

Vowel Systems

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1. Introduction

It used to be a major area of concern for phonologists to rethink and reconsider the proper set of distinctive features needed to analyze the vowel and consonant systems of languages around the world. Since the changes and shake-ups in phonology of the 1970s, changes which shifted attention toward the geometrical structure of phonological representations, this concern has by and large been suspended.

That is most unfortunate, if for no other reason than that autosegmental analyses still rely heavily on the use of features, and unexamined assumptions about the inventory and nature of these features will almost inevitably affect the validity of the conclusions drawn from them. [1]

In recent years, the primary concern involving the nature of features has revolved around whether phonological features act in a strictly binary way within the lexical phonology, or whether only one value of each feature plays an active role at that point. Each individual argument that has been offered about this matter, however, inevitably makes certain assumptions about the proper set of features needed to describe vowels and consonants, and it is that which we ought to reconsider.

My purpose in this paper is to step back for a moment and rethink the proper treatment of some of the most basic kinds of vowel systems. The particular emphasis in this paper will be on the canonical five vowel system, as in (1), in part because it is the most common system, and the one from which most other vowel systems deviate in relatively minor ways. It is also simply a fruitful area for research of the sort that I propose undertaking.

1. Five vowel system

i e a o u
a

2. Tradition

Tradition of quite long canonical five vowels; henceforth call "the 1" leaves no doubt that 1 -- is a vowel system (Mid, and Low), and 1 (Back), (though one tra years in this count; central vowel; America; such vowels Back and n

Recent tradition also binary features, High {e,o} as "minus" [-] following chart:

(2)	a	e	i	o
High	-	-	+	-
Low	+	-	-	-
Back	+	-	-	+
Round	-	-	-	+

This, I trust, is as of the reader's hand.

3. Problems

This treatment of unsatisfactory in several to light a surprising theory: the lack of a right to answers to

1. Why do the vowels system, rather than v feature specifications?

2. Why should phonological binary features, High binary combinations phonological explanat

3. Why do the distributional class these vowels are equivalent), and t occurrence that other up in unstressed position only these three vo

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(f...))

2. Tradition

Tradition of quite long standing now informs us that the canonical five vowel system as in (1) -- which I shall henceforth call "the five vowel system", when context leaves no doubt that this is what is being referred to -- is a vowel system with three vowel heights (High, Mid, and Low), and two horizontal positions (Front and Back), (though one tradition, less heard from in recent years in this country, includes the vowel /a/ as a central vowel; Americans, following SPE, generally call such vowels Back and non-Round).

Recent tradition also analyzes vowel height using two binary features, High and Low, marking the mid vowels {e,o} as "minus" [-] for both features, giving us the following chart:

(2)

	a	e	i	o	u
High	-	-	+	-	+
Low	+	-	-	-	-
Back	+	-	-	+	+
Round	-	-	-	+	+

This, I trust, is as familiar to the reader as the back of the reader's hand.

3. Problems

This treatment of the five vowel system is unsatisfactory in several respects, respects which bring to light a surprising deficiency in current phonological theory: the lack of a theory of vowel systems. We have a right to answers to the following questions:

1. Why do the vowels in (2) form the most natural vowel system, rather than vowels defined by some other set of feature specifications?

2. Why should phonological theory be driven to use two binary features, High and Low, for which one of the four binary combinations is simply disallowed with no phonological explanation?

3. Why do the vowels {i,u,a} form a natural distributional class? In many linguistic traditions, these vowels are called "primary vowels" (or the equivalent), and these vowels have privileges of occurrence that other vowels do not: only they may show up in unstressed position, for example. In other cases, only these three vowels may be present underlyingly.

I'm glad
HE
KNOWS
IT!

far enough phonology that it
is
way!

Why do these three vowels form the canonical three-vowel system?

4. Why do the vowels [e, o] form another natural class? As we shall see, these vowels trigger Height harmony in Bantu and other languages: why?

5. Why do /a/ + /i/ typically merge to form [e], and /a/ + /u/ to form [o]? Featural accounts give no hint or clue as to which features should be saved and which lost when two vowels "merge" (and such accounts provide no notion of "merger", either). The sequence /i/+u/ most often fails to merge, other than to form the diphthong /y/, though in some cases it merges to /ü/.

The aim of the this paper, and the work that it summarizes, is to provide a simple theoretical framework that provides straightforward answers to these questions. We may add a further desideratum for such a proposal: we would like it to depend on a minimal number of theoretical modifications and innovations. Finally, an extremely important condition must be added: we would like this undertaking, of the modification of our conception of vowel features, to be consistent with the effort to show that all assimilations are autosegmental in character, i.e., are all formally represented by the addition of association lines. This is a more difficult result to achieve at this point, but it is, at the very least, something that I take to be a desideratum for a theory of vowel representations.

Another point that may be borne in mind in evaluating this proposal is that it attempts to (and succeeds in) sharply reducing the number of features used in the lexical phonology for the vowel systems of most languages, thus making more plausible the notion that all features are autosegmentalized. This notion (originally suggested by several people, of whom the first was Morris Halle, over ten years ago) suffered a much larger degree of implausibility at the time due to the fact that so many features, many of them highly dependent on each other, would have to be placed on separate tiers (e.g., High on one tier, Low on another). This hypothesis -- one feature, one tier -- becomes more plausible under the current account, at least as far as vowel systems are concerned. Similar work has already made such a view for prosodic systems quite plausible.

The proposals offered here should be viewed in the light of parallel work being done currently by a number of linguists from very similar perspectives, especially Vergnaud, Kaye, and Lowenstamm, Rennison, van der Hulst

and Smith, and Schan (References below).

4. A Proposal Regarding

The main framework the phonology of a tra features used in separate tiers. I innovation.

The first modification features be allowed privative, in a way feature-specific. T but in this context t feature is one for w or minus) is used lexical phonology. theory (within lexic which both featur distinctive, lexical work with the SPE g proposal differs, underspecification t in that the phonology of oppositions.

Having defined this these possibilities 1

(3) a. Privative feat

$$\begin{array}{c} [+F] \\ | \\ V \quad V \end{array}$$

The examples in (3) explicit: if we representations, the privative feature distinction, and an to a ternary distinc true in practice (wh will see below, beca put upper and lower 1 lines linked to a pa however, is another proposal. In any ternary distinction

WHY IS THE MCGEEK EFFECT THE WAY IT IS?

KEEP QUESTION THAT LIES AT THE HEART OF DELAEPHAN OTI

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and Smith, and Schane (for specific references, see the
References below).

4. A Proposal Regarding Feature Specifications

The main framework that I will be using is autosegmental
phonology of a traditional sort, with the vocalic
features used in the lexical phonology placed on
separate tiers. In this there is no theoretical
innovation.

The first modification I wish to propose is that
features be allowed to be either equipollent or
privative, in a way that is language-specific and even
feature-specific. The terms I borrow from Trubetzkoy,
but in this context they must be explained. A privative
feature is one for which only one feature value (plus,
or minus) is used and allowed in the distinctive,
lexical phonology. The position of underspecification
theory (within lexical phonology) is that all features
have this character. An equipollent feature is one for
which both feature values are used within the
distinctive, lexical phonology, as within most of the
work with the SPE generative tradition. The present
proposal differs, then, from both recent
underspecification theories and from the SPE tradition
in that the phonology must be allowed to use both kinds
of oppositions.

A GREAT IDEA!
(E only MARKED)
FEAT. IS VISIBLE
WASTFUL

Having defined this distinction, let us observe what
these possibilities look like, as in (3).

(3) a. Privative feature b. Equipollent feature



The examples in (3) make clear what has not been
explicit: if we set no further conditions on
representations, then in an autosegmental context, a
privative feature will give rise to a binary
distinction, and an equipollent feature will give rise
to a ternary distinction. This will not always prove
true in practice (which is probably fortunate), as we
will see below, because we will suggest mechanisms that
put upper and lower limits on the number of association
lines linked to a particular skeletal position. That,
however, is another matter, and a separate, distinct
proposal. In any event, the interpretation of the
ternary distinction suggested in (3b) is by no means

WHICH MAY EXIST! (E MARKED)

self-evident, and the examples below will suggest that the formally unmarked case (the third case in (3b)) will sometimes be interpreted phonetically in a way indistinguishable from one of the actually specified values; this is the case for the feature [Round], in the five vowel system, where a vowel that is unmarked for [Round] is not round, though it is still phonologically distinct from a vowel that is phonologically marked [-Round]. In other cases, the unmarked value will be phonetically interpreted as intermediate between the [+F] value and the [-F] value. I would like to emphasize that this leeway between the phonological representation and its phonetic interpretation is not an inherent weakness of the proposal, in my view, recent concretist views on phonological features -- that they can, in effect, be largely inferred from phonetic detail -- are based on a philosophy of phonological representation that has certainly not been borne out by current work in phonology: there seems now little reason to think that the structure of phonological representations directly reflects instrumentally observable phonetic fact.

THIS IS GREAT PROSE!

Before proceeding further, I would like to paraphrase the suggestion made just above. Typically, vowel systems will have between three and eight or nine vowels. Given the assumptions reviewed so far, that means that the vowel system will typically have two or three contrastive vowel features, each on a separate autosegmental tier. If these features were the same across all languages -- if there were only three vowel features -- but each language could choose whether it used each privatively or equipollently, we would be faced mathematically with an inventory of nine types of complete vowel systems using two features, and twelve types of complete vowel systems using three features. I mention this calculation for one simple reason: to waylay the reaction which some readers may feel, the reaction that says that by allowing the privative/equipollent distinction to be feature-specific, we open the doors to astronomical numbers of vowel systems, vast beyond measure. In fact, we get only a very reasonable number, by no means any larger than what we might expect to find in a typology of distinct vowels systems.

The privative vs. equipollent distinction seems pretty PARADOXICAL - L.T. 13.17 -

We turn now to the canonical five vowel system. This will be analyzed with one equipollent feature, [+Round], and one privative feature, [Low], on separate tiers. The combinations allowed are given in (4), and the vowels that these feature combinations represent are given below.

(4) [-Round] [+F]
|
v

/i/

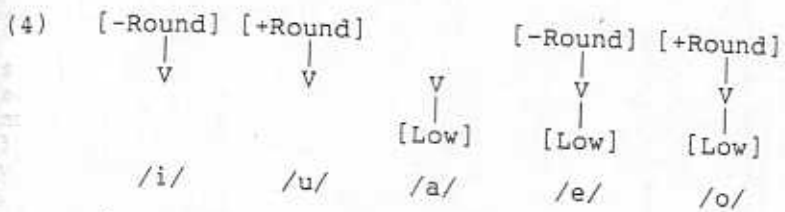
In such a system tenseness, and by no need to be re phonology. The n added by the (pos that is not prese vowel language.

(5) Redundant Fron

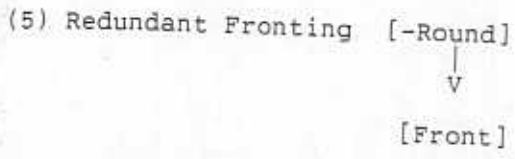
The mid vowels [e, e /i/ and /u/ respect demand as a bou representation. 7 natural class in elements.

This process of cot associated with a component of the suggest a languag number of associat from the various vo two figures in pare (e.g., (0,2)). We it has all the vow parameter. Initia property of the l speak, by each ske proceed, we shall the maximum and min whole as outer para vary things in a example of this neutralization, typ where the wide ran down to a set of v vowels. In such effect arises from associations allow

low will suggest that
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In such a system, fronting is as predictable as tenseness, and by traditional reasoning, therefore, has no need to be represented in the distinctive lexical phonology. The non-contrastive feature [Front] will be added by the (post-lexical) rule (5) on a separate tier that is not present in the lexical phonology in a five vowel language.



The mid vowels {e,o} are formal combinations of /a/ with /i/ and /u/ respectively, the kind of result that we demand as a boundary condition on our system of representation. The primary vowels {a,i,u} form a natural class in that they are singly-associated elements.

This process of counting the number of association lines associated with a skeletal V-slot is an important component of the definition of a vowel system. We suggest a language specifies the minimum and maximum number of associations permitted on a skeletal position from the various vowel feature tiers; we indicate these two figures in parentheses, as will be illustrated below (e.g., (0,2)). We will call a vowel system complete if it has all the vowels permitted by the minimum-maximum parameter. Initially we may view this as being a property of the language which is inherited, so to speak, by each skeletal V-slot in that language; as we proceed, we shall see that there is reason to think of the maximum and minimum numbers set by the language as a whole as outer parameters within which the language may vary things in a systematic way. The most striking example of this involves positions of vowel neutralization, typically found in unstressed positions, where the wide range of underlying vowels must narrow down to a set of vowels chosen from a smaller subset of vowels. In such cases, we will try to show that the effect arises from the fact that maximum number of associations allowed the skeletal position has

I think
what the
way express
is
PRIMARY-FEATURE
+
Roughness
Gloag
FRONTNESS
COLD
WALK
BARKING
WALK
PASSIVE
ENTHUSIASM

the
Rounding
Fusion is
what many
lead from
this way
(change
agnostic
about the
horizontal
dimension
of /a/)

BARNES; KUMBEZKOF; JAKOBSON

I like to paraphrase
Typically, vowel
and eight or nine
viewed so far, that
typically have two or
each on a separate
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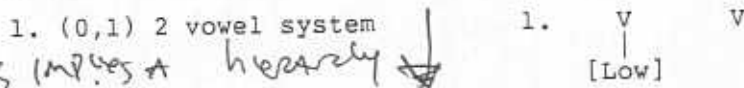
decreased.

Another point, one which is largely terminological but nonetheless of some interest: I shall define the schwa (and use the symbol ə) as the skeletal position associated with no vowel features. The term "schwa", of course, is widely and inconsistently used to variously refer to a vowel of a particular quality, or a vowel that cannot be stressed, or a vowel that tends to delete more than others, or yet some other sort of vowel. With this terminological move I mean to suggest that the constant factor in all this, and the intuition that lies behind the use of the term, is that there is a phonological common ground to these schwa vowels: that phonologically they are unassociated with vowel features. This point has already been made in slightly different terms, I hasten to add, by a number of other linguists using similar frameworks, such as by Anderson (1982).

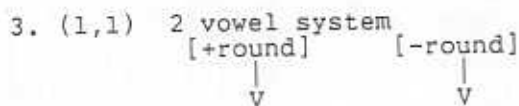
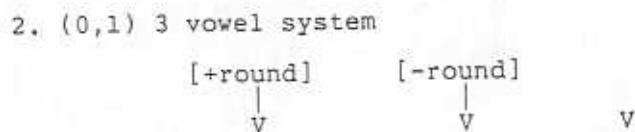
One other assumption will be made in the material that follows: the value of a feature, if privative, is predictable, or put in a slightly clearer fashion, there is available a privative feature Low, but none called "High"; there is a privative feature Front, but none called "Back"; there is a privative feature Round, but none called "Unround".

With this in mind, we may review the set of vowel systems that this notation allows for.

I. One privative feature (let us suppose it is Low, for concreteness' sake)



II. One equipollent feature (Round, for concreteness' sake)

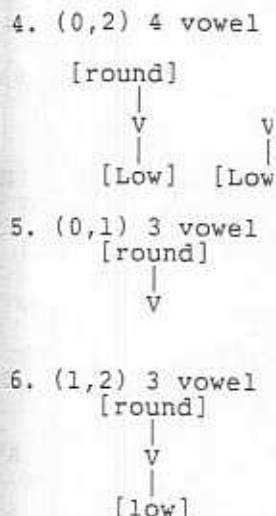


with variety for MANY versions

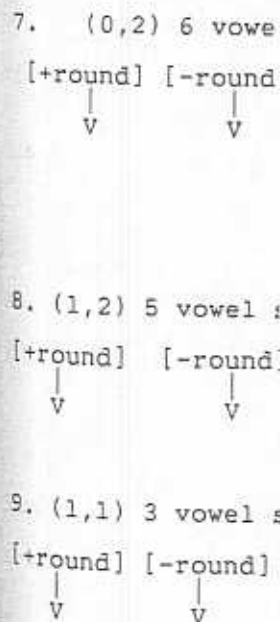
Have-IFER context-free markedness! (got what for?)

THIS implies a hierarchy

III. Two privative

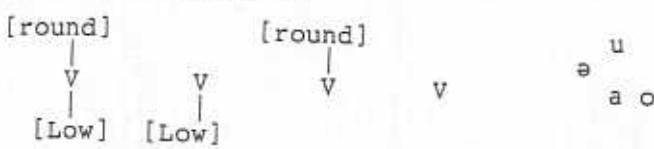


IV. One equipollent feature (low)

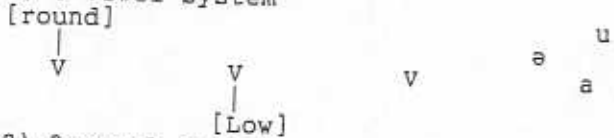


III. Two privative features (Round, Low)

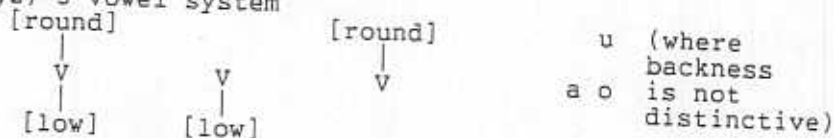
4. (0,2) 4 vowel system



5. (0,1) 3 vowel system

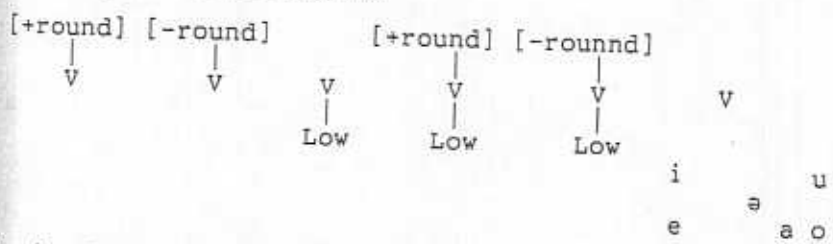


6. (1,2) 3 vowel system

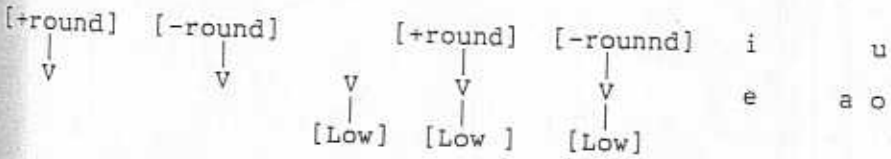


IV. One equipollent feature (Round), one privative feature (low)

7. (0,2) 6 vowel system



8. (1,2) 5 vowel system



9. (1,1) 3 vowel system



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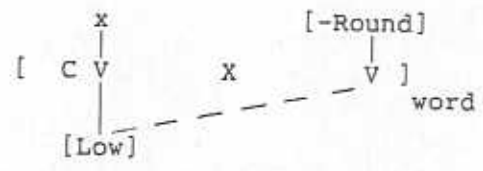
v

I should include A LONG chapter on why people like K&J largely ignore paradigmatic facts (as Goldsmith HERE puts it), but the Flemming

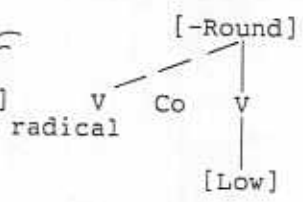
word seems to be about the importance of syntagmatic relations (as does Banca, who seeks phonetic with -u, they merge to /o/, and if it begins with /i/, they merge to /e/. The connective na meaning "with", for example, merges with the Class 1 prefix umu to give nomu, just as it merges with the Class 2 prefix imi to form nemi.

I have elsewhere argued in some detail that Yaka, a less well-studied Bantu language, also shows the internal behavior of the System 8 proposed here. I will briefly point out the highlights this account, discussed in Goldsmith (1985). Yaka involves two vowel harmony processes, the sort of processes that have been central since the dawning of the discussion of features in phonology, in the light of the understanding that harmony is typically agreement in the value of a particular feature, thus providing us with a handle on how the language assigns at least some of the features to its vowels. Yaka provides evidence that the representation of the vowel system proposed above is correct, based on rightward spreading of the privative feature [Low] and on leftward spreading of the equipollent feature [-Round]. There are two harmony rules, given in (6) and (7), and they apply as illustrated in (8).

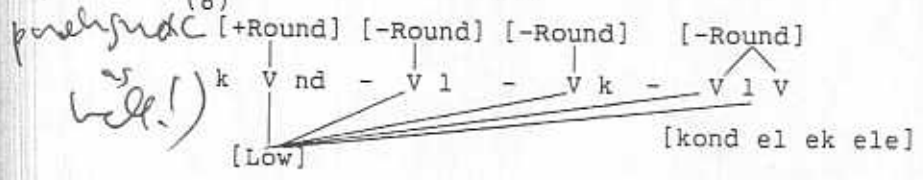
(6) Low Harmony



(7) Leftward Nonround Harmony (optional and iterative)



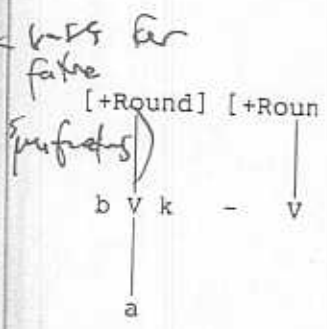
(8)



Goldsmith
[non]Bantu
Spec. Phonol
(i, t
a pair of
A&P?)
radical

is
preliterate
well!

IS THIS, CIP
WALL (E. B. ...)
Spongy?



Another important... The first vowel... vowels of the 1... underlyingly ma... three. Which... surprising: it is... (1,1) set of vowe... 9, i.e., {i,u,e... that this vowel... account for: v... distribution, th... be simply expres... features, modify... of associations F

6. Pasiego

Many five vowel... the /i/ and /e/,... and /o/, on the... in Yaka, and... characteristic... restlessness of... and not atypica... Montanes Iberia... popularized in th... into traditional... (1984)).

Montanes has, on... (9). Calling th... far as arithmetic... clearly makes me... canonical five v... feature has been l... vowel system from... High, non-Round... superficially.

it begins with /i/,
na meaning "with",
prefix umu to give
ass 2 prefix imi to

l that Yaka, a less
shows the internal
e. I will briefly
unt, discussed in
two vowel harmony
t have been central
1 of features in
understanding that
the value of a
s with a handle on
ne of the features
evidence that the
proposed above is
of the privative
spreading of the
are two harmony
id they apply as

[+Round] [+Round] [+Round] [-Round]

b V k - V l - V k - V l V [bokwelekele] or
[bokelwekele]
a

Another important point emerges from a look at Yaka. The first vowel of the stem may be any of the five vowels of the language, but the vowels in the suffixes underlyingly may only be chosen from a limited set of three. Which three those are, though, is hardly surprising: it is the subset which can be defined as the (1,1) set of vowels chosen from System 8, i.e., System 9, i.e., {i,u,a}. This illustrates an additional fact that this vowel system aims at providing a formal account for: when there are positions of limited distribution, the subclass of available segments should be simply expressible using the same assumptions about features, modifying only the minimum and maximum number of associations permitted in that position.

6. Pasiego

Many five vowel systems show limited contrasts between the /i/ and /e/, on the one hand, and also between /u/ and /o/, on the other. We have seen an example of this in Yaka, and provided a formal account of this characteristic. The history of Spanish shows the restlessness of this contrast as well. An interesting and not atypical case is described by Penny for a Montanes Iberian dialect (the facts have been popularized in the generative tradition by a rendering into traditional autosegmental notation by McCarthy (1984)).

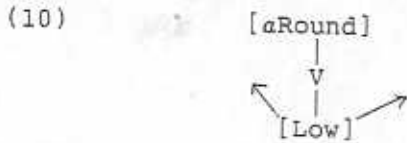
Montanes has, on the surface, a 9 vowel system, as in (9). Calling this a 9 vowel system may be correct as far as arithmetic goes, but in a systematic sense, it clearly makes more sense to describe it as a canonical five vowel system on top of which another feature has been lain (call it Fronting), creating a 10-vowel system from which one vowel (the Fronted, non-High, non-Round vowel) has been removed, at least superficially.

*This is
Yaka, and
is a
contrast
needs to
be
171*

(9) Fronted vowels Normal vowel

i	ú	i	u
	ó	e	o
	â		a

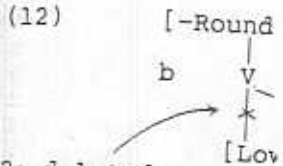
Let us focus on the normal (non-Fronted) vowels. As Penny demonstrates, when the stressed vowel is {i,u,e,o} -- anything but {a} -- then the other vowel positions of the word lose their five way oppositions. Just as in Bantu, where in non-initial position only the three primary vowels may appear underlyingly, so here we find that only three vowels may appear. We may even say that the three vowels that may appear are here also {a,i,u} if we allow ourselves a bit of abstract leeway, for the fact is that if the stressed vowel is /e/ or /o/, then the unstressed vowels may be /a/, /e/, or /o/ (again, as in Bantu), a process which should be analyzed as a spreading of the privative feature Low, as in (10). (For example, we find words like /tenér/, /aθér/, /orél/.)



When the stressed vowel is /i/ or /u/, then the vowels /a,i,u/ may appear in unstressed position (e.g., /mintira/, /arina/, /kumída/). In short, when the stressed vowel is /e,o,i,u/, then the unstressed positions take on the minimum-maximum specification of (1,1). The crucial question arises at this point -- given that this can only happen after stress has been assigned -- what happens to a vowel position that is, in effect, told that it can associate to only one vowel feature if it is already associated with two? The answer here is clear: as stated in (11), the privative feature [Low] is deleted.

(11) To meet the Well-formedness Condition: If the associations of a skeletal position exceed the permitted maximum, delete a privative feature (in the absence of language-particular rules).

Thus the derivation of a form like /bebér/ is as in (12).



2: deleted, by (11) and rule in text

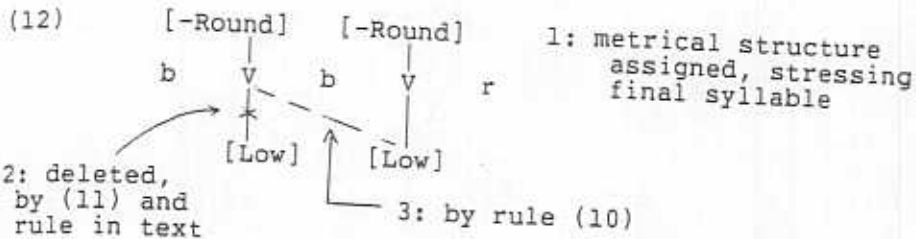
7. Hungarian, Finn

If the approach credence to the vowels systems, suggested in Golds, suggested above in conceptually extr. own internal r analysis is based accounts of these unformalized and accounts, that is, basically 5 vowel Fronting overlain c

Our account of the presence of only the feature Front is "subphonemic" way, vowels, treating preferred kind of (below). Such a p feature -- here, Fr a simple rule of Fr privative feature. At an early stage, be a stress unit, simple word-initial be reconstrued and word. Once this be see how this Fron having spread from somewhere in the w characteristic of t specific as to why t When a harmony pr language learner he it is tenseness, to over the entire word as to which syllable

Handwritten notes:
 This might be the most difficult part yet!

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7. Hungarian, Finnish.

If the approach suggested here is correct, it lends credence to the analysis of the Hungarian and Finnish vowel systems, and their vowel harmony systems, suggested in Goldsmith (1985) [2]. The analysis, already suggested above in the list of basic vowel systems, is conceptually extremely simple, and carries with it its own internal reconstruction, interestingly. The analysis is based on what has been noted in traditional accounts of these vowel systems but which is generally unformalized and unformulatable in earlier generative accounts, that is, the idea that these vowel systems are basically 5 vowel systems of the familiar sort with Fronting overlain onto them.

Our account of the 5 vowel system, again, is based on the presence of only two features, Round and Low. The feature Front is defined post-lexically in a totally "subphonemic" way, assigning Front to all [-Round] vowels, treating Front as a privative feature (the preferred kind of feature, a point we will return to below). Such a post-lexical insertion of a privative feature -- here, Front -- is perfect and ripe ground for a simple rule of Front harmony, which would spread this privative feature across a relevant span of syllables. At an early stage, one might well suspect this span to be a stress unit, such as the foot; in a language with simple word-initial stress placement, this could easily be reconstructed and reinterpreted as harmony within the word. Once this becomes obligatory, it is very easy to see how this Fronting could be reinterpreted not as having spread from a [-Round] vowel that appeared somewhere in the word, but rather as being a lexical characteristic of the word. In fact, we can be more specific as to why this reanalysis should have occurred. When a harmony process operates across a word, the language learner hears the prosodic feature -- whether it is tenseness, tone, nasality, or frontness -- spread over the entire word. The child must make a hypothesis as to which syllable that feature spreads from, and the

I am missing this feature in my accent!

FB is an interesting concept

anted) vowels. As vowel is {i,u,e,o} vowel positions of ions. Just as in on only the three y, so here we find e may even say that here also {a,i,u} ct leeway, for the /e/ or /o/, then , or /o/ (again, as be analyzed as a w, as in (10). (For /aθér/, /orél/.)

, then the vowels position (e.g., short, when the en the unstressed specification of s at this point -- r stress has been position that is, in to only one vowel d with two? The ll), the privative

Condition: If the sition exceed the rative feature (in r rules).

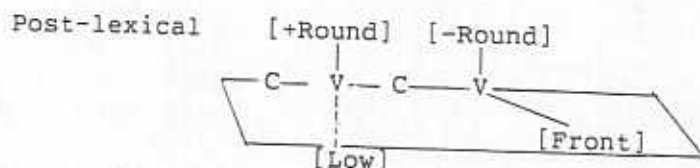
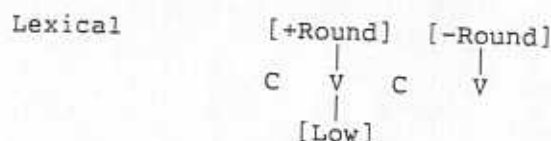
/bebér/ is as in

hypothesis the child will inevitably draw is that it comes from the most heavily accented syllable (this notion is formalized in Goldsmith (1987)). In the case of a system like Hungarian or Finnish, this means interpreting the Frontness as coming from a vowel that may not have been the historical source of the Fronting, if the first vowel is not [-Round], where a later [-Round] vowel in the word was actually the source.

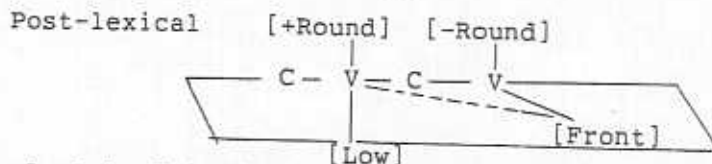
The stages of this account for a word that was originally of the form CoCi, for example, are illustrated in (13).

(13)

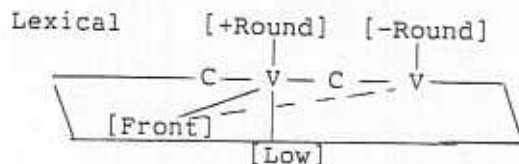
Stage 1: A standard 5 vowel system



Stage 2: A post-lexical spreading of the non-distinctive feature Front is added, adding another stage in the post-lexical derivation:



Stage 3: Rule 5 (Redundant Fronting) is dropped, and the feature Front is lexical, but its deepest association is (only) with the stressed syllable, and is later spread by either a lexical or a post-lexical.



8. Conclusion

We have suggested features that autosegmental t first, the privative/equipo of counting of This counting maximum specificity both in description and for description, neutralization, I

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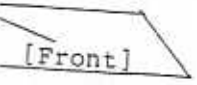
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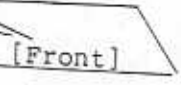
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8. Conclusion

We have suggested a preliminary treatment of vowel features that departs minimally from familiar autosegmental theory, but which rests on two points: first, the feature-specific use of the privative/equipollent distinction, and second, the use of counting of associations allowed to a skeletal tier. This counting procedure, with both a minimum and a maximum specified for skeletal positions, is effective both in describing complete vowel systems as a whole, and for describing the character of positions of neutralization, both underlyingly and derivationally.

I have said little about the relative naturalness of one such vowel system compared with another, and in general I do not think there is much that can be added on that score. In general, the analysis of a vowel system by the language learner must encode the phonological oppositions that are encountered, and it seems reasonable to assume that an opposition is preferably analyzed as a privative opposition over an equipollent opposition, where possible, just as one equipollent opposition is chosen over two privative oppositions.

This is the outline of the proposal then: only future work will provide us with an answer to the question as to whether this is a fruitful and correct direction to seek a deeper understanding of the phonology of vowel systems.

Notes

1. The extremely interesting paper by Steriade in this volume contains several examples of this sort, where the assumption that the vowels have the features as in (2) plays an important role.

2. The paper by Farkas and Beddor in this volume on Hungarian vowel harmony raises two points of considerable interest. First, they point out that the account sketched here has offered no explanation for why the front unrounded vowels (the potentially neutral vowels) act like neutral vowels when not in word-initial position, but act like front vowels when in word-initial position. The reason for this, I suggest, is essentially the same as the reason given in the text in the discussion of the historical development of such a type of vowel system: in clear accentual systems, the accented syllable has a special status with respect to

This is something Calabrese needs to accept.

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The potential for the front unrounded vowels to be phonologically associated, or not, with the privative feature [Front] does not necessarily mean that words will randomly choose to have or not have the feature [Front] attached to such vowels. While it is reasonable for Farkas and Beddor to point out that there is some system to such assignment in Hungarian, they leave the unfortunate impression that the proposal they are criticizing itself actually suggests that the [Front] assignment to neutral vowels is random or unprincipled. In fact, certain theoretical principles point in the right direction. Drawing on the proposal in Goldsmith (1987), let us consider the following (language-particular) statement: in cases of phonetic ambiguity [i.e., cases where harmonic feature assignment is not immediately determined by the phonetic facts], vowels are assigned a harmonic feature if and only if they are in a (primary) stressed position. This principle accounts for the first generalization in Farkas and Beddor's paper.

They raise a more difficult problem, albeit an entirely traditional one, when they consider the relation of root-internal harmony and word-level harmony. This distinction was not addressed in Goldsmith (1985), but while there certainly is a relationship between the two, it has never been firmly established that in systems with a healthy number of disharmonic roots, as in Hungarian, the two principles are to be identified as one.

A reasonable approach to the Hungarian facts (and those of similar languages that I am aware of) that maintains the vowel system proposal offered here, and that also meets Farkas and Beddor's criticisms, is the following. Let us take root harmony to be a condition on well-formedness (or, to neologize, "better-formedness"), rather than a rule in the familiar generative sense. (This notion is explored as well in Goldsmith (1987).) We express the sense in which fully harmonic words in Hungarian are "better-formed" than disharmonic words by defining the most highly-valued structure as that one with the most-associated harmonic autosegment. A word with a [Front] autosegment that is associated to all the vowels of a word is more highly valued than a word with the autosegment associated to only a subset of its vowels, and so forth. This same formation condition will ensure that words with front vowels at their beginning, when followed by neutral vowels, will have the [Front] autosegment associated to

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all the vowels of the word, including, in particular, the neutral vowels. This answers Farkas and Beddor's second important objection. Other questions arise in comparing their own proposal and the present one, but the remarks in this footnote are intended as an elaboration of the system presented in Goldsmith (1985) and in the text, in the light of Farkas and Beddor's objections.

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