carry'   chiing-a-chiing   'carry and carry'
      /Bek/   'shave'   Bek-a-Bek   'shave and shave'
      /lum/   'bite'   lum-a-lum   'bite and bite'

When suffixed forms of roots appear in the reduplicated construc-
tion, apparently the verbal root is copied first, and only the
right-most root is followed by the suffix

(15) /lum-a-lum-il/   → lumalumil   'bite and bite for'
      /chiing-a-chiing-il/ → chiingachiinjil 'carry and carry for'
      /Bek-a-Bek-il/   → BekaBechil/el   'shave and shave for'

Yet when the causative follows l- or r-final roots in this con-
struction, a causative stem must be formed, because both occurences
of the root surface as s-final.

(16) /lel-a-lel-ı/ → lesalesı   'make nurse and nurse'
      /Bır-a-Bır-ı/ → BısaBısı   'make pass and pass'
But cf the following
      /chııng-a-chııng-ı/ → chııngachııŋjı 'make carry and carry'
                            *chııŋjachııŋjı
      /Bek-a-Bek-ı/   → BekaBechı   'make shave and shave'
                            *BechaBechı

Postulating a causative stem-formation process for these l- and r-
final roots ın the reduplıcated constructıon accounts for the fact
that root-fınal s appears ın both ınstances of the root   Thıs
process creates a causative stem before reduplıcatıon, makıng ıt
possıble for s to appear ın the copıed root   Note also that ıt ıs
not surprısıng that a stem-formatıon process would precede a
morphologıcal process lıke reduplıcatıon   On the other hand, a
rule lıke phonetıc palatalızatıon applıes only after the root has
been copıed   Sınce ıt ıs generally assumed that morphologıcal
rules lıke reduplıcatıon precede phonetıc rules, then orderıng
palatalızatıon after reduplıcatıon ıs also expected

     5 5   It turns out that the causative stem-formatıon process
does not affect every root ın the compound causative constructıons
dıscussed   As we have seen above ın (16), the reduplıcated-causa-
tıve form for /chııng/, 'carry' ıs chııng-a-chııŋj-ı, and not
*chııŋj-a-chııŋj-ı   And ın the causative-recıprocal forms, the
root /Bek/ 'shave' appears as Bek-an-ı (< /Bek-an-ı), and not
*Bech-an-ı 'make e o shave ' In these cases, the root-fınal
segments g and k are not changed, and a causative stem ıs not
formed

     5 5 1   It appears, then, that the causative stem-formatıon
process must be lımıted ın a specıfıc way   Thıs ıs summarızed by
the followıng

(17)   "The causative stem-formatıon process affects roots wıth
           certaın fınal segments   These root-fınal segments must
           be subject to rules whıch are condıtıoned solely by the
           causatıve suffıx "

The lıquıd mutatıon rule whıch changes l or r to s when the causa-
tıve follows ıs such a rule, and therefore causative stem-formatıon
affects l- and r-fınal roots   But the phonetıc palatalızatıon rule
whıch applıes to k, g, etc , ıs not condıtıoned solely by the causa-
tıve, sınce any front vowel wıll trıgger ıt (cf examples ın (1),
(2), and (6) above)   Roots contaınıng segments subject to the

phonetic palatalization rule will not therefore undergo the causa-
tive stem-formation process

    5 5.2   This is further confirmed by the causative formation
of certain <u>ux</u>-final verb roots   A morphophonemic process changes
<u>ux</u>-final verb roots to <u>us</u>-final <u>only</u> before the causative suffix ⁶

(18) ılux   'run'   > ılus-ı   'make run'
      pulux   'fly'   > pulus-ı   'make fly'
      ambux   'cross' > ambus-ı   'make cross'
Phonetic palatalization changes <u>x</u> to <u>sh</u> in non-causative construc-
tions
(19) ılux   'run' > ılush-ıl   'run for'
      teex   'cook' > omu-teesh-ı   'one who cooks, wife'
                       eshı-teesh-e   'which is cooked, food'
But in the causative-applied construction, only <u>ux</u>-final roots
become <u>us</u> final
(20) pulux   'fly' > pulus-ıl-ı   'make fly for/toward'
      ılux   'run' > ılus-ıl-ı   'make run for'
      yayux   'melt' > yayus-ıl-ı   'melt for'
In the causative-reciprocal construction, <u>ux</u>-final roots become
us-final
(21) pulux   'fly' > pulus-an-ı   'make e o fly'
      ılux   'run' > ılus-an-ı   'make e o. run'

    Thus, the causative stem-formation process affects <u>ux</u>-final
verb roots in compound causative constructions   These roots under-
go a morphophonemic change of <u>ux</u> to <u>us</u> in the simple causative
form which is conditioned solely by the causative suffix   On the
analogy of the simple causatives, a causative stem is formed, and
appears in these compound causative constructions   In contrast,
other <u>x</u>-final verbs which become <u>sh</u> by the phonetic palatalization
rule do not change <u>x</u> to <u>sh</u> in the appropriate compound construc-
tion   /teex-an-ı/ → <u>teexanı</u>, *<u>teeshanı</u> 'make e o cook ' The case
for the causative stem-formation process is therefore strengthened
by the additional evidence provided by these <u>ux</u>-final roots

    6   To summarize the discussion of the causative, the first
indication that a causative stem-formation process is involved in
certain constructions comes from a consideration of vowel harmony
conditions in the causative-applied forms   The evidence from vowel
harmony discredits an approach involving the metathesis of the
applied suffix, and indicates instead that some distinction must be
made between the <u>l</u>-final reversive and expansive suffixes on the
one hand, and the applied suffix /ıl/ on the other. It has been

proposed that a causative stem-formation process changes root-final
segments in certain productive compound causative constructions
(like the causative-applied and the causative-reciprocal), and in
the reduplicated construction   Liquids of suffixes which are non-
productive and idiosyncratic, and which do not affect the syntax of
following NP's, are changed to s̲, while the roots are unaffected,
because these lexically dependent suffixes are considered to be more
"root-like" than "suffix-like " An additional limitation on causa-
tive stem-formation is that the process only affects roots which have
simple causative forms derived by non-phonetic, morphophonemic pro-
cesses specific to the causative

     II   In this section, the stative construction will be discus-
sed   It will be shown that vowel harmony considerations point to
a generalized account of the process of stative formation, in which
the notion "possible morpheme of a language" plays a crucial role [7]

     1   It will be recalled that stative formation involves the
suffixation of /ıx/ and obligatory vowel harmony conditions

(22) /naB/   'sew'   naB-ıx   'sewn'
      /lım/   'farm'   lım-ıx   'cultivated'
      /xup/   'beat'   xup-ıx   'beaten'
      /lol/   'see'   lol-ex(*ıx)   'visible'
      /rem/   'cut'   rem-ex(*ıx)   'be cut'

     2   Consider the following ı̲-final verbal roots in the stative

(23) ñ̃aası   'give trouble'   ñ̃aasıx   'be troublesome'
      sımı   'extinguish'   sımıx   'extinguished'
      yuunjı   'hurry(t v)'   yuunjıx   'be hurried'

Notice that the vowel preceding x̲ is short   There is no phonetic
reason to expect that /ı-ı/ sequences should reduce to ı̲ because
no such rule or process exists in the language   So, it might be
proposed that the ı̲ of the root is dropped, and the suffix /ıx/
follows

(24) /sımı/ → /sım/, /sım-ıx/ → s̲ı̲m̲ı̲x̲

     If, however, we consider ı̲-final roots with mid-vowels in the
preceding syllable, we find the following stative forms

(25)   ınoosı   'explaın'   ınoosıx,*ex   'explaınable'
       sheesı   , 'greet'   sheesıx,*ex   'greeted'
       hesı   'fınısh'   hesıx,*ex   'be fınıshed'
       helesı   'gıve'   helesıx,*ex   'be gıven'

If ıt ıs proposed that the ı of the root ıs dropped, and /ıx/
follows, then we cannot explaın how ıt ıs that ıx, not *ex, ap-
pears ın the surface form of these statıves   Sınce vowel harmony
ıs oblıgatory for the statıve suffıx, then eıther these forms are
exceptıons, or our analysıs ıs basıcally ıncorrect

        3   An alternatıve analysıs for these ı-fınal roots ın the
statıve would be that a reduced form x of the statıve suffıx fol-
lows root-fınal ı   That ıs, /sheesı-x̄/ → sheesıx, /sımı-x/ →
sımıx, etc. We would not need to propose that a phonetıcally un-
motıvated reductıon rule applıes to /ı-ıx/ sequences and produces
the surface ıx forms. Nor would the vowel harmony condıtıons be
vıolated, because x, not ıx, follows these ı-fınal roots   Thus
the evıdence from vowel harmony serves to dıscredıt our fırst
proposal, and to lend support to an alternatıve.

        4   We shall next consıder statıves of other root types to
fınd further evıdence of the appearance of /x/, a reduced form of
the statıve   After we have examıned these forms, a general prın-
cıple wıll be proposed whıch can be used to predıct the occurence
of thıs reduced form of the statıve suffıx

        4 1   The reduced form /x/ of the statıve appears when the
statıve of reversıves ıs formed

(26)   fuung   'close' > fuung-ul 'open'   > fuung-u-x 'be open'
       naB   'sew'   > naB-ul   'rend'   > naB-u-x   'rent'
       Bıs   'hıde'   > Bıs-ul   'uncover'   > Bıs-u-x   'uncovered'
       fwaal   'dress' > fwaal-ul 'undress'   > fwaal-u-x 'unclad'

If ıt ıs proposed that the reduced form /x/ appears after the ul-
fınal reversıve forms, then there ıs phonetıc motıvatıon for the
deletıon of ı   Consonant clusters begınnıng wıth a non-nasal are
never found ın OluTsootso, so the deletıon of ı before x serves
to prevent the surface appearance of such an ungrammatıcal cluster

        4 2   When the expansıve suffıx /V1V1/ appears before the
statıve, once agaın ıt ıs /x/ whıch ıs suffıxed, whıle the fınal ı
of the expansıve ıs deleted

(27)   raats-ɩlɩl   'hemorrage'   >   raats̬-ɩlɩ-x   'hemorraged'
       fɩɩn̂-ɩlɩl   'compressed'   >   fɩɩn̂-ɩlɩ-x   'compressed'
       n̂aan̂-ulul   'devour'   >   n̂aan̂-ulu-x   'devoured'

Thus, when l-final suffixes are followed by the stative, the reduced form /x/ appears, which triggers the deletion of the preceding l of the suffix

4 3   Apparently, this process has analogically spread to some non-suffixed l-final roots, as the following examples show

(28)   futul   'pierce'   futu-x   'be pierced'
       ɩBul   'give birth'   ɩBu-x   'be born'
       aBul   'split open'   aBu-x   'split open'
       yaBɩl   'bury'   yaBɩ-x   'be buried'
       techel   'tremble'   teche-x   'be shaken'
       ɩtsulɩl   'remember'   ɩtsulɩ-x   'memorable'

Yet the following l-final roots do not suffix the reduced form of the stative, but show ɩx or ex instead

(29)   ɩkal   'shut'   ɩkal-ɩx   'be shut'
       yaakal   'sharpen'   yaakal-ɩx   'be sharpened'
       tsaangal-   'lose taste'   tsaangalal- 'be tasteless'
       al   ɩx
       eleel   'dangle'   eleel-ex   'be dangled'
       fuumbel   'embrace'   fuumbel-ex   'be enclosed'

Notice that a purely phonological distinction (based on either syllable count or the quality of the vowel preceding l) cannot be proposed as a conditioning factor for the appearance or non-appearance of /x/

However, the l-final forms in (29) (which are followed by the full form of the stative /ɩx/) differ from the l-final forms in (28) (in which l is deleted before /x/) in a way which turns out to have important implications for the process of stative formation   The l-final forms in (29) can not be analyzed as consisting of a root and a suffix of the language, whereas all the l-final forms which involve the suffixation of /x/ consist of either (a) a root plus a suffix, or (b) a hypothetical root followed by a 'possible' suffix of the language   From this it is possible to propose the following general principle to account for when /x/, not /ɩx/, follows verbal forms in the stative

(30)   "If a verbal form can be analyzed as consisting of a
            root plus a suffix, then /x/, not /ıx/, appears ın the
            statıve "

This princıple then ıncludes verbal forms whıch are actually
suffıxed, as well as those whıch are analogıcally analyzable as
beıng 'suffıxed,' so long as the 'suffıx' resembles a 'possıble'
suffıx of the language   For convenıence and brevıty, I wıll at
tımes refer to both of these types of verbal forms as 'derıved'
forms, sımply because verbal derıvatıon ın OluTsootso ınvolves
suffıxatıon

    4 4   I shall next dıscuss ın detaıl how ıt ıs that speakers
analyze certaın verbal forms as 'derıved' and then contrast these
wıth other verbal forms whıch are <u>not</u> analyzed as 'derıved '

    4 4 1.   If we re-examıne the forms of (28), we see that these
appear to consıst of hypothetıcal roots followed by possıble suf-
fıxes

(31) /futul/   analyzable as   /fut*-ul/   (root-reversıve)
      /aBul/   "   /aB*-ul/   (root-reversıve)
      /yaBıl/   "   /yaB*-ıl/   (root-applıed)
      /techel/   "   /tek*-ıl/   (root-applıed)

    4 4 2   The above forms contrast wıth the forms ın (29), be-
cause the latter cannot be analyzed as consıstıng of a hypothetıcal
root followed by a 'possıble' suffıx

    Let us see why thıs ıs so   Consıder the fırst three examples
of (29), all of whıch end ın -al   Sınce <u>al</u> does not exıst syn-
chronıcally as a suffıx,[8] the segmentatıon representıng the mor-
phemıc analysıs as /root*-al/ ıs ımpossıble   Thus, these verbal
roots cannot be analyzed as derıved forms of hypothetıcal roots,
because the "suffıx" <u>al</u> ıs not a 'possıble' suffıx of the language

    The verbal form /eleel/ ıs sımılar ın that ıt may not be analy-
zed as eıther /el*-eel/ or /ele*-el/   In the former sıtuatıon, the
"suffıx" would be <u>eel</u>, presumably from the applıed /ıl/   Yet a
lengthened versıon of ıl or <u>el</u> does not occur, and so *<u>eel</u> ıs not
a 'possıble' suffıx As for the segmentatıon /ele*-el/, no e-fınal
verb roots exıst ın the language, and so *<u>ele</u> ıs an ımpossıble root
Therefore, /eleel/ cannot be analyzed as a derıved form of a verb,
and so /ıx/, not /x/, appears ın the statıve constructıon

Finally, /fuumbel/ cannot be analyzed as hypothetical /fuumb*/ followed by el Since the vowel harmony conditions require that the applied suffix /il/ appears (optionally) as el only when mid-vowel roots precede, then el could not possibly be the applied suffix occurring after /fuumb*/, a high vowel root So, /fuumbel/ cannot be analyzed as a derived form of a verb, and is therefore followed by the full form of the stative, /ix/

4 4 3   The principle proposed in (30) accounts for the appearance of /x/ in the statives of actual reversive and expansive forms of (26) and (27) respectively   Since reversives and expansives are obviously derived forms of verbs, /x/, not /ix/, appears in the stative construction

4 4 4   Another actual derived construction that involves the suffixation of /x/ is the stative form of causatives   The following verbs surface with /x/ after the causative vowel /i/

(32) kul   'buy'   kus-i   'sell'   kus-i-x   'sold'
      káà̰l   'be O K '   káà̰s-i   'repair'   káà̰s-i-x   'repairable'
      man̰   'know'   man̰-i   'show'   man̰-i-x   'shown'
      kaal   'be inat-   kaas-i   'distract'   kaas-i-x   'distrac-
                tentive'   table'

These forms are in accord with the principle proposed in (30), since causatives are obviously derived forms of verbs

4 5   Returning now to the stative forms of i-final roots first introduced in (23) and (24), it is clear that these are analogically analyzable as "causative" forms of simpler hypothetical roots   Since the final i resembles a possible suffix (the causative), roots like /sheesi/ can be analyzed as /shees*-i/[9], or 'derived ' And as the corroborating evidence from vowel harmony showed, /x/, not /ix/, is suffixed to these roots

5   To summarize, stative formation usually involves the suffixation of /ix/, which surfaces as ex when preceding vowels are mid   The statives of i-final verbs appear to be violations of the vowel harmony process, at least if it is assumed that /ix/ is suffixed   If /x/ is postulated as the stative suffix in these forms, no violation of vowel harmony occurs   The appearance of /x/ as the stative can be predicted by the principle proposed in (30), which states that if a verbal form can be analyzed as a derived form, then /x/ appears in the stative   If such an analysis is impossible,

then the full form of the stative, /ɪx/, is suffixed   This prin-
ciple has been shown to make correct predictions concerning the
stative forms of reversives, expansives, certain l-final verbs,
causatives, and l-final roots   In each case, then, the speaker's
ability to analyze forms as 'derived' is crucial in determining
the correct forms for the stative construction

III   The vowel harmony conditions provide evidence of a spe-
cial vocalic process involving a set of certain verbal roots   These
roots are of the phonological shape C or CV, differing from the
canonical CVC form of most roots. They are referred to as "mono-
syllabic"[10] roots in traditional grammars of other Bantu languages,
and often occur with confusing and irregular alternations

Some of these roots are listed below.[11]   In the simple infini-
tival form, final a appears after the root

(33)   /lɪ/   'eat'   oxu-lɪ-a   'to eat'
       /ku/   'fall'   oxu-kw-a   'to fall'[12]
       /sɪ/   'grind'   oxu-sɪ-a   'to grind'
       /ñu/   'drink'   oxu-ñw-a   'to drink'

1   The applied form for some of these verbs seems perfectly
regular, since il appears as expected after the root

(34)   oxu-lɪ-il-a   'to eat for'
       oxu-rɪ-il-a   'to fear for'
       oxu-kw-iil-a   'to fall for'
       oxu-fw-iil-a   'to die for'

However, the following forms seem to surface with el as the applied
suffix, and not il

(35)   oxu-sɪ-el-a   'to grind for'
       oxu-shɪ-el-a   'to dawn for'
       oxu-ñw-eel-a   'to drink for'

Notice that these forms are apparent violations of vowel harmony,
because il, not el, is expected to appear when preceding vowels are
high   In fact, forms in which il is suffixed are ungrammatical
*oxu-sɪ-il-a, *oxu-shɪ-il-a, *oxu-ñw-iil-a, *oxu-xw-iil-a

As was the case in the stative construction, we would like to
account for apparent violations of the vowel harmony process in a

non-ad hoc way, rather than listing certain forms as exceptions
It turns out that other constructions involving the monosyllabic
roots will provide evidence that these applied forms are not viola-
tions of the vowel harmony process

2   If we examine the passives of these roots, in contrast with
certain non-passive forms, we find evidence that (1) an extra vowel
appears after the root in the passive, (2) B is inserted, (3) the
passive suffix /u/ becomes w by glide formation [13]

(36) oxu-li-a   'to eat'   oxu-li-i-B-w-a   'to be eaten'
      oxu-ri-a   'to fear'   oxu-ri-i-B-w-a   'to be feared'
      oxu-s̃i-a   'to grind'   oxu-s̃i-e-B-w-a   'to be ground'
      oxu-n̆w-a   'to drink'   oxu-n̆w-ee-B-w-a   'to be drunken'

What is of interest here is that the inserted vowels appearing after
the roots in the passive forms are the same as those which appeared
in the applied construction   For example, /li/ was followed by i
in the applied, and an added i appears in the passive   /si/ appears
with e following in the applied form (an apparent violation of vowel
harmony), and e appears in the passive form as well

3   In the following constructions, the monosyllabic roots ap-
pear with an extra vowel and the inserted ts [14]

(37) a   habitual/continuous
           /Ba-li-ng-a/ → Ba-li-i-ts-aanga   'They eat'
           /Ba-si-ng-a/ → Ba-si-e-ts-aanga   'They grind'
           /Ba-k̟u-ng-a/ → Ba-k̟w-ii-ts-aanga   'They fall'
           /Ba-n̆u-ng-a/ → Ba-n̆w-ee-ts-aanga   'They drink'

      b   reciprocal
           /-li-an-/   → -li-i-ts-an-   'eat e o '
           /-si-an-/   → -si-e-ts-an-   'grind e o '
           /-xu-an-/   → -xw-ee-ts-an-   'pay e o dowry'

      c   stative[15]
           /-li-ix-/   → -li-i-ts-ix-   'edible'
           /-si-ix-/   → -si-e-ts-ex-   'be ground up'
           /-k̟u-ix-/   → -k̟w-ii-ts-ix-   'fallen'
           /-n̆u-ix-/   → -n̆w-ee-ts-ex   'potable'

Notice that here again the same vowel that appears after the
root in the applied and passive forms surfaces in the above con-

structions   It seems that once these vowels appear after the roots
in these forms, ts is inserted, apparently to prevent an ungrammatical
sequence of three successive vowel morae from surfacing [16]

4   It appears then that the monosyllabic roots condition the
insertion of a vowel in certain constructions. It is likely that
this vowel is determined lexically, because I can find no phonolo-
gical features in the roots which would condition the appearance
of 1 as opposed to e   But once these vowels are lexically inserted,
it appears likely that they condition the insertion of B in the
passive forms and ts in the above constructions, in order to pre-
vent three successive vowel morae from surfacing

5   If we return now to the applied forms of the monosyllabics,
we can account for the apparent violations of the vowel harmony pro-
cess   It could be proposed that the vowels appearing before the 1
of the applied suffix are in fact the lexically inserted vowels
specific to each monosyllabic root, and that they are not the vowel
of the applied suffix   In this way we can explain the otherwise re-
markable coincidence that the applied forms which seem to be viola-
tions of the vowel harmony process all involve roots which condition
the insertion of e in other verbal constructions   And if it is the
lexically inserted vowel which appears before the 1 of the applied,
then no violation of vowel harmony occurs, because that process in-
volves suffixal vowels

Notice that it is also necessary to propose that the vowel of
the applied suffix is deleted when the lexically inserted vowel ap-
pears, because, e g , 1ili, and not *li-i-il 'eat for' appears
Yet even this process can be motivated phonologically, because
without it, the ungrammatical sequence of three vowel morae would
surface

6   To summarize, monosyllabic roots condition the appearance
of lexically determined vowels in various constructions   The evi-
dence from the vowel harmony process for the applied indicates
that these lexically inserted vowels appear before the 1 of the
suffix, and that the vowel of the applied is deleted   Under this
proposal, forms which seem to be unexplained violations of the
vowel harmony process are given instead an illuminating and
generalized account

IV   The vowel harmony conditions have been used in a number
of verbal constructions to provide evidence in the determination

of morphophonemic interactions   The vowel harmony conditions in
the causative-applied construction provide the first indication
that a causative stem-formation process should be proposed to ac-
count for some otherwise confusing morphophonemic alternations,
found in other compound causative constructions   In addition, an
interesting distinction between suffix types is motivated   some
suffixes are more "root-like" than others, in terms of productivi-
ty and syntactic effect   This distinction became crucial for
morphophonemic processes as well

Vowel harmony provides evidence that the stative formation of
i-final verb roots involves the suffixation of /x/, a reduced form
of the full stative, /ix/   The appearance of /x/ turns out to be
predictable in a more general account of stative formation, which
states that the reduced form of the stative appears when verbal
forms can be analyzed as 'derived '   The analysis of forms as de-
rived depends crucially on what constitutes a 'possible' suffix
in OluTsootso

Finally, the vowel harmony conditions were used to show that
applied forms of certain monosyllabic verb roots would have to be
unexplained exceptions to the vowel harmony process, unless an al-
ternative was proposed   It turns out that the exceptions to the
vowel harmony conditions are all roots which require the lexical
insertion of e in other verbal constructions   From this it has
been proposed that the vowel preceding the l of the applied is
also the lexically inserted vowel, not the vowel of the suffix

In each case, then, the vowel harmony conditions are used to
provide evidence for generalized and explanatory accounts of the
causative, stative, and monosyllabic-root constructions in
OluTsootso

NOTES

and Chuck Kisseberth have been most helpful   The symbols used in
the text correspond to the IPA system, except that B̲ represents
[β], ch̲ is [tʃ], sh̲ is [ʃ], ng̲' is [ŋ], and ng̲ is actually [ŋg]

[2]A palatalization rule changes k̲, x̲, and g̲ (in the nasal
cluster ng̲) to ch̲, sh̲, and j̲ respectively. ng̲' becomes n̲ before
front vowels, and h̲ becomes y̲ before ı

[3]The situation in ChiMwı nı has been related to me by Chuck
Kisseberth in personal communication   The grammar by Ashton
(p 231) accounts for the Swahılı data

[4]This is the result of an historical situation in which s̲ is
derived from *t̲ and *d̲ (the ancestors of the liquıds r̲ and l̲) when
the so-called "super-high" vowel *ı̲ followed   The vowel of the
causative was probably *ı̲ which has subsequently merged with *ı
to /ı/ in OluTsootso,̲ but the alternations associated with *ı̲ have
survived synchronically

[5]This suffix denotes that the action of the verb is carried
out in a repetitive, grandiose, and/or unnecessary manner

[6]This development is discussed in Dalgısh (under preparation)
It is shown that ux̲-final verb roots are analyzed as derived forms
of hypothetical ul̲-final forms   The latter would of course change
to us̲-final before the causative   There are some further complexi-
ties̲ which do not affect the point made here, which is that this
change is limited to the causative construction

[7]Cf O'Bryan (1974)   This topic was discussed in a paper
delivered at the summer LSA meeting, 1975, by O'Bryan and the
present writer.

[8]It is likely that this was the verbalizing suffix *ad in
proto-Bantu

[9]These could also be analyzed more abstractly as l̲- or r̲-
final, as if the root-final ı̲ were the causative, and that the̲
surface s̲ is created by liquid mutation   But no corresponding
l̲- or r̲-final form can be found, and so these are probably analyzed
as s-ı̲-final

[10]The term is unfortunate, since most Bantu roots are /CVC/
which should certainly be labelled monosyllabic as well   Apparently,

traditional writers included the final vowel -$\underline{a}$ in their descrip-
tions of roots, so that /C/ or /CV/ roots became /C-a/ or /CV-a/,
and therefore "monosyllabic," while /CVC/ roots are considered
"bi-syllabic" (/CVC-a/)

[11]The $\underline{C}$ roots /h/ 'give' and /r/ 'put' are not discussed here

[12]Glide formation changes /u/ to $\underline{w}$, and compensatorily length-
ens a following vowel (except $\underline{u}$) Compensatory lengthening is
blocked in word-final position, as no V_1V_1 # sequences exist

[13]$\underline{B}$ is inserted when the final vowel of a verbal root is fol-
lowed by the passive   /sheesi-u/ → sheesi-B-u   Glide formation
then changes the $\underline{u}$ to $\underline{w}$ /sheesi-B-u-/ → $\underline{sheesiBw-}$ 'be greeted '

[14]The appearance of these vowels probably has an historical
explanation   Since most root-internal vowels are either short (V)
or identically long (VV), the presence of non-similar root-internal
vowels would not have been tolerated, and may have been dropped
Now, they seem to be re-inserted   As for $\underline{ts}$, it is quite likely
that this consonant, or some other, was lost for these roots (prior
to the proto-stage, in fact), because most roots are /CVC/   It is
now being re-inserted, perhaps to prevent the surface appearance
of three successive vowel morae

[15]Notice that in these cases, the appearance of the reduced
form /x/ as the stative suffix would be phonetically motivated,
in that it would serve to prevent three successive vowel morae
from surfacing   /li-ix/ → /li-i-ix/ (in which the lexically de-
termined vowel is inserted), this triggers the reduced form of
the stative to appear as /x/   *$\underline{li-i-x}$ But this is ungrammatical,
because /x/ appears only when verbal roots are analyzed as 'derived,'
monosyllabic roots can never be analyzed that way

[16]For a discussion of the numerous devices the language em-
ploys to prevent $\underline{VVV}$ sequences, cf Dalgish, 1975

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