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HEAVY CONSONANTS AND COMPENSATORY LENGTHENING

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Many languages contain phonological rules sensitive to *syllable weight* – that is to say, they draw a binary distinction between *heavy* and *light* syllables. An intuition dating back to antiquity suggests that there is natural unit for measuring this weight: the Greeks called it the *khrónos prõtos* 'primary time'; Sanskrit grammarians the *mātrā*; and since the 19th century the term *mora* has been employed. To quote McCawley 'The only reasonable definition of "mora" that has been proposed is: "something of which a long [heavy] syllable consists of two and a short [light] syllable of one" (McCaweley 1977:265).

The weight of a syllable is somehow correlated with the number (sometimes also the type) of segments within its rhyme. An open syllable containing a short vowel always counts as light; a syllable with a long vowel will count as heavy; the way in which any other segmental material of the rhyme contributes to the total weight of a syllable varies from language to language. Perhaps most typically, all closed syllables are treated as heavy; but quite frequently only vowels can bear weight – see the following classification of languages (Hyman 1985:5)

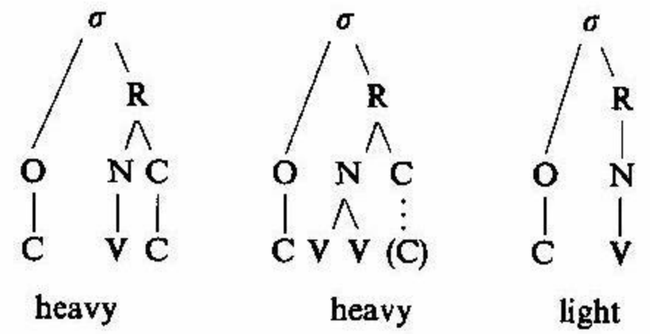
(1) Syllable weight

	light	heavy
Type A	CV CVC	CVV CVVC
Type B	CV	CVC CVV CVVC

Some languages belong to a mixed type, somewhere between the two extremes: in Lithuanian vowels and sonorants can bear weight; in Cayapa syllables of the shape *CV(V)(C)* or *CVC* count as heavy, but *CV*ʔ (with a final glottal stop) is a light syllable.

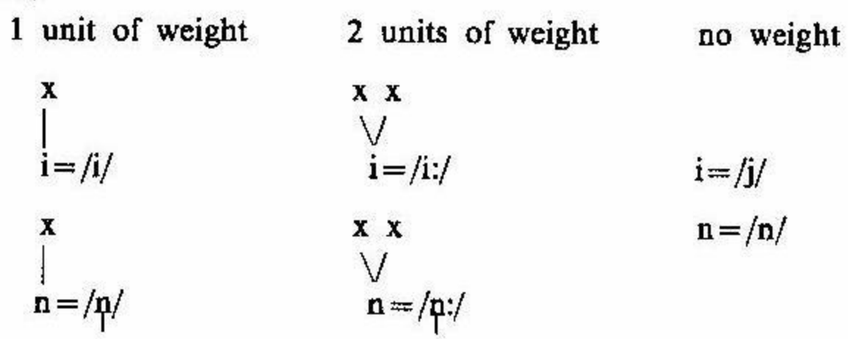
Traditional phonology employs no overt representation of moras; when necessary, syllable weight is evaluated from the structure of the rhyme. If there are two or more skeletal positions in the rhyme (or in the nucleus alone, for a Type A language), the syllable is said to be heavy, or to contain two moras; otherwise it is said to be light, or to contain just one mora:

(2)



It has been argued, however (Hyman 1985) that the units which contribute to syllable weight are in many cases the same units which can carry stress, pitch accent, tone or quantity. According to Hyman, moras belong to a special autosegmental tier – *weight tier* – where they exist independently of syllable structure. When associated with segments, moras represent their phonological weight and also length (Hayes 1989) (here and henceforth 'x' will symbolise a mora):

(3)



In Hyman's model, a universal rule of weight assignment associates a mora with every underlying segment, whereupon another universal rule (of 'onset formation') deletes the weight of prevocalic consonants and attaches such consonants to the moras of the following vowels; finally, language-specific rules of coda formation and syllabification organise the rest of the material. The result is a prosodic structure based upon the mora as its lowest unit:

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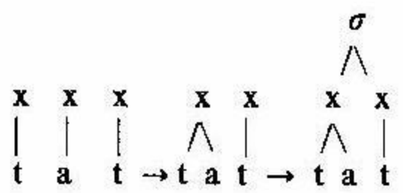

This model (as well as a similar one found in Hayes 1989) has the advantage of being able to represent phonological weight overtly, thus simplifyng all those rules which depend on mora counting. It also makes it clear that the commonly found relations between syllable weight and processes such as stress or tone assignment result not from a mere coincidence but from the independent existence of an autonomous weight tier. I generally agree with Hyman's argument in favour of such an approach; nevertheless, I should like to point out a few disadvantages of his solution:

(A) Hyman's rules generate 'syllables' whose structure is hardly compatible with the 'traditional' syllable structure,

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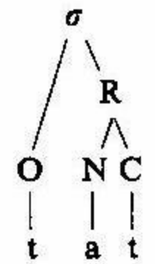


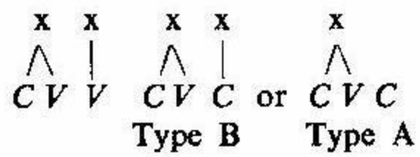
and it is far from clear how to build this well-established structure, using moras as bricks, in a natural way.

(B) Hyman's rules do a few unnecessary things, such as assigning weight to segments which never carry it on the surface. If something must always be deleted, there may be some gain in not assigning it in the first place.

I propose a modification of Hyman's model: weight is initially assigned to *vowels* only (one mora to a short vowel, two moras where length is not predictable and has to be represented in the underlying form); at the same time consonantal onsets are formed as in Hyman's theory. Whether consonants that do not form onsets may bear weight (that is, may be assigned moras) is a problem delegated to language-specific rules. In a Type A language a consonantal coda is never given weight; in a Type B language it can be given a mora of weight.

I do not wish here to analyse the question whether the mora is more *basic* than the syllable. It will suffice for our present purpose to assume that the mora is an *autonomous* entity and that a string of segments can be divided into moras independently of syllabification. A typological motivation for mora counting can be seen in Vennemann's 1988 'preferred syllable structure' (CV): in the initial analysis of a string of segments, the 'basic' *CV* sequences are counted first; the rest of the segmental material may be treated as 'imperfect' *CV*'s:

(6)



Compensatory lengthening is an important class of phonological processes for which explanations founded on moraic theory have been proposed. Roughly speaking, we have a case of compensatory lengthening when one segment is deleted and another segment makes up in length for what is lost. In the most common form of the phenomenon, a consonant in the coda of a syllable is lost and the vowel of the nucleus becomes lengthened ($VC \rightarrow V$:):

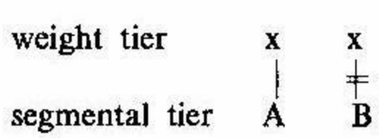
(7) PIE * *nisdos* > Skt *ni:da*

PGmc * *gans-* > OE *go:s*

According to de Chene (1985: 221-86) every such process can be interpreted as assimilation: the consonant becomes a glide, and the glide coalesces with the preceding vowel; the resulting vowel is long because it remains associated with two skeletal positions. The process does not involve 'compensation' in any real sense; consequently, the very designation of 'compensatory lengthening' is a misnomer.

Hock (1986) and Hayes (1989) defend the view that compensatory lengthening is a more complex process, guided by a prosodic frame and consisting in the reassignment of a weight unit (mora). Within the framework of moraic phonology, compensatory lengthening (CL) can be defined as follows:

(8)



where B is either deleted or re-associated, and its mora attaches itself to A.

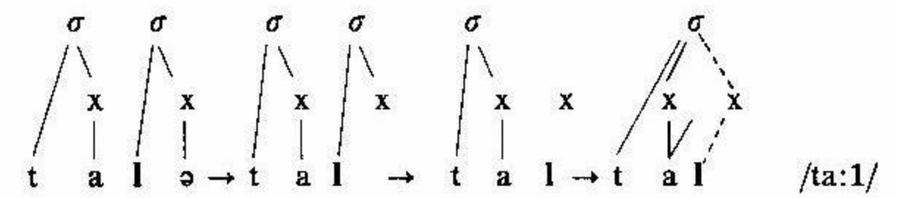
There is an interesting type of sound change that, though usually classed as compensatory lengthening, obviously cannot be explained as assimilation. It happens when the second of two non-adjacent vowels is lost and the first of them becomes lengthened: $V\,C\,V \rightarrow V{:}\,C$. De Chene (1985:211) mentions just one case of this (in Slavic), and chooses to refrain from discussing 'any change of this sort'. The problem is that the phenomenon may be much less isolated than it appears to de Chene; therefore, it may be worth discussing.

The *Middle English Open-Syllable Lengthening* (MEOSL for short) has usually been described as follows: Middle English stressed vowels are lengthened in open penultimate syllables. Minkova (1982) convincingly demonstrates that lengthening is regular only in disyllabic words whose final vowel becomes lost in early Middle English (words such as *name, tale*); it does not occur in words like *maniȝ* 'many', where both vowels are preserved. We have occasional, irregular lengthening in words ending in a liquid or a nasal (like ModE *raven, over, weasel, staple*), where the vowel of the second syllable is 'reduced' and may be altogether deleted, but its syllabicity is taken over by the final

consonant; as a rule, there is no lengthening (cf. ModE *saddle, heaven, seven, kettle, little, never*).

If MEOSL is conditioned by the loss of the final vowel (ə → ∅ /__#), it is a splendid example of 'compensatory lengthening by vowel deletion'. Minkova regards it as such; she says that the lengthening preserves 'isochrony'. But how is vowel length to be measured and why should it be conserved? Is the shift of length from the final /ə/ to the stressed vowel abrupt or gradual? If we use moras to represent length, we must assume that the stressed vowel somehow 'inherits' the mora of the deleted segment. Hayes (1989) gives a moraic account of the process:

(9)



When the final vowel is lost, its mora becomes a stray autosegment which subsequently attaches itself to the nearest vowel. Elegant as the account is, it has some weak points. First of all, it provides no diachronic motivation for the lengthening, unless we consider the conservation of phonological weight a universal law. Secondly, if the stray mora is reassigned in *tale* or *bede* 'bead', why is it simply lost without trace in *helpe, bedde* or whenever the stressed syllable is closed? My own account of MEOSL runs as follows:

1. The /ə/ is a 'reduced' vowel, phonologically underspecified and – during the early Middle English period – in the process of losing, among its various features, its ability to bear phonological weight. Historically, this loss of weight is a prelude to total deletion.

2. The onset of the mora containing the evanescent /ə/ inherits the total weight of the original CV sequence (we can see a comparable process at work in ModE *su*ppose, *ca*reer, *po*tato; Fr *pe*tit).

3. Middle English does not normally assign weight to consonants (or at least there is no evidence that it does; in this respect it differs from Old English). In stressed syllables it has a binary contrast of weight characteristic of Type A language (see (1)); its unstressed syllables display no such contrast and may be treated as unimoraic irrespective of their structure. In such a language a heavy (moraic) consonant is something of an anomaly; therefore the mora associated with the consonant tends to be deleted or reassociated with a neighbouring segment capable of bearing it. In early Middle English such a segment has to be a stressed vowel.

4. In the course of the history of English the process has become fossilised as a sequence of rules in lexical phonology, somewhere below the level at which regular endings are affixed – so that we get a long vowel not only in *make*, but also 'analogically' in *makest, ma(k)de* etc.

For Middle English the following phonological rules can be proposed:

(1) (A universal rule.) Assign moras to all [– cons] segments and create maximum acceptable onsets for all moras.

(2) Assign stress to the first mora.

(3) Delete the final /ə/.

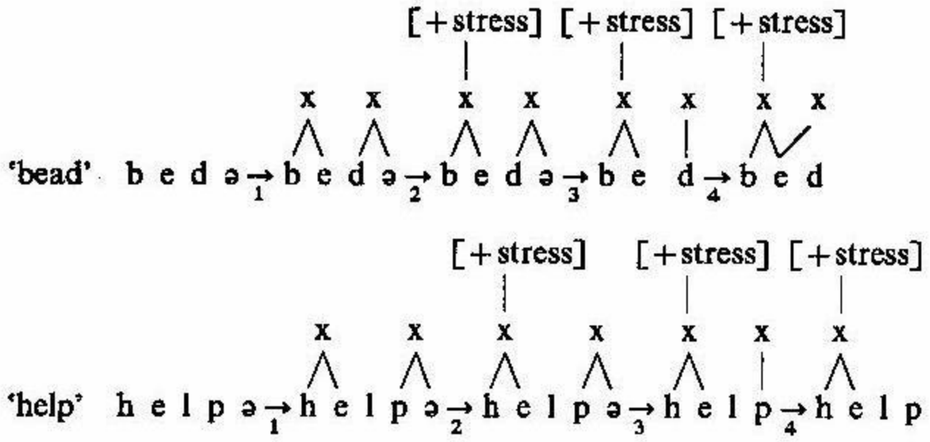
(4) If, as a result of (3), there appears a mora-bearing consonant (or cluster of consonants), then

– if the preceding segment is dominated by a single [+stress] mora, the mora of the consonant is attached to that segment and detached from the consonant;

– otherwise the mora of the consonant is deleted.

Examples

(10)



When the reduced vowel is followed by /n/, /l/ or /r/, we have (originally dialectal?) variation: long vowels in *beaver, raven, maple* as opposed to short vowels in *never, seven, kettle.* For some speakers of Middle English such words may have lacked the weak vowel in the underlying form (if present on the surface, it would have been inserted by a rule of epenthesis in order to break up an impossible coda); for some, the vowel may have been present in the underlying form and remained undeleted. Finally, a syllabic sonorant could, after the loss of the vowel, have offered sufficient support to the unstressed mora. There is hardly enough evidence to choose between such possibilities. For all we know, all of them could have occurred on a restricted scale, creating alternative forms from which the standard language has eventually selected one or the other.

The *Old Polish Compensatory Lengthening* is one of a number of similar processes affecting various Slavic languages at the time of the loss of a reduced vowel continuing the Common Slavic 'jers' (short, and probably lax, high vowels /ɪ/ and /ʊ/, transcribed ъ and ь by many philologists). Simplifying matters a little we can assume that in the West Slavic dialects from which

Polish developed there was a vowel that can be plausibly symbolised as /ə/, resulting from the merger of the 'jers'. When it was lost, the vowel of the preceding syllable was lengthened::

(11) *l^{j}odə>*l^{j}o:d CSL *ledъ*, Mod Polish *lód* 'ice'
*bobrə>*bo:br CSL *bobrъ*, Mod Polish *bóbr* 'beaver'
*bol^{j}ə>*bo:l^{j} CSL *bolь*, Mod Polish *ból* 'pain'

It should noted that Proto-Polish, like Common Slavic, had *only* open syllables and *every* underlying consonant cluster was an acceptable onset; it also had long vowels inherited from a more remote period. Consequently, it was a Type A language with phonological weight assigned only to vowels.

The reduced vowel is not always lost in Old Polish. If two or more consecutive syllables contain it, the ə's are lost *alternately*, starting from the last (this rule is known as *Havlik's Law*). The surviving ə's merge, at a later date, with Polish *short* /e/:

(12) p^{j}əsəkə>*p^{j}sək>*psek* 'little dog' (Mod Polish *piesek* owes its existence to analogy)
*šəv^{j}əcəmə>*šəv^{j}cəm>*szewcem* 'cobbler, instr sg'

Havlik's Law resembles compensatory lengthening: it is as if a super-short vowel became, by compensation, *simply* short in an environment that would make a normal short vowel long. Since moras – the quanta of weight – are indivisible, it will not do to call the 'jers' half-moraic vowels (although the term is not unknown among Slavists) and to explain their selective survival as short vowels with the help of the formula $\frac{1}{2}+\frac{1}{2}=1$. Still, I believe that it is perfectly possible to analyse the compensatory lengthening and Havlik's Law as one and the same phenomenon, assuming – as in the case of MEOSL – that the 'reduced' vowel changes its weight (first historically and then through a rule of a synchronic grammar) from one to zero. Apart from not being dependent on stress, the process is almost the same as in Middle English; it is also motivated in the same way by the instability of heavy consonants in a system which normally does not assign phonological weight to consonants. For Old Polish, I propose the following rules:

(1) (A universal rule.) Assign moras to all [-cons] segments and create maximum acceptable onset for all moras. (Note: After the application of (1) all segments will be grouped into moras, imitating the open-syllable structure of Common Slavic)

(2) Detach all ə's from their moras.

(3) Perform the following operations iteratively:

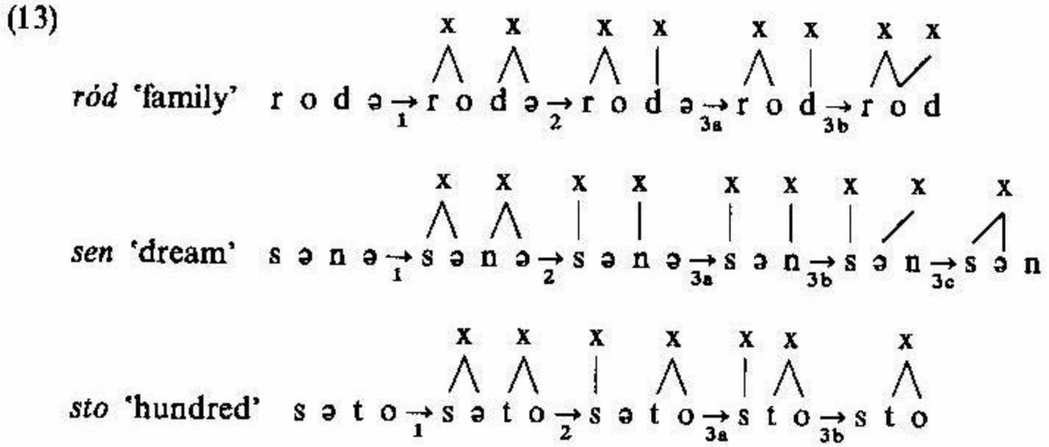
(a) Delete the last weightless vowel you encounter.

(b) If a mora dominates *only* a consonant or a consonant cluster, and the adjacent segment to the left is a vowel bearing no moras or one mora, attach the mora of the consonant to that vowel and detach it from the consonant. If there is no such vowel to the left, delete the mora.

(c) If a mora is assigned to /ə/, any consonant preceding this /ə/ becomes automatically the onset of the mora, losing its own weight.

The examples under (1) show that the rules account equally well for the compensatory lengthening and the preservation of /ə/ in alternate positions.

(13)



Unlike the Middle English change, the Old Polish 'lengthening' applies after affixation, producing morphological alternations still partly preserved in Polish (eg. *Bóg* 'God, nom': *Boga* 'gen'; *sen* 'dream, nom': *snem* 'instr'), and more fully attested in dialects (especially Kashubian, which according to J. Baudouin de Courtenay is 'plus polonais que le polonais même' in this respect).

Lengthenings similar to MEOSL can be found in Middle High German and some other Germanic languages. (They should not be confused with genuine open-syllable lengthenings, also operative in the Germanic group.) A change similar to the Old Polish one described above took place, about one thousand years ago, in numerous Slavic languages (exceptions, which are easier to list, comprise most East Slavonic dialects, Bulgarian, Macedonian and Slovak). If this is not enough to contradict de Chene's assertion that the Slavic process is an isolated affair, we can add a handful of examples from outside both Germanic and Slavic.

Of the two main dialects of Albanian, Tosk and Geg, the latter has been affected by a final schwa deletion with the compensatory lengthening of the vowel of the preceding syllable, as in

(14) *kohë* 'time', Tosk /kohə/, Geg /ko:h/

In Hungarian, the final short high vowels have undergone reduction and loss; again, the vowel of the preceding syllable is lengthened:

(15) **vizi* > *víz* /vi:z/ 'water, sg', but no lengthening in the plural *vízek*, where there has been no vowel loss.

In St. Lawrence Island Eskimo there is a 'reduced' vowel /ə/ (realized as [ə] or [i̯]), and there is a phonological rule which deletes this vowel unless the deletion should produce a cluster of three consonants. Here, too, a lengthening process accompanies deletion:

(16) /atəq + uma:q/ → [a:tχoma:q] 'he has gone down' but
/atəq + tuq/ → [atəχtoq] 'he goes down'

If my analysis is correct, it can be predicted that compensatory lengthening of the type VCV → V:C will be likely to take place in a language which already has long vowels (represented as bimoraic), at least one 'reduced' vowel with a tendency to be deleted, and *no rules assigning weight to consonants.* It will not take place in a Type B language (like Latin) which treats all closed syllables as heavy; for in such a language the loss of a weak vowel will be sufficiently 'compensated for' by the preceding syllable becoming closed and therefore heavy:

(17) x x x x
| ∧ | |
V C V → V C

The process analysed in this paper is at least one kind of 'compensatory lengthening' which is not reducible to assimilation or anything similar in the spirit of de Chene. I do not think it can be convincingly explained without having recourse to *a* theory of phonological weight. For these reasons alone it deserves a place in any discussion of compensatory lengthening, and more attention than it gets from scholars interested in theories of syllable weight.

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