The syllable

The syllable is a basic unit of speech studied on both the phonetic and phonological levels of analysis. No matter how easy it can be for people and even for children to count the number of syllables in a sequence in their native language, still there are no universally agreed upon phonetic definitions of what a syllable is.

PHONETIC DEFINITION: Phonetically syllables "are usually described as consisting of a centre which has little or no obstruction to airflow and which sounds comparatively loud; before and after that centre (…) there will be greater obstruction to airflow and/or less loud sound" (Roach, 2000: 70). In the monosyllable (one-syllable word) *cat* /kæt/, the vowel /æ/ is the "centre" at which little obstruction takes place, whereas we have complete obstruction to the airflow for the surrounding plosives /k/ and /t/.

PHONOLOGICAL DEFINITION: Laver (1994: 114) defines the **phonological** syllable as "a complex unit made up of nuclear and marginal elements". Nuclear elements are the vowels or syllabic segments; marginal elements are the consonants or non-syllabic segments. In the syllable *paint* /peɪnt/, the diphthong /eɪ/ is the nuclear element, while initial consonant /p/ and the final cluster /nt/ are marginal elements.

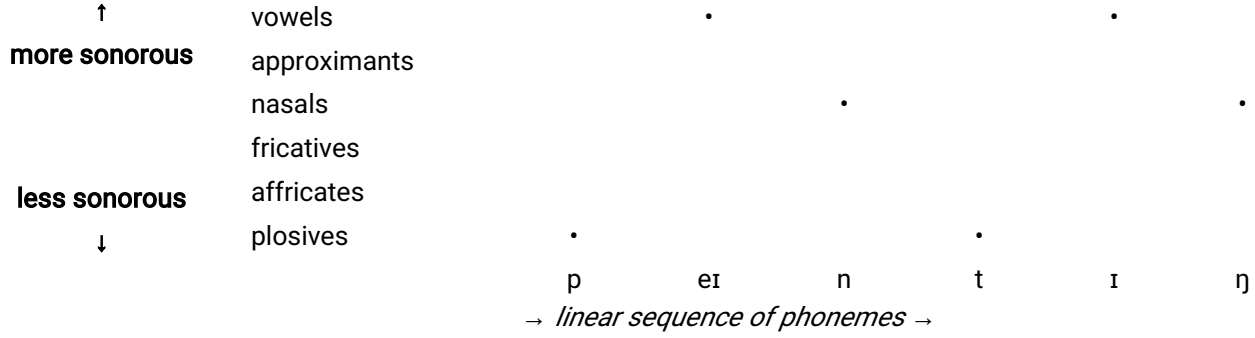
PROMINENCE THEORY: Attempts have been made to provide physiological, acoustic or auditory explanations and definitions of the syllable. According to the **prominence theory**, for example, which is based mainly on auditory judgements, the number of syllables in a word is determined by the number of peaks of prominence. In the word *entertaining* /ˌentəˈteɪnɪŋ/ the peaks of prominence are represented by the vowels /e ə eɪ ɪ/. However, this theory does not help much in discussions of **syllable division**.

CHEST PULSE THEORY: The **chest pulse theory** discusses the syllable in the context of muscular activities and lung movements in the process of speech. Experiments have shown that the number of chest pulses, accompanied by increase of air pressure can determine the number of syllables produced (Gimson, 1980: 56), thus allowing to associate the number of syllables with the number of chest pulses. This approach, however, cannot account for cases when 2 vowels occur one after the other – for example in words like *being* /ˈbiːɪŋ/ or *playing* /ˈpleɪɪŋ/ the second chest pulse might be almost irrelevant and thus lead erroneously to the conclusion that such English words consist of one syllable only.

SONORITY THEORY,SONORITY SCALE

Another approach is presented by **sonority theory** according to which the pulses of pulmonic air stream in speech "correspond to peaks in sonority" (Giegerich, 1992: 132). The sonority of a speech sound is discussed as "its relative loudness compared to other sounds" (Giegerich, 1992: 132) and each syllable corresponds to a peak in the flow rate of pulmonic air. Thus nuclear elements, or syllabic segments can be described as intrinsically more sonorous than marginal, or non-syllabic elements.

Speech sounds can be ranked in terms of their intrinsic sonority according to a **sonority scale**. The sonority scale for English is given below (although in principle it is also valid for other languages). Voiced segments are more sonorous than voiceless ones and sonorants are more sonorous than obstruents; vowels are more sonorous than consonants, open vowels being more sonorous than close ones. The disyllabic word *painting* /ˈpeɪntɪŋ/ has been plotted onto the sonority scale as an example.



As can be seen from the chart, there are two peaks of sonority in the phoneme string /p-eɪ-n-t-ɪ-ŋ/, namely the vowels /eɪ ɪ/. This is to indicate that the number of syllables is 2 as well.

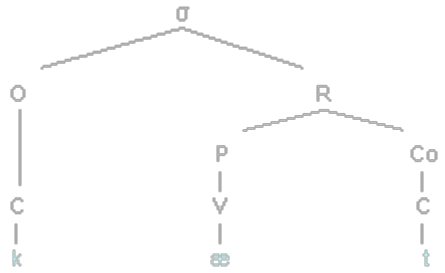
The sonority scale, like all the approaches outlined above, is of little help when it comes to delimiting separate syllables, however.

Syllable structure

HIERARCHICAL STRUCTURE OF THE SYLLABLE

The bulk of present-day phonological theory agrees that the syllable has **constituent** or **hierarchical**, rather than linear, structure.

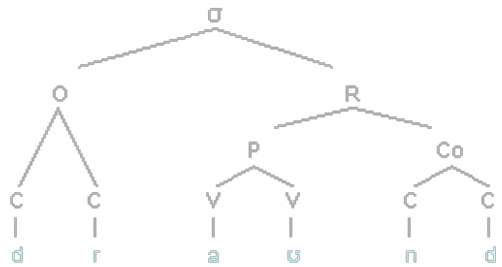
The syllable (conventionally marked as small Greek sigma: σ) has two **immediate constituents** (it "**branches**" into two elements, to put it in another way) – the **Onset** (O), which includes any consonants that precede the nuclear element (the vowel), and the **Rhyme** (R), which subsumes the nuclear element (the vowel) as well as any marginal elements (consonants) that might follow it. The Rhyme, in turn, further branches into **Peak** (P), also known as **Nucleus** (N), and **Coda** (Co). The Peak (Nucleus), as the designation suggests, represents the "nuclear" or most sonorous element in a syllable. The Coda includes all consonants that follow the Peak in a syllable. Syllable structure may be represented graphically by means of a "tree diagram". The first example we shall take is *cat* /kæt/.



OPTIONAL CONSTITUENTS: In the case of *cat* /kæt/, the Onset, Peak and Coda each consist of one segment: the consonant (C) /k/ occupies the Onset, the vowel (V) /æ/ – the Peak, and the consonant /t/ is the Coda of this syllable. However, there are syllables in English where either or both marginal elements (i.e. O and/or Co) are absent – only the Peak is an **obligatory** element in all languages, and in English both the Onset and the Coda are **optional**. (There are languages, though, where the Onset is obligatory, as well as such that allow no Codas.) Consider the following examples.

	Onset	**Peak**	**Coda**
sea /si:/	/s/	/i:/	Ø (none)
on /ɒn/	Ø	/ɒ/	/n/
eye /aɪ/	Ø	/aɪ/	Ø

BRANCHING ONSETS, PEAKS AND CODAS: On the other hand, the Onset, Peak and Coda may each further branch into two C- or V-constituents respectively. Then we speak about **branching** or **complex** Onsets etc. The English syllable *drowned* /draʊnd/ is an example in which all three elements branch:



As can be seen from the diagram, diphthongs are treated as branching Peaks – each element of the diphthong occupies a single V-slot. The case is quite similar with "long vowels": in terms of syllable structure, they are interpreted as sequences of two identical V-elements – /i:/ is represented as V_1 = [i] + V_2 = [i], and /ɑ: ɔ: ɜ: u:/ are [ɑ+ɑ, ɔ+ɔ, ɜ+ɜ, u+u] respectively.

CLOSED SYLLABLE, OPEN SYLLABLE:

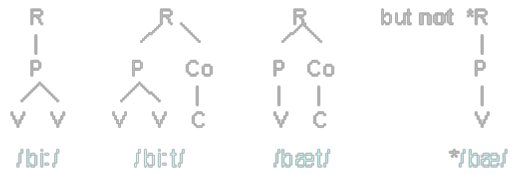
Syllables ending in a consonant, e.g. *cat* /kæt/, *it* /ɪt/, *eat* /i:t/, are traditionally known as **closed** syllables, whereas those ending in a vowel, as in *sea* /si:/ or *eye* /aɪ/, are called **open**. In terms of syllable structure, in closed syllables the Coda is present, i.e. we have a branching Rhyme, while open ones have non-branching Rhymes – the Coda element is absent. Syllable Onset is irrelevant to this distinction.

Phonotactics: **Phonotactics** is a branch of phonology that studies the permissible strings of phonemes in a language. The syllable is a central unit in phonotactic description, although sometimes the principles governing the distribution of phonemes go beyond the confines of a single syllable.

ENGLISH STRONG-SYLLABLE RHYMES:

English has certain limitations on the form of strong syllables – they can be open only if they contain a long vowel or a diphthong, and only a closed strong syllable may have a short vowel. In other words, long vowels and diphthongs can occur in both open (*sue* /su:/, *bay* /beɪ/) and closed (*beam* /bi:m/, *eight* /eɪt/) strong syllables, whereas short vowels only occur in closed ones (*cat* /kæt/, *ill* /ɪl/).

As we saw in the section on syllable structure, a syllable ending in VC has a branching Rhyme with a non-branching Peak and Coda; and VV is a branching Peak, while VVC is a branching Rhyme with a branching Peak and a non-branching Coda. We can now consider the permissible Rhyme structures of English strong syllables:



The phonotactic restriction can be defined this way: **the Rhyme of a strong syllable must branch, OR contain at least one branching constituent**. (Lass, 1984: 254–255)

Division of syllables

So far we have been using monosyllabic words as examples. But when a string of syllables is concerned, how do we decide what is the Coda of one and the Onset of the next? The question of **syllabification**, the division of a word into syllables, is quite controversial and there are several approaches to it.

The two most important and widely used pronunciation dictionaries of the English language, the ***English Pronouncing Dictionary*** (EPD) and the ***Longman Pronunciation Dictionary*** (LPD), employ different principles of syllabification, which we shall quote in turn, and then briefly mention another, more abstract, approach to syllable division.

SYLLABIFICATION IN EPD, MAXIMAL ONSETS PRINCIPLE

In the Introduction to EPD syllable divisions are explained as follows:

> A dot **.** is used to divide syllables, in accordance with the current recommendations of the International Phonetic Association. (…) However, this is not used where a stress mark ˈ or ˌ occurs, as these are effectively also syllable division markers. (…)
>
> (a) As far as possible, syllables should not be divided in a way that violates what is known of English syllable structure. The 'Maximal Onsets Principle', which is widely recognised in contemporary phonology, is followed as far as possible. This means that, where possible, syllables should be divided in such a way that as many consonants as possible are assigned to the beginning of the syllable to the right (if one thinks in terms of how they are written in transcription), rather than to the end of the syllable to the left. However, when this would result in a syllable ending with a stressed /ɪ/, /e/, /æ/, /ʌ/, /ɒ/ or /ʊ/, it is considered that this would constitute a violation of English phonotactics, and the first (or only) intervocalic consonant is assigned to the preceding syllable; thus the word 'better' is divided /ˈbet.ə/, whereas 'beater' is divided /ˈbiː.təʳ/. In the case of unstressed short vowels, /e/, /æ/, /ʌ/ and /ɒ/ are also prevented from appearing in syllable-final position; however, unstressed /ɪ/ and /ʊ/ are allowed the same "privilege of occurrence" as /ə/ when a consonant begins a following syllable, and may therefore occur in final position in unstressed syllables except pre-pausally. Thus in a word such as 'develop', the syllable division is /dɪˈvel.əp/.
>
> (b) Notwithstanding the above, words in compounds should not be re-divided syllabically in a way that does not agree with perceived word boundaries. For example 'hardware' could in theory be divided /ˈhɑː.dweə/, but most readers would find this counter-intuitive and would prefer /ˈhɑːd.weə/. This principle applies to open, closed and hyphenated compounds.

SYLLABIFICATION IN LPD

Here is how LPD sets out an alternative approach to syllabification:

> Syllable divisions are shown in LPD by spacing. (…)
> It is generally agreed that phonetic syllable divisions must as far as possible avoid creating consonant

clusters which are not found at the edges of words. This is the **phonotactic** constraint. Thus **windy** might be ˈwɪn di or ˈwɪnd i, but it could not be ˈwɪ ndi (because English words cannot begin with nd). LPD takes the view that the syllabification of this word actually parallels its morphology: **wind+y**, ˈwɪnd i. For the same reason, **language** must be ˈlæŋ gwɪʤ, not ˈlæŋg wɪʤ or ˈlæ ŋgwɪʤ.

The principle that LPD adopts is that **consonants are syllabified with whichever of the two adjacent vowels is more strongly stressed**. If they are both unstressed, it goes with the leftward one. A **weak** vowel counts as 'less stressed' than an unstressed strong one.

In general, this principle is subject to the phonotactic constraint. However, there are some cases where correct prediction of allophones requires us to override it.

(i) Certain unstressed syllables end in a strong short vowel, even though words cannot. In **nostalgia** the t is unaspirated (as in **stack** stæk, not as in **tack** tæk), so the syllabification is (BrE) nɒ ˈstælʤ ə.

(ii) r can end a syllable, even though in BrE it cannot end a word pronounced in isolation. The r in **starry** is like the r in **star is**, and different from the more forceful r in **star runner**. Likewise, ʒ can end a syllable: **vision** ˈvɪʒ ᵊn.

(iii) Within a morpheme, tr and dr are not split. If **petrol** were ˈpet rəl, as the phonotactic constraint leads us to expect (since English words do not end in tr), its t would likely be glottal and its r voiced (as in **rat-race** ˈræt reɪs). In fact, the tr in this word is pronounced as a voiceless affricate; so LPD syllabifies it ˈpetr əl.

(Wells, 2000: xix–xx)

AMBISYLLABICITY: Yet another possibility of treating intervocalic consonants that the phonotactics of a language allows as both Codas and Onsets is to view them as belonging to both syllables at the same time. Consider the disyllabic word *habit* /ˈhæbɪt/. The consonant /b/ may well function as Coda in the initial syllable – [hæ**b**] – or, alternatively, as Onset in the final syllable – [**b**ɪt]. (Here we use square brackets [ ] to indicate syllable boundaries.) In cases like this, many phonologists argue that the intervocalic consonant has a dual function – Coda in syllable 1, on one hand, and Onset in syllable 2, on the other. This can be represented as follows: $[_1$hæ$[_2$b$]_1$ɪt$]_2$ (σ_1 = [hæb], σ_2 = [bɪt]). Consonants that enter the structure of two syllables are called **ambisyllabic**. (Example from Lass, 1984: 266)