Züritüütsch umlaut and the non-existence of the feature [tense]

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1. GENERAL INTRODUCTION

The Zürich dialect of Swiss German has a highly complex vowel system. Five phonemic distinctions of height are involved among monophthongs, and there are nine diphthongs. All in all we claim that there are no less than 44 distinct vowels including length distinctions, and 33 ignoring this factor.

In this short article we will attempt two things. Firstly, we will describe the facts involved in an umlaut process, which relates various pairs of vowels. Then we will propose an analysis of these facts in terms of the model for segmental structure we have developed in some recent articles (van der Hulst 1988, this vol.; van der Hulst and Smith 1989; forthcoming), demonstrating in particular that there is no need for the positive expression of a feature [tense]. Some research in this framework, for instance by Smith et al. (1989), has assumed that "tenseness" can sometimes be accommodated in the same terms as "advancement of the tongue root" or "pharyngeal expansion", which is expressed in terms of a phonological primitive lil, which also expresses frontness (cf. van der Hulst, this vol.). This, however, cannot be the correct approach to the rich vowel system of Züritüütsch, as in this system the properties "tenseness" and "frontness" function independently. Front rounded and back rounded vowels clearly differ in terms of presence or absence of the component lil. Yet within each class we also find a tenseness contrast.

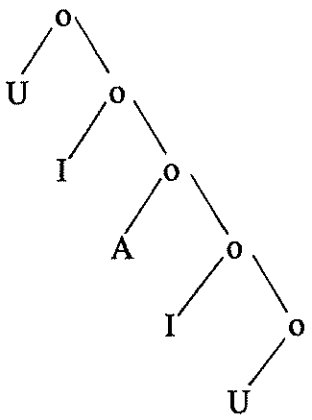
The central claim here is that three unary components suffice to express the various places of articulation – including those of vowels – that are distinctive within natural languages. The various place features of other versions of generative phonology are therefore much reduced in number. This is achieved at a certain cost, however. Part of the cost is shared with other non-linear approaches - the recognition that some hierarchical structure is required. Less universally accepted is another aspect, that of the hypothesized existence of dependency relationships (but see Kaye, Lowenstamm & Vergnaud 1985; Anderson & Ewen 1987).

For reasons of space we will avoid going into further details of our theory now (cf. van der Hulst 1988, this vol.; van der Hulst & Smith forthcoming). Our analysis of the umlaut facts will, we hope, suffice to express some of our

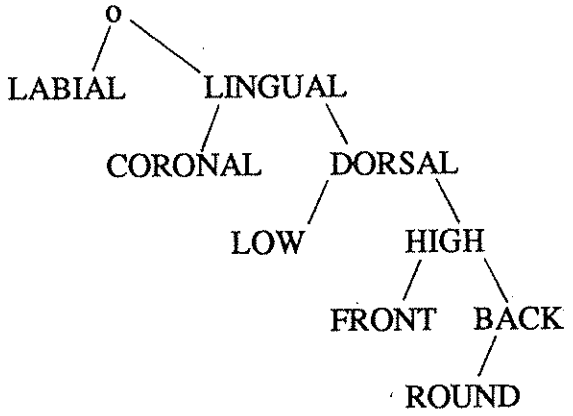
ideas on how vowel systems are structured, and how vocalic patterns may change.

The basic hierarchy postulated for Place is as follows:

(1) a.



b.

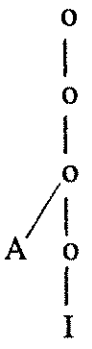


(1a) illustrates the hierarchy in its maximal form, while (1b) illustrates the simplified phonetic content of the various nodes and terminal features or 'components'. Contained within (1a) are two different kinds of entity – firstly the 'components': |u|, |i|, and |a|, the first two of which may attach at two different locations in the structure (or, alternatively, one may represent our view in terms of a *cyclic graph* with an arrow pointing from the sister of the lower |i| to the top node of the tree); and secondly, what we refer to as the segmental "spine", i.e., the path consisting of the unlabelled nodes. These nodes form sockets, as it were, where the various components may be plugged in, but we allow them to occur 'bare' or 'empty', a move which is crucial to our treatment of the tense-lax oppossition (cf. van der Hulst, this vol. for other motivation and details).

As we have said above, there will always be some dependency relationship present in the hierarchical structures. We represent heads and dependents by means of vertical and oblique association lines attached to some node. Therefore (2a) involves a different dependency relationship from (2b).

(2) a.

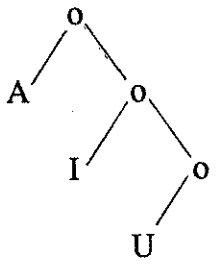
b.



(2a) represents a vowel where the "low" component |a| is the head, and the "front" component |i| is the dependent, while (2b) represents the converse of this situation. (2a) might represent a vowel /æ/, like that of English "*had*", in the region of the IPA cardinal low front vowel, while (2b) might represent a vowel /e/, in the region of the IPA half-close front vowel.

As we will almost solely be concerned with vowels, below we will only make reference to that portion of the hierarchy that is relevant for these segments. This is the part dominated by the spinal node with the meaning "DORSAL", i.e., the part-structure with the maximal specification:

(3)



Note that possible vowels are of various types:
- simple vowels with one component (and with no empty spinal nodes)
- complex vowels with two or three components
- vowels with one or two components and one or two empty spinal nodes

We assume that dependent spinal nodes do not receive prominent phonetic interpretation. For this reason it makes little sense to allow vowel structures with a component as head and an empty spinal node as dependent, as the empty spinal node would have little content, or, perhaps, no content at all. This assumption reduces the number of structures possible in our model. Any vowel structure with an empty terminal spinal node therefore automatically have this as head. Empty spinal nodes, then, act as "default heads" (cf. van der Hulst, this vol.).

At this point we must raise the question of how "tenseness" is to be represented. Instead of considering "tenseness" as susceptible to representation in terms of some component or other, let us consider it in strictly relational terms. Part of the characterization of the nature of a vowel resides in the number of spinal nodes it incorporates: a) only the DORSAL node; b) the DORSAL node and the HIGH node; or the DORSAL, HIGH, and BACK nodes. The components that may be plugged into these nodes may be seen as carrying out the function of *enhancing* these nodes. This notion, developed in Stevens, Keyser & Kawasaki (1989), is employed to explain, for instance, the relationship between the features [back] and [round]. Without going into details we may interpret their account of this in the following way. The effect of backing has certain

acoustic consequences. A further rounding of the segment in question will exaggerate these acoustic effects.

Now, to talk of "enhanced" or "exaggerated" effects reminds us immediately of some of the articulatory differences that have been claimed to exist between lax and tense vowels. It seems that, at least for non-low vowels, the tense vowels are further removed from the position of the neutral vowel (taking this to be schwa). In many languages it appears to be the case that the tense vowels are relatively longer (as in Southern English and American English), or are the only vowels that can be lengthened under particular circumstances (as in Scottish English). A discussion of the articulatory correlates of the tense-lax opposition conforming to this view is offered in Wood (1975).

If we attempt to relate these various ideas of "enhancement", "nonneutrality", and "length" with each other, one possible result would be the following. The difference between tense and lax vowels is that the head contains an (enhancing) component in the one case, and not in the other.

(4)

/u/ (tense)	/U/ (lax)		/i/ (tense)	/I/ (lax)
o	o	<DORSAL>	o	o
|	|		|	|
o	o	< HIGH >	o	o
|	|		|	
o	o	< BACK >	I	
|				
U				

Although the difference between tense and lax *i*, then, is formally identical to the difference between advanced and non-advanced *i* (cf. van der Hulst, this vol.), the same does not hold for the corresponding oppositions for *u*. In the case of low vowels we even get opposite effects. Whereas the advanced *a* is more fronted and raised, a tense *a* is more back and low, having the positive property of phargyngeal constriction. The lax low vowel, in our terms, would be the completely unspecified vowel, having just the dorsal node. Our approach explains, we believe, the partial overlap (and confusion) between the traditional features [±ATR] and [±tense].

2. THE FACTS OF ZÜRITÜÜTSCH UMLAUT

Firstly we will set out the basic vowel system in (5), essentially following Weber (1964). Weber includes two vowels in his statement of the vowel system

which we regard as allophones of other vowels. We indicate these by [ ]. A vowel which does not occur on the surface – /ÖÖ/ – but which we consider to be underlyingly present, is indicated by / /.

(5) a. **Monophthongs**

Front Unrounded		*Front Rounded*		*Back (Rounded X "a")*	
Short	*Long*	*Short*	*Long*	*Short*	*Long*
i	ii	ü	üü	u	uu
I	II	Ü	ÜÜ	U	UU
e	ee	ö	öö	o	oo
[E]	EE	[Ö]	ÖÖ	–	/OO/
ä	ää	–	–	a	aa

b. **Diphthongs**

iə	üə	uə
ei	öi	ou
äi	Öi	au

c. **Schwa** ə

Note that the lower mid vowel inventory is defective in lacking distinctively short vowels.

The umlaut relationships between vowels can be summed up as follows. Firstly we have a group where the relations are unique pairwise.

(6) *Unique umlauts*

a.	*Monophthongs*	u → ü	uu → üü
		U → Ü	UU → ÜÜ
		o → ö	oo → öö
		o → Ö /___ r,x	
b.	Diphthongs	uə → üə	
		ou → öi	
		au → äi	

This group subsumes all the umlaut relationships involving solely surface non-low vowels. Umlaut relationships holding of surface low vowels are as follows. The umlaut products are quite varied.

(7) *umlauts of "a"*

a.	*"New" umlaut*	a → ä	aa → ää
b.	*"Old" umlaut*	a → e	aa → EE, e
		a → E /___ r,x	
c.	*umlaut of "/OO/"*		aa → ÖÖ

The umlaut relationships treated in (6) are largely self-explanatory (examples will be given below). The only exception concerns the umlaut-product of /o/. This is /ö/, except if followed by /r/ or /x/, when the lower mid [Ö] appears. This appears to be a purely allophonic question: [ö] does not occur preceding /r, x/. In this environment laxing takes place.

The relationships in (7) are much more complex, however. To deal with (7c) first, this can be analysed in a straightforward fashion if the assumption is made that the surface alternation [aa ~ ÖÖ] is interpreted as representing underlying /OO/. This accounts for a gap in the system, and in addition it creates symmetry among the three vertical subgroups in the vowel system.

With (7a) and (7b), however, the situation is more difficult. It is clear that all the types represented here derive from underlying /a(a)/. Weber distinguishes between these two types as "Old umlaut" and "New umlaut". These labels indicate that "Old umlaut" represents a pattern similar to that of Standard High German, while "New umlaut" is an innovation. Note that "New umlaut" operates in a parallel fashion to what we have called *Unique umlauts* in (6), i.e., purely as a fronting process. We will regard this as the productive umlaut process for /a(a)/, a decision which is in accord with the facts of the language.

We treat *Old umlaut* as recessive, and irregular (seen from the scope of umlaut, which is of varying productivity). The umlaut product [E] is only of allophonic significance, being apparently the allophone of /e/ that occurs before /r/ and /x/. This is of course parallel to the relationship of [Ö] to /ö/. This leaves us with two umlaut products: /e/ and /EE/. Short /a/ exhibiting Old umlaut goes to /e/; the long vowel, however, displays both the development to /e/, and the development to /EE/, in roughly equal proportions.

For reasons of space we will ignore the existence of the diphthongal umlaut cases in the rest of this article since the whole question of the representation of diphthongs would be too much of a diversion from our purpose in this article.

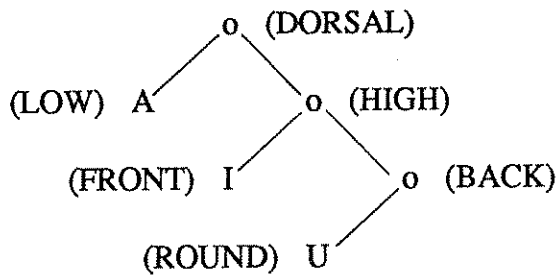
(8) **Exemplification**

Underlying Vowel	*Base form*	*umlaut*	*Gloss (plural*
u	kSudər	kSüDər	unkempt hair
uu	buux	büüx	belly
U	grUnd	grÜnd	ground
UU	sUU	sÜÜ	son
o	Sopf	Söpf	spade
oo	gloon	glöön	clown
OO	xrOO (> [xraa])	xrÖÖ	cake
a	bank	bänk	couch
a	xrats	xrets	scratch
a	swax	swExər	weak (comparative)
aa	pfaarər	pfäärər	minister
aa	naagəl	negəl	nail
aa	taarm	tEErm	gut

3. ANALYSIS OF THE VOWEL SYSTEM

The three components, lil, lul, and lal, can be given the approximate meanings "Front", "Round", and "Low". In (9) we repeat the hierarchical relationship of the components and spinal nodes relevant for the vocalic system.

(9)



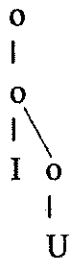
The three high tense vowels are represented as follows:

(10)

/i/	/ü/	/u/
o	o	o
|	|	|
o	o	o
|	/|	|
I	I o	o
	|	|
	U	U

The representations for /i/ and /u/ are straightforward. We have provided some justification for them already, in connection with (4). However, the discerning reader will have spotted a problem with our representation for /ü/. We stated above that spinal nodes dominating head components were to be given greater phonetic weight than those dominating dependent components. This suggests that the node directly dominating |u| – i.e. that with the meaning "BACK" – is to be interpreted as such. One might reasonably enquire why we have not assigned the representation in (11) to /ü/.

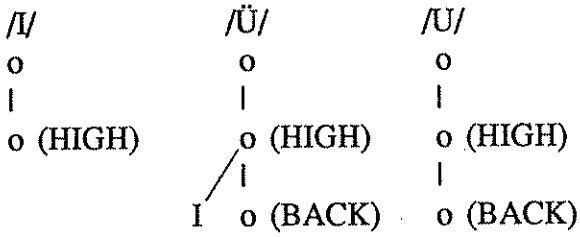
(11)



Here, the spinal node dominating |u| is not in a "head branch", and so is not interpreted as having much weight.

One reason for assigning the representations in (10) to the tense vowels, concerns those that have to be given to the corresponding lax vowels.

(12)

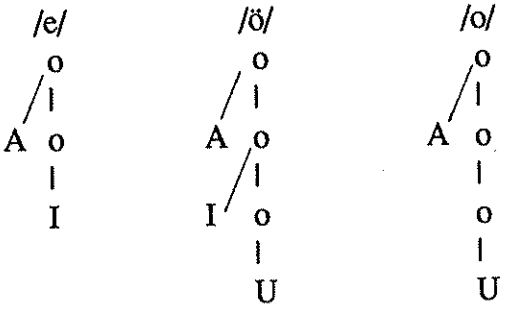


Note that the representation we have provided for /Ü/ is the only possible one, given the proviso above that terminal spinal nodes require to be heads.

What this suggests is that the terminology utilized for the interpretation of the components is overly biased in the direction of the articulatory aspects of the sounds concerned. We are in favour of a more neutral set of definitions (although our terminology is based on articulatory categories), reflecting also, or even primarily, the acoustic aspects of sounds. The basic point that the same sound can often be produced by means of different articulations argues for the primacy of the acoustic side of things. We interpret "BACK" then not as a direct indication of where the sound is produced but rather as an indication of the primary nature of the acoustic parameter concerned.

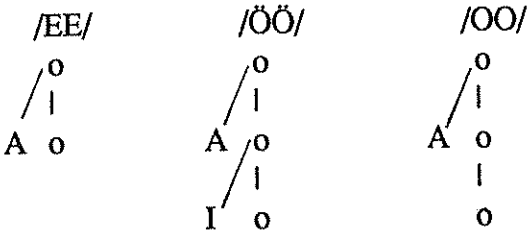
The mid tense vowels differ from the high tense vowels by the addition of a dependent component |a|, to indicate their lower position.

(13)



We remove the head component to get the corresponding lax vowels /EE, ÖÖ, OO/.

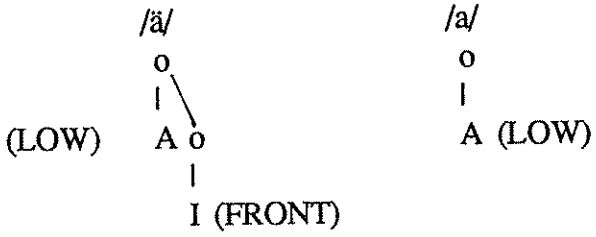
(14)



The same considerations as in the case of /ü, Ü/ (see above) apply to the vowels /ö, ÖÖ/, as regards the phonetic interpretation of the terminal spinal node ("BACK").

Finally we come to the low vowels /a/ and /ä/ which we represent as in (15):

(15)



To conclude, we can say that mid vowels involve a dependent lal, low vowels a head lal, and high vowels no lal at all. Front vowels involve the component lil. This is the head in the case of non-low, non-rounded vowels /i, I, e, EE/, and a dependent in all other cases.

4. THE UMLAUT PROCESS ANALYSED

Umlaut is applicable in a variety of nominal, adjectival, and verbal inflectional and derivational processes. It is never totally regular, although it appears to have a high degree of productivity in some cases, e.g., the diminutive, where

suffixation of nouns with /-li/ is regularly accompanied by umlaut. We will restrict ourselves here to discussion of the phonological processes involved, and ignore the (extremely complex) morphological aspects of umlaut.

The first question we will set ourselves is the following. What precise changes take place in the "Unique" cases of umlaut (see (6))? These cases (/u > ü; U > Ü; o > ö/) all consists of adding a dependent lil to the hierarchical representation, i.e., involve the least possible alteration to the existing structure.

Umlaut is, we presume, caused by some phonological element. This can only be a floating element, for both phonological and morphological reasons.

Phonologically, a variety of suffix types causes umlaut – both involving the vowel /ə/ (schwa), and the vowel /i/. However, other suffixes with these vowels do not cause umlaut. Additionally, umlaut results in some cases without there being any segmentally isolatable suffix present at all.

One obvious side effect of the theory adopted here is a restriction on the type of elements that are capable of being floating. Clearly, spinal nodes cannot float, since they can have no independent existence apart from the hierarchy within which they exist, and by which they are defined. Components, on the other hand, are capable of a free existence, and may therefore float. The objection might be raised at this point that if we have a component lil, for example, then we will not know whether it is an lil directly dominated by the spinal node "LINGUAL", or whether it is an lil directly dominated by the spinal node "HIGH". It would take us too far afield to discuss this point further, but we would like to claim that this duality is in fact a positive advantage. However, in the present case we are dealing with vowels, and we claim that in this case the unmarked case is for lil to attach to its lower "socket", i.e., the spinal node "HIGH".

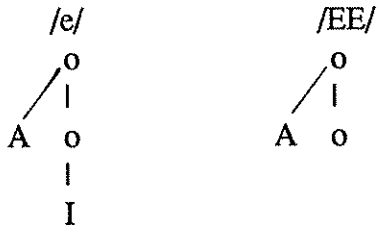
If we turn to the types of umlaut illustrated in (7) – the varied umlaut products of (surface) /a/, then we find a variety of relationships.

If we look first at the "New umlaut" case, we will find that the effect of umlaut is that a dependent lil has been added to the representation which consisted of unadorned lal (see (15)). This is the same result as in the aforementioned cases.

If we turn to the "Old umlaut" case then we have to distinguish between short and long vowels, as the result in the first case is /e/, and in the second /EE/. Note that short [E] is an allophone of /e/, and that /ee/ does not function as an umlaut product, although /aa/ does in some cases give /e/ – the only case where umlaut alters the length of a vowel. We will not deal with this change in length as such here.

In the case of /e/ (resulting from either /a/ or /aa/), we have umlaut resulting in the addition of a new head component lil. In the case of /EE/ (from /aa/) we find another effect – the head is no longer lal, but unlike in /e/ there is no lil component present, merely a spinal node (with the meaning "High"). We illustrate these two vowels again as (16).

(16)



How do we explain the umlaut product /EE/? Why does "Old umlaut" of /aa/ not result in /ee/ as might be expected? We believe that we have only the beginnings of an answer to this question. Given that (short) /e/ appears as often as (long) /EE/, it might simply be a question of a constraint of the "docking" of lil on the long vowel. The two different outcomes would then represent two possible options to avoid this; either the vowel is shortened, or lil is set afloat. What weakens this explanation is the fact that the vowel /ee/ is wellformed in the system.

The reader might at this juncture argue that, in the latter case, no explicit umlaut would take place at all. This is not the case, however. The "docking" of a floating component has two aspects: the attachment of the component, and the creation (if not already present) of a suitable spinal node to dock on. A constraint which causes the setting afloat of lil would not cause the deletion of the spinal node dominating this component.

Finally, the umlaut of the surface [aa] to which we assign the underlying structure /OO/ takes effect again by the addition of a dependent component lil (see (14)).

The umlaut process, as we have analysed it above, consists of the addition of dependent lil (usually), and head lil (sometimes). Let us examine the claimed effect on vowels with respect to whether the umlaut product contains these components, or not.

This gives us three cases – (a) vowels containing head lil; (b) vowels containing dependent lil; and (c) vowels containing neither.

In "Old umlaut" the added component lil becomes the head, in the one case. This illustrates the (a) case. The (c) case also falls under "Old umlaut"; here /EE/ is the result. We could say that the floating lil acts as a catalyst, causing the spinal node that normally carries the lil to become head, but stopping short of attaching this component itself. This aspect clearly requires further investigation. In both cases we get the concomitant effect of raising the low vowel /a/ to a mid vowel of some kind.

We find the (b) effect with both the Unique umlauts and "New umlaut". The obvious effect of the change of "Old" to "New" umlaut is a regularization of the umlaut process, which now, in its most productive form, may be stated in a simpler fashion for vowels of all heights. We would claim that adding a dependent component to an already extant structure is less marked than making the new element the head of the new structure.

5. CONCLUSION

We are aware of the fact that this article does no more than scratch the surface of the complexities of the Züritüütsch vowel system. Much more work and space would be required to do it justice. However, we do think that our analysis, preliminary as it is, has certain advantages. Firstly, the expression of the tense-lax relationship in vowels in terms of "enhancement", rather than in terms of an explicit feature, has certain attractions. Secondly, the fact that umlaut – which we interpret as an effect of the floating component |I| – sometimes results in a change of height receives a simple explanation in terms of varying dependency structures. Thirdly, the introduction of "New umlaut" – which we would assume involved a certain cost, i.e. the introduction of a new vowel /ä/ – can be seen as a simplification of the umlaut process.

NOTE

The reversal of the authors' names in this case has no implications for the significance of their relative contributions to this article. The intention is rather to recall more emphatically an enjoyable field trip to the wilds of Switzerland in which the first author and Henk van Riemsdijk both participated.

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