# The Syllable Structure and Re-syllabification in Kalhouri Spoken in Khanaqin with reference to English

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## Abstract

Th general assumption about the world languages is that group themselves into constituents known as syllables. Whereas the existence of syllable is a principle in the world's languages, its structure and the way the phonemes are grouped is subject to parametric variation. To the best of the researcher's knowledge, the theories of syllable are not applied on data from Kalhouri Spoken in Khanaqin[1] (KSK henceforth). Therefore, this paper embarks on applying the principles of syllable structure and (re)syllabification on KSK data to see whether the syllable as a phonological unit is universal and thus it can be attested in new data. Since English language is intensively studied, it is used as a reference for the KSK data to see how it fares compared to the English Language. It is concluded that the syllable is a phonological unit in KSK and its structure, unlike English, is simple as it does not allow consonant cluster. Further, onsetless syllables are not permitted. Re-syllabification is enforced through the insertion of an epenthetic vowel in which the principles of maximality, directionality, prosodic licensing and extrametricality is followed.

**1.Introduction** Before commencing the investigation into the syllable structure and its representation in KSK, the phonemic transcription of all KSK phonemes along with examples containing those phonemes should be presented as in Table One below.

Khanaqin is among the disputed areas between Kurdistan Region and Iraqi central government. According to a census conducted by the district council of Khanaqin in 2015-2016, the total population of the district including its sub-districts which are Saadiya and Jalawla is estimated at 250, 000 while the central district of Khanaqin is estimated at 150,000.

| No. | IPA symbol | Examples | No | IPA symbol | Examples |
|---|---|---|---|---|---|
| 1 | b | baw 'come' | 16 | χ | χaɾ 'donkey' |
| 2 | p | kalpal 'clothes' | 17 | ħ | ħaft 'seven' |
| 3 | t | tawsɑn 'summer' | 18 | z | zɨg 'belly' |
| 4 | k | kawɨʃ 'shoes' | 19 | ʒ | ʒan 'pain' |
| 5 | d | daʃt 'outside' | 20 | ŋ | baŋdan 'act of calling f prayer |
| 6 | q | qɑli 'carpet' | 21 | m | madʒara 'drawing' |
| 7 | g | guʃ 'ear' | 22 | n | nim 'half' |
| 8 | ʧ | ʧaɾmi 'white' | 23 | ɫ | kuɫ 'short' |
| 9 | dʒ | dʒawal 'plain' | 24 | l | gul 'leper' |
| 10 | v | gɨvɨn 'coily' | 25 | j | Jak 'one' |
| 11 | ʁ | ʁaɫuz 'coal' | 26 | w | wahaɾ 'spring' |
| 12 | h | haɾ 'boisterous' | 27 | ʔ | ʔaʃ 'food' |
| 13 | s | sif 'apple' | 28 | ʕ | ʕanaɾ 'pomegranate' |
| 14 | f | fɨɾawɨr 'talkative' | 29 | r | riga 'route' |
| 15 | ʃ | ʃɨwaɫ 'underpants' | 30 | ɾ | sɨɾma 'kohl' |
| 31 | a | saɾ 'head' | 32 | ɑ | ʃaɾ ' city' |
| 33 | u | muɾ 'louse' | 33 | e | χeɾ 'charity' |
| 34 | i | siɾ 'garlic' | 34 | ʉ̂ | qʉ̂x |

It should be noted that KSK has an epenthetic vowel which is /ɨ/ as in /pɨr/ 'full' with its allophonic variation which is /ʉ/ as in sʉwir 'bride'.

Defining syllable, its structure and the process of syllabification has been a controversial issue among the linguists as there are a considerable number of different theories and assumptions seeking to define them, which none of them is probably free from flaws from linguistic perspectives. Chest pulse theory by Stetson (1927, cited in Den Ouden, 1995, p. 10) is probably among earliest attempts to define syllable in a given natural language. According to this theory, the number of syllables is determined by the number of chest pulses. But the recent attempts seek to separate the phonetic explanations from the phonological ones when they try to define the nature of

syllable. This notion is proposed by Pike (1947 cited in Den Ouden, 1995, p. 11) when he describes the chest pulse as a phonetic property of syllable while the phonological characteristics of a syllable are analyzed in the frame of its phonotactic function in any given language.

Phonologically, the syllable is assumed to be a unit in the prosodic hierarchy which can be recognized universally, "there exists a higher order hierarchical prosodic structure of which syllables must be seen as building blocks" ( Goldsmith et al, 2011, p. 328). Moreover, it is not only the phonotactic constraints which can be explained with reference to syllable or syllable structure but also the domain of applications of several phonological processes along with the sufficient explanation of suprasegmental phenomena such as stress and tone ( Goldsmith et al, 2011, 329).

Thus, these motivations mentioned above have led the phonologists to consider syllable a constituent in the prosodic hierarchy (Nespor and Vogel, 1986, p.13). The assumption is that syllable is a universal constituent, i.e. the sounds f all languages group themselves to syllable.

Hence, a question arises: how to syllabify and explain the syllable structure in a particular language? To answer this question, this paper looks into the syllable structure, re-syllabification and other phototactic constraints in KSK. This paper explores such aspects with reference to English. The reason that English is to be considered is that English is used as a reference in this study and it is a well-studied language in terms of applying re-syllabification concept and other phonological considerations such as English specific template composition and its phonotactic constraints.

The concept of re-syllabification which is introduced by Selkirk (1982, cited in Goldsmith et al, p. 344) is that the syllable

boundary or structure can be determined as a result of a phonological derivation. Moreover, the approach could solve the emergence of the non-compliant segments in the light of sonority theory which may occur in both onset and coda positions in English. Nevertheless, the language specific template-based approaches along with the parametric measures which allows for language-specific conditions will be considered.

## 2.Methodology

Two major sources are used for the data collection: the first one is a group of informants consisting of five KSK speakers, four of them aged over 30 years who are native Kalhouri speakers from Khanaqin and the last one is below 30 years old whose mother tongue is Kalhouri before she learnt Central Kurdish in school. The informants are asked to determine the well-formedness and the meanings of all linguistic expressions. In other words, the intuition of the informants is used to determine the grammaticality of the expressions and the validity of the phonological features. The other source is the existing literature on Southern Kurdish (mainly Kalhouri). Together, they are used to validate the scientific aspect of the study. It should be noted that English is used in this paper as a well-studied language with respect to syllable and re-syllabification process which are discussed in this paper.

Moreover, the theoretical framework for investigating the data in this paper is based on generative phonology and those principles and parameters which are in conformity with generative grammar in general and generative phonology in particular. Relevant references to those principles and parameters are made in the appropriate sections of this study.

## 3. The Syllable in English
### 3.1. The syllable structure and phonotactic constraints in English

Since a vowel alone can be a syllable in English, the minimum syllable template of English is [V], as in *or* [ɔː], *eye* [ai] and *I* [ai] which proves that not all syllables in English are so rich in internal structure. Roach (2009, p. 56) states that consonants also in the forms of isolated sounds can be considered syllables when they are expressed to indicate a particular statement. The sound */m/* can be expressed to indicate agreement and it is a single syllable. Thus, the onset and coda are both optional in English syllable. However, an English syllable may have an onset consisting of one single consonant as in 'day' /dei/, 'may' [mei] and 'me' [mi:]. Thus, the structure is [CV].

Moreover, the peak of the syllable can be followed by a coda consisting of a single consonant. That is, the structure is [VC] as in *'at'* /ət/, *'add'* [æd] and *'in'* [in]. Although the vowels can generally function as syllable nuclei or peak of the syllable, some types of consonants can fill the position of the peak of the syllable, which are called syllabic consonants. These are typically nasals and liquids (Roach, 2009, p.64) as in '*bottle'* /ˈbɒtɫ/, *'bottom'* /bɒtm/ and *cattle* /kætl/. The maximal number of consonants which the peak of the syllable may take initially as onset is three and similarly the maximum number of consonants which the peak of the syllable may take finally as coda is three. This is based on an approach taken by Selkirk (1982, cited in Goldsmith et al, 2011, p. 337). Thus, the English syllable structure can be represented as ( C ) ( C ) ( C ) V ( C ) ( C ) ( C ) as in student /stjudnt/. Although it may be argued that a quadri-segmental coda can exist in English, this study takes that approach which disregards the

inflectional endings which are always the fourth consonant finally in any given word in English which will be discussed below.

When a consonant cluster comes into being in a particular lexicon, the internal structure of its phonemes can be viewed in terms of the distributional and phonotactic considerations. In other words, it can be questioned whether the presence of one consonant is controlled by its following ones or its nucleus or whether the three major parts of syllable which are onset, nucleus and coda are 'equally' controlled by each other or not. Pike (1967, pp. 386-387) argues for the constituency among the consonant clusters in the margins, stating that a closer relationship, for example in CCV, can be observed between the two consonants than between the second consonant and the nucleus. He gives an example of an initial /s/ slot which can be followed by another consonant in the onset, arguing that the list of phonemes which can occupy the second consonant slot is 'more likely to be controlled' by the presence of the /s/ than the presence of the nucleus. Now, the second part of the question which is related to the possible relationship between the margins and nucleus of the syllable should be answered.

Several linguistic and even psychological suggestions have been brought forward to indicate that there is a stronger relationship or link between peak and coda than between peak and onset. Thus, peak and coda are usually grouped into a constituent, leading to the emergence of the two major constituents in a syllable which are onset and rime (also known as rhyme) which consists of peak-coda unit. Thus, it is argued that English syllable is structured on the basis of onset/rime division supported by the idea that only rime is of significance for stress assignment (Treiman, 1988, p.221).

As stated above, there is a strong link between two or more adjacent segments occupying a particular node. This link based on shared features of the adjacent sounds such as /st/ as in *'stem'* /stem/ is shown in (1).
(1)
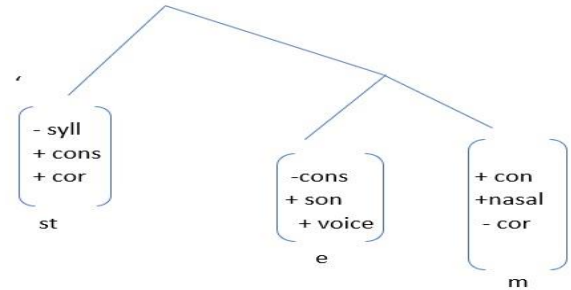


As it is shown in (1), the feature [+coronal] is shared between the two consonants occurring initially. That is, the node dominates a coronal cluster. This template, however, cannot satisfy all phonotactic constrains which are possible in English. Three consonants, as stated previously, can occur as an onset in English which is not reflected in this template. Thus, the additional collocational restrictions, as proposed by Selkirk (1982, cited in Goldsmith et al, p. 333) should be added to capture more generalizations. The three consonants which can form an onset in English begins with /s/ which is followed by an obstruent. She proposes an auxiliary template which can satisfy all phonotactic restrictions for onset formation in English as shown in (2).
(2)
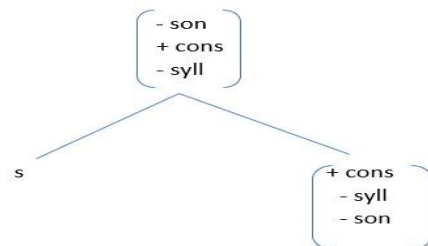


This attempt does not violate the original template since the sound /s/ in the initial position along with an additional obstruent

form a single obstruent occupying one slot in the template. These two consonants along with the third sound in sequence form a consonant cluster. Thus, based on the template (2), the syllable representation of *scream* /skri:m/ is shown in (3):

(3)
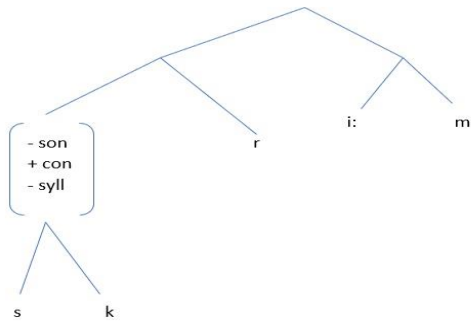


Since all the consonants in the onset share a particular node, they can be grouped into a constituent. Moreover, the representation of the word 'scream' is ruled well-formed since it could meet all the requirements imposed by the collocational restrictions related to the possible onset combinations. Examples of such restrictions are an onset of three consonants should begin with the sound /s/ followed by a voiceless stop while the third consonant must be a glide or liquid. Thus, based on the features description, the onset structure of the word scream can be shown in (4).

(4)
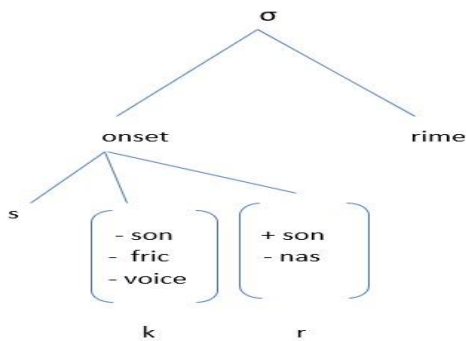


As for the peak which is the most essential part of the syllable, a syllabic element fills the peak position. As previously discussed, it is not only the vowels that can fill the position of the peak, which is also called nucleus, but also a syllabic sonorant can do so in English. Selkirk (1982, cited in Goldsmith et al, p. 337) discusses the phonotactic restrictions of English with regard to the peak of the syllable, describing them as strong since two syllabic elements can co-occur in the peak. This is totally restricted to the presence of the glides and sonorant liquids with the vowels. Based on the underlying segment combinations, the only two vowels which can precede /j/ in the peak are /i/ and /e/. as for the glide /w/, this segment does not follow any vowel except for /a/ if the diphthongized /uw/ and /ow/ are derived by rule (Selkirk,1982, cited in Goldsmith et al, p. 333).

In discussing the possible combinations of segments in the coda in English, it should be noted that, as previously discussed, up to four consonants are permissible in the coda while the coda itself is optional based on the phonotactic constraints in English. It is generally agreed that there is a structural tie among the elements within a consonant cluster in coda as well. The phonotactic restrictions in the coda can begin with a fact that if there are two consonants in the coda, the second must be a coronal. The /s/ plus obstruent, however, can rescue the syllable pattern whose the second and the third elements are coronal which is /st/ as in next /nekst/. Thus, the feature coronal shared by the two elements can conform to the coronal requirement on consonants in the second place of the coda. A problem arises if the /s/ plus obstruent comes as the second and third elements in the coda while the two elements within the auxiliary (s + non-coronal) do not share the coronal feature.

Based on the phonotactic constraints and the principle of constituency in constructing syllable, two consonants are permissible in coda whose second consonant is coronal while the three consonants are allowed in the coda provided that /st/ or /sθ/ exist in the second and third place. Thus, as Selkirk (1982, cited in Goldsmith et al, p. 338) argues, quadri-consonantal codas are not permissible in English since those syllables with apparently four consonants in coda are those whose final elements are inflectional endings. She states that the inflectional suffixes should be not accounted for in underlying representation. She founded her argument on the basis of the relation of the inflectional endings with the preceding segments and the final segments in the coda with it preceding segments as well. These 'final' segments create two different phonological processes.

As for the collocational restrictions in the coda, which supports the idea of forming coda as a constituent, there are a number of strong collocations resulting in the existence of tens of consonant cluster patterns in the coda in English (Gregová, 2010, p. 81). When, for example, there is a second consonant in the coda, the first cannot be /b/, /g/, /v/, /tʃ/, /dʒ/, /ʃ/ or /ʒ/. As for the relationship between peak and coda and turning into rhyme, Selkirk (1982) also argues in support of the universality of the rhyme on the basis of the phonotactic restrictions between them. This argument is supported by the idea that the "stress assignment rules are sensitive to the structure of syllable rime but disregard completely the character of the onset," Selkirk (1980, p.93).

## 3.2 The syllabification in English

Since the satisfaction of the basic syllable composition along with the collocational restrictions may not be sufficient to parsing all syllable types in English, several parameters have been proposed to capture all syllable representations such as Onset Maximization and Filters as explained below.

### 3.2.1 Onset Maximization

Although Onset Maximization was proposed to be a universal, that is, it can be regarded as principle, it should be treated as a parameter. As proposed by Itô (1989, p. 223), parsing the consonants in sequences is a language specific matter but 'onset satisfaction' is universally accepted.

Thus, English, for example, does not only have the tendency to have onset satisfaction but also maximizes the onsets. The word atrocious /ətroʊʃɪs/ can be syllabified either as */ət.roʊ.ʃɪs/ (where the dot indicates the syllable boundary) or /ə.troʊ.ʃɪs/. But, only the latter syllabification is correct since "English maximizes its onsets: if the consonants in question are increasing in sonority, they are all placed in the onset," (Black, 2021, p. 7). But in certain situations, considering the sonority principle along with onset maximization may not still be explanatory to the syllabification. Thus, Filters should be brought forward.

### 3.2.2 Filters

As previously stated, onset maximization and sonority principle alone cannot explain the validity of all syllable parsing operations in English. /t/ and /l/, for example, can be grouped together as onset of a syllable if only these two parameters are accounted for as in */æ.tləs/. This sequence, however, is not permissible in English. Thus, filters are proposed to rule out such sequences (Clements and Keyser, 1983, p. 31). According to this condition, all +coronal, -strident segments are not allowed in an onset when they are immediately followed by a lateral (Black, 2021, p. 8). If this filter is accounted for, the correct syllabification is /æt.ləs/. These parameters

along with the templates proposed by Selkirk (1982, p. 328-338) discussed above can explain the syllabification process in English. Now, we turn to discuss the nature of syllable structure and syllabification in KSK and explore the possibility of the presence of the phonotactic constraints in it in following sections.

## 4. The Syllable Structure and Phonotactic Constraints in KSK

In discussing the syllable structure and its patterns in KSK, Karimi Doostan (2021, p. 9) presents a list of possible syllable types in Southern Kurdish, a major Kurdish dialect which Kalhouri belongs to. He states that minimum syllable template of Southern Kurdish is [CV]. However, Kord Zafaranlu Kambuziya and Sobati (2014, p. 198) have a different view, claiming that a minimum syllable in Kalhouri sub-dialect can consist of one single vowel as in *ʔara* 'why' which was represented as V.CV.
But this view is to some extent confusing since the initial glottal stop in *ʔara* should be represented in the syllable structure regardless of its defective distribution as a requirement to fill the slots within the syllable structure as Hamid (2016, p. 26) states that onsetless syllable is not permitted in Kurdish. Thus, *ʔara* can be represented as CV.CV. The syllable structure of *ʔara* is represented in (5).

(5)
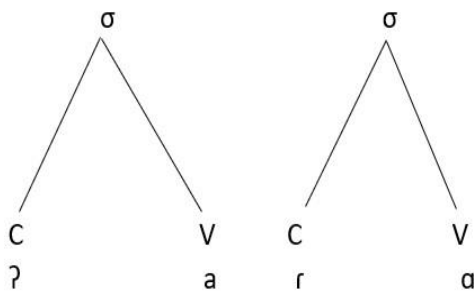


As for the peak of the syllable, no study on Kurdish language could be found that might present segments other than vowels to function as nuclei of the syllable. The presence of consonant clusters in Kalhouri sub-dialect is controversial dialect, especially in the onset position. Karimi Doostan (2021, p. 9) states that consonant clusters can occur initially provided that the second consonant is a glide or approximant.

This paper, however, supports the idea that initial consonant cluster is not allowed in KSK as an epenthetic vowel can be observed between the consonant and the glide which follows it. This epenthetic vowel appears when a suffix is added to the word as shown in (6).

(6). a. xwaʃg ' sister' + /xʉ.waʃ.gig/ 'a sister'

　　b. xwɑ ' salt' + /xʉ.wɑ.ga/ 'the salt'

Nevertheless, the consonant cluster may occur in the coda as in *xa.rq* ' stone', *naft* 'oil'. These consonants are not broken by epenthesis provided that they are clusters of falling sonority.

Thus, the maximal number of consonants that the peak of the syllable initially in KSK is one while the maximal number of the consonants that the peak of the syllable can take finally is two. In general, the syllable structure of KSK can be represented as CV (C) (C). Based on the phonotactic constraints of Kurdish, /ɫ, r and ŋ/ cannot occur initially in KSK.

In discussing the relationship between nucleus and coda which turn into rhyme as a constituent, both can function as a domain for several phonological processes. Some templates of reduplication, for example, in KSK can support the onset/rhyme argument in which the rhyme is repeated as in *taw* ' fever' when only the rhyme which is /aw/ is repeated to form *taw u maw* ' fever and alike' and *maɫ u ħaɫ* 'home and alike'. Based on the syllable structure shown above, the coda is optional in KSK. This is, similar to

Central Kurdish, in compliance with the universally accepted syllable type inventories as onsets are highly desirable while codas are not (Hamid, 2016, p. 89). This temple-based approach, however, may not easily partition all Kalhouri lexicons or phrases into their syllables since some of them lack apparent vowels in their underlying representations, leading them to have merely adjacent unparsed consonants known as stray consonants. Thus, several parameters have been proposed for the syllabification of such unparsed consonants. The following section discusses the syllabification in KSK.

## 4.1 Syllabification in KSK

As discussed in the previous section, certain parameters have been proposed to deal with the adjacent unparsed consonants. The first question which should be answered is where the epenthesis is inserted in unparsed consonants. Itô (1989, p. 218 -219) proposes several principles and parameters which have been applied by Hamid (2016, p. 79) to determine the suitability and site of the epenthesis in the syllabification process in Central Kurdish which are Maximality, Directionality, Prosodic Licensing and Extrametricality . This paper explores the application of such parameters in determining the syllabification in KSK as well.

### 4.1.1 Maximality

Maximality is a principle which was first proposed by Prince (1985, p. 471), according to which, a unit must be of maximum size provided other constraints are considered which may reduce it.
In considering this principle in the process of the insertion of epenthesis in a string of consonants, the size of the syllable is maximized as minimal number of epenthesis is expected to

be inserted. Consider (7a and 7b):
(7)
a. wʃkn ⟶ wiʃ.kɨn 'shriveled'
b. triʃk ⟶ tɨ.riʃk 'adhesive tape'
(7a) illustrates that two epenthetic vowels are necessary to break up the impermissible consonant cluster, yielding a grammatical form as *wiʃ.kɨn* in the output. The insertion of the epenthetic vowel, however, depends on meeting several requirements at this stage such as adherence to the principle of maximality, sonority principle and other phonotactic constraints in KSK such as the impermissibility of consonant cluster in onset. (7b) , on the other hand, demonstrates that the second consonant initially may not necessarily become the coda of the first syllable as an epenthetic vowel is necessary to break up the cluster initially but the second consonant leaves the first syllable and syllabified to the onset of the second syllable. It should be noted that the consonant cluster finally cannot be broken up as cluster of two consonants with falling sonority can keep as the coda of the second syllable. That is, two epenthetic vowels in (7a) and one in (7b) are necessary to guarantee minimum number of epenthetic vowels are inserted to rescue maximum number of stray consonants.

One may argue for using only one epenthetic vowel to rescue maximal number of stray consonants. But any such attempt would violate sonority principle. Moreover, if an extra epenthetic vowel is added to leave the first syllable open as in * wɨ.ʃi..kɨn this syllabification process yields ungrammatical form since it violates maximality principle. Thus, two epenthetic vowels are sufficient to maintain both the maximality and sonority principles in this example. Hence, another question arises: where to start epenthesising the unparsed consonants, from right-to-left or left-to-right?

The directionality parameter which is discussed in detail by Itô (1989) can solve this problem.

## 4.1.2 Directionality and Prosodic licensing

Directionality is of paramount importance in predicting the correct position of the epenthesis which are necessary in the syllabification process in KSK. This parameter has two options which are right-to-left and left-to-right mechanisms. They may make difference in terms of determining the number of the syllables and ways in parsing the stray consonants for which the phonotactic constraints of the given language should be accounted for. In addition, the prosodic licensing should be met according to the KSK syllable templates. Take, a word *krmn* 'wormy' whose underlying representation lacks explicit peak, leading us to syllabify it. The directionality, however, leaves us with two options as shown in (8a and 8b).

(8)
a. *kɨ. rɨm.na (right-to-left syllabification)
b. kɨr.mɨ.na ( left-to-right syllabification)

In both (8a) and (8b), the maximality principle along with minimal sonority distance between a liquid and nasal are maintained. The maximality principle is satisfied in both (8a) and (8b) through inserting two epenthetic vowels to rescue as many stray consonants as possible. The minimal sonority distance, however, between the liquid and the nasal in (8a) is maintained through inserting an epenthetic vowel between the two while it is maintained in (8b) through being in parsed into two adjacent syllables.

In addition, both outputs have the same syllable types which are CV.CVC.CV and CVC.CV.CV respectively which are permissible according to the syllable templates allowable in KSK. However, (8b) is the only grammatical form since it is syllabified rightward. Moreover, the left-to-right approach guarantees that maximality principle is always maintained and it allows bi-consonantal coda of falling sonority in KSK. Consider the word *t͡ʃnd͡ʒg* 'seed' in (9).

(9)
a.  ~~*t͡ʃi.ni.d͡ʒig~~ ( right to left
t͡ʃnd͡ʒg       syllabification) 'seed'
b.  ~~t͡ʃin.d͡ʒig~~ ( left-to-right
t͡ʃnd͡ʒg       syllabification)

Only (9b) is grammatical since minimal number of syllables is yielded, which is two, through inserting minimum number of epenthetic vowels to rescue maximal number of stray consonants when the syllabification is rightward.

The leftward syllabification, on the other hand, imposes inserting three epenthetic vowels, yielding three syllables which violates maximality principle in (9a), resulting in its ungrammaticality.

A bi-consonantal coda of falling sonority can be grouped correctly based on the phonotactic constraints in KSK if the syllabification is left-to-right as in (10a) while it is violated if it is right-to-left as in (10b):

(10)
a.  ~~si.ɬp~~ ( left-to-right
sɬp       syllabification) 'tea leaves'
b.  *si. ɬip (right-to-left
sɬp       syllabification)

It should be also noted that (10a) also maintains the maximality principle as well whereas (10b) does not.

## 4.1.3 Extrametricality

Extrametricality deals with the positions of the extra-syllabic segments in the prosodic hierarchy. A segment, which is a consonant, is extra-syllabic when it is not associated with the syllable structure, appearing before, after or between the syllables of a word (Sternberger & MacWhinney, 1984, p. 355). This paper, however, does not intend to probe into the

presence and nature of extra-syllabic consonants in KSK. The reason this issue is mentioned is that it should be accounted for in the syllabification process since the final consonant in the bi-consonantal coda behaves in certain ways as extra-syllabic in KSK. That is, this paper discusses how the final consonant in bi-consonantal coda behaves when the syllabification process is considered. The word-final clusters are broken up by an epenthetic vowel if the sequence of the consonants is in the rising sonority as in (11a) while they remain together to form a complex coda if their sequence is in falling sonority as in(11b).
(11)
a. (i) xaf.tɨn ' sleeping'    (ii) ka.mu.tɨr ' pigeon'
(iii)  Ɂɑ.gir 'fire'                (iv)  pɑ.pɨl  'foot'
b. (i)  pamg 'cotton'              (ii) kɨlwank  'ring'
(iii)  tɨrp      'radish'      (iv)  sard      'cold'
The final segment in the complex coda, however, may behave as an extra-syllabic segment when it is represented in a prosodic analysis. That is, it is linked directly to the higher prosodic level and it is not linked to the coda which is at lower prosodic level. This detachment is clearly confirmed or proved in the syllabification process when the word undergoes a morphological process such as suffixation     as     shown     in     (12).
(12)
a. (i) qand 'cubic sugar' vs qan.da 'it is cubic sugar' , (ii) xarg 'mad' vs xar.ga.sa.ri ' hardship'
b. kaft 'he fell'   vs kaf.tɨn ' the act of falling'  c. wɨʃk ' dry'          vs     'wɨ.ʃik.tɨr 'drier'
 (12a) indicates that the second consonant in the bi-consonantal coda leaves the coda and it becomes the onset of the next syllable. It may be argued that the second consonant leaves the coda to fill a phonotactic requirement of KSK that onsetless syllable is disallowed. This argument can be easily dismissed because when a consonantal initial as in (12b) and (12c)

is added to a complex coda, that complex coda becomes a string of stray consonants as *ftn* in (8b) and *ʃktr* in (8c) that should be syllabified on the basis of adhering to the parametric measures mentioned above such as maximality and directionality, yielding two different forms of syllabified string consonants medially, yet, both are grammatical. This proves that the second consonant in complex coda inclines to leave the coda, proving that complex coda word medially     is     banned     in     KSK. The extra-syllabicity of the final segment in the complex coda can be further noted as it is deleted when it is supposed to be re-emerged medially as a result of compounding process as shown                in                (12).
(12)
a. dast +  ⟶     das.nɨmas 'ablution'
nmas
   hand                +                    pray
  b. gʃt + ɣɑn  ⟶                gɨʃɣɑn
'all                of                    them'
   all       ⟶         +          them
c.                  pʃt           +          grtn
'pɨʒ.gɨr.tɨn                          'backing'
   back                +                    hold
It should be noted that voicing assimilation may also occur when the second segment of the first syllable is omitted in (12c), the first segment becomes voiced under the influence of the first segment of the second syllable, that is, a regressive     assimilation     is     observed. Another piece of evidence is found which proves the extra-syllabicity of the second consonant in the complex coda. Consider (13):
(13)
bɑn 'on' + dast  ⟶ ~~bɑn.tis.b~~bɑx 'nail 'hand' + sɨbɑx          polish' 'plaster'
Diachronically speaking, the word bɑn.tɨs.pɑx is a  combination  of  three  words. A close examination demonstrates that only the extra-

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syllabic segment in the middle word which is /t/ remains during the cluster reduction to form the new word. This proves that the extra-syllabic /t/ is outside the syllable structure of the word dast 'hand', which is syllabified to become the onset of the second syllable. In addition, this example along with others above illustrates that KSK, unlike English, is not adherent to onset maximization during the resyllabification of the consonant clusters medially. Rather, KSK is adherent to the maximality, left-to-right and extra-syllabicity parameters when it comes to syllabifying the consonant clusters medially, resulting that the consonant cluster of even falling sonority is banned word medially. This is in conformity with a previous study stating that consonant cluster word medially is banned in Kalhouri (Saye, 2004, p. 90). As discussed, final cluster of two consonants of falling sonority is allowed in KSK. The patterns of such clusters will be discussed in the following section.

## 4.2. Patterns of cluster in syllable final position

The following consonant clusters are observed in the coda position as shown in (14):

(14)

/-rs/     as in tɨrs 'fear' , qurs ' heavy'
/-rʃ/     as in 'karʃ' ' belly', turʃ ' sour'
/-rx/   as in pɨr.xa.pɨrx 'snoring', qɨrxaqɨrx ' to make stertorous sounds'
/-rd/   as in / mard/ ' brave', /sard/ ' cold'
/-rg/   as in /jarg/ ' offspring', xarg 'mad'
/-rz/   as in /larz/, /marz/ 'border crossing'
/-rtʃ/     as in / tʃɨrtʃ/ 'wrinkle'
/- rp/   as in /tɨrp/ ' radish'
/-rm/ as in /narm/ ' soft' , garm 'hot'
/-rn/ as in /murn/ 'having lice in hair', tɨrn ' flatulent'
/-xt/ as in /waxt/ 'time' , baxt 'luck'

/-ɫp/ as in /sɨɫp/ ' tea leaves' , /quɫp/ 'bubble'
/-ɫq/   as in /zɨɫq/ 'chard', /bɨɫq/ 'blister'
/-lk/   as in /palk/ 'plait', salk 'bulb'
/-sp/   as in /ʔasp/ 'horse', /tʃasp/ ' glue'
/-sq/         as in lasq 'stalk'
/-ʃt/   as in /bɑɫiʃt/ 'pillow', /guʃt/ 'meat'
/-ft/   as in / naft/ 'oil' , /xaft/ 'slept'
/-ʃk/   as in /triʃk/ 'adhesive tape', wɨʃk 'dry'
/-ʃg/         as in /xɨwaʃg/ , malaʃg
/-ng/   as in /xung/ 'flirt', /tʃɨng/ 'claw'
/-nk/ as in /mɨlwank/ 'necklace', kɨlwank 'ring' , fenk
/-ndʒ/ as in bɨrɨndʒ 'rice', nɑrɨndʒ 'bitter orange' ,         pandʒ         'five'
/-nd/ as in /qand/ 'sugar', /pand/ 'lesson'
/-mg/ as in /pamg/ 'cotton' , /mamg/ 'breast' , mimg
/ʁz/   as in /kɑʁz/ 'paper', /maʁz/ 'brain'
/-wr/ as in /qawr/ 'grave' , /tawr/ 'axe'
/-wg/ as in /bɑwg/ 'father' , nɑwg 'belly button'
/-yz/   as in /payz/ ' autumn'

The above consonant clusters in the coda position shown in (14) reveal several phonological findings. To begin with, the stops are the least sonorant consonants, they are not expected to occupy the first consonant in the cluster bearing in mind that consonants of falling sonority are permissible to form coda in KSK. Moreover, when the initial consonant in any coda cluster is fricative or glide, the second consonant usually agrees in voicing with its preceding one as in /-ʃt, -ft , -ʃk, -wr, -wg, and -yz/. However, exceptions are found when the second consonant does not agree in voicing with its preceding one as in /ʃg/. Nevertheless, the two phonemes in a cluster still share other features as they are [ - syll, + cons, - son, - ant].

## 5. Conclusions

The key findings of this paper can be summarized as follows

1- The minimal syllable template of KSK is [CV] since onsetless syllable is not permissible in

KSK. Moreover, the syllable structure of KSK can be represented as CV (C) (C). This contrasts with the English Data which allows onsetless syllable and complex onset of up to three consonants.

2- Rhyme can turn into a constituent and function as a domain for certain phonological processes in KSK, reduplication is given as an example.

3- KSK is not adherent to the universally preferred principle of onset maximization when it comes to syllabification process. Instead, several other parameters such as maximality, directionality and extra-metricality can be used for the syllabification process given the presence of unparsed consonants in the underlying representations of many KSK lexicons. Onset maximization is also enforced in English provided that phonotactic constraint is not violated.

4- The phonotactic constraints of KSK reveal that the consonant cluster in the onset is not permissible while the consonant cluster consisting of two consonant segments in the coda is allowed provided that they are in falling sonority. Moreover, evidences prove that the second segment in the coda may behave as an extra-metrical segment.

5- The voicing agreement with few exceptions is usually observed between the two segments of the consonant cluster in the coda.

6- Comparing to the English Data, KSK syllables are less complex in the sense that complex onset is not allowed and codas with more than two consonants are not allowed. Further, Sonority Sequencing Principle is not violated in KSK whereas in English Sonority is violated in particular when /s/ is initial in complex onset of three consonants.

## References:

1-      Berkeley Linguistics Society. University of California: Berkeley. 471–490.

2-      Black, H. A. (2021). Introduction to Syllabification. Available at [ Introduction to Syllabification (sil.org)].

3-      Clements, George N. & Keyser, Samuel Jay. (1983). CV phonology: a generative theory of the syllable. Cambridge, Mass: MIT Press

4-      Den Ouden, D. B. (1995). Syllable Structure: A Comparison of Different Analyses. Part I: Child Cluster Reduction and Compensatory Lengthening; Part II: Syllable Structure in Sranan.

5-      Goldsmith, J.A, Riggle, J., & Alan, C.L. (Eds). (2011). The handbook of Phonological theory (Vol.60). John Wiley & Sons.

6-      Gregová, R. (2010). A comparative analysis of consonant clusters in English and in Slovak. Bulletin of the Transilvania University of Braşov• Vol, 3, 52.

7-      Hamid, T. S. (2016). The prosodic phonology of Central Kurdish (Doctoral dissertation, Newcastle University).

8-      Itô, J. (1989). A prosodic theory of epenthesis. Natural Language & Linguistic Theory, 7(2), 217-259.

9-      Karimi-Doostan, K., (2021). Unpublished manuscript. In Sheyholislami, J., Haig, G., Khezri, H., Akin, S., & Opengin, E. (Eds.). Oxford handbook of Kurdish linguistics. Oxford University Press.

10-      Kord Zafaranlu Kambuziya, A., & Sobati, E. (2014). Phonological Processes of Consonants in Kalhori Kurdish Dialect. Language Related Research, 5(1), 191-222.

11-      Pike, K. (1967). Language in Relation to a Unified Theory of the Structure of Human Behavior. The Huge: Mouton.

12-      Prince, A. (1985). 'Improving Tree theory'. Proceedings of the Eleventh Annual Meeting of the

13-      Roach, P. (2009). English phonetics and phonology paperback with audio CDs (2): A practical course. Cambridge university press.

14-      Saye, N. A. (2004). Rêzimanî Kurdî Zarî Kelhurî. [ The Kurdish Grammar of Kalhouri]. Slemani: General Directorate of Printing and Publishing.

15-      Selkirk, E. O. (1980). The Role of Prosodic Categories in English Word Stress. Linguistic Inquiry, 11(3), 563–605.

16-      Sternberger, J. P., & Mac Whinney, B. (1984). Extrasyllabic consonants in CV phonology: an experimental test. Journal of Phonetics, 12(4), 355-366.

17-      Treiman, R. (1988). Distributional constraints and syllable structure in English. Journal of Phonetics, 16(2), 221-229.