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Syllable Structure in English Words: Phonotactic Constraint Approach

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ABSTRACT

Background: The background of this article is based on the writer's Experian in teaching English phonetics and phonology fourth semester in fifteen years. The students feel very difficult to understand and construct onset construction in initial and coda contractions in final position in a word because of lack of phonology knowledge.
Purpose: this article aims to analyze the structure of syllable based on the theory of onset and coda.
Methodology: The method used in this article is based on phonotactic constraints that concerned with the limitation or restriction of permissible sequence of sound combination in initial, and final consonant that refer to cluster of consonants. The data analysis procedure is based on existing data in English.
Result: The result and findings that the writer come across are as follows: (a) sequences of consonant are different from clusters of consonant, (b) the sequences of phonemes are not random in English, but they have certain rules, (c) Different number of syllables are partly determined by dialectal differences.
Conclusions: what is obligatory in every English syllable is 'nucleus' (vowels or diphthongs) and consonant are optional in onset and coda, and the writers of this article only focus on word with one syllable.

***Keywords**: nucleus, onset, rhyme.*

INTRODUCTION

It may seem obvious that sounds are organized into syllables, and syllables are organized into words. Each word consists of one or more syllables and each syllable consists of one or more sounds. "Syllable" is not a tough notion to grasp intuitively and there is considerable agreement in counting syllable. But technical definitions have proven challenging. Still, there is agreement that a syllable is a phonological unit consisting of one or more sounds and that syllables can be divided into two parts-a rhyme and an onset. The rhyme consists of a nucleus and any consonants following it. The nucleus is usually a vowel, although certain consonants called sonorants can also function as a nucleus. Sonorants include nasal like [m] and [n] and liquids like [r] and [l]. Consider the words *button, butter,* and *bottle*, whose second syllable represented as [bəc], containing a vowel and consonant. The same words could be represented as [bʌtn] [bʌtr], and [bʌtl], where the diacritic [.] under the sonorants [n̩r̩l̩] indicates that they are the nucleus of a syllables. *Consonants that precede the rhyme in a syllable constitute the Onset. Any consonants following the nucleus as part of the rhyme are called the Coda*. The Hierarchical constituted below represents the structure of a syllable as described in (1).

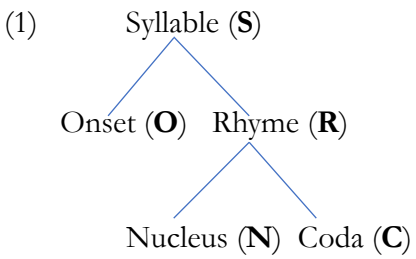


Diagram 1: Structure of a syllable

The only essential element of a syllable is *the nucleus*. *Not every syllable has Onset, and not every rhyme has a coda, but there is always a nucleus in every syllable*. That means that since a single syllable can constitute a word, a word can consist of a single vowel, and the following table it can found that a word can have one, two, there, and four syllables as described in table 1.
Vowels and consonants in English are not just strung together haphazardly into long, unstructured strands: instead, they form a series of larger units with their own internal structure and distribution, governed by their own rules, that is phonotactic constraints. Recognizing and understanding syllables help the readers state some phonological process (for example, involving English [p^h] and the aspiration of voiceless plosives) more accurately and succinctly.

Constituents of The Syllable

The universal syllable template accepted by more phonologic is given in (3) note that small sigma (σ) is shorthand for syllable.

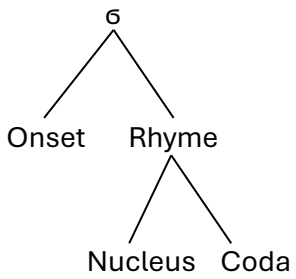


Diagram2: Constituents of the syllable

The only compulsory part of the syllable is the nucleus. This will generally contain a vowel (and recall that vowels are *[+syllabic]*) indeed, the syllable I [aI], or the first syllable of about [ə-baut], consist only a nucleus, if no vowels are available, certain consonants can become nucleus in English. And in English this is true of [l], [m], [n], and [r] in rhotic action: that is, the sonorant in natural class term. Each of the words *bottle* [bɔtl̩], *bottom* [bɔtm̩], *button* [bΛtn̩], and *butter* [bΛtr̩] has two syllables, and in each case the second syllable consist only of nuclear or syllable [l̩], [m̩], [n̩], and [r̩]. Both the onset and the coda are optional constituents and each will contain one or more consonants. In English be [bi:] has an onset and no coda, eat [i:t] has a coda but no onset, and beat [bi:t] has both.

Phonotactic Constraints

Even languages like English which allow *both onsets and codas have restrictions or permissible contents of those slots; these restrictions are known as phonotactic constraints*. In particular, English allows clusters of two or three consonants in both onset and codas. Some restrictions on the composition of the cluster reflect structural idiosyncrasies of English, these examples include in (2).

(2)(a) In CCC-onset, the first consonant must
be [s]
(b) [ŋ] does not appear in onsets
(c) [vðzʒ] do not form part of onset clusters
(d) [tdϴ] plus [l] do not form permissible onset clusters
(e) [h] does not appear in codas

Coda cluster of nasal plus oral stop are only acceptable, if this two stops share the same place of articulation, [lg] is not a permissible coda cluster. Words are composed of one or more syllables. A syllable is a phonological unit composed of one or more phonemes. Every syllable has a nucleus, which is usually a vowel (but it may should be a syllabic liquid or nasal), *the nucleus may be preceded and/ or followed by one or more phonemes called the syllable onset and coda*, which is usually consonant (s). *The nucleus + coda*

constitute the subsyllabic unit called a rhyme. A syllable that has a hierarchical structure of the monosyllabic word is *shown in* diagram 3.

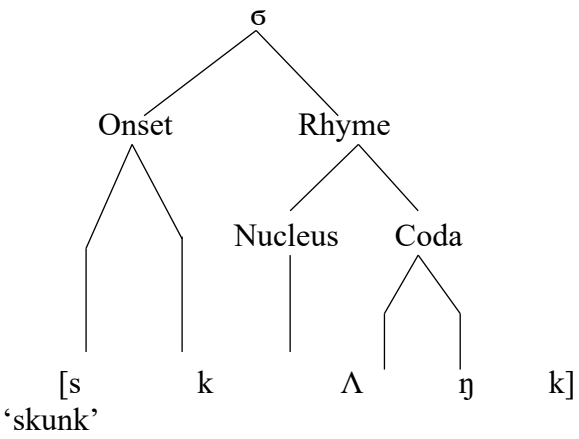


Diagram3: Syllable of *Skunk*

Sequential Constraints of Phonemes

Suppose the English learners were given the following four phonemes and asked to arrange them to form all possible English words [b], [i], [k], [l]: they would most likely produce the following: [blIK], [klib], [bIlk], and [kIlb]. These are the only permissible arrangements of these phonemes in English. *[lbkI], *[llbk], and *[Ilkb] are not possible English words. Although [blIk] and [klIb] are not now existing words.

If they heard someone said *'I just bought a beautiful new blick'*, they might ask, *'what is blick?'*. If, on the other hand, they heard someone say *'I just bought a beautiful new bkli'*, they may reply *'you just bought a new what?'*

The limitations on sequences of segments are called phonotactic constraints. Phonotactic constraints have as their basic the syllable, rather than the word. That is, *only the cluster that can begin a syllable can begin a word*, and only a cluster that can end a syllable can end a word.

The writers of this research find that in every language especially in English there are research patterns of permissible sequences of phonemic units they combine to form the larger units of the language-morphemes or words. The regular patterns for combining the sounds of a language in a sequence are called the phonotactics of the language (Wolfrom and Johnson, 1981:75)

LITERATURE REVIEW

Trask (1996) state that although native speakers usually find it easy to decide, how many syllables are present in a given word or utterance. There have been various attempts to define the syllable phonetically; as a single respiratory movement (the chest-pulse theory), but Trask state again another theory, that is the syllable is purely phonological unit consisting of a single peak of intrinsic sonority as in English like spit, which has two peaks. It is now usual to subdivide the syllable into an Onset and a rhyme, with the rhyme further divided into a nucleus (or peak) and a Coda and the writers also used this theory on describing the syllable in English. Other linguists like Levin, Bailey (1978). Used sonority sequencing principle (SSP). Languages like English have more complex syllables than any other languages, like Japanese, and Eskimo. Two factors have to be taken into considerations in accounting for this language. First, what types of consonant clusters can appear before and after the vowel of a syllable. Second, where do we divide complex sequences of consonants at syllable boundaries. For example, the syllable for cation of extra in English can be [Ɛk-strə], [Ɛks-trə], [Ɛkst-rə], and [Ɛ-kstrə], but which one is accurate, since [str-] is a possible syllable – in its sequence, is [Ɛk-strə].

Some simple English syllables.

The writers of this article show a number of stressed words in English which are regarded as monosyllabic in table 2.

All these monosyllabic words end with a vowel, a situation for which the traditional term of an open syllable has been used. Additionally, word in [2a] contain nothing but a vowel; since there are no words without a vowel, this would suggest that the vocalic nucleus is an in dispensable element of the syllable; as the form of in [2b] show,

the nucleus may be preceded by a consonant.

The consonantal sequence preceding the nucleus is termed the Onset. Thus, the open syllable in [2] contains a vocalic nucleus preceded by an optional consonantal Onset. The Onset is a constituent present in the syllabic structure of words even if it has to skeletal or melodic content. Move is shown in this article the Onset that contain two consonants rather than just one in table 3.

As can be seen in table 4, onset can comprise one or two skeletal positions in the same way as nuclei; an onset or a nucleus which straddles two slots is said to be branching. A constituent embracing just one position is said to be no branching. The words awe, bay, play, illustrate a branching nucleus preceded by an empty onset, a no branching one and a branching one. Together with the melodic and skeletal representations, *the onsets (O) and nuclei (N) of these words are presented* in diagram 6.

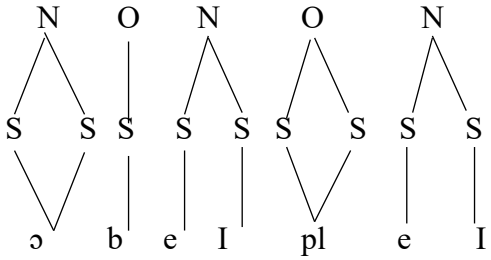


Diagram 6: skeletal of Syllable

The represent action in diagram 6 indicate that a syllable is made up of an onset followed by an nucleus even if the onset is empty, both skeletally and melodically. The nucleus is indispensable for syllables to exist. The simple syllables that has been described above comprise a sequence of an onset followed by a nucleus. The onset is an optional constituent in the sense that it may have no consonant.

MATERIAL & METHODS

The method used in this article is the descriptive qualitative method due to the fact that the findings in this article are considered with the structure of a syllable based on phonotactic constraints or restriction because from phonotactic constraints it can be seen the possibility of the combination of sounds are well formed or not. The determination, if the patterns of these permissible sounds, is an important part of speaker's knowledge about their language and in this case is English. The writers focus on onset and coda because onset and coda are optional in English, for example take a look at this example.

Once note, firstly from this data that syllables need not have onsets; in (4a), eye, eat and ink begin with the syllabic element (the peak). Next, if there is an onset then [i:] may contain either one consonant position (4b) or two (4c). Examples (4d) gives some ill-formed syllable, all of which contain three consonant positions in the onset. But what about (4e)? clearly *street* and *spring* contain three onset consonants and are nevertheless well-formed. The coda of the syllable is the consonant or sequence of consonants that follow the nucleus. Take a look at the following table:

Like onsets, codas are optional (5a) exemplifies well-formed syllables that have no codas. Also like an onset, a coda can contain one consonant position (5b) or two (5c). And again, two such consonant +positions seem to constitute the upper limit: the syllables in (5d), containing three coda consonants, are ill-formed (ungrammatical). But once more we are faced with a problem: consider the examples in (5e). Clamps contains three coda consonants and seems, therefore to violate the rule.

Number of Syllables

It is generally agreed that speakers of English do not have a good deal if difficulty in identifying the number of syllables inmost words. Even in uncommonly used vocabulary such as *consumptiveness, docility, divinatory*, and *cosmographical, decisions* are rather quick and *unanimous* four syllables in the first two words, and five syllables in the last two.

These are, of course, some words where there are due to dialectical differences. For example, the word *military* has four syllables [mi.le.tə.rI] in *American English*, while it has three syllables [mI.le.trI] in *British English.* Another group of words that may have different number of syllables can result from [ə] deletion as exemplified in *veteran* [və.tə.rən] three syllables or [və.trən] two. It also happens in the word library, in American English, it is pronounced [laI-bre-rI] three syllables while in British English it only has two syllables because it is pronounced [laI-bri]. Cases where there is disagreement are clearly limited and they are dependent upon how to say them.

Data Analysis

The background of this article is that there have been four different approaches ro syllable structure in generative phonology since sound pattern of English (SPE) proposed by Chomsky and Halle, the four different approaches are as follows: (1) *Syllable Boundary Approach*, (2) *Autosegmental Approach*, (3) *Constituent Structure Approach*, and (4) *Moraic Approach.* The writers only focus on number (3) that is constituent structure approach because it's concerned with phonotactic constraints. In the constituent structure approach, the syllables is divided into constituents. The first division is into an Onset and rhyme, with the rhyme in turn further divided into a nucleus and coda, as illustrated in (7).

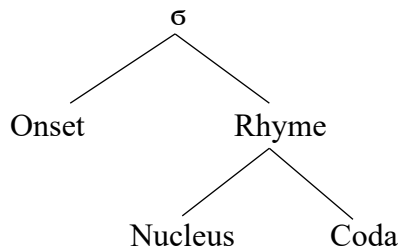


Diagram 7: The Division of the Syllable

The writers use the Greek letter lower case sigma (σ) to represent syllable. The divisions into onset and rhyme is justified by the fact that the rhyme is relevant to stress assignment in many languages, such as English, while the onset only rarely served this function (*Dawis 1988*). In addition, the unit in (7) serve as the domain of phonotactic constraints. The writers focus on onset and coda only.

English syllable phonotactics

In this article the writers will catalogue the possible syllable in English by looking at possible onset at the beginning of words and possible codas in the end of words.

The Onset

Syllable onsets may consist of from zero to three consonants in English. Vowel initial words have zero onset. Any single consonant from the inventory of English consonant can begin a syllable, phonetically, the only consonant that is not allowed to take the onset possible in English is [ŋ].

Double Onset

The writers catalogue and list possible two segments onset cluster in English as illustrated in (6).

The writer only found the three consonant onsets are as follows: as illustrated in table 8 they are very limited.

These three consonants onsets are what one would expect and the three consonants onset are those whose first two consonants from a possible two consonant onset and whose last two consonants from another possible two consonant onset. When this arrangement is found, the first consonant can only be the sound [s], the second consonant can be [p], [t], or [k], and the third [l], [r], [w], or [y].

The Coda

The writers catalogue the possible two consonant codas, and list words containing these clusters as codas. The final clusters are illustrated as follows:

apt, depth, copse
robed, robes
eighth, width, adze, act, ax
sagged, sags

watched, judged, soft, fifth, laughs, loved, loves, pithed, deaths, smoothed, smooths, raps, last gazed, wished, rouged, lamp, dreamed, paint, hint, lunch, tenth, tense, lens, ringed, rink, length, rings, gulp, bulb, fold, mulch, twelve, health, pulse, etc.

The three-consonant codas are more limited as listed in table 8.

Four consonant codas appears to be very limited to cases, where the three consonant codas are followed by an inflectional suffix, thus the writers only found four as illustrated in the following.

[ksϴs] *sixths*
[[kts] *instincts*
[lpts] *sculpes,* and
[rpts] *excepts*

RESULTS

Every syllable has a structure: it consists of a certain phonemes in a particular sequence; for example, Ned, den, and and have the same three phonemes, [d], [Ɛ], and [n], but in different sequences. The words leap, peel, and plea consist of the same phonemes, [l], [p], and [i:], in different arrangement. A word also has a structure: it consists of at least one syllable, like the six words mentioned, and numerous words have two, three, four or more syllable in a particular sequence.

Every syllable contains a syllable segment usually a vowel and most syllables have syllabic segments such as [l,m,n] what is obligatory in any syllable is *the nucleus, or vowel.* The consonant or consonants that precede *the nucleus are the onset of the syllable, and the consonant or consonants that follow make up the coda of the syllable.* The onset may be zero, as in the case of end, and there may be a zero coda, as in plea. The exclamation oh! And the verb owe, both [ou] have only a nucleus, *with zero onset and zero coda.* The structure of these seven syllables can be shown in table 9.

Instead of saying that a table 9 consists of onset, nucleus, and coda, the writers might instead say that a syllable consists of an onset and rhyme, and the rhyme consists of a nucleus and the coda than the structure. *A coda of three consonants is not common,* and no English word ends with more than three consonant phonemes.

Cluster and Syllable Structures

In any language phonemes can be combined with other phonemes to form a syllable. A combination of two or more consonantal phonemes which belong to one syllable is called a consonant cluster. The English [sp] in '*spirit*' is a consonant cluster because the sounds [s] and [p] belong to one syllable, that is, [sp]. The same combination of sound [sp] as in the word '*aspirate*', does not constitute a cluster. But sequence of sound because the two sounds belong to two different syllables, that is as-pirate [æs-pirət].

Consonant Clusters

Consonant clusters can be divided into two groups: (a) those occurring at the beginning that refer to onset and (b) those occurring at the end of a syllable or a word that refer to coda.

Table 1: English words divided by syllables

One Syllable	Two Syllables	Three syllables	Four Syllables
ton [tΛn]	*even* [i-vən]	*anyone* [Ɛ-ni-wΛn]	*anybody* [Ɛ-ni-bΛdi]
spin [spIn]	*although* [ɔl-ðou]	*syllable* [si-lə-bəl]	*respectively* [ri-spƐk-təv-lt]
through [Ϭru]	*consists* [kən-sIsts]		
	writer [raIðər]		

Table 2: Simple English Structure

a. oar, awe [ɔ:]	eye, I [aI]	aye [eI]
oh [ɔu]	err [ʒ:]	
b. bay [beI]	lie [laI]	be, bee [bi:]
low [ləu]	sir [sɜ:]	do [du:]
row [rau]	pour, paw [pɔ:]	
sear [sIə]	dour [duɔ]	bare, bear [beɔ]

Table 3: The Structure of Monosyllable

play [pleI]	pry [praI]	tree [tri:]
glow [glau]	blur [blɜ:]	through [Θru:]
brow [brau]	draw [drɔ:]	
clear [kliə]	pure [pjuə]	clare [kleə]

Table 4: The Onset of Syllable

a	b	c	d	e
eye	Pie	*pry	*pfry	Spy
Eat	seat	*sleeve	*tsleeve	Street
Ink	wink	*swing	*kswIng	spring

Table 5: The Coda of The Syllable

a	b	c	d	e
Pie	Seat	clamp	*filmp	clamps
Free	Feel	film	*firlm	adze
	Fill	clasp	*clampsp	acct

Table 6

play	*pray*	*pueblo*	*pure*
blade	*braid*	*bwana*	*beauty*
trim	*twin*	*tune*	
dry	*dwell*	*dune*	
clan	*cry*	*quick*	*cute*
glow	*green*	*etc*	
fly	*fry*	*few*	
three	*thwart*		
speak	*steak*	*scan*	*sphinx*
smile	*snow*	*slow*	*swarm*
spiel	*shrink*	*schwa*	
hue	*mute*	*new*	*lute*

Table 7: Monosyllable

a	b
*[spl] splice**,v***	*[spyu] spew*
*[spr] sprite**,***	*[styu] stew*
*[str] stray**,***	*[skyu] skew*
*[skl] sclera**,***	*[skr] scream*
[skw] squeak	

Table 8: The three-consonant codas

[dst] midst	*[lpt] sculpt*
[kst] next	*[lks] calx*
[ksΘ] sixth	*[lfΘ] twelfth*
[mpt] tempt	*[nst] against*
[mps] mumps	*[st] amongst*
[kt] instinct	
[ks] lynx	
[rmΘ] warmth	
[rpt] except	
[rps] corpse	

Table 9: The structure of these seven syllables

Onset	**Nucleus**	**Coda**
n	Ɛ	d
d	Ɛ	n
Φ	Ɛ	nd
l	i:	p

p	i:	l
pl	i:	Φ
Φ	ou	Φ

Table 10

[sp] spot	speed	spin
[st] stay	still	stop
[sk] skill	school	scope
[sm] smell	small	smoke
[sn] snow	snail	snub
[sl] slope	slash	sling
[sw] swing	sway	sweat
[sf] sphere	sphinx	

Table 11

[pl] play	plot	please
[pr] pride	probe	pretty
[py] pure	punitive	dispute
[kl] claim	cloud	clue
[kr] crew	cry	cram
[kw] quick	quantity	quarrel
[bl] blow	blame	blouse
[br] bring	bright	brown
[by] beautiful	abuse	tribute
[gr] glow	grain	grab
[gl] glad	glow	glamour
[Θr] throw	thread	three
[my] muse	amusing	
[ny] news	renew	
[hy] huge		
[vy] view	review	
[ʃr] shrew	shred	shrimp

Table 12

[spl]	splash	split	splendid
[skl]	selerosis		
[spr]	sprite	spray	spring
[str]	string	strong	strive
[skr]	screw	screen	scribble
[skw]	squat	squleak	squeeze
[spy]	spew		
[sty]	steward	stew	
[sky] skewer			

Table 13

No.		
1.	With initial [s]:	s → p: spy, speed, sport t: stop, stay, storm k: sky, skip, school [s] → l: slow, slim, slight f: sphere, sphinx m: small, smile, smear n: snow, snake, snarl w: swim, sway, swear
2.	With initial [p]:	**l:** play, plan, plural [p] → r: pride, pray, price y: pure
3.	With initial [b]:	**l:** blue, blame, blind

		[b] { r: bring, bright, broom y: beauty
4.	With initial [t]:	r: train, true, try [t] { w: twin, twilight y: tune, tube
5.	With initial [d]:	**r:** dream, dry, drastic [d] { w: dwell, Dwight, dwarf y: due
6.	With initial [k]:	**l:** elve, climate, clay [k] { r: cream, crew, crime y: cube, cue, cute
7.	With initial [g]:	[g] { r: grow, great, grammar l: glow, glamour, glad
8.	With initial [v]:	[v] → y: view, review
9.	With initial [Ɵ]:	[Ɵ] { r: through, thrift, throng w: thwart
10.	With initial [h] and [w]:	[h] → y: hue, huge, human [w] → y: mute, amusing, mutual
11.	With initial [n] and [l]:	[n] → y: news, renew [l] → y: cute

Table 14

Pattern 1: [s] + [p, t, k, f, m, n, l, w]
Pattern 2: [p, t, k, b, d, g, f, Ɵ, s, ʃ, h, m, n, l] + [l, r, w, y]

Table 15

[-nt]	*ant*	*hint*	*hunt*
[-lp]	*help*	*scalp*	*gulp*
[-sk]	*ask*	*task*	*mask*
[-rt]	*cart*	*smart*	*heart*
[-mp]	*lamp*	*camp*	*hemp*
[-mz]	*seems*	*beams*	*themes*
[-nz]	*buns*	*runs*	*rains*
[-pt]	*kept*	*slept*	*clapped*
[-kt]	*walked*	*talked*	*rocked*
[-sks]	*asks*	*tasks*	*masks*
[-skt]	*asked*	*tasked*	*masked*
[-kst]	*text*	*next*	
[-fƟs]	*fifths*		
[-pst]	*lapsed*	*collapsed*	
[-ksts]	*texts*		
[-mpts]	*prompts*		
[-lfƟs]	*twelfths*		

Table 16

Final clusters starting with a nasal:	m → p: *bump,lamp* m → f: *triumph* n → d: *land, blend* n → s: *sense, lens* n → Ɵ: *tenth* n → tʃ: *bench, munch* n → ʤ: *range, strange* ŋ → k: *tank, think*

Table 17

[-kst]: *text, context*
[-ksϴ]: *sixth*
[-mpt]: *contempt, attempt*
[-mps]: *glimpse*
[-nst]: *against*
[-sps]: *corpse*
[-rld]: *world*
[-rst]: *thirst, burst*

DISCUSSION

Initial Consonant Clusters (Double Codas)

English has a rich system for consonant clusters. The maximum number of sounds for the *initial cluster is three. If a cluster consists of two sounds the first consonants can be the sound [s] followed by the sound [p], [t], [k], [m], [n], [l], [w], or [f]* as illustrated as follows in table 10:

The first consonant of a cluster can also be [p], [k], [b], [j], [f], [ϴ], [h], [v], [m], [n], [l], or [ʃ]. If the first consonant is may of these sounds, the second consonant can also be [l], [r], [w], or [y]. Not all second consonant, however, can occur with any first consonant. Thus, [p] can occur with [l] as in '*play*', [r] as in '*pray*', and [y] as '*pure*', but not [w]. some examples of *initial consonant clusters* are illustrated as follows in table 11.

An initial consonant cluster in English can also consist of three sounds. When the arrangement is found, *the first consonant can only be the sound [s]. The second consonant can be [p], [f], or [k],* and *the third [l], [r], [w], or [y].* however, what can occur with what sound is not random. The following are the possibilities as illustrated as follows in table 12:

All of the possible combination of consonants to form a cluster can be illustrated above.

Initial Clusters with Two Consonants

If an initial consonant cluster consists of two sounds, the first sound can be [s], [p], [b], [t], [d], [k], [j], [f], [v], [ϴ], [h], [m], [n], or [l]. The second sound is either [l], [r], [w], or [y]. The following are the possible combinations as illustrated as follows in table 13:

In brief we can say that if an initial consonant cluster, consists of two sounds, *the cluster can be divided into two different patterns*: one that begins with [s] and the other that begins with some other sounds as illustrated in (14).

It is to be noted that for pattern 2 not every sound can combine with every other sound. For instance, [p] can combine with [l] as in '*play*', but not with [w]. this is no English word that begins with the cluster [pw]. On the contrary, [t] can combine with [w] as in '*twin*' but not with [l]. No English word starts with the cluster [tl-].

Initial Clusters with Three Consonants

For an initial cluster with three consonants the possibility is more restricted. It always begins with [s], followed by [p], [t], or [k], and ends with either [l], [r], [y], or [w], as illustrated in diagram 8 'splash'.

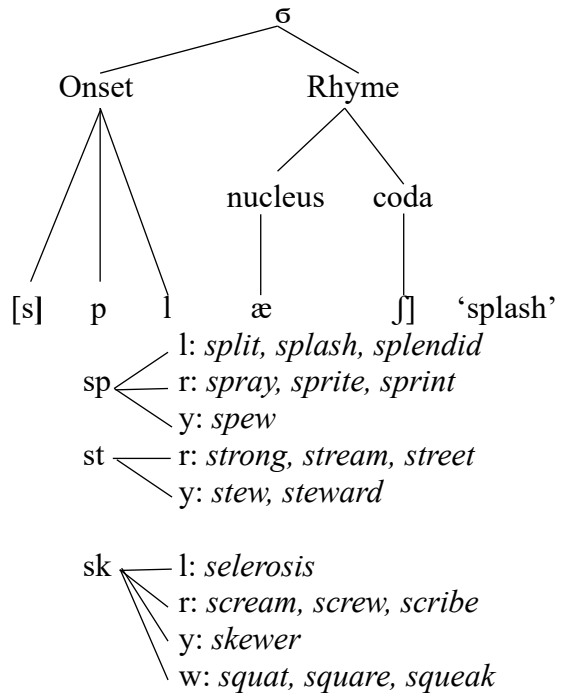


Diagram 8: Initial Clusters with Three Consonants

Final Consonant Clusters

The final consonant clusters are those which occur at the end of a word. The clusters are those which occur at the end of a word. The clusters can be divided into two major groups: (1) Those which are parts of the morpheme, and (2) Those that constitute separate morphemes. Thus, the clusters [-lt] as in the word '*belt* 'and [-mp] as in the word '*camp'* belong to the first group [-lt] and [-mp] are parts of the morphemes '*belt'* and '*camp'* respectively. On the other hand, the clusters [-qz] as in '*dog's* and [-ks] as in '*walks'* belong to the second group since the [z] and [s] are not parts of the morpheme *'dog'* and '*walk'* respectively.

There are final consonant clusters in English, and the writers found the maximum number is four sounds. Some samples are illustrated as follows in table 15:

Final Consonant Clusters with Two Consonants

The final consonant cluster of a mono morphemic word which consists of two phonemes may start with a nasal, a lateral, or and approximant [r] as illustrated as follows in table 16:

2. Final clusters starting with a lateral or [r]

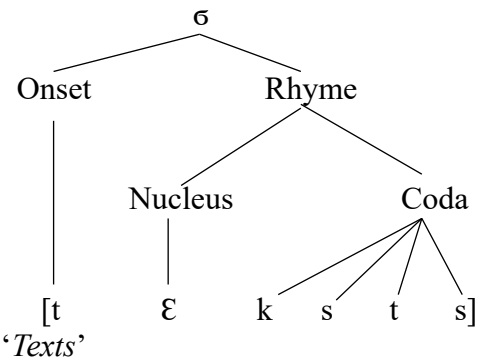
l/r p: *help, pulp, harp, carp*
b: *bulb, curb, herb*
t: *belt, pelt, cart, smart*
d: *bold, bald, cord, fork*
k: *silk, bilk, pork, fork*
f: *half, wolf, scarf*
v: *shelve, serve*
ϴ: *twelfth, health, earth, perth*
s: *else, course, horse*
ʃ: *welsh, harsh, marsh*
tʃ: *belch, perch*
ʤ: *bulge, large*
m: *film, calm, arm, charm*
n: *kiln, burn, turn*

3. Final clusters starting with fricative or stop:

s → p: *wasp, clasp*
s → t: *list, mist*
s → k: *ask, task*
f → t: *rift, left*
f → ϴ: *fifth*
p → t: *apt*
p → ϴ: *depth*
p → s: *collapse*
t → s: *rits*
t → ϴ: *eighth*
k → t: *fact, tack*
k → s: *fax, lax*
d → z: *adze*

Final Consonant Clusters with Four Consonants

There are only some final consonant clusters with four consonants such as [-ksts] in plural form of '*text', 'twelfths',* etc as can be described as in diagram 9:



'*Texts*'

Diagram 9: The Coda with four consonants.

Final Consonant Clusters with Three Consonants

Clusters which are found at the end of a word can consist of three consonants. The following examples are illustrated in table 17.

CONCLUSIONS

Based on the data observe the writers draw a conclusion that *first of all*, syllable onset consists of two, and three consonant clusters, and syllable coda consist of two, three, and some four consonant clusters with different possibilities. *Secondly*, there are some clusters that do not exist in English words in initial and final such as [tl], [lg] is not a permissible coda cluster. *Thirdly*, for

an initial cluster with three consonants, it always begins with [s]. *Fourthly*, initial consonant cluster consists of two sounds, the clusters can be divided into two:
Pattern 1: [s] + [p, t, k, f, m, n, l, w]
Pattern 2: [s] + [p, t, k, b, d, s, g, f, Θ, s, ʃ, h, m, n, l] + [l, r, w, y]
Fifthly, there are no words in English started with [ʒ] and [ŋ], and *sixthly,* there is no word in English ended by [h] as in the writers' language (karonese) '*silih*' (one's wife's brother). *Seventhly*, [vðzʒ] do not form part of onset clusters, and [tdΘ] +[l] do not form permissible onset clusters. *Eightly,* the writers of this article draw a conclusion that constituent structure approach (CSA) based on phonotactic constraints is easier than the other three approaches to analyze. *Last but not least*, there is no [kn-] in initial onset, that's why the word 'knife' in English is pronounced [naIf], since there is no initial /kn-/cluster.

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