

Cycles in Metrical Phonology

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INTRODUCTION

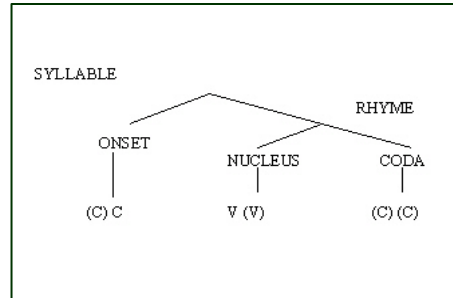
Within the tradition of structural linguistics, the study of sounds was designated by different levels of analysis. With the advent of generative phonology, new levels of analysis were needed to account for the process of affixation. Since affixes impact on the syllabic structure of words, the process of metrical phonology became a part of the phonological model. The nature of these rules and their modules in the form of rule cycles are discussed in this essay.

THE RISE OF METRICAL PHONOLOGY

Linguists who attempted to understand phonological processes within the new system of generative grammar asked the question of what is the basic unit of sound. The problem occurred when linguists attempted to account for tone languages, pitch languages, intonational phrases in language, trisyllabic root languages, and stress patterns. At this time, they began to realize that generative phonology could be characterized by a preoccupation with the rule system and that other kinds of phonological information merited equal discussion. As they looked back at Classical Phonemics, they realized that the idea of having a level of phonology separate from one of morphology was important and that it should be reinstated. Instead of levels of analysis, they called these STRATA or DOMAINS.

Kahn (1976) broke with the tradition by arguing for the importance of syllable structure in phonology and how syllables were important for an adequate description of English phonology. He also addressed the issues of tone and stress and how they relate to syllable structure. Syllables are structured. Each syllable has a nucleus that is usually a vowel. The other elements in a syllable are non-syllabic. The nucleus, symbolized by (N), is the only obligatory member of the syllable. It forms the core of the syllable. The onset, symbolized by (O), is made up of elements that precede the nucleus, and the coda, symbolized by (C), is made up of elements that follow the nucleus. Finally, the Rhyme, symbolized by (R) is important for designating rhythmical patterns in language.

The old notion of FOOT, important to traditional phonemics, was re-instituted under the revised model of metrical phonology (Lieberman, 1975). The new system allowed linguists to explain how two words echo one another by means of rhyme, assonance, consonance, and alliteration.



Rhyme has to do with the relationship between words with different consonants immediately preceding the final accented vowels and identical sounds, for example “pillow/willow” and “go/know”.

Assonance is the relationship between words with different consonants immediately preceding the nucleus and following the last vowel. The vowels have identical sounds. For example “hit/will” and “disturb/bird.””

Consonance is the relationship between words whose final accented vowel sounds are different but with the same consonant frame. For example, “truck/trick” and “billion/bullion.

Alliteration is the relationship between words with identical consonants preceding the first accented vowel and possibly different sounds on that vowel in subsequent syllables. For example, “slip/slide” and “glowing/glare.

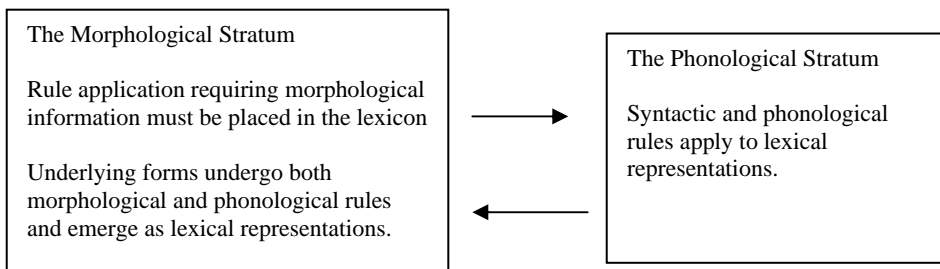
In syllabic terms, these can be summarized as follows:

Name	Example	Onset	Nucleus	Coda
Rhyme	Pillow, willow	Different	Same	Same
Assonance	Hit, will	Different	Same	Different
Consonance	Lip, lap	Same	Different	Same
Alliteration	Slip, slow	Same	Different	Different

Since syllables had to be distinguished from phonology and morphology, Goldsmith (1969) argued that a new field of Autosegmental Phonology was needed. He referred to the old system characterized by the Sound Patterns of English (Chomsky and Halle, 1968) as Segmental Phonology. The new approach is non-linear. It involves moving between different strata within a grammatical system. Such a model is multi-tiered. This multi-tiered approach to autosegmented phonology allows one to explain compensatory lengthening. When the voiceless velar fricative is lost, the syllabic structure along the skeletal tier is reassigned to the vowel, making it a long vowel. It also allows one to explain long monophthong vowels and how they differ from diphthongs. Similarly, geminates can be distinguished from clusters of consonants.

Assimilation can be explained by delinking and spreading rules as when the cluster “kt” becomes assimilated to a geminate or long “tt.”

The last change to be made in metrical phonology came from Siegel (1974) who wanted to specify the interaction between phonological rules and other modules in the grammar of a language. His research led him to recognize several strata beginning with the morphological module and its relationship to the phonological one.



Under this new framework, morphological representations are treated differently from phonemic ones. This is reminiscent of the levels of analysis within classical phonemics.

Morphophonemic representation	t
Phonemic representations	st
Phonetic representation	t ^h

Velar Softening and Spirantization are morphological processes. They must be dealt with within the morphological module of the language. It accounts for the following English alternations.

VELAR SOFTENING

[k]	→	[s]
Electric		electricity
Critic		criticism
Mystic		mysticism

SPIRANTIZATION

[t, d]	→	[s]
Pirate		piracy
President		presidency
Permit		permissive
Conclude		conclusive
Corrode		corrosive
Deride		derisive

One of the first findings to emerge within this new framework was a resolution to the problems of affixation. Why does velar softening occur before some affixes and not others? For examples, panic/panicking, flight/flighty, might/mightily, but not *panisy, *flighsy, nor *mighsily. The answer has to do with what Mohanan (1986) Class I and Class II affixes. He designates these in accordance to the modules in which they occur. Class I affixation operates in the Lexical Module; Class II affixes operate in the Postlexical Module. An example of this can be found in the rule of trisyllabic shortening that operates only in the Lexical Module and is consequently considered to be a morphological rule.

LEXICAL MODULE

[diviin]	[iti]	Underlying Representations
[divPin]		Stress Placement
[divPin}	[iti]	Affixation (Class I Affix)
[divPn]	[iti]	Trisyllabic Shortening
[divPniti]		Lexical Representation

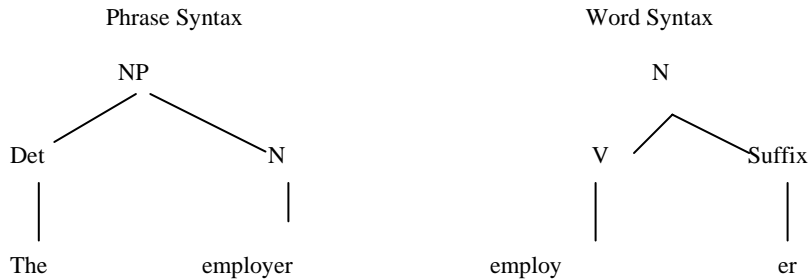
POSTLEXICAL MODULE

[divPniDi]	Dental Flappnig
[divPniDi]	Phonetic Representation

The rule of Trisyllabic Shortening accounts for the following words in English. An exception to this rule is “obscene/ obscenity.”

Vain, vanity Serene, Serenity Divine, divinity

What is important about the morphological component or the lexical module is that it enables linguists to distinguish between word phonology and phrase phonology.



This similarity between phrase syntax and word syntax has led certain linguists to argue that both systems can be handled by the same principles. Notice that the shift in recent times is away from rules and how they are formed to principles and the parameters that surround rules. Hence, the concept of the head of a phrase in syntax has been applied to phonological structures by many within lexical morphology.

HEAD	PHRASE	COMMENT
N	NP	The Noun is the functional head of a Noun Phrase
V	VP	The Verb is the functional head of a Verb Phrase
A	AP	The Adjective is the functional head of an Adjectival Phrase
P	PP	The Preposition is the functional head of a Prepositional Phrase
ADV	ADVP	The Adverb is the functional head of the Adverbial Phrase
Q	QP	The Quantifier is the functional head of a Quantifier Phrase

From this pattern of head constructions, linguists were able to generalize that X is the head of XP.

HEAD	PHRASE	COMMENT
X	XP	X is the functional head of the X Phrase

This new way of categorizing phrase markers allows linguists to create three levels of categories: X, X-bar, and X-Double Bar.

PHRASE	X-BAR UNIT	HEAD
X-Double Bar	X- Bar	X
NP	N-Bar	N
VP	V-Bar	V

AP	A-Bar	A
PP	P-Bar	P
ADVP	ADV-Bar	ADV
QP	Q-Bar	Q

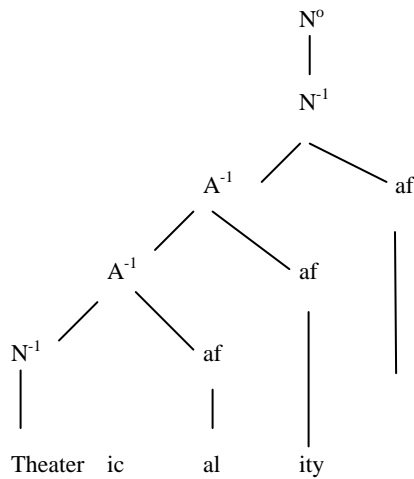
Given this framework, linguists naturally asked if word phrases have head constructions. Selkirk (1980) has argued that the word structure follows the same system of principles and parameters as one finds in government binding theory. He employs X-bar theory in order to explain word syntax. Notice that the negative superscripts represent morphology and that the positive ones represent syntax. {See next page}

Within this multi-tiered approach, lexical phonologists developed several domains or tiers within phonological structure.

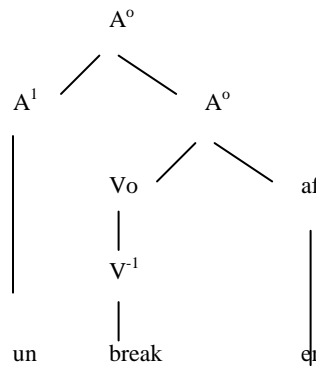
The Prosodic Hierarchy

- Phonological Phrase
- Phonological Word
- Foot
- Syllabic Constituents
- Skeletal Positions

Theatricality



unbroken



THE STRATUM MODEL OF LEXICAL MORPHOLOGY

Mohanan (1986) argued that one does not need to invoke X-bar theory in order to account for morphological and phonological information. He devised a simpler system with just two tiers which he called Stratum I (Class I affixation) and Stratum II (Class II affixation). Harris (1994) refers to these as Root Morphology and Word-Level Morphology respectively. (See next page)

Siegel (1974) was the first to notice the behavior of Class I and Class II affixes. He noted that both classes are adjective and noun forming, but a class I affix cannot be attached to a stem containing a class II affix.

Bountifulness *bountifullity
 Guardedness *guardedity

Hence, nouns can be formed with Class I or Class II affixes, but these affixes must be ordered in their units of operation. It is important to notice that in the older linear phonology, rules were defined by their operations. Morphological rules operated on morphological elements and phonological rules operated on phonetic elements. Under the new system, rules apply to strata. The same rule can apply to Stratum I or II. The language dictates how rules are assigned and to what domains they belong. Hence, in the lexicon, -ity is designated as a Stratum I ending and -ness is designated as a Stratum II ending.

STRATUM I					
[beauty]	[ful]	[ness]	[period]	[ic]	[ity]
-			[period][ic]		Affixation
-			[period][ic][ity]		Affixation

Morpheme List



Stratum I

Class I Affixation

In-

-ic	-ian	-ity	-ion
-ant	-ary	-ate	-y
-th	-al	-ful	

strong Verbs, bound morphemes

Unkind, kindness, kindly, statehood,
 beautiful, kingdom, friendship, ladylike,
 tired, horses, entitlement



Stratum II

Class II Affixation

Un-	-like	-ness	-dom
-hood	-ship	-ed	-ment
-es	-ly	-ful	

Compounds ↓

Participant, participate, dialectal, class,
 vegetarian, solution, imaginary, sensate,
 passionate, decency, cranberry

presentation

STRATUM II

[beauty][ful]		–	Affixation
[beauty][ful][ness]	–		Affixation

STRATUM I

[beauty] [ful] [ity]		[period] [ic] [ness]	
–		[period][ic]	Affixation

STRATUM II

–		[periodic][ness]	Affixation
[beauti][ful]			Affixation

The suffix –ity cannot be attached to “beautiful” because this word is formed at Stratum II. At this point, the –ity affixation is no longer available. In order to affix –ity to this word, one must go back to Stratum I and this is disallowed. Once a form leaves Stratum I and enters Stratum II, it cannot return to this domain. What is important about these levels is that they distinguish affixation from compounding, something that was not done in the earlier work of Chomsky and Halle (1968). Hence, “blackbird, redcap” and other endocentric compounds are found in Stratum I, whereas exocentric compounds such as “maidenhood” are found in Stratum II. It also designates that only in Stratum I can one find bound morphemes such as “inert, intrepid, immaculate, insipid, and “cranberry.”

There are several words in which the voiced velar stop [g] appears in some root forms and are deleted in others.

[n]	[n]	[gn]
sign	signing	signature signal
resign	resigned	resignation
malign	maligning	malignant
design	designing	designate
assign	assignment	assignation
paradigm		paradigmatic

The same kind of alternation can be found in alveolar nasals as evidenced by the following words.

[m]	[m]	[mn]
solemn		solemnity
damn	damming	damnation
hymn	hymned	hymnal, hymnology, hymnic
column	columns	columnal, columnar
condem	condemning	condemnation

Finally, there are words in which [mb] clusters are reduced to [m] after certain suffixes.

[m]	[m]	[mb]
bomb	bomber	bombard. bombastic
crumb	crumby	crumble

Why do all of these forms undergo consonantal alternations? The answer can be found in the kind of suffixes that are attached to them. Mohanan (1986: 22) arrives at the following rule for g-deletion (sign, signature) and n-deletion (hymn, hymnal).

G-DELETION (Domain: Stratum II)
 G → ρ / __ [+nasal]

N-DELETION (Domain: Stratum II)
 N ρ / [+nasal] __

HOW MANY STRATA IN ENGLISH?

Mohanan (1986:26) argues that there is evidence for at least four Strata in English. This is based on the fact that a third stratum is needed for compounds, and a fourth is where regular inflection occurs.

Stratum I	Class I derivation, irregular inflection
Stratum II	Class II derivation
Stratum III	Compounding
Stratum IV	Regular inflection

Mohanan discovered a major problem in the sound patterns of English. He noted that Chomsky and Halle did not distinguish between vowel tensing and vowel lengthening. It was assumed that all tense vowels were long. Such is not the case. There are tense vowels that are long as in keep, reed, site and tense vowels that are short, as in the final vowel of “city.” Hence, he found it necessary to discuss the rule of Stem Final tensing. This is the rule that stresses the final vowel of “city.” This is a rule that tenses a non-low final vowel. Hence, it accounts for the final vowel of “city” [sIti] being tenser than the medial vowel.

- A. city [sIti], happy [hΦpi], vary [veχri], remedy [remIdi]
- B. cities [sItizz]
- C. city hall (sItihl]
- D. happiness [hæpinβs]

What is happening in these forms is that the lax vowel [ɪ] becomes tense [i] before Class II affixes and before another stem in a compound word. At first, Mohanan (1986:26) believed that the rule should be assigned to Stratum II. However, in investigating how that rule operates in compounds, he found it necessary to assign it to Stratum III, the level at which compounds are formed.

STRATUM I				
[sItI]	[sItI] [z]	[sItii] [liif]	[hæpI]	[nes]
-	-	-	-	-
STRATUM II				
-	-	-	[[hæpI][nes]]	affixation

–	–	–	[hæpInes]Bracket Erasure
STRATUM III			
–	–	[[sItI][layf]]	– Compounding
[siti]	[sItI]	[[sItI][layf]]	– Final Stem V Tensing
–	–	[sItIlayf]	– Bracket Erasure
STRATUM IV			
–	[[sItI][z]]	–	– Affixation
–	[sItiz]	–	– Bracket Erasure

Stratum III is where compound nouns are formed and Stratum IV is where inflectional endings are attached.

CLOSED SYLLABLE SHORTENING

When words are put together, they may appear as compounds that are organized on Stratum III or they may be concatenated elsewhere such as in Stratum I. The following words provide evidence for levels of compounding in Stratum I.

Vowel Shortening		
Receive, reception	Perceive, perception	Describe, description
Reduce, reduction	Scribe, scripture	Retain, retentive
Intervene, intervention	Five, fifty	Wise, wisdom
Keep, kept	Deep, depth	Wide, width
Sleep, slept	Deal, dealt	Leave, left
Thief, theft	Heal, health	Steal, stealth

Are these forms listed as complete units in the lexicon or are they derivable by means of a phonological or morphological rule? What do all of these forms have in common is that they undergo the process of vowel shortening. The next question is where do these rule applications occur. By looking at the affixes attached to these root forms, one can readily ascertain that they are Class I affixes. Hence, the rule of vowel shortening must take place in Stratum I.

THE LOOP

Mohanani (1986: 47) uses the metaphor of the word-making factory to explain how strata are organized within a grammar. The factory has a storehouse in which all morphemes are listed. There is an entry gate from the storehouse to the factory work area. There is also an exit gate from which the finished products emerge. Within the factory there are four rooms, these domains are called Strata I-IV. There is a conveyor belt that runs from the entry gate to the exit gate and it passes through each of the four rooms. The forms from room I automatically goes on to room II and so on. There are two types of workers in the factory. One group works on morphological rules and the other works on phonological rules (the Lexical Domain and the Post-Lexical Domain). Mohanani (1986: 48-49) found it necessary to include a loop from room III back to room II for certain lexical items. This loop is optional and accounts for variations within words that undergo palatalization and yod deletion.

<u>Racial</u>	<u>Radio</u>	
STRATUM II		
Sy	dI	Underlying Representation
Šy	–	Palatalization
Š	–	Yod Deletion
POST-LEXICAL STRATUM		
–	dy	Yod Formation
–	d)	Palatalization

In order for these dialects to function, the lexical items must be recycled through the second stratum. The concept of the loop is still controversial in English metric phonology and not all languages participate in loop constructions.

THE MENTAL REPRESENTATION OF LEXICAL ENTRIES

One of the realizations of the new model of lexical phonology is that both morphological and phonological rules function as redundancy rules (Aronof, 1976). Their purpose is not to generate an output, but to maintain a distinction between potential words (lexical outputs) and actual words (word lists). The phonology of some words in the lexicon are completely transparent and others are rather opaque. For example, “went” is listed in the lexicon, but it is derived from the specification of [go+PAST]. Words such as “student union” and “government center” are exceptional in that the major stress is on the second compound. Hence, such forms are relegated to word lists in the lexicon. What is interesting about the new phonology is that no two speakers have the same lexicon. This is because generative grammar is a model of the knowledge of the language of a speaker and no two speakers have the same knowledge. A word may exist in the mind of the speaker as a listed item. Once it has been subjected to morphological analysis and rule behavior, it will be relegated to a lexical output. Consider, for example, the word “breakfast” which is semantically opaque for most speakers. Once an individual understands its etymology and sees it as coming from “to break the fast with food” then the meaning of the word is no long opaque.

The productivity of the strata in the lexicon is another aspect to consider when dealing with the mental representation of lexical entries. Mohanan (1986: 56) has derived a hierarchy of productivity base on the functions of production, recognition, and lexical storage.

A	Rules, which are used only in production and recognition, need not be stored and they constitute highly productive rules. Hence, aspiration, flapping, nasalization, and rhota deletion are productive rules. The rule of plural suffixation (-es) and past tense formation (-ed) belong to this category.
B	Rules which are used both in production, recognition, and storage are less productive. Vowel shortening, vowel lengthening, Vowel shift-diphthongization, g-deletion and n-deletion belongs to this category.
C	Rules that are used only in storage and recognition, but not in production are even less productive. The rules of ablaut (man/men, foot/feet) and the rule of velar softening belong to this category.

D	Rules which are used only in storage and not in production nor in recognition are the least productive. Many rules having to do with syllabic constraints (CCC onset) belong to this category. Similarly prefixes such as con- and per- are totally unproductive.
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When one considers the four strata in English, it turns out that Stratum I is the least productive.

Inept, classic, grammarian, polity, illusionary, destruction, generate, dialectal, informant. ...

Stratum II is more productive.

Unkind, dislike, kingdom, kindness, statehood, friendship, beautiful, argument, orderly, takes, eaten, walked, and compounds.

SYLLABIFICATION

There are many examples of morphological restructures undergoing re-syllabification at the syllable level of metrical phonology. An obvious example is provided below from Spanish.

Morpheme Level: l+o+s animale+s

Syllable Level: lo.sa.ni.ma.les

Word Level: los animales

Words may undergo syllabification when a high front vowel is transformed into a front glide (yod) before another vowel.

Morpheme Level: iat

Syllable Level: yat "yacht"

The more interesting cases of re-syllabification, however, can be found when nasal and liquid consonants alternate become syllabic under certain conditions within a syllable structure.

Morpheme Level: botm

Syllable Level: bot.m "bottom"

"The property of syllabification, however, is not limited to liquids and nasals. They can also occur when a fricative functions as the peak of a syllable: /pst/

What appears to be at issue in these examples is the property of sonority. The nucleus of a syllable is the most sonorant sound in that syllable. Hence, the following sonority scale can be ascertained (Giegerich, 1992: 133):

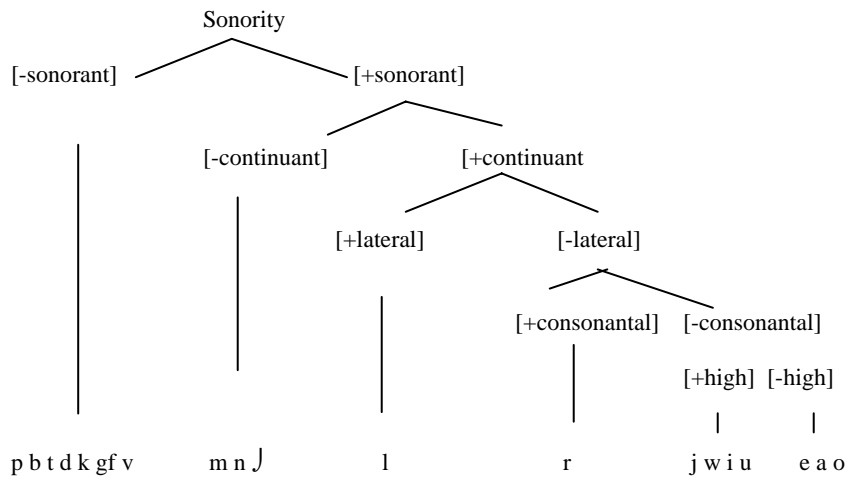
What this chart signifies is that the most sonorous element in a segment functions as its syllabic peak or nucleus. The voiceless fricative /s/ functions as a syllabic peak in the vocative "pst." Hence, the sonority of a sound is based on its relative loudness in comparison to other sounds in its syllabic environment. These syllabic environments, it should be noted, are marked by morphological boundaries. If they were not, one would not be able to account for the differences in syllabic structure between the following lexical items:

Hidden aims

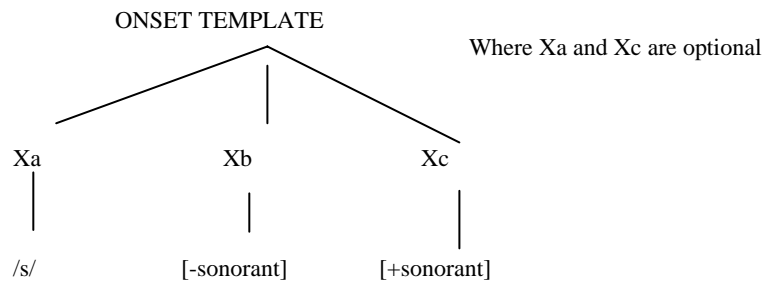
Hidden names

As noted earlier in this synopsis of metrical phonology, the syllable is structured and consists of an onset and a rhyme. The rhyme is further structured into a nucleus or peak and a coda. Each of these structures accounts for phonotactic asymmetries and each has its own phonotactic domain.

Sonority Scale →							
Oral Stops		Fricatives		Nasals	Liquids	semivowels	Vowels
Voiceless	Voice	Voiceless	Voiced				
p	b	f		m	l r	i j	i u
t	d	s	z	n			e o
k	g	ʃ	ʒ	ŋ			a

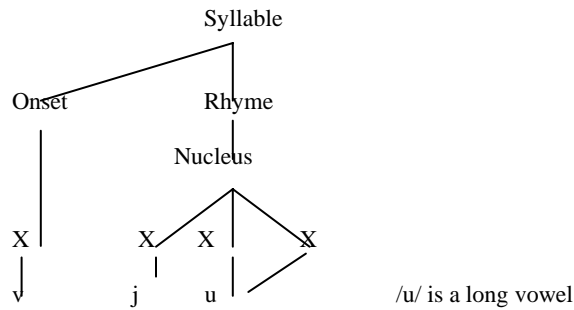


Many lexical items do not have onsets (eye, eat, ink). Others do contain an onset (pie, sleeve, swing, spring, spy, street). Phonologists have noted that there are many possible combinations of onsets in English, but they do not all appear in the language. The onset of /bn/, for example, is possible in English, but it does not appear. This leads them to hypothesize that the onsets in English are constrained so as to omit certain combinations of sounds. They do this by establishing a syllable template for English and in that template they build in filters that account for the onset patterns of English.

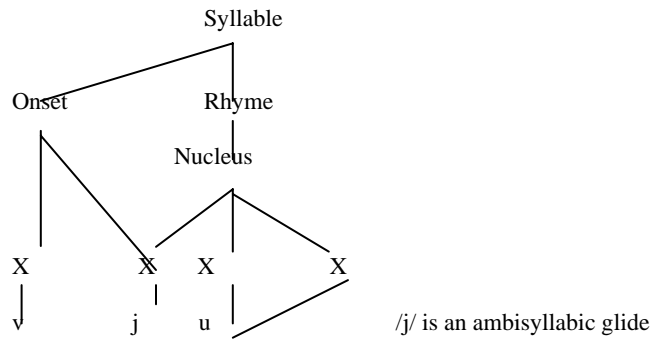


Each language will have its own syllable template to account for its onset phonotactics. An interesting situation occurs between onsets and the nucleus of the rhyme in words such as “view /vju/.” The yod (front glide) may have originated in the rhyme of the syllable, but it is quickly associated with both the onset and the peak of the syllable.

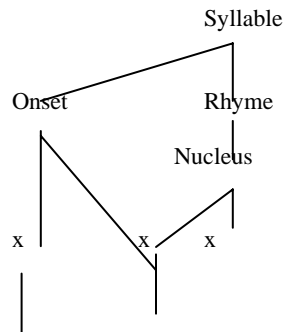
Morphological Form for “view”



The Re-syllabification of "view"

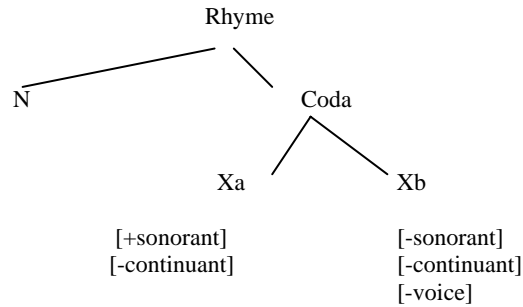


The process of re-syllabification means that the front glide /j/ must belong to both the onset phonotactics and the rhyme phonotactics. Hence, the following filter is needed for English syllable structure.

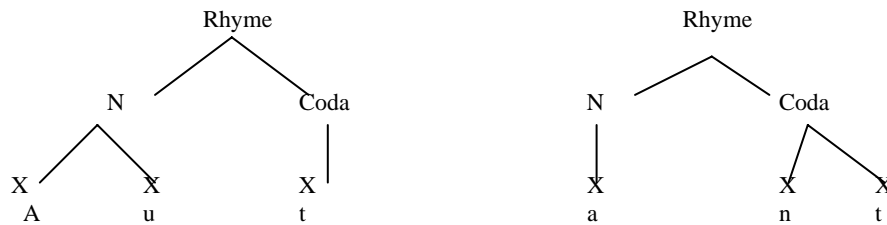


[+coronal] j

It is now time to consider the Coda and how it functions alongside the nucleus of a syllable. The ending of syllables in English can be /nt/ “lent,” /nd/ “land,” /mt/ “dreamt,” /md/ “hummed,” and /ʃd/ “hanged.” Other combinations are not allowed. Hence, the template for the coda is provided below:



This syllabic structure accounts for out and ant.

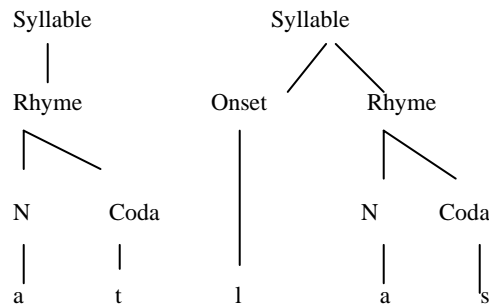
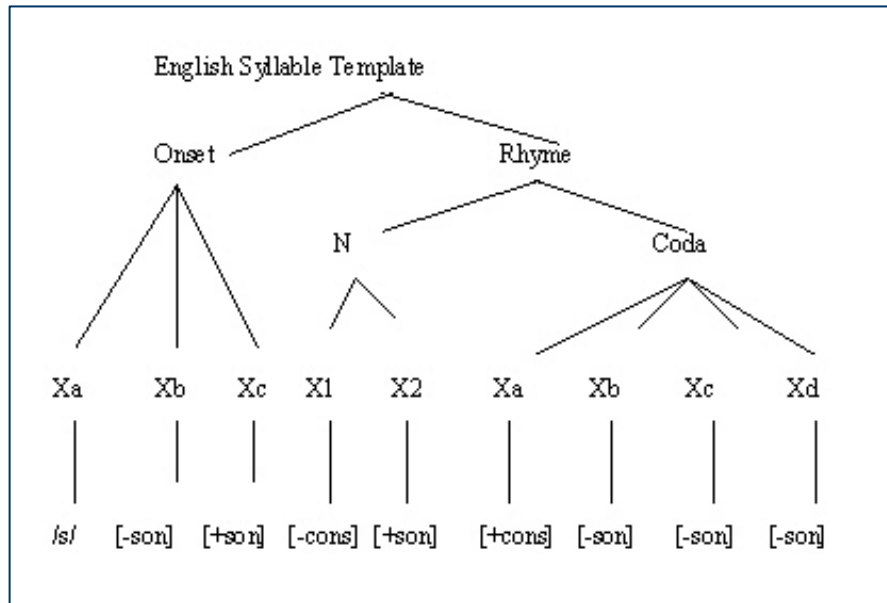


Not all words in English are monosyllabic. Hence, one needs to consider polysyllabic words and how they are re-syllabified.

- | | | | |
|------------|-------------|---------------|----------|
| e.nig.ma | Ag.nes | hem.lock | |
| Ed.na | de.cath.lon | pho.ne.mic | co.di.fy |
| Al.ti.tude | a.pri.cot | al.ge.bra | ma.tron |
| a.gen.da | stan.dard | nigh.tin.gale | ma.ri.na |

Phonemic representation /atlas/
 Syllable Boundaries [at las]
 Syllabic Structure:

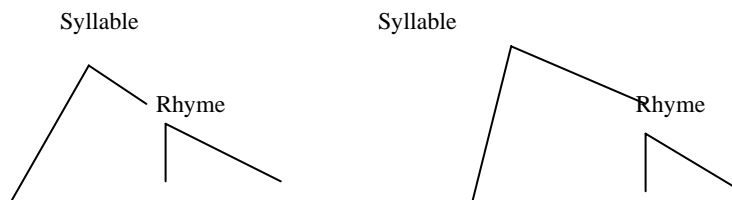
The final syllable template for English is provided below:

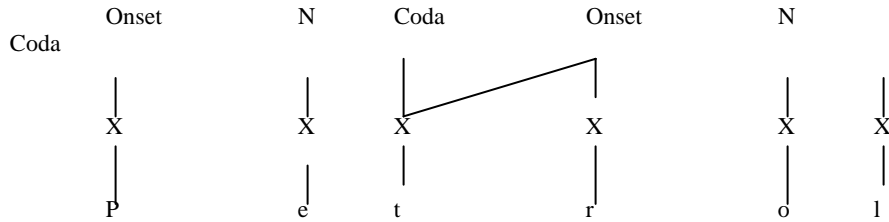


The following words provide an interesting problem for the syllabic structure of the coda. They are ambisyllabic.

- | | | | | |
|---------|----------|----------|----------|--------|
| Apple | pedestal | Madonna | Petrol | camera |
| Rubella | epic | labrador | confetti | Africa |

How does one syllabify apple? Is it app.le or a.pple? The first syllable in “apple” should be [ap] because of the branching rule. The second syllable would contain the syllabic liquid [l]. Hence, the syllabification should be [ap][l]. The problem with this conclusion is that the syllabification of this word is ambiguous. The [p] in apple is ambisyllabic. A similar ambisyllabic lexical item can be found in petrol, i.e., pet.trol.



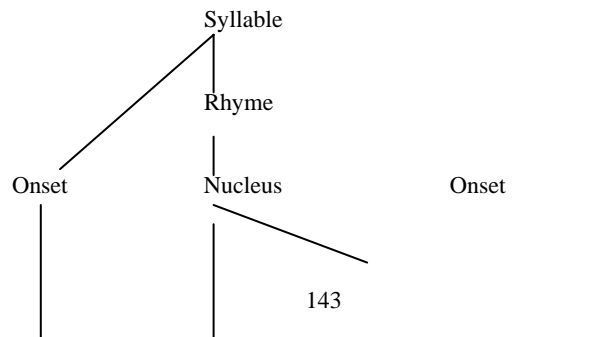


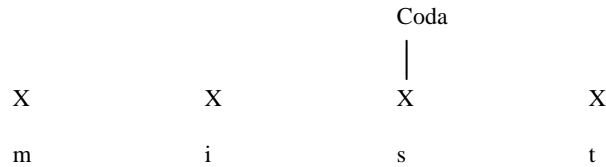
EXTRASYLLABICITY

The cluster of consonants in the coda of a syllable presents a problem for metrical phonology. The kinds of clusters in a word final coda differ substantially from those that occur within a word. This is because morphological endings such as the past tense endings /t, d/ complicate the structure of final codas.

- Two-Position Final Coda
 - VV day, so, see, pie
 - VC pat, tip, den, gull
- Three-Position Final Coda
 - VVC late, light, town, feat
 - VCC fist, fact, desk, gulp
- Four-Position Final Coda
 - VVCC paste, paint, rind
 - VCCC text

The problem of syllabification occurs with suffixation at the word level. The plural marker makes a VCCC [text] into a VCCC-C [text-s] structure. These final consonants resulting from suffixation fail to observe the expected final coda pattern. Hence, it has been proposed that these forms are extra-syllabic. What this means is that they remain unsyllabified until they are licensed at some other level within metrical phonology. Some have referred to this unassigned final coda as a degenerate syllable. It is degenerate because it lacks an audible nucleus. Hence, the final coda has its own phonotactic domain. It has its own phonotactic constraints. It differs from word internal coda in that it has to delay syllabic assignment until later in the phonology of the language where all morphological suffixes have been added and word final phonotactics are assigned.





The final /t/ is “mist” represents a stray onset because it is not followed by a nucleus. Some of the differences in syllabic assignment of codas can be seen in the following examples:

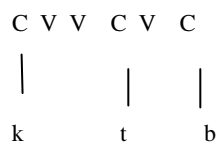
	Final	Medial
VVnt	saint, mount, pint	fountain
VVnd	rind, sound	flounder
VVns	pounce, ounce	council
VVnd)	range, scrounge	angel
VVlt	revolt, colt	poultry
VVld	child, cold, field	shoulder
VVst	paste, boast, boost	pastry
(V)VsC	cast, clasp, cask	basket

ABSTRACT SEGMENTS

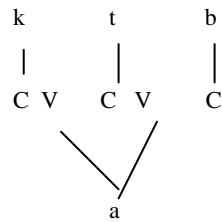
The phonological template for a language such as Arabic would differ substantially from English because it contains tri-consonantal roots.

TKR (*taraka*, to leave), FHM (*fahima*, to understand),
 RKB (*rakiba*, to ride), NSR (*nasara*, to help), etc.

These tri-consonantal roots are used as the underlying structures for other phonological processes such as derivation where RKB produces the infinitive *rakiba* (to ride) and the agentive form *rakib* (rider). Similarly, the root KTB is used to produce the nominal forms *kitab* (book) and *katib* (writer). Obviously, what is happening in this language is that the vowels of the language are intercalated among the tri-syllabic roots. This process differs substantially from the phonological pattern of English where a root form merely takes on a prefix or a suffix. In Arabic, the affixal morphology consists of intercalated vowels. Hence, the template for the Arabic root KTB consists of tri-syllabic consonants and intercalated vowels that are unspecified.



The V slots have been left vacant in the Arabic word template because they will be assigned values later. Such is the case in the following example where the root is KTB and the vowel melody is /a/.

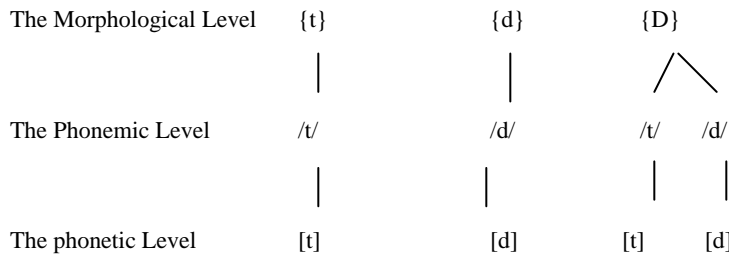


katab "he writes"

The use of abstract underlying forms that are filled later in the phonological derivation is reminiscent of Trubetsky's concept of the archiphoneme. His concept was used to explain vowel neutralization in word final position among German nouns.

- Tag [tak] day Tage [tage] days
- Bund [bunt] alliance Bunde [bunde] alliances
- bunt [bunt] colorful bunte [bunte] colorful

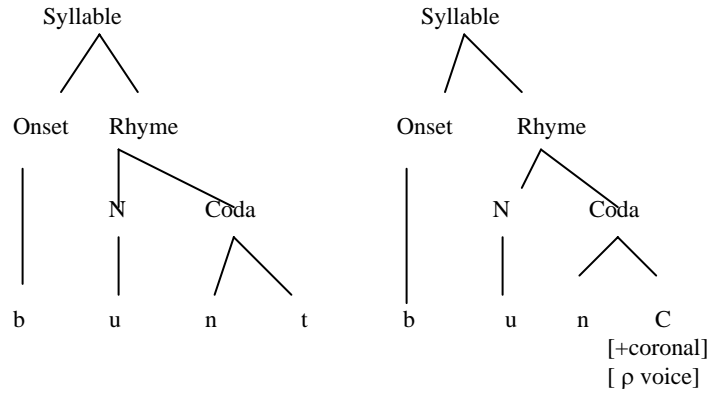
In structural phonemics, phonemes were contrasted as opposites. Structuralists believed in the adage that "once a phoneme, always a phoneme." What they meant by this is that phonemes were not allowed to overlap. The allophone [t] is assigned to the phoneme /t/ and the allophone [d] is assigned to the phoneme /d/ and they can never overlap. But what one finds in German is just such a case of phonemic overlapping.



To account for this problem of phonemic overlapping, Troubetsky created the concept of the archiphoneme {D}. This element existed at the morphological level and had two variants at the phonemic level. Because this form existed at the level of morphology, it did not violate the restriction on phonemic overlapping. What was different about the archiphoneme and how did it avoid the problem of phonemic overlapping? It was different because it underwent a morphological rule of devoicing.

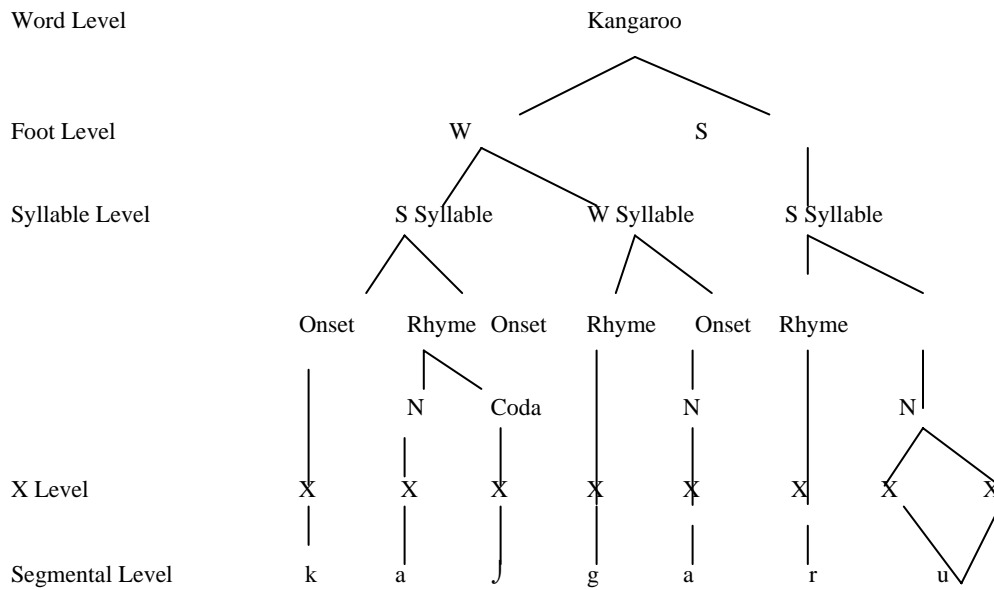
Morphological Level	/bunt	bunte	bunD	bunDe /
Word Final Devoicing	-	-	bunt	-
Phonemic Level	bunt	bunte	bunt	bunde

One could now handle this same problem in metrical phonology by saying that the morphological archiphoneme {D} is unspecified for the distinctive feature of voicing. The word final coda template assigns the value of [-voiced] to the archiphoneme in word final position.

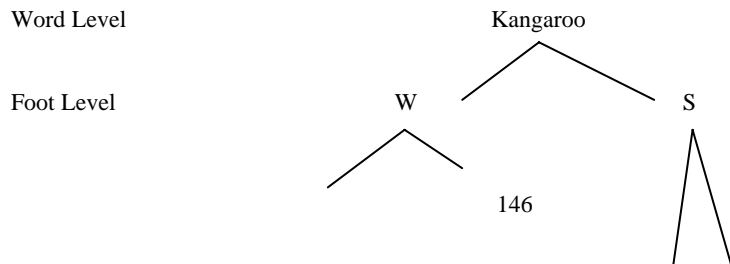


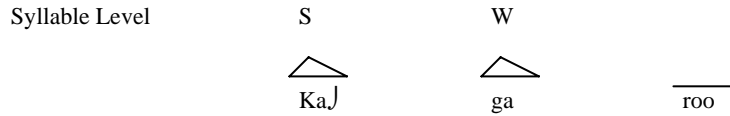
FOOT STRUCTURES

The level above the syllable is the foot. This is an important timing unit in English. There are two kinds of syllables: strong (S) and weak (W). Stressed syllables must be heavy (S) while unstressed syllables may be light (W).

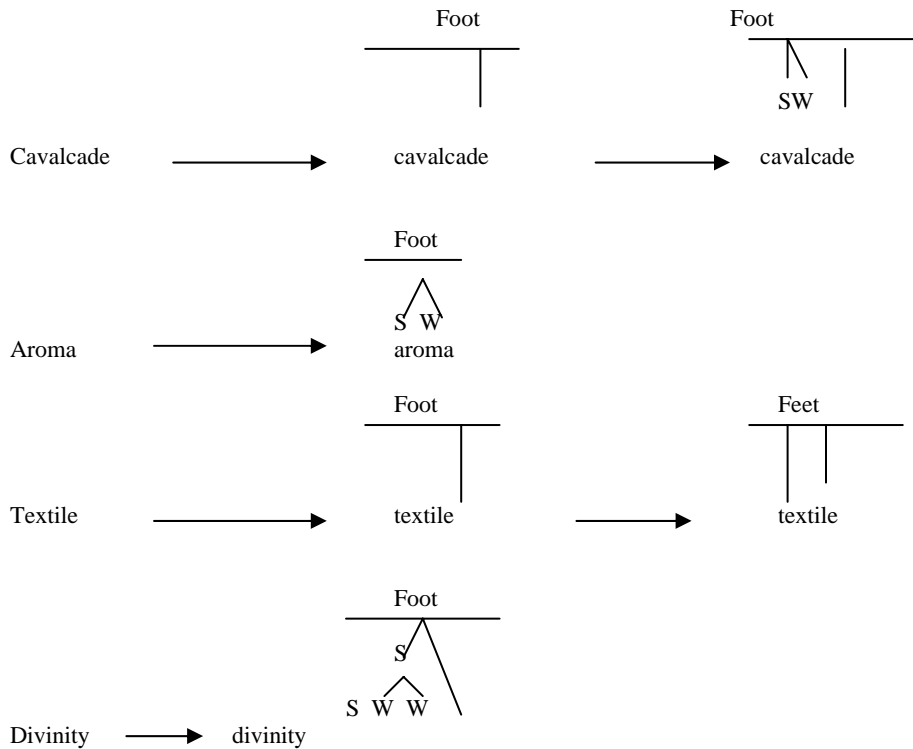


One could also represent this structure as follows:





There is a process known as foot assignment. (1) Assign a foot to the final syllable of a word if it contains a long vowel or if it is heavy. (2) Assign a bisyllabic foot to the penultimate syllable if it is heavy. (3) Assign a foot to the penultimate syllable if it is heavy and initial. (4). Assign a maximal bisyllabic or trisyllabic foot to any remaining string of syllables from right to left.



POETIC MEASURES

There is a whole tradition in poetry dedicated to the study of the rhythms of speech. Within this tradition, each line of poetry is measured and assigned a foot structure. Students of poetic literature even have their own prosodic symbols.

- ˘ An unaccented syllable, W syllable
- / An accented syllable, S syllable
- x A non-rhyming line

These poets looked for patterns of assonance, consonance, alliteration, and rhyme. For example, alliteration occurs when the onsets of a syllable are the same as in slip and slide.

Name	Example	Onset	Nucleus	Coda
Rhyme	Pillow, willow	Different	Same	Same
Assonance	Hit, will	Different	Same	Different
Consonance	Lip, lap	Same	Different	Same
Alliteration	Slip, slow	Same	Different	Different

Poetic structures have names. Many of these names were borrowed from Greek poetry and still reflect these original phonological structures of the Greek language

CONCLUSION

Phonology has gone through several changes. One of the most significant has been the introduction of syllabic structures into phonological and morphological patterns. The introduction of syllabic functions allows linguists more explanatory power. It enables them to account for the physiology of phonation, the modularity of affixation, and other linguistic processes.

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