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A Study of Consonant Clusters in English Onomatopoeic Words

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ABSTRACT

This paper studies consonant clusters in English onomatopoeic words. Consonant clusters are groups of two or more consonants that occur together in a syllable without a vowel in between. English onomatopoeic words as imitations of sounds show such sequences. The present study aims to investigate the forms of consonant clusters and to show the most prominent ones and their frequency in the data. It also aims to emerge the forms which violate the phonotactic constraints of syllables in English. After analyzing the data statistically, it has been found that there are 33 forms of two-initial consonant clusters which are the most frequent ones since they occur 162 times in the data. There are 13 forms of two-final consonant clusters, 11 forms of two medial consonant clusters and 5 forms of three-initial consonant clusters whose frequency are 38, 22 and 20, respectively. The form /bl- / is the most frequent one in initial position, /-mb- /in medial position and /-ŋk/ in final position in words. The data also shows that the sequences of consonant clusters in two positions in words are limited. Additionally, it has been shown that some forms defy the phonotactic limitations of English syllables. These are mostly found in syllable-onsets. Even more, there are few English onomatopoeic words produced with two or three consonants with a prolonged one and with no observable vowel.

Keywords: English onomatopoeic words, Consonant clusters.

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Introduction

Languages differ considerably in the number and types of phonemes that are allowed to combine in the syllable. In some languages such as Japanese, only the structure (C)V is generally legal, with a single consonant C- which is optional followed by a single vowel V. English tolerates clusters as complex as CCCVCCCC (Knowles, 1987, p. 68). Consonant clusters, also known as consonant sequences, are groups of two or more consonants that occur together in a word without a vowel in between. Such clusters are distributed initially, medially and finally depending on the positions they occupy in the English syllables. There are restrictions on how many consonants can occur in a particular position, and which consonants can occur together, e.g. in English /sk/, /pl/ and /spl/ are possible combination at the beginning of words, but /sd/, /fp/ and /zr/ are not. Aside from their conventional use as phonetic mimics of environmental sounds, English onomatopoeias have a wide range of consonant clusters that appear in various word positions. Even more, they show some consonant combinations not permitted in other words in the language. (Savinainen-Makkonen, 2007, pp. 347-359) found that some consonant clusters—including ones that weren't characteristic of Finnish—only appear when onomatopoeia is produced. The same is true of English. Some English onomatopoeias do not confirm well to the phonotactics, possible consonant combinations, of English. Thus, this study aims to identify the different forms of consonant clusters and demonstrate on which English onomatopoeic consonant clusters are not subject to the constraints of English consonant clusters found in syllables.

1.1. Aims of the Study

The study under investigation aims at:

1. Identifying consonant cluster forms in various distributions and how frequently they occur in English onomatopoeic words.
2. Finding consonant cluster forms in English onomatopoeias that do not submit to the phonotactics of English consonant clusters.

1.2. The Problem of the Study

The meaning and acquisition of onomatopoeia have been studied by different linguists such as (Stump, 2021) and (Schlegel et al., 2021). The acquisition and production of onomatopoeia have also been studied by (Laing, 2014, pp. 387-405) and (Laing, 2019). Onomatopoeia has also been studied in Poetry by (Al-Zubaidi, 2014, pp. 181-193) and (Sabira, 2023, pp. 71-78) and in Phonology in general by (Putri, 2021). Even more, most of these studies are qualitative. There is no study that investigates the consonant clusters in English onomatopoeia. So, the purpose of this study is to look into the different forms of consonant clusters and how frequently they occur in English onomatopoeia. As well, the study is a quantitative one.

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1.3. The Scope of the Study

This study investigates the forms of consonant clusters and their frequency in one and as one word onomatopoeia in English. Two words as onomatopoeia such as dum-de-dum are excluded and when the same consonant and/ or vowel reoccurs in one word, it is dealt with as one only, e.g. bzzzzz, is treated as /bz:/ in our study. This study is primarily a phonological one and there will be no reference to meaning of the investigated onomatopoeic words.

2. Review of Related literature

2.1. Onomatopoeia

Onomatopoeia is defined as a name for an object which is associated with its sound (Putri, 2021, p. 213). They refer to words whose pronunciation suggests their meaning (Fromkin et al., 2014, p. 587). (Hornby, 2005) defines onomatopoeia as "words containing sounds similar to the noises they describe". They also relate to the creation and usage of a word whose pronunciation imitates the sounds connected to the object and the permitted action (Holman, 2000, p. 309). They are a poetic device which uses phonetics to recreate actual sounds people hear. Usually, these words imitate the sounds of an activity or other sounds, like those made by animals. The sounds of nature and animals are onomatopoeic words capture sounds from natural body like sneezing, wheezing and sighing. Examples of onomatopoeic words are those of animal sounds like meow (the sound of a cat), woof (the sound of a barking dog). They may refer to the actions of the body parts like atishoo (the sound of sneezing) and lub dub (the sound of the beating of heart). They can also be sounds made by other things, like pow (the sound emanating from the firing of a gun or canon and creak (the sound of a door when it is opened). "Every language has these kinds of mimetic words, which are often used to express an impression in a personal, emotional manner and are considered indispensable in everyday conversation" (Schlegel et al., 2021, p. 2). Because onomatopoeia establishes a non-arbitrary relationship between the spoken sound and its meaning, it is regarded in linguistics as the sole exception to the theory of language's arbitrariness (Poole, 1999).

It not only that onomatopoeia found in infants' speech across languages (Vihman, 2001, p. 271) and contributes to language acquisition for children (Putri, 2021, p. 212). It is also used in comic books, creative writings, poetry and fiction, advertising and marketing and in children -books.

2.2. The Phonology of Onomatopoeia

Onomatopoeia connects the meaning and sound of words to mimic real world noises. Phonology explains how specific letters and sounds create the words. Sounds are produced by how they are articulated in the vocal tract, carrying universal meanings across different languages. For this, onomatopoeias' sounds "that do not

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originate from the human vocal tract and thereby do not have linguistic form or articulatory detail" are typically easy to produce (Laing, 2019, p. 18).

In English, onomatopoeias are heterogenous with respect to their adherence to the phonological regularities of the language. While some onomatopoeias, such as arf, murmur, and tick tock, are entirely consistent with the inventory of speech sounds used in common English words and the phonotactics that govern how these sounds combine, others deviate from either this inventory of sounds or standard phonotactic principles (Stump, 2021, p. 4).

These irregularities in the formation of English onomatopoeic words can be observed at both the segmental and the suprasemental level. At the segmental level, some English onomatopoeias have some consonants that are not found in English. for instance, the voiceless velar fricative [x] is found in the gun hot onomatopoeia [pcxx] and the crash onomatopoeia [Ekx:]. In a similar instance, the glottal stop, which is simply an English allophone of /t/, manifests as a non-alternating consonant in onomatopoeias like [?ee?] "abrasive sound of a buzzer" (Stump, 2021, p. 40).

At the suprasegmental level, most onomatopoeias have the same syllable structures found in English syllables, e.g. the words "split" and "splat" begin with CCC. However, others depart from the standard English syllable structure patterns., e.g. the rhyme in the bouncing onomatopoeia "boing" /boɪ ŋ/ is not a typical in English. Some English onomatopoeias, as in the mosquito sound [bzzzz] lack the syllable nucleus (Benczes, 2019, pp. 101-104).

Some onomatopoeias which refer to animal sounds, like baa-baa, moo-moo, and meow-meow, are reduplicated and whereas others, like brush and stomp, are not. (Putri, 2021, p. 218).

2.3. Types of onomatopoeia

According to (Simpson, 2004, p. 67), two types of onomatopoeia can be observed:

a. Lexical onomatopoeia: this term describes words that are recognized in the language system and can be found in dictionaries, such as crack, crashes, and ring, whose pronunciation enacts symbolically their referents outside language. For instance, the word ring in the Oxford English Dictionary is defined as "the phone produces a series of resonant or vibrating sounds to sign incoming call".

b. Non-lexical onomatopoeia: refer to a collection of sounds that, without the aid of linguistic frameworks, mimic the outside world in a more unmediated manner, such as marked hitting scenes which are represented as kroww or kromp. These may not be found anywhere in dictionaries. However, they are used in the language and may also be used in poetry like "Tu-whit-tu-who" which is used as owl's sound in Love's Labour's Lost "Winter's Song" (Act V, Scene 2) (Al-Zubaidi, 2014, p. 182).

These two types are also called, secondary and primary onomatopoeia by other linguists like (Stump, 2021).

There is another classification of onomatopoeia adopted by (Bredin, 1996, pp. 555-569). These are:

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a. Direct onomatopoeia: is the word that has a similar sound to the object., e.g. poof, hiss, moan and cluck.
b. b. Associated onomatopoeia: is tied to the sound of the word by imitating object or activity it signifies. Association is as much a matter of convention as it is of aural similarity. This category includes words like whip and cuckoo.
c. Exemplary onomatopoeia: in this category, the way in which a word is spoken suggests a quality and this quality becomes the meaning. Sluggish and sloth take time to articulate while others like nimble and dark are spoken in a more quick and abrupt fashion.

2.4. Consonant Clusters

In English, a syllable can consist of one vowel. The vowel may be preceded and/ or followed by one or more consonants at the margins, i.e. preceding and following a vowel. "Consonant clusters" is termed for a sequence of consonants at the margins of a syllable (Mees, 2003, p. 72). The syllable can begin of up to three consonants in initial position, as in "straw" and as many as four in final position, as in "glimpsed". However, the permitted combinations of sounds that can occur in consonant clusters are limited in English, as they are in many other languages. As it is claimed by (Catford, 2001, p. 208) who said that "not only is the number of consonants that can occur initially and finally in syllables always subject to limitations imposed by the phonological structure of the language, the particular sequences of consonants that can occur in clusters is always limited". (Knowles, 1987, p. 68) also mentions that /ps/ does not appear at the start of English syllables, not because it is hard to say, but because it is forbidden in English. So, there are a number of constraints which are operative on syllable structures. Among these are:

1. English does not permit syllable onsets such as /pn/, /ps/, /vw/.
2. English has no /tl/ or /lk/ onset and /kl/ is not found in coda position.
3. The lenis fricatives /v, ð, z, ʒ / never occur in onset clusters.
4. In three-element onset clusters, the initial consonant is invariably /s/.
5. /t, d, θ/ never combine with /l/ in onset clusters.
6. Nasals never combine with stops in onsets.
7. Nasals with stops in coda clusters are invariably homorganic, i.e. having the same place of articulation, e.g. /mp, ŋk/, but not /mk, np/ (Mees, 2003).

Because of these restrictions, linguists determine the kinds of consonant clusters that occur initially and finally in words and as in follows.

2.4.1. Initial Consonant Clusters

Initial consonant clusters are of two types in English. These are:

1. Two-initial consonant clusters

Two-initial consonant clusters are of two types: The first one begins with /s/ followed by /p, t, k, f, m, n, l, w, j/. e.g. spy /spaI/and snow /snəʊ/. /s/ is regarded as

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the pre-initial consonant whereas the following consonant is regarded as the initial one, (Roach, 2009, p. 57). The second one consists of one of /p, t, k, b, d, g, f, θ, v, m, n, h/ followed by /l/ or one of the cnsonants /r, w, j/, as in try /traI/ and few /fju:/. The first one is called initial consonant and the second is post-initial consonant (Roach, 2009: 57). Not all of these sequences are found, e.g. /pw/ and /dl/ do not occur (O'Connor, 1980). Furthermore, a syllable may begin with /θr/, but not with /ðr/. The sequences /t, d, θ/ and /p, b, f/ do not precede /l/ and /w/, respectively (Knowles, 1987).

2. Three- initial consonant clusters

There are only three initial consonant clusters in English, and they all start with /s/. /s/ is followed by a voiceless stop, which is either /p/, /t/ or /k/. The latter is followed by one of /l, r, w, j/. So, these clusters include /spr/, /str/, /skr/, /spj/, skw/, skj/, /stj/ and /spl/. Examples are words like street /stri:t/ and square /skweə/. /s/ is regarded as pre-initial consonant, initial consonant is the voiceless plosive and post-initial consonants is one of /l, r, w, j/ (Roach, 2009, p. 57).

2.4.2. Medial Consonant Clusters

There are no clear limitations on possible combinations of sounds which occur as medial consonant clusters. In medial position, there may be two, three, or four consonant clusters.

1. Two-medial consonant clusters

Examples of two medial consonant clusters are words like: under /ʌndə/, rested /restɪd/, and finger /fɪŋgə/.

2.Three-medial consonant clusters

Examples of three-medial consonant clusters are words like: extend /ɪkstend/, endless /endlɪs/, export /ekspoːt/ and hungry /hʌŋgri/.

3.Four-medial consonant clusters

Four-medial consonant clusters are found in words like: promptly /prɒmptli/, explain /ɪkspleɪn/ and extract /ekstrækt/.

2.4.3. Final Consonant Clusters

Most final-consonant clusters are made of two consonants only. Plural and past-tense ends are used to form the majority of consonant clusters. They terminate in /s, z, t/, or /d/. (O'Connor, 1980, p. 67). /θ/ is also used to form nouns like strength /streŋgθ/ and numerals like fifth /fɪf θ/. According to (Roach, 2009), pre-final consonant is one of the nasals /m, n, ŋ/, /l/ or /s/ and post-final consonant is one of /s, z, t, d, θ/. Final consonant clusters are of three types:

1. Two-final consonant clusters

There are two kinds of two final consonant clusters. The first one is a final consonant that comes after a pre-final consonant. Examples are words like: rubbed /rʌbd/, bump /bʌmp/ and ask /a:sk/. The second one is a final followed by post-final consonant. Examples are: eighth /eɪtθ/ and backed /bækt/. These two kinds consist of

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either stop+ stop, stop+ nasal consonant, /t/ or /d/+ /l/, any consonant+ /s, z, t, d/, any consonant+ / θ/, /l/+ any consonant or nasal + any consonant, e.g. slept /slept/, battle /bætl/, and jump /dʒʌmp/ (O'Connor, 1980, pp. 67-73).

2. Three-Final consonant clusters

There are two kinds of three -final consonant clusters. It is either pre-final+ final consonant + post-final consonant, as in banks /bæŋks/ and bonds /bɒndz/ or final consonant + post-final 1+ post-final 2, as in next /nekst/ and lapsed /læpst/.

3. Four-final consonant clusters

There are two types of four-final consonant clusters: The first one consists of pre-final+ final+ post-final 1+ post-final 2, e.g. twelfths /twelf θs/ and prompts /prɒmpts/, and the second one consists of final+ post-final1+ post-final 2+ post-final 3, as in sixths /sɪksθs/ and texts /teksts/.

4. Method

In this study, a quantitative method is used for analyzing the data. Efforts are directed toward identifying the forms of consonant clusters in initial, medial and final positions in words. These clusters are arranged according to their number and position in words into: two-initial, three-initial, two-final and two-medial consonant clusters. Two-initial with medial, two-medial with final, two-initial with final, and three-initial with two-final consonant clusters are also investigated. The frequency of consonant cluster forms and their percentages are also explored. Particular attention is given to the forms of consonant clusters that do not submit to English phonotactics. These clusters are found in 215 English onomatopoeic words. The material for the study was selected from dictionaries and websites. The words were classified as onomatopoeic based on their origins. Words which are not originally onomatopoeia were excluded. The transcription of these words was checked by the researcher. Some of these words are only used in spoken English. 8 with no overt vowels are presented in this section and 207 are presented in the appendix. The frequency and percentages of consonant clusters are displayed in tables as shown in the results.

5. Results

The results of analyzing the consonant clusters in 215 English onomatopoeic words reveal that these clusters are of different forms. These forms in the words investigated have different frequencies and percentages and as explained.

Two-initial consonant clusters

Table 1 reveals that the English onomatopoeic words contain 33 different forms of two-initial CCs. These forms have (162) frequency. It is found that the form /bl-/ which is found in words like “blah” and “blab” and begins with the plosive /b/ followed by the lateral /l/ is the most frequent one. It appears (22) times in English

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onomatopoeic terms, with a percentage of roughly %13.58. It is also shown that there are (11) forms which happen to be found only once in the data.

Table 1. Frequency of Two-initial consonant clusters

Forms of CCs	Frequency of forms of CCs	Percentage of CCs	Forms of CCs	Frequency of forms of CCs	Percentage of CCs
/bl-/	22	13.58	/fj-/	2	1.23
/fl-/	21	12.96	/fr-/	2	1.23
/kl-/	17	10.49	/sk-/	2	1.23
/kr-/	12	7.40	/tr-/	2	1.23
/pl-/	9	5.55	/vw-/	2	1.23
/sn-/	9	5.55	/gw-/	1	0.61
/hw-/	8	4.93	/hj-/	1	0.61
/sl-/	6	3.70	/nj-/	1	0.61
/gr-/	6	3.70	/ŋg-/	1	0.61
/sw-/	6	3.70	/sm-/	1	0.61
/br-/	5	3.08	/ʃr-/	1	0.61
/dr-/	5	3.08	/θr-/	1	0.61
/bw-/	3	1.85	/θw-/	1	0.61
/gl-/	3	1.85	/vb-/	1	0.61
/kw-/	3	1.85	/vr-/	1	0.61
/sp-/	3	1.85	/zw-/	1	0.61
/tw-/	3	1.85			
Total	162	100			

As it is shown, a few consonant clusters like /gw-/, /θw-/ and /zw-/ found in the data are rarely used in English -syllable onsets while the forms /bw-/, /ŋg-/, /vb-/ and /vw-/ violate the phonotactic constraints in English. Even more, the sequences /bw-/, /ŋg-/, /vb-/ and /vw-/ which are found in English onomatopoeia have zero frequency in the onset position of syllables in other words in English. These sequences violate the sonority sequencing principle when used in syllable onset.

Three-initial consonant clusters

Table 2 shows that there are only five different forms of three-initial consonant clusters. The frequency of the forms is (20). All of these begin with /s/ followed by a plosive consonant and then by /l/, /r/ or /w/. The most common one is /skw-/. It appears (9) times in the data, with a percentage of forty-five percent. It is found in words like “squee” and “squeal”. /str-/ and /spr-/ happen to occur once in the data and the percentage of each one is % 5.

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Table 2. Frequency of three-initial consonant clusters

Forms of CCs	Frequency of forms of CCs	Percentage of CCs
/skw-/	9	45
/spl-/	6	30
/skr-/	3	15
/spr-/	1	5
/str-/	1	5
Total	20	100

Two-final consonant clusters

There are (13) different forms of two-final consonant clusters, as Table 3 shows. They are found in syllable-coda in English onomatopoeic words. They occur (38) in the data. The most frequent consonant cluster is /-ŋk/ which begins with a velar nasal and followed by a velar fricative consonant. The frequency of /- ŋk/ is (16) and its percentage is % 42.10. It is found in words like "clonk" and "oink". It is important to say that /-kl/ is rare in English words and /-ʃl/ is not permissible in English. It is only found in words like onomatopoeia. The data contains (8) consonant clusters with a percentage of % 2.63. Each one occurs once in the data.

Table 3. Frequency of two-final consonant clusters

Forms of CCs	Frequency of forms of CCs	Percentage of CCs
/-ŋk/	16	42.10
/-mp/	7	18.42
/-nt/	3	7.89
/-ntʃ/	2	5.26
/-ltʃ/	2	5.26
/-lp/	1	2.63
/-ks/	1	2.63
/-kl/	1	2.63
/-sl/	1	2.63
/-ʃl/	1	2.63
/-sk/	1	2.63
/-sp/	1	2.63
/-ns/	1	2.63
Total	38	100

Two-medial consonant clusters

Medial consonant clusters occur within words, often across syllables. Table 4 shows that these clusters are found in only few English onomatopoeic words. These clusters come in just (22) different forms. The most prominent one is the one which has a

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bilabial nasal followed by a bilabial plosive, viz. /-mb-/. It appears (7) times in the data, with a percentage of %31.8. It is found in words like "fumble" and "mumble". There are (8) forms that occur only once in the data.

Table 4. Frequency of two-medial consonant clusters

Forms of CCs	Frequency of forms of CCs	Percentage of CCs
/-mb-/	7	31.8
/-ŋg-/	5	22.72
/-ŋk-/	2	12.5
/-nd-/	1	9.09
/-pl-/	1	4.54
/-br-/	1	4.54
/-km-/	1	4.54
/-st-/	1	4.54
/-sp-/	1	4.54
/-ntʃ-/	1	4.54
/-mp-/	1	4.54
Total	22	100

Two-initial with medial consonant clusters

There are only (7) forms of two-initial with two final consonant clusters in the same word in the data. Each one has a percentage of 14.28 and only appears once. They begin with a plosive followed by /l/, /r/ or with /hw-/ sequence and followed by various medial consonant clusters as shown in the table below. They are found in words like: "crinkle", and "whisper".

Table 5. Frequency of two-initial with medial consonant clusters

Forms of CCs	Frequency of forms of CCs	Percentage of CCs
/bl-mb-/	1	14.28
/bl-st-/	1	14.28
/kl- ŋg-/	1	14.28
/kr- ŋk-/	1	14.28
/gr-mb-/	1	14.28
/hw-mp-/	1	14.28
/hw-sp-/	1	14.28
Total	7	100

Two-medial with final consonant clusters

There is only one onomatopoeic word with two consonant clusters medially and two finally, and the word is "kerplunk". The sequence /-pl-/ occurs medially and /-ŋk/ finally.

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Two-initial with final consonant clusters

Table 6 shows that there are (17) forms of two-initial with two final consonant clusters. The form /kl- -ŋk/ which begins with a velar plosive followed by a lateral and ends with a velar nasal followed by a plosive is the most commonly used, as in "clank", and "clink". It occurs four times in the data and its percentage is %19.04. The English onomatopoeic words have (15) forms. Each one occurs once in the data.

Table 6. Frequency of two-initial with final consonant clusters

Forms of CCs	Frequency of forms of CCs	Percentage of CCs
/kl- -ŋk/	4	19.04
/pl- -ŋk/	2	9.52
/br- -sl/	1	4.76
/pl- -mp/	1	4.76
/kr- - ntʃ/	1	4.76
/kl- -mp/	1	4.76
/kr- -kl/	1	4.76
/dr- -nt/	1	4.76
/gr- -nt/	1	4.76
/gr- - ntʃ/	1	4.76
/fl- -sk/	1	4.76
/fl- -ks/	1	4.76
/fl- -mp/	1	4.76
/hw- -ŋk/	1	4.76
/hw- -mp/	1	4.76
/st- -mp/	1	4.76
/sp- -ŋk/	1	4.76
Total	21	100

Three-initial with final consonant clusters

There is only one word in the data that begins with /s/ followed by a velar plosive /k/ which is followed by a bilabial approximant /w/ and ends with the lateral /l/ which is followed by a plosive /tʃ/ and this is the word "squelch".

Onomatopoeic words with no overt vowels

The data contains (8) words which have no canonical consonant clusters, and syllable structures built on a cluster of stop, fricative, approximant or nasal consonant. Most of these are interjectional symbolic sounds. The 2nd or 3rd consonant is a prolonged sound. The sequence violates normal phonotactic constraints by stringing together unvoiced obstruent; a speech sound produced by blocking or restricting airflow in the vocal tract, and prolonged sonorant. The sound is produced with a

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relatively free airflow through the vocal tract, without causing air friction and without true vocalic nuclei. They violate the sonority sequencing principle SSP by rising and falling erratically in sonority.

Five forms of these words consist of two consonants only as shown in Table 7 below.

Table 7. Frequency of onomatopoeic words of two consonants only

Forms of CCs	Frequency of forms of CCs	Percentage of CCs
/bz:/	1	20
/fz:/	1	20
/gr:/	1	20
/k ʃ:/	1	20
/hm:/	1	20
Total	5	100

Table 8 shows that there are (3) forms which consist of three consonants only without an intervening vowel. One of these consonants is prolonged.

Table 8. Frequency of Onomatopoeic words of three consonants only

Forms of CCs	Frequency of forms of CCs	Percentage of CCs
/bz:t/	1	33.3
/pf:t/	1	33.3
/skr:/	1	33.3
Total	3	100

6. Conclusions

Based on the results of analyzing the consonant clusters in English onomatopoeic words, it has been concluded the following:

1. Consonant clusters occur initially, medially, and finally in words. There is no word in the data begins with more than three consonants and ends with more than two consonants.
2. Two-initial consonant clusters in English onomatopoeic words are the most frequent ones. These are 33 forms and their frequency is 162. The least ones are two-medial consonant clusters. Their forms are only 11 which happens to be found 22 times in the data.
3. The majority of two-medial consonant clusters connected to two neighboring syllables in the same word. The most prominent form is /-mb-/ which happens to be found 7 times in the data.
4. There are only 5 forms of three-initial consonant clusters. They all begin with /s/ followed by a voiceless plosive; /p/, /t/, or /k /which is followed by the lateral /l/ or one of the consonants /l/, /r/ or /w/.

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5. The most frequent form of initial consonant clusters is /bl-/ which occurs 22 times The form begins with the plosive /b/ followed by the lateral /l/. The form /fl-/ has the second frequency and then /kl-/. The most common final consonant cluster is /-ŋk/. It happens sixteen times. The second frequency is found in the form /-mp/, followed by /-nt/. The most frequent form of two-medial consonant clusters is /-mb-/. It occurs 7 times. Followed by /-ŋg/ and then /-ŋk/.
6. The form /skw- -ltʃ/ is the only one which begins with three consonants and ends with two.
7. The form /pl- -ŋk/ is the only one which is found in more than one position in the word. It occurs as two-initial with medial consonant clusters once and as two-medial with final consonant clusters the other.
8. Compared to two-initial with medial consonant clusters and two-medial with final consonant clusters, two-initial with final consonant clusters are more common. The frequency of two-initial with final consonant clusters is 21. The most prominent form is /kl- -ŋk/ which happens to be found 4 times in the data.
9. Most consonant clusters in English onomatopoeic words submit to the rules governing combinations of consonants in English. However, some like /zw-, bw, ŋg-/; especially those occupy the onsets of syllables in English onomatopoeic words violate the English phonotactic constraints. These forms begin with the less sonorant consonants to the more sonorant ones. Similar forms are /-bl/ and /-ʃl/ which occupy syllable-codas.
10. There are 8 onomatopoeic words which have no canonical syllable structures and no vowel as nucleus of the syllable. They either consist of two or three consonants with a prolonged one. They are made of combinations of a plosive, fricative, approximant, and/or nasal.

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Appendix
English Onomatopoeic Words Having Consonant Clusters

1	abracadabra
2	belch
3	blab
4	blabber
5	blad
6	blah
7	blam
8	blamber
9	blare
10	blast
11	blaster
12	bleat
13	bleh
14	bleep
15	blizzard
16	blore
17	blout
18	blub
19	blubber
20	blarney
21	blumber
22	blurp
23	blurt
24	bluster
25	bluther
26	bokmakierie
27	bounce
28	bonk
29	bray
30	brastle
31	brattle
32	brum
33	brunt
34	bump
35	bwah
36	bwee
37	bweep
38	cangle
39	chinkherinchee
40	chomp

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41	clack
42	clamor
43	clang
44	clangor
45	clank
46	clash
47	clatter
48	click
49	clikket
50	clink
51	clobber
52	clonk
53	cluck
54	clump
55	clunk
56	crack
57	crackle
58	craunch
59	crash
60	creak
61	crick
62	cricket
63	crinkle
64	croak
65	crout
66	crow
67	crunch
68	dingle
69	drant
70	dring
71	drip
72	drone
73	drum
74	flacker
75	flaff
76	flap
77	flash
78	flibbertigibbet
79	flicker
80	flimmer
81	flip
82	flirt
83	flisk

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84	flitter
85	flizz
86	flob
87	flog
88	flop
89	flounder
90	flirt
91	fluff
92	flummox
93	flump
94	flurry
95	floush
96	fratch
97	fribble
98	fumble
99	fweeooo
100	gasp
101	gloosh
102	glug
103	glup
104	grraa
105	graunch
106	groan
107	growl
108	grumble
109	grunt
110	gweeze
111	honk
112	hue
113	hwine
114	jangle
115	jingle
116	jink
117	jumble
118	kerchunk
119	kerplunk
120	kloosh
121	kwak
122	mamble
123	mumble
124	ngh
125	nyeeaarrr
126	phew
127	plap

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128	plash
129	plink
130	plod
131	plonk
132	plop
133	plout
134	plump
135	quack
136	quag
137	reeshle
138	rumble
139	scat
140	scratch
141	screech
142	scritch
143	scud
144	shreik
145	slam
146	slap
147	slash
148	slither
149	slosh
150	slurp
151	smack
152	snap
153	snarfle
154	snarl
155	sneeze
156	sniff
157	snip
158	snore
159	snort
160	snuffle
161	spatter
162	spank
163	splash
164	splat
165	splatter
166	splish
167	sploo
168	splosh
169	spray
170	sputter
171	squal

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172	squash
173	squeal
174	squee
175	squeak
176	squelch
177	squirt
178	squish
179	stramash
180	swash
181	swiii
182	swirl
183	swish
184	swoosh
185	swoop
186	throb
187	thwack
188	tinkle
189	trickle
190	trill
191	twang
192	tweet
193	twitter
194	vbeep
195	vroom
196	vwahaha
197	vwoop
198	wham
199	whimper
200	whirr
201	whisper
202	whistle
203	whonk
204	whomp
205	yelp
206	yikes
207	zwum

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