MAKERERE UNIVERSITY

PHONOTACTIC CONSTRAINTS IN RUNYANKORE SYLLABLE CONSONANT CLUSTERING

BY

AGABA JOAKIM

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DECLARATION

I **Joakim Agaba**, hereby declare that this dissertation titled **Phonotactic Constraints in Runyankore Syllable Consonant Clustering** is my original work and to the best of my knowledge has never been presented to any academic institution for any award. All sources of information used in this work have been acknowledged accordingly.

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JOAKIM AGABA

STUDENT

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This is to certify that this dissertation titled **Phonotactic Constraints in Runyankore Syllable Consonant Clustering** has been done by **Agaba Joakim** under my supervision. This dissertation is a partial fulfillment of the requirements for the award of the degree of Master of Arts in Linguistics of Makerere University and has been submitted to the Department of Linguistics, English Language Studies and Communication Skills with my approval as supervisor.

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ABSTRACT

This study investigated the phonotactic constraints of consonant clustering in Runyankore syllable structure. Runyankore is among the over 40 indigenous languages spoken in Uganda. It falls under the Bantu language family. Languages have different constraints or restrictions that affect the consonant combinations that appear in their syllables and because of these differences; a person cannot tell whether the sound combinations which are permissible in one language are also possible in the other. The main target of this study was to investigate the phonotactic constraints that determine syllable consonant clustering in Runyankore. The aim of this study was to identify different consonant clusters in Runyankore syllables, to categorize them and to describe the phonotactic constraints which determine the combining of consonant members in a cluster. The study was based on the Sonority Sequencing Principle (SSP) and the Minimal Sonority Distance Principle (MSDP); a framework which centers on the sonority status of the consonant members in a cluster. The study required data in form of syllables from Runyankore words and this data was obtained from reference materials and through elicitation method. The consonant clusters that were identified from Runyankore words were analysed by categorising them and explaining the mechanisms that lead to clustering in Runyankore. One of major findings is that the Runyankore syllable onset can have a maximum of three consonants in a cluster. In addition, a three consonant cluster in the structure CCCV must have the third consonant as a glide because of the sonority status of the participating consonant members. Glides have higher sonority and thus appear next to the nucleus sound. Regarding phonotactic constraints, it was found out that a cluster of two-member consonants is dependent on sonority, similarity, voice and place of articulation of the sound members. The study provides an analysis of these phonotactics and restrictions on onset clusters that makes reference to the SSP and MSDP. The study will contribute to linguistic practice basically to teachers and learners in Runyankore teaching and learning, lexicographers, dictionary writers and corpus linguists when finding data on sound patterns in Runyankore. The study points to further areas of study including comparative phonotactic analysis with related Bantu languages, morpho-phonological influences on consonant clustering, sociolinguistic variation in phonotactic realization and computational modeling of phonotactic constraints.

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DEDICATION

To my mother, Banyenzaki Dezilanta, who taught me the value of hard work and perseverance and to everyone who journeyed with me in this course.

And to my late Dad (R.I.P), who loved us so much but left us so early, I dedicate this work to you.

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To all whose names may have been reserved and kept under the bottom of my heart. This work stands on the shoulders of your generosity and belief in me. Thank you all.

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ABBREVIATIONS

SSP	Sonority Sequencing Principle
MSDP	Minimal Sonority Distance Principle
IPA	International Phonetic Alphabet
C	Consonant
V	Vowel
PT	Phonetic Transcription
N	Nasal
L	Liquid
G	Glide
F	Fricative
A	Affricate
P	Plosive

DESCRIPTION OF SYMBOLS

[p] Voiceless bilabial stop

[b] Voiced bilabial stop

[ß] Voiced bilabial fricative

[d] Voiced alveolar stop

[t] Voiceless alveolar stop

[g] Voiced velar stop

[k] Voiceless velar stop

[h] Voiceless glottal fricative

[ʒ] Voiced post-alveolar fricative

[ʃ] Voiceless post-alveolar fricative

[f] Voiceless labiodental fricative

[v] Voiced labiodental fricative

[θ] Voiceless interdental fricative

[ð] Voiced interdental fricative

[j] Palatal glide

[w] Bilabial glide

[m] Bilabial nasal stop

[n] Alveolar nasal stop

[ŋ] Velar nasal stop

[l] Voiced alveolar lateral

[r] Voiced alveolar trill

[s] Voiceless alveolar fricative

[z] Voiced alveolar fricative

[tʃ] Voiceless post-alveolar affricate

[dʒ] Voiced post-alveolar affricate

[σ] Greek letter sigma which represents a syllable

CHAPTER ONE
INTRODUCTION

1.1 Background to the Study

Phonotactics play a crucial role in shaping the syllable structure of languages, governing permissible combinations of consonant clusters within syllables. Consonant clustering is a significant aspect of phonology, influencing patterns and pronunciation of words in languages. Despite the extensive research on phonotactics in various languages, the phonotactic constraints governing consonantal sequences in syllables remains understudied in Runyankore. Understanding these constraints is essential for language teaching and learning, speech therapy, linguistic theory and language documentation. This research study is intended to investigate the phonotactic constraints in Runyankore syllables that determine the combinations in consonant clusters.

1.1.1 Consonant clustering in syllables

Consonant clusters refer to sequences of two or more consonants occurring together within a syllable without intervening vowels (Hyman, 2003). In other words, a consonant cluster refers to a sequence of two or more consonants that occur adjacent to each other within a syllable. Clusters can occur in onset position (before the vowel), coda position (after the vowel), or in positions in a single syllable (Al-Mamri, 2021) as in *spring/sprɪŋ/* where /spr/ is the onset and /ŋ/ is the coda. The acceptability of clusters varies significantly across languages and is governed by language-specific phonotactic constraints specific (Fikkert and Freitas, 2004); rules that determine permissible sound combinations. In words, consonant clusters can appear at the initial, medial or final position of a word, also depending on the phonotactics of a particular language. The arrangement of consonants within clusters often follows the Sonority Sequencing Principle (SSP) or the Minimal Sonority Distance Principle (MSDP), which explain the ordering of consonant members that exist within a cluster. The SSP is about the ordering of consonants in a cluster based on their sonority status and MSDP is about the distance between the members in a cluster on the sonority scale. These principles form the theoretical framework of this study as detailed in section 1.6 of this chapter. In English, onset clusters like /bl/ (*blue*), /tr/ (*tree*),

and /skr/ (*scream*) are allowed, while clusters like /lb/ /tm/ are impermissible due to violations of sonority sequencing or articulatory complexity (Parker, 2002). The structure and complexity of clusters are strongly influenced by sonority-based principles such as the Sonority Sequencing Principle (SSP) and the Minimal Sonority Distance Principle (MSDP), which determine the phonological well-formedness of a cluster.

1.1.2 Phonotactic constraints and syllabification

Phonotactics is a subfield of phonology that examines the permissible combinations of sounds within a particular language. The phonotactics of a language or dialect dictate the allowable structures of syllables, including the arrangement of consonants and vowels, as well as the occurrence and positioning of consonant clusters. Aljasser and Vitevitch (2021) explain this as the frequency of occurrence of the segments and sequences of sounds in words in a term that they refer to as phonotactic probability. This research study focuses on only consonantal sounds arrangement in clusters specifically in Runyankore complex onsets which have two or more consonants in a single syllable.

Phonotactic constraints are highly language-specific (Fikkert and Freitas, 2004) for example, while English permits complex consonant clusters (Younis, 2022) like ‘spl’ in "splash," languages such as Runyankore, the case study of this research, restricts such combinations, typically allowing only simpler structures like [k] or [t] at the beginning of syllables (Taylor, 1985). Studies on sound patterns in Runyankore as well as other Bantu languages, have been limited such as Ndoleriire (2020) who provides an inventory of sounds in the four dialects of Runyakitara and Kaji (2023) who gives a descriptive approach of the phonetics of Runyankore-Rukiga. The phonotactics that lead to clustering of consonants in Runyankore syllables has been a clear gap that has not been studied at all. These phonotactics constraints are integral to the linguistic identity of a language, influencing aspects such as pronunciation, word formation, and the ease with which speakers can produce and perceive words (Aljasser &Vitevitch, 2021). The context of this study is phonetics and phonology, a branch of linguistics which explains phonemes, sound inventories, syllable, and syllabification.

According to Crystal (2008), syllabification is the term which refers the division of a word into syllables. He as well describes a syllable as a unit of pronunciation typically larger than a single sound and smaller than a word. The single distinct sounds that make up the syllables are the phonemes such as [t], [p], [k] for consonant sounds and [i], [a], [e] for vowel sounds. Sound inventories are a collection of phonemes, distinct sounds in a particular language according to the International Phonetic Association, IPA (2005). Sound inventory components include consonant phonemes, vowel phonemes, diphthong phonemes, and supra-segmental phonemes like stress and tone. Phonotactic constraints are the rules that govern possible phoneme sequences in syllables of a language. Goldsmith (1990) states that phonotactics refers to the study of the distribution and patterning of speech sounds within words of a particular language.

Phonotactic constraints can be categorized into syllable structure constraints such as onset, coda and nucleus constraints, segmental constraints such as restrictions on consonant clusters and sequential constraints. For example, in English onset constraints, the sound 'ng' phonetically written as [ŋ] cannot begin a word in English. It only occurs in the coda like in words *king* and *bring.* In addition, English can have a three consonant cluster in the coda like 'nts' combination in the word *aunts*, yet Runyankore syllables do not have the coda. These are some of the phonotactic constraints that affect sound combinations. Particularly this study will focus on segmental constraints on consonant clusters in the Runyankore onsets because Runyankore has only open syllables. This study investigates the onset constraints because Runyankore as a Bantu language does not have the coda in her syllables; with only open syllables (Taylor, 1985). Phonemes combine to form various combinations or clusters of consonant sounds in the syllables of a particular language. A consonant cluster is a set of consonant sounds that occur at the beginning or at the end of the syllable (Ladefoged and Johnson, 1993) which means the segment can occur in either the onset or coda. Runyankore syllables allow clusters, also known as multiple consonants, in the onset. Some examples include *maama /ma:ma/* 'mother' with CV, *embaata /ɛmba:ta*/ 'duck' with CCV, and *embwa /ɛmbwa*/ 'dog' with CCCV structures. Therefore, due to these phonotactic constraints, some combinations of sounds can exist in one language and may not exist in another. This study thus focuses on the complex onsets of

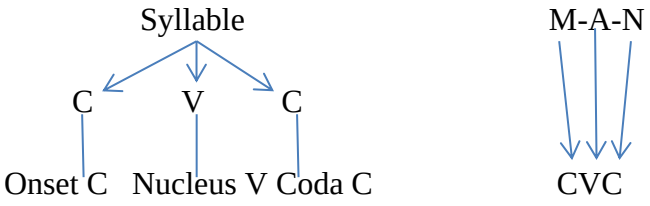
Runyankore which have more than one consonant, to find out the restrictions that influence the clustering.

1.1.3 Syllable and Syllable structure

The syllable is a pronounceable segment of a word, composed of a vowel surrounded by consonants. The term *syllable* traces its etymology to the Latin *syllaba*, which itself comes from the Greek *syllabē*, meaning 'that which is held together' or 'a collection' (Crystal, 2008). In linguistic terms, the syllable is often considered the basic unit of speech rhythm and phonological structure. It typically comprises a nucleus, which is most often a vowel, and may also include onset and coda elements composed of consonants (Gussenhoven & Jacobs, 2017). For example, the English word *plant* has one syllable, structured as CCVCC, where *pl-* is the onset cluster, *a* is the nucleus, and *-nt* is the coda cluster.

Howard (1982) describes the syllable as the intermediate level of phonological organization between the word and the phoneme. The syllable has three main parts, namely the mandatory nucleus made up of the vowel, the initial consonant known as the onset, and the final consonant called the coda (Hyman, 2003). The coda and onset may sometimes be optional. The constituents of the syllable are shown in the tree diagram representation below, using the English example *man* which has one syllable with a CVC structure.

Fig. 1 Tree diagram showing the syllable constituents in a CVC Structure



Steriade (2000) states that a syllable is a string of segments grouped around one obligatory vowel or vowel-like element. For one to get syllables, words are divided or syllabified into segments, which are syllables. This entails that words can have different syllable structures. Runyankore syllabification in words have structures such as monosyllabic for one syllable such as in *sho* /ʃo/ 'your father', bisyllabic for two syllables in *twena* /*twɛna*/ 'all of us', trisyllabic for three syllables as in *enkoko* /*ɛnkɔkɔ*/ 'hen' and polysyllabic words for many

syllables like four, five, or more as in *orunkucence /ɔrunkutʃɛntʃɛ/* 'goose bumps'. Syllabification can be further illustrated in English words such as in the noun *language*, in the verb *make*, and the adjective *beautiful*. Most prepositions of English are short words with one syllable such as *on, in, by, to*, and *at* with structures VC or CV. The syllable is a very important unit in speech; it is made up of phonemes and it is functional in both the phonology and sometimes in morphology of a language.

Syllables in phonology are represented with the Greek letter sigma /σ/, and within a transcription, the boundaries between syllables are notated with the IPA symbol [.], as in the transcription */əb.dʌkt/* for the word *abduct*. In morphology, syllables combine to form words such as in the words *woman* and *teacher*. In phonology, these syllables are pronounceable segments that aid articulation of the sounds that make up words. For example, during the stage of language acquisition, babies are able to produce sounds such as /*ma.ma.ma/* or /*ta.ta.ta/* referring to their mother or father respectively in Runyankore. This is because a syllable is the most easily possible pronounceable constituent referred as syllabic constituent. Khan (1976) argues that the syllable has no internal constituents but consist of the segments themselves. This study will explore the syllables in Runyankore. Runyankore words form syllable structures such as V, CV, CCV and CCCV. Table 1 shows some words with the different syllable segments in Runyankore.

Table 1 Syllables in Runyankore words

Syllable segments	V-CV	CV-CV-CV	CCV-CV	V-CCCV
Runyankore example	Aho	webare	mpora	embwa
English meaning	There	thank you	slow	dog

1.1.4 Typological Features of Runyankore

Runyankore is a Bantu language spoken in Uganda, in the South-Western region covering districts like Mbarara, Kiruhura, Ntungamo, Rukungiri, Bushenyi, Kanungu, Mitooma and Sheema among others. Some existing studies and written literature have treated Runyankore as coexisting and spoken along another language, Rukiga (Taylor, 1985). This is sometimes referred to as Runyankore-Rukiga, because the two languages are mutually

intelligible. However, there are existing slight differences between these two languages. It is in view of this that, this study will focus on Runyankore. Runyankore is a Bantu language and Maho (2009) states that it is categorized as JE13 in the updated Guthrie referential classification of the Bantu languages. Runyankore as an identical language has sound inventories that reproduce various phoneme combinations to form syllables. This has been studied by Taylor (1985) and Hyman (2014) who explain the positions and patterns of sounds in Runyankore syllables respectively. However, the phenomenon of phonotactics and clustering of consonants as constraints in syllable formation in Runyankore are hardly studied.

Runyankore, a Bantu language spoken predominantly in southwestern Uganda, is typologically characterized by a strong preference for open syllables that end in vowels and a simple (C)V syllable structure, which avoids complex consonant clustering (Hyman, 2003). In native vocabulary, onset consonant clusters are extremely rare, and coda clusters are virtually non-existent. Taylor (1985) explains that most syllables in Runyankore are composed of a single consonant followed by a vowel as in *abaana /aba:na/* 'children', and *omuti / omuti /* 'tree'. Ndoleriire (2020) studies Runyankore phonetics and phonology by examining the sound descriptions in the language for both consonants and vowels.

Runyankore also exhibits agglutinative morphology, where syllables often align with morphological boundaries (Poletto, 1998). This tendency further supports the phonotactic preference for clear, syllable-based articulation over consonant complexity. Unlike English, which tolerates a wide range of consonant combinations, Runyankore phonology prioritizes simplicity, syllable clarity, and vowel prominence; traits that are typical of Bantu languages (Maddieson, 2013). Taylor (1985) in his work on Nkore- Nkiga gives a few details on consonant combinations especially those which involve consonant plus a glide such as [bw]. According to his study, there is distribution of consonants in words, where he asserts that word-initial consonant combinations in Runyankore are always a consonant plus semi-vowel such as [bw] or [rw] as in *bwaara* 'thorny tree' and *rwagati* 'between' respectively. However, he leaves a number of clusters unmentioned and does not tackle the subject of phonotactic constraints in Runyankore syllable consonant

clustering, thus this research study will basically investigate the subject to fill this knowledge gap.

1.2 Problem Statement

Several studies have been done on different subject areas in Runyankore such as tense and aspect, topics in Runyankore Phonology (Poletto, 1998), Bantu segmental phonology (Hyman, 2014) as well as prosodic features like stress and tone. Specifically, some studies such as the phonetics and phonology of Runyankore (Ndoleriire, 2020) have attempted to study the phonology of Runyankore. A few studies that have been conducted on clusters in syllables of Runyankore include sound patterns (Hyman, 2014) which only focuses on the syllable structure and a few combinations. Taylor (1985) also slightly hints on positions of sounds in syllables and words by only highlighting the consonant-plus-glide combinations such as [bw], [rw], [kw]. However, there are more possible combinations in Runyankore syllables than the mentioned glide clusters which this study intends to find out. In addition, all these studies hardly explain the specific phonotactics that influence the clustering of consonants in Runyankore complex onsets. Therefore, the main target of this study was to investigate the different consonant clusters in Runyankore and the phonotactic constraints which determine the syllable consonant clustering.

1.3 Research Objectives

1.3.1 General objective

The general objective of the study was to investigate the phonotactic constraints that influence consonant clustering in syllables in Runyankore.

1.3.2 Specific objectives

The specific objectives of the study were as follows:

i. To identify the consonant clusters that exist in Runyankore syllables.
ii. To describe the phonotactic constraints which determine consonant clusters in Runyankore.

1.4 Significance of the Study

This research study will be significant in identifying and establishing the syllable patterns on consonant clustering and phonotactic constraints in Runyankore as a Bantu language. This study will aim at documenting this knowledge since little work has been studied and written on this subject. The study will contribute to linguistic practice such as in phonemics and reading of Runyankore for teachers and learners in language teaching. In addition, material developers can use this study as reference such as lexicographers and dictionary writers. The study will also be significant to corpus linguists when finding data on sound patterns in Runyankore.

1.5 Justification of the Study

The study on syllable consonant clustering is vital in understanding the phonological system of Runyankore as Bantu language. The rationale of this study was to investigate the consonant clustering in Runyankore syllables and to document it. There are various languages that have interrelated structures basically Bantu languages like Luganda and Rutooro, thus documenting knowledge on a syllabification of Runyankore will reveal the typological sound patterns in this language.

1.6 Theoretical Framework

The study was based on the sonority theory subsumed majorly under two principles, namely the Sonority Sequencing Principle (SSP) and the Minimal Sonority Distance Principle (MSDP). The former explains the sequencing of consonants in a cluster whereas the latter focuses on distance between the sounds on the sonority scale. The MSDP is an elaboration of the former, whereby it basically applies in specific language environments with distinctions not made by applications of the SSP. Both principles determine the phonotactic constraints for permissibility of consonant clusters. The constraints differ from one to the other according to consonant-type parameters (i.e. phonetic nature of consonants).

Sonority Sequencing Principle (SSP) and the Minimal Sonority Distance Principle (MSDP)

According to Crystal (2003), sonority of a sound as its inherent loudness with pitch and duration constant. Sonority greatly influences the organization of sounds in syllables. For example, vowels make up the nucleus or peak which is a mandatory part of a syllable in terms of structure and composition (O'Grady & Katamba, 2011) because they have the highest sonority index. Vowel sounds are highly sonorous and thus tie together different consonants in a syllable.

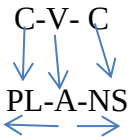
The Sonority Sequencing Principle (SSP) states that sonority in the syllable is highest at the syllable peak and becomes progressively lower towards the syllable margins (Renata, 2021, Berber, 2000). The SSP was an idea discussed very early phonological works by Eduard Sievers (1881) and Otto Jespersen (1913). However, the principle has been widely studied and developed by different scholars such as Steve Parker (2012), John Goldsmith (2011), Clements (1990), Hooper (1976) and Selkirk (1984).

Parker (2011) states that a sonority hierarchy often used is following the ascending order as:

vowels > glides > liquids > nasals > fricatives > stops.

The SSP posits that in an onset cluster (the pre-nuclear consonants), the consonants should show increasing sonority as they approach the vowel; in a coda the reverse should hold (a decrease in sonority away from the vowel). The SSP can be illustrated with English words that have consonant clusters in both the onset and coda such as *plans*. It has a CCVCC structure.

Fig 2: Tree diagram of English word with CCVCC structure



In the examples above, the sonority in syllable decreases from the nucleus shown by arrows in opposite directions, depicting that sonority is highest at the nucleus with vowels [a] and

[i], and next is a nasal [n] and liquid [l] which are more sonorous than stops [k], [t], [p] and [s]. Selkirk (1984) states that based on the SSP, when syllabifying a word, the sonority of a syllable should increase from the first phoneme of the onset, to the nucleus and then falls off to the coda.

The SSP has often been used as a markedness constraint whereby clusters that violate the expected sonority slope are more "marked," less preferred (Clements,1990) because they may be very hard to articulate phonologically. However, the differences in the way languages exist does not stop some clusters from opposing the SSP. That is why the later works give an extension of the MSDP that applies for specific language environments.

The Minimal Sonority Distance Principle (MSDP) states that the members of a cluster must be *d* distance apart on the sonority scale, whereby *d* is determined on a language particular basis. This principle is an extension of the SSP and was developed by Parker (2012) and Clements (1990). The MSDP explains that allowable consonants which cluster depend on the minimum allowed sonority distance between these consonants on the sonority scale. For example, there is a sonority distance between fricatives and glides, thus a cluster of /ʃ/ and /w/ as [ʃw] is possible due to this distance. This is opposed to a cluster with two stops such as [t] and [d] because there is no minimum distance between them on the sonority scale. The principle explains the clustering of consonants in the onset or coda of a syllable.

Phonotactic constraints on syllable structure are significantly informed by the Sonority Sequencing Principle (SSP) and the Minimal Sonority Distance Principle (MSDP)**,** both of which aim to explain permissible consonant clusters within syllables particularly in onset and coda positions. These principles interact to regulate not just the internal order of segments based on sonority, but also the distance in sonority values between adjacent segments, offering a more precise understanding of clustering behaviour.

The Sonority Sequencing Principle (SSP) posits that within a syllable, sounds must rise in sonority from the onset to the nucleus and fall from the nucleus to the coda (Selkirk, 1984; Clements, 1990). For instance, the English onset cluster [pl] in *"play"* is acceptable because /p/ (a voiceless stop) is less sonorous than /l/ (a liquid), thus forming a rising sonority slope in the cluster conforms to the SSP. In Runyankore, clusters with consonant

plus glide also conform to the SSP such as /mw/ in *emwe* ‘one’ [bj] and [rj] in *ebyokurya* ‘food’.

While the SSP governs the direction of sonority change, the MSDP refines it by requiring a minimum sonority difference between adjacent consonants in a cluster. This constraint accounts for why some rising sonority clusters are still disallowed. They do not achieve the necessary “sonority distance” to be perceptually distinct (Parker, 2002). Fikkert and Freitas (2004) argue that clusters which obey the SSP are usually obstruent-sonorant clusters whereas there are those which do not obey this principle and usually consist of a palatal-alveolar sibilant plus an obstruent. They affirm that for both types of clusters, an account relies on sonority-based onset selection to provide a uniform account.

On the interaction between SSP and MSDP, the SSP provides a general template for well-formedness, while the MSDP imposes granular constraints that filter out clusters with minimal sonority contrast. Together, they determine which consonant sequences are phonotactically legal or rather permissible within a given language. In English, this interaction explains the full range of permissible onset clusters. Clusters such as /tr/ in *“tree”* or /gl/ in *“glow”* satisfy both the SSP and the MSDP. Meanwhile, sequences like /dl/ or /tm/ are rare or unattested due to either reversed sonority (SSP violation) or minimal sonority contrast (MSDP violation), or both.

The implication of the SSP and MDSP on this study on phonotactic constraints on syllable consonant clustering in Runyankore is to understand that the joint function of these principles is crucial for analyzing syllable consonant clustering across languages. These principles serve as predictive tools for evaluating neologisms, loanword adaptation, and cross-linguistic variation. Their explanatory power is particularly useful in typological studies and in modeling the limits of cluster formation in languages like Runyankore, where the absence or repair of certain clusters can often be traced back to these sonority-based constraints.

On the other hand, there are other parameters that develop from this theoretical framework which informed the analysis of the phonotactics in Runyankore in chapter four as follows.

Firstly, the consonant type which determines sonority of a consonant member in combination also influences clustering. A consonant-type parameter refers to the manner, place, and voicing of consonants involved in a syllable, which influences possible syllable combinations and phonotactics. Classification of consonants such as fricative or stop, obstruent or approximants, labial or velar play a big role here. For example, English allows voiced stops like [b] in word-initial syllables '*bat*', but aspirated voiceless stops [p^h] tend to occur in stressed syllables '*pat*' (Ladefoged & Johnson, 2021). Several parameters are highlighted in the literature, including the position of a cluster, segment level, and complementary distribution.

Secondly, is the positioning which is expounded in the sequencing of consonant members. The parameter of positioning of a cluster refers to the location of a cluster within a word; typically categorized as initial, medial, or final. This classification helps in understanding stress patterns, phonological rules, and word structure. For example, in the word *banana*, the syllables are positioned as: [bə] (initial), [næ] (medial), and [nə] (final) (Ladefoged & Johnson, 2021).

Giegerich (1992) points out the syllable structure as one key framework in categorising consonant clusters, especially basing on the coda and onset formations. This is illustrated in the segment levels such as syllable, cluster and word levels of analysis of structure in the data analysis. Segmental level refers to the individual sound units or a combination of phonemes within a syllable for this study; which is termed as a cluster. The segment level was used identifying the consonant members in a cluster and then transcribed using phonetic notation**.** The three levels of analysis, namely that presented the consonant sound, the cluster, and the syllable. These are the three levels that aided this classification; *sound <cluster < syllable* as shown below in Table 2.

Table 2: Levels of syllable analysis that aided in the consonant cluster classification

Level	Sound level	Cluster level	Syllable level
Example	[m]	[mb]	[mba]

These levels of analysing the syllabic constituents range from the smallest unit composition both at syllable and word level. This means that individual consonant sounds combine to form clusters within a syllable. The sound has one consonant (C), the cluster has two consonants (CC) and the syllable has a consonant or consonants and the nucleus (CCV). Syllables can have biconsonantal clusters and triconsonantal clusters with two and three consonants respectively. Therefore, the structure and size of segments (phonemes), especially in terms of its onset, nucleus, and coda determine the clustering of the consonants in a syllable.

The parameter of complementary distribution in syllable analysis also influences clustering because it relates to sonority distance of similar sounds. Complementary distribution refers to when two sounds occur in mutually exclusive environments, suggesting they are allophones of the same phoneme. For example, the two labio-dentals [f] and [v] are complementary distributed in a way that the two cannot make a consonant cluster. As a parameter, glide Interaction in Runyankore syllables refers to the permissibility of the glides [j] and [w] with different consonants to form clusters. This is because glides are the most prevalent consonant sounds in Runyankore words and syllables. Ndoleriire (2020) gives a functional and distributional framework on the existence of sounds in Runyakitara languages, by giving an illustration on phoneme identification. He bases on the fact that if a sound can differentiate one word from another if replaced in a given segment, and then it is a phoneme. Furthermore, Ndoleriire (2020) uses the minimal pairs and complementarily distributed sounds /k/ and /g/ in two to differentiate words *kukanya* ‘to increase’ and *kuganya* ‘to be miserable’.

1.7 Scope of the Study

The data of the study were obtained focusing on all word classes. Nouns and verbs appeared most because these syntactic word categories are the most prevalent in the speech of any language. Also, the study identified the syllable consonant clusters that are possible in Runyankore syllables basing on phonotactic constraints. The study identified words which have one consonant CV, two consonants CCV, and three consonants CCCV in the findings in Runyankore syllables. The phonemes that make up these combinations were described based on parameters of consonant sound description of place and manner of articulation of these sounds. This elucidates the phenomena of sonority and similarity that was explained in the phonotactics in Runyankore syllables, since it was observed that there are absolute restrictions in patterning of phonemes in syllables (Kessler and Treiman, 1997). In addition, the roles of syllables such as formation of words, aiding word articulation and determining the lexicon of a language, in this case Runyankore was also explained. The study, therefore, analysed consonant clustering and establish the phonotactic constraints which operate in Runyankore syllables.

CHAPTER TWO

LITERATURE REVIEW

This section of the research study gives an overview from the existing scholarly literature related to this study. These include phonotactics constraints, syllabification and clustering of consonants. Some studies on Runyankore and other related Bantu languages are also provided in this section.

2.1 The composition of a syllable and its role

The organization of consonants and vowels in a syllable typically follows the structure of onset (consonants), nucleus (vowel), and coda (consonants). The vowel or nucleus is the obligatory and most sonorous component (Clements, 1990). The relationship between consonants and vowels is not merely structural but also dynamic. For instance, vowel quality can affect the voicing of adjacent consonants, and vice versa, due to co-articulation effects (Ladefoged & Johnson, 2021). Furthermore, some languages feature syllabic consonants that take the place of vowels, showing that the vowel-consonant relationship in syllables can be flexible and language-specific (Roach, 2009). This interplay is crucial in phonological theory and phonotactic modeling.

The syllable is a very functional unit across various linguistic subfields. In phonology, it structures sound sequences and governs processes like assimilation, elision, and epenthesis (Kenstowicz, 1994). In morphology, syllables affect affixation patterns and reduplication, for instance in languages like Tagalog and Indonesian (Rubino, 2005). Prosodic phonology sees the syllable as a constituent in the prosodic hierarchy, influencing stress and intonation patterns (Nespor & Vogel, 1986). In language acquisition, children often acquire syllables before individual phonemes, relying on syllabic templates for word formation (Vihman, 1996). These roles underline the interdisciplinary importance of the syllable in understanding linguistic structure and development.

2.2 Phonotactic constraints and phoneme clustering

According to Howard (1982), phonemes or sounds themselves have no meaning; thus, their only function is to combine together to form higher -level meaning units, that is words. This is a very important assertion because through combining of phonemes, syllables are formed and eventually words get shape and meaning. He thus deduces that between the phoneme and word is the intermediate level of phonological organization, the syllable. Thus, phonemes combine to form syllables and then syllables combine to form words. Further, on clustering and combining consonants, he affirms that English has up to three consonants before the nucleus and four after it. In simple terms, the English onset has maximum of three CCC cluster as in ***str****aight* and four CCCC the coda as in *stre****ngths.*** The clustering and combining of sounds in Runyankore syllables remain a question, which this research intended to answer. Howard (1982) further argues that the initial and final clustering of consonants in English is restricted by phonotactics in that a phoneme may not combine with just any other due to these restrictions. In relation to this study, the Runyankore syllable constraints and phonotactics have not much been studied.

Skandera and Burleigh (2005) assert that phonotactics determine the range of environments in which a linguistic unit can occur, which they termed as distribution. These scholars explain the concept of complementary distribution of allophone, a notion that will be expounded in chapter four. They assert that if two or more allophones cannot replace one another, then these sounds are usually mutually exclusive meaning that they do not occur in the same position. These sounds are usually mutually exclusive and one is always voiced whereas the other is voiceless, for example [f] and [v]. This is evident in the ordinal number form 'five' in English which is 'fifth' not '*fivth'* because the sounds [f] and [v] do not fit phonologically.

Skandera and Burleigh (2005) further affirm that phonotactics are language specific in a way that every language has restrictions on the distribution of phonemes within a syllable, morpheme, or word. They argue that most importantly these rules govern the possible sequences of consonant combinations (consonant clusters). A cluster of these consonants is usually pronounced consecutively without an intervening vowel or pause such as the

initial [st] in *stir*. This clearly explains this study's topic, that is idea of consonant clustering in syllables.

Selkirk (1982) emphasizes that while the general principles of onset maximization and sonority hierarchy apply cross-linguistically, languages impose specific restrictions on what constitutes a valid syllable. This entails that syllabification is not universally determined but is influenced by language-specific rules and constraints. English for example allows complex onsets such as /str/ in *strike*, whereas languages like Hawaiian restrict onsets to a single consonant (Parker, 2011). Similarly, Bantu languages cannot have closed syllables (Taylor, 1985). As already stated, some languages permit syllabic consonants while others do not, like Runyankore. Therefore, all this shows how syllable boundaries and permissible structures vary (Blevins, 1995). These constraints shape phonological processes such as stress assignment, reduplication, and morphological parsing.

2.3 Syllabic consonants in syllables

Skandera and Burleigh (2005) explain this notion of syllabic consonants. They describe such consonants as those which form the centre and peak in a syllable which has no vowel at all. It is well known that a syllable has three parts that is onset, nucleus and coda. Among these three parts, only one is mandatory and that is the nucleus usually a vowel. However, some words in some languages exist without vowel sound for example the English word rhythm /*rɪðm/*. The syllabic consonants act as a nucleus of a syllable, often replacing a vowel sound. Skandera and Burleigh (2005) further assert that a syllabic consonant and a corresponding non-syllabic consonant cannot distinguish meaning as minimal pairs because they are simply allophones of the same morpheme such as the syllabic [l] in words *table, double* and *cuddle.*

Studies have shown that syllabic consonants have distinct and phonological properties for example research on Slovak has found that syllabic consonants have unique articulatory correlates such as differences in movement timing and amplitude (Pouplier & Benu, 2011). Syllabic consonants can be challenging for non-native speakers to pronounce which was affirmed in the study on pronunciation errors in syllabic consonants among patients (Romani & Calabrese, 1998).

2.4 Syllabification in Bantu languages

Hyman (2014) explains that Bantu segmental phonology is characterized by variations, notable properties of syllable structure, consonant or vowel inventories, and various phonological processes. Specifically, on syllabification and syllable structure in Bantu languages, he argues that most syllables have one single consonant and importantly vowels are either short (V) or long (VV), thus the most prevalent syllables exist as CV or CVV. In addition to consonant phonology in Proto-Bantu, he affirms that languages have relatively simple consonant systems with all syllables open; thus, there are no closed syllables and no codas in Bantu syllables. Further, about consonant clustering, he argues that the onsets are mostly simple with a single consonant, however he notes that complex onsets with consonant clusters mostly appear with nasal + consonant (NC) such as [nk] or [mb] and consonant + glide (CG) such as [tw] or [rj] combinations. On the ability to cluster, he argues that glides [j] and [w] are typically derived from underlying vowels; as a result, these sounds are able to behave similar to high vowels such as [i], [u] or [e] with different consonants. However, in these analyses, the question of phonotactic constraints that influence this clustering is left unanswered. Hyman (2014) argues that adjacency of consonants in syllables of words in Proto-Bantu results into processes like nasalization, palatalization or assimilation and these phonological realizations are highly morpheme specific.

Katamba and Hyman (1990) in their work on Luganda syllabification affirm that some Bantu languages have phonology-morphology interface. These scholars affirm that Luganda syllabification is intimately tied to the morphological realization of words whereby the parsing and allocation of segments to syllables takes into account grammatical considerations. Katamba and Hyman (1990) illustrate the phonology-morphology interface in Luganda syllabification through examples involving prefix-stem boundaries, particularly with nasal consonants and morpheme structure constraints. An illustration is shown in the example below (Katamba and Hyman, 1990: 367):

/tu-a-laba/ → [twa.la.ba]
'we saw'

In the above example, /*tu*-/ is the subject prefix ‘we’, /*a*-/ is the tense marker ‘past’ and /*laba/* is verb stem ‘see’. Despite the fact that /u/ and /a/ could form a diphthong phonologically, Luganda prevents this because these vowels belong to different morphological domains. This process depends on morphological structure: if the two vowels are from separate morphemes but are allowed to form a glide due to morpho-phonological rules, syllabification reflects this. This shows that syllable structure in Luganda is not purely phonological but is shaped by the morphological composition of words as asserted by Katamba and Hyman (1990). The phonology-morphology interface that exists in Luganda also manifests in Runyankore such as in nominalization and affixation. As an example, the verb-stem *rya* ‘eat’ is nominalized to become *ebyokurya /ɛbjɔkurja/* ‘food’ by adding some syllables.

Katamba and Hyman (1990: 364) also explain that the syllables influence not only sound patterns and clustering but also word formation. This manifests in similar sound combinations of syllables being able to appear in other different words. For example, they give the illustration below.

(ku-) al-a	'to spread'	(ku-) al-aa - yal-a	[kwaa.laa.ya.la]
(ku-) er-a	'to sweep'	(ku-) er-aa - yer-a	[kwee.raa.ye.ra]

In the examples, the similarity does not come only in consonants [r] and [l] of the same manner; that is liquids but also in the changes in the verbs by all introducing a syllable with <y>.

Katamba (1984) asserts that syllable structure plays a pivotal role in the phonological framework of any language through influencing aspects such as pronunciation, rhythm, and stress patterns. A comparison of languages, such as Bantu languages (a larger language family where Runyankore belongs), and English (a Germanic language), shows that the two languages exhibit distinct syllabic architectures. This review delves into the comparative analysis of syllable structures in Bantu and English, highlighting their unique characteristics and implications for linguistic studies and language acquisition.

Taylor and Katamba (2025) affirm that Bantu languages are characterized by a preference for open syllables, typically following a Consonant-Vowel (CV) syllable pattern. This structure is prevalent across many Bantu languages, contributing to their rhythmic and melodic qualities. The scholars assert that most Bantu bisyllabic stems often begin with a consonant, and long vowels are rare in the first syllable. The syllable nucleus in Bantu languages is typically a vowel, and the onset may consist of a single consonant and codas are generally absent, leading to a preference for open syllables (Taylor, 1985).

The English syllable structure exhibits greater complexity, accommodating a wide range of consonant clusters and closed syllables. Syllables in English can follow various patterns, including CV, CVC, CCV, and even CCCV, allowing for intricate consonantal arrangements. For example, the word *strengths* has a complex consonant cluster at the coda position with three members [str].

The nucleus of an English syllable is typically a vowel, but syllabic consonants, such as the [l] in *bottle* or the [n] in *button*, can also function as syllable nuclei, particularly in unstressed syllables. Additionally, English syllables may include complex onsets and codas, contributing to the language's characteristic stress patterns and rhythm.

The primary distinction between Bantu and English syllable structures lies in the complexity and flexibility of consonant arrangements. Bantu languages favour simplicity, with a predominant CV structure and minimal use of consonant clusters. In contrast, English accommodates a broader array of syllabic configurations, including complex onsets and codas. This difference has implications for language acquisition, particularly for speakers transitioning between these linguistic systems.

Furthermore, the presence of syllabic consonants in English adds another layer of complexity, as these are relatively rare in Bantu languages. This disparity can pose challenges for Bantu language speakers learning English, necessitating targeted phonological instruction to address syllabic structures and stress patterns.

2.5 Runyankore syllabification and phonotactics

Taylor (1985) studies phonotactics in Runyankore syllables and explains the consonant distribution, clustering of consonants and distribution of vowels but does not give much on the clustering of consonants in Runyankore. In his study, he only highlights that consonants are allowable initially in words though vowels are the most prevalent in words in the initial position and that the word-initial consonant clusters in Runyankore are consonant plus semi-vowel. However, Taylor (1985) does not give details on the different consonantal sequences and combinations that lead to the consonant clustering in Runyankore syllables. The few examples of clusters he gives are stop plus glide such as [b] and [t] form [bw], [bj], and [tw], [tj] clusters, respectively. He however does not explain the mechanisms and phonotactic constraints that influence the permissibility in these combinations. The gap in his study therefore lies in missing consonant clusters and the phonotactics that lead to clustering in Runyankore syllables. Taylor (1985) further states that there are no word-final consonant clusters, but they exist as word- medial clusters where the cluster may be nasal plus another consonant without giving ample illustrations on this kind of combination. Lastly, on vowel sound distribution in the syllable, he states that all the five primary vowels occur in final position, and in the initial position, the vowel [u] does not occur initially in any stem.

Poletto (1998) in his study on Runyankore phonology explains that verb roots can have one syllable, thus can exist as monosyllabic CV as in *–rya* (to eat), *-fa* (to die), *-mwa* (to shave*), - za* (to go). He argues that these monosyllabic roots are reduplicated to have two or three syllables CVCV or VCVCV as in *kurya* or *okurya* consecutively. The changes the syllable structures of words are due to morphological processes of introducing the syllables *oku-* to cater for the infinitive 'to'. The reduplications that occur in these verb syllable structures affect the syllabic representations of words (Hyman, 2022), whereby sometimes the morphological changes can alter the constituent members in the onset or nucleus of the Runyankore verbal syllable structure for example *banywa* 'they have drunk' can change to *banywire* 'they drank'. This is seen in consonant constraints and reduplication. On consonant phonology, Poletto affirms that consonants [r], [d] and [z] are variants of one another such as in [r] changing to [z], for instance in *okubara/ɔkubara /* 'count' and *abazire*

/*abazire*/ ‘counted’. Another variant of [r] is [d] as seen in the word *okurinda /ɔkurinda/* ‘to guard’ changing to *okundidira /ɔkundidira/* ‘to guard for me’. He also hints on consonant allophones in which sound [g] changes to [dʒ] in some words such as *okusiga* */ɔkusiga/* ‘leave’ and *okusigyira* ‘leave for’, which changes the consonants in the word syllables. His work hardly tackles the subject of consonant clusters in Runyankore, more so the phonotactics.

Hyman (2022) argues that Runyankore tone system is subject to constraints. This particular work by Hyman focuses on verb stem reduplication dealing with the distribution of tones within the verb stem, which consists of the verb root and suffixes. For example, he looks at changes in word stem like *kor-* ‘work’, *okukora* ‘to work’, *okukorera* ‘to work for’ and *okukoragye* ‘to work well’ expounding all the reduplications in the stems of verbs. The main attention in the work is that verb stems can be monosyllabic, bisyllabic, trisyllabic and quadrisyllabic. He also asserts that long vowels are written orthographically with double letter in the word. Most verbs and nouns in their syllable nucleus have double vowel represented orthographically, such as in *abaana / aba:na/* ‘children’, *abeeteeraine /abe:te:raine/* ‘people in association’, *okuzaana /okuza:na/* ‘to play’. It is important to note that tone is influenced by the syllabification of words in any language for example if we have a long vowel in one of the syllables such as in *obucoori /ɔbutʃɔ:ri/* ‘maize, the tone is affected.

In Runyankore, the connection between verbs and nouns is in morpheme boundaries with connecting syllables with clusters like *bya-, bwa-, twa-,* two consonants; normally a stop plus a glide as in *ebyaana by’enjangu’* ‘young ones of a cat’, *obwara bw’enjangu* ‘claws of a cat’ and *otwiino tw’enjngu* ‘small teeth of a cat’. These phrases have a noun connected to another noun using clusters such as [bw], [bj] and [tw] hence Runyankore syllabification also has a connection between phonology and morphology in words.

2.6 Constraints on Runyankore Borrowed and Loan Words

Phonotactic constraints significantly shape how borrowed and loanwords are integrated into a recipient language, such as Runyankore borrowing from English in the word ‘sweater’ to become *eshweeta /* ɛʃwɛta/. Languages often adapt foreign words to fit their

own permissible syllable structures and sound sequences basing on the phonotactic constraints of that specific language. According to Paradis and LaCharité (1997), this adaptation process involves modifying illicit consonant clusters, inserting vowels (epenthesis), or deleting segments to conform to native phonotactic rules. For example, Japanese often inserts vowels to break up consonant clusters in English loans “strike" becomes "sutoraiku" (Vance, 2008). Similarly, in Runyankore, initial consonant clusters are typically avoided, leading to modifications like in the example given above ‘sweater’ becoming *eshweeta* ‘/ɛʃwɛta/ thereby avoiding the [sw] cluster at the initial position. These changes underscore the critical role of phonotactic constraints in regulating how foreign lexical items are syllabified and pronounced in a native local language, such as Runyankore.

2.7 Critical evaluation of literature

The scholars who have conducted studies on English show that phonotactics play a big role in the clustering of consonants in both the onset and the coda. This is studied in the onset constraints and coda constraints showing how many consonants are possible and what order should they follow, for example, for the English coda or onset. There is hardly a study which gives satisfactory information about Runyankore on the same subject. The studies shown in the review cover areas on verbs syllable structure (Hyman, 2022) and (Poletto, 1998), and sound distribution in words (Taylor, 1985). This therefore implies that the notion of phonotactics and consonant clustering in Runyankore syllables has been less investigated; thus, it was the focus of this research study.

CHAPTER THREE

METHODOLOGY

This chapter presents the research methodology that was used and followed during the data collection process and analysis. The chapter gives details on how the data sets of this research study were obtained. The sections presented in this chapter include research approach, research strategy, nature of data required for the study, research area, population, sampling techniques and size, methods of data collection, validation of data, identification data, ethical considerations, and data analysis approach.

3.1 Research approach

This research study was qualitative. This qualitative criterion was the basis of data analysis of words basing on their syllabification. Seers (2012) asserts that good qualitative research uses a systematic and rigorous approach that aims to answer questions. In this study, the interpretation and data analysis was achieved to answer questions on how the clustering of consonants occurs in Runyankore complex onsets in the syllables. In addition, different themes emerged from the data collected to achieve the objectives of this research study.

3.2 Research strategy

This research used two study strategies namely theoretical and descriptive strategies. The theoretical strategy was significant because the study applied the theory on sonority to find out permissibility in consonant clustering. For example, the theory on sonority was applied by using sonority index values of consonant members to administer impossible clusters such as stop plus stop clusters like [bp], [dk], [tg] are practically impermissible. The descriptive approach was employed by explaining the phonotactic constraints which determine the consonant clustering in Runyankore syllables. Thus, both the theoretical and descriptive research strategies were applied in this research study.

3.3 Nature of data used for the study

This research study required data in form of syllables from Runyankore words with different consonant sound clusters. The syllables having clusters implies the existed in

either CCV or CCCV structures. Permissible consonant clusters were generated from words obtained from the respondent. The words were got in spoken or written form and then transcribed phonetically for example the word *amacwante* /amatʃwantɛ/ 'saliva'. Words belonging to different syntactic categories were collected and analysed based on syllabification and consonant clustering.

3.4 Research Area

The research study was conducted in South Western Uganda in selected villages of Buyanja sub-county, Rukungiri district. This is this area has a good population of Runyankore speakers. Rukungiri is a relatively big district, at a level of a Municipality with three constituencies. The major languages spoken in Rukungiri are Runyankore and Rukiga. The data collection, however, focused only on Runyankore which is dominantly spoken in Buyanja. In this research area, Runyankore is spoken and used on radios, religious places, speeches in public spaces, kindergarten and lower primary teaching, music and songs.

3.5 Population

This research study was carried out in target areas with a big population of Runyankore speakers in Rukungiri district around the mentioned sub-counties. These respondents provided primary data in form of spoken words guided by a data collection scheme in Appendix II. Respondents from all age groups were significant in providing data in form of Runyankore words that they use in daily communication.

3.6 Methods

Sampling

i. Sample size

Each selected village gave a sample size of between 10-20 respondents. These respondents were asked to provide words in Runyankore that have different syllables to enable the researcher to find the clusters during analysis.

ii. Sampling techniques

The data collection process employed purposive sampling. Purposive sampling was effective in identifying only speaker Runyankore and those who specifically provided the needed data. According to Katamba and Nsubuga (2014), purposive sampling as a technique gives the researcher the freedom to find respondents who can give the information that exactly fits in the study. Purposive sampling was used because the research study required specific data, thus involved a selective approach of getting words with syllables that have consonant clusters from a sample of the respondents.

iii. Data collection

The research study employed two data collection methods. Firstly, the elicitation method was used to obtain primary data from the field. Under the elicitation, Runyankore speakers were to give or speak different words using a generated consonant clusters scheme (Appendix II). The scheme was designed to have multiple sound combinations to aid in generating words from the respondents in the field. During the data collection, every word obtained was noted down with a pen in a notebook or recorded in a computer. In addition, phone interaction recordings with the respondents were stored for transcription purposes. The recording of speech enabled storing pronunciations and articulations of some words for transcription.

Secondly, the use of written and reference materials method was used to obtain secondary data. This method was effective because the data obtained here provided orthographic representations of the words, which had the syllables with different consonant clusters, the kind of data that was used in this study. These included dictionaries and bibles of Runyankore, and written teaching textbooks. Under this method, the written literature provided resourceful texts for identifying and finding existing syllables in Runyankore words. The data got in this method had orthographically written words which were compared to the primary data obtained from the field.

During primary data collection in the field, a data collection scheme shown in Appendix II, with all the consonants that exist in Runyankore was used to elicit different clusters in words from respondents. In addition, some of the words obtained using these combinations

from the respondents are given in Appendix III and IV. An extract table 4 from the data collection scheme is shown below.

Table 3: Information that was used to obtain clusters during data collection

Sound	Cluster	Runyankore word examples	Phonetic Transcription	English meaning
/b/	[bw]	obworo	/ obworo/	poverty

The researcher during data collection used this research tool to formulate questions to get words from the Runyankore speakers. For example, a respondent would be asked to say words that have letter b plus w; thereby obtaining a word like *obworo* /*obworo*/ 'poverty'.

iv. Validation of data

The quality of data collected was highly ensured by assessment of tools and procedures used to collect data. The orthographic words were compared to the recorded and transcribed words. The research tools and instruments such as recordings on the phone were assessed by comparing to what was recorded in the notebooks and computer. Data from different respondents was also compared to ensure quality. For example, comparison of synonymous words in the data such as *manvuli* and *omutaka* to mean umbrella, *amajumba* and *amahambira* to mean 'garden ridges. Some of these differences were due to other languages feeding Runyankore new words. Therefore, data validation was ensured by comparing data from different respondents and resources.

v. Data coding

This research study used data in form of syllables from words with different consonant sound clusters. A data collection scheme that has all different consonant clusters was generated from the respondents to be used to get various words and syllables. Words belonging to different syntactic categories were collected and categorized depending on how many consonants make up the syllable constituents of these words. For example, in from nouns, a word with two-membrer cluster [nt] *ente* 'cow' and three-member cluster [mbw] *embwa* 'dog'.

vi. Data analysis

The data collected for analysis and interpretation was in form of word-syllables. Firstly, syllables were identified and categorized in groups according to syllable clusters such as one-consonant CV as in [na] or [ba], two-consonant cluster CCV as in [nda] or [mba], and three-consonant cluster CCCV as in [nkwa] or [mbwa] as they existed in the data which was obtained. Word examples with these clusters such as *omunda* 'inside', *ibumba* 'clay', *nkwata* 'catch me' and *embwa* 'dog'. The first step of data analysis, therefore, involved categorization of data depending on the number of consonants in the clusters.

Then, the clusters were analyzed based on the consonant parameter of descriptions such as labial plus labial [mb], [bw], alveolar plus labial [nw] and many more other possible combinations to obtain the categories of clusters in the Runyankore syllables. Using the parameter of place of articulation, sounds in the clusters were also explained for example sounds produced at the hard palate, the palatal sound [tʃ] in the word *ebiconco /* ɛbi*tʃɔntʃɔ/*. The constituent members in a cluster that share the same place of articulation, for example, were placed under the phenomenon of auditory similarity. The sonority scale was applied in the study to identify clusters based on their sonority status. On auditory similarity, there are sounds that displayed similar characteristics such as similar place of articulation in labial clusters like [bw] in *obwoba* /*obwoba*/ 'fear'.

Finally, the data analysis established the phonotactic constraints which affect the clustering of consonants. Under this analysis, some of the phenomena that are associated with phonotactics such as sonority, similarity, and articulators were explained. For example, the analysis of clusters with consonant [m] would involve identifying the articulators as lips (labial sound), the sonority being relatively high since the sound is a nasal and similarity seen with fellow labial sounds in clusters such as [mb] and [mw]. The study came up with phonotactics in Runyankore that influence clustering of consonants in syllables.

3.7 Ethical Considerations

This research study was highly ethical. Clearance and acceptance before going to the field were obtained. This involved following the right procedures such as getting a permission letter from the Department and other different offices before going to the field. An

acceptance letter is hereby given in Appendix I. During the data collection process, respecting people and obtaining consent from respondents was ensured by presenting my field acceptance letter from the department followed with an explanation about the authenticity of the study The research ensured there was no harm involved with the participants who were involved. The study respected privacy of the respondents, and confidentiality of all people who were involved.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS, AND RESULTS

This chapter contains the results that were obtained from the study by aligning with the methodology and theoretical framework of this research study. The results presented satisfy the objectives of this study. The interpretation of the results was achieved based on the theoretical framework of the study. The analysis and interpretation of data is done in two major sections that link to the three specific objectives of the study.

The first section of the chapter presents the inventory of consonant clusters. This section unveils a collection of the consonant clusters that occur particularly in Runyankore thereby satisfying the first specific objective. The section further focuses on the classification according to different parameters thereby fulfilling the second objective. The categorisation was pertinent because it shows how different clusters share some similarities and also how they uniquely exist differently. In this section, different tabulated examples of Runyankore words are provided to show the different consonant clusters.

The second section of the chapter presents the description and explanation of the phonotactic constraints. The phonotactic constraints that influence clustering in Runyankore syllables conform to the permissible consonant clusters which were formulated. This means that after finding out the consonant clusters that exist in Runyankore, restrictions that influence permitted clusters were described showing how these clusters are possible or not thereby fulfilling the second specific objectives.

4.1 Consonant clusters in Runyankore syllables

This section basically presents findings ad results of the first objective in two parts. The first part unveils the consonant clusters that were found in Runyankore words and syllables. The second part focuses on categorising these clusters based on several classification parameters.

4.1.1 Inventory of consonant clusters in Runyankore syllables

A consonant cluster inventory is a collection of all the consonantal combinations of the consonant sounds basing on their phonetic realisation, particularly the way they occur in Runyankore as a language or dialect. It was evident in Runyankore, just like in most Bantu languages, that most syllables tend to follow a CV pattern (Taylor, 1985), and consonant clusters particularly in the syllable onsets are inevitably restricted. In Runyankore, the present inventory of consonantal sequences reflected both inherited Bantu phonotactic constraints and language-specific morphophonological processes. This section presents the results of a data analysis of consonant clusters in Runyankore syllables, specifically in the complex onsets, providing an inventory of permitted sequences and illustrating their distribution with examples. The aim is to generate a consonant cluster inventory that provides a systematic account of existing clusters that were found permissible in Runyankore words. These words were obtained from different reference materials in form of secondary data.

The consonant inventory of Runyankore includes a range of stops, fricatives, nasals, glides and approximants. For example, the typological description records for Runyankore have the following consonant sounds; with certain phonemes marginal or dialectal. Taylor (1985) gives a number of the consonants that exist in Runyankore as shown below.

/p b t d k g f v s ts ky ɟ ɲ ʃ z c ʒ ʧ h m n w j ɾ r l/

These consonants are articulated different basing on the place and manner of articulation of each sound. For example, the consonant /b/ has different phonetic realisations depending on the context that is, it can be a voiced bilabial stop [b] in most positions like in *abaana* *'*children*'* and a voiced bilabial fricative [*ß*] like in *aba /aßa/* *'*these people*'* (Ndoleriire, 2020). The differences can depend factors such as surrounding sounds, speaker variation and dialects.

The description of this CC inventory suggests that Runyankore allows consonant clusters, but in a more limited way than many western Indo-European languages. The clusters that do appear are typically either morphologically induced (nasal prefix + stem) or involve glide/semivowel sequences (stop + j/w). It was affirmed that there is little evidence of large

onset clusters with a maximum of three consonants in a cluster dominated by glides for example the [mp] in *mpwera /mpwera/* 'help me'.

From the perspective of the SSP, which predicts that onsets should rise in sonority to the vowel nucleus and codas fall in sonority away from the nucleus, it was observed that some clusters do not conform to this principle. The factors like distance in the articulators as stipulated in the MSDP and similarity in the articulators play a big role in the clustering as be discussed in the next sections of this data analysis. Some of these clusters include the three-consonant cluster combinations such as [ndw] as in *omutehindwa* /*omutehindwa*/ iron bar.

i. Nasal + Stop/ fricative (NC) clusters

One common sequence in Bantu languages is a nasal prefix plus stem-initial stop for instance [nt] in *entasya* / *entasja*/ 'income' and [mb] in *omuramba* /*omuramba/* 'local brew'. In Runyankore, such NC sequences are attested. These are onset sequences of nasal + stop/affricate + glide in some cases. They illustrate that the nasal + consonant sequence is permissible in onset position, although often being morphological rather than purely phonotactic clusters. Poletto (1998) asserts that NC sequences are allowed in Runyankore, but are largely in morphological contexts (prefixation), and not as independent complex consonant clusters arising purely from phonotactic combination. A list of the NC clusters that were evident in Runyankore words is shown below;

[mb] [mp] [nk] [nt] [nd] [nf] [ns] [nv] [nʧ] [nʃ]

The above examples of clusters mostly occur in the medial positions of words as discussed in the next section on categorising clusters. This inventory group focused on nasal-stop interaction, the next group focuses on stop-glide interaction.

ii. Stop+ Glide (C + j/w) clusters

Another set of consonant clusters that was found to be prevalent involved a stop plus a glide [j] or [w], or a palatalising semivowel. In the Runyankore typology, there is mention of sequences such as C + y [j] (or "ky" orthographically). This /ky/ is pronounceable the same way as 'c' /ʧ/ in Runyankore. For example, /ky/ in the initial position of the word

kyamushana /kyamushana / *'*lunch*'* and the 'c' in *-cwa /ʧwa/* 'to tear' is all pronounced in the same way by native Runyankore speakers. Some borrowings and morphologically formed words showed clusters such as [bw], [mw], [tw], and these sequences appear as complex onset clusters rather than prefix + stem morphology, and thus contribute to the cluster inventory in Runyankore. For example, *omwata /omwata/ '*weeds*'* and *obwato* / *obwato*/ 'trough' have the [mw] and [bw] clusters consecutively.

The first two consonant cluster inventory groups focused on a two-member cluster. The next group unveils a three-member cluster with a nasal plus an obstruent plus a glide on

iii. Nasal+ Stop/affricate/Fricative+ Glide (N+C+G) clusters

The typological account showed that clusters of three consonants are extremely rare in Runyankore but exist in the language. It was noted that these clusters must have at least a nasal, another consonant and a glide in a combination NCG. In the word *encwera /en*ʧwera*/ '*cobra snake*',* this combination is existent with the cluster [nʧw] made up of a nasal, affricate and glide. This complex cluster manifests with the maximal onset number of consonants a Runyankore syllable can have as discussed in section 4.3.

The Table 4 below gives a summary of the attested consonant clusters that were obtained from Runyankore words and the combination description.

Table four showing consonant clusters and their combination description

Consonant clusters examples	**Combination description**
[mp] [mb] [nk] [nd]	Nasal+ Stop clusters
[nf] [ns] [nv] [nʃ]	Nasal+ Fricative clusters
[nʧ] [nky]	Nasal + Affricate clusters
[ʃw] [sj] [zj]	Fricative + Glide clusters
[kw] [bw][mw] [nw] [nj] [mj]	Stop + Glide clusters
[mbw] [ndw] [nkw]	Nasal + Stop+ Glide clusters

In conclusion, the different consonant clusters that were found existing in Runyankore words were identified on the basis of different criteria. Firstly, consonant type whereby

combinations based on the type of consonant were recognized such as fricative plus glide [sj, zj] as in *okusya /okusja/* 'to be burnt', *okwozya /okwozja/* 'to wash 'and nasal plus stop [mb, mp, nk, nt, nd,]. Secondly, the typology of the cluster such as biconsonantal (with two members) such as [mw, rw,] as in *mwami* 'husband', *rwagati* 'between' and triconsonantal (with three members) such as [nkw, mbw].

This section focused on giving a foundation of what consonant clusters were found to exist in Runyankore syllables thus achieving the first objective to establish an inventory of the consonant clusters in the language. The next section focuses on the categorisation of these clusters based on different parameters such as position, sonority order, syllable structure and size, consonant type among others.

4.1.2 Categorization of consonant clusters in Runyankore syllables

The section explains the categories of consonant clusters in Runyankore syllables whereby they are grouped into categories and subcategories. In addition, the section explores the distribution and frequency of clusters with in different positions in words. The section therefore expounds the phonological patterns of consonant sounds in Runyankore syllables focusing on onset clustering with the aim of understanding the structure of Runyankore syllables.

The categorisation of the consonant clusters was based on different parameters to classify the clusters that were identified in words and syllables of Runyankore as follows.

(i) Runyankore consonant clusters by syllable position

Syllable position plays an important role in the categorisation of consonant clusters in Runyankore syllables. Taylor (1985) affirms that consonant clusters in Runyankore words can appear only either initially or medially in a word. Results from consonant clustering in Runyankore syllables show that most clusters appear word medially with most words either starting or ending with a vowel. In nouns, all the clusters that were found in Runyankore syllables occur medially. Table 5 shows examples of nouns with medial consonant clusters with two (CC) and three (CCC) consonants.

Table 5: Nouns with medial consonant clusters

	orthographic	***Transcription***	***Cluster***	***meaning***
CC medial	enkooko	ɛnkɔ:kɔ	[nk]	a hen
	empuunu	ɛmpu:nu	[mp]	a pig
CCC medial	embwa	ɛmbwa	[mbw]	a dog
	endwara	ɛndwa:ra	[ndw]	diseases

The data on verbs shows that if a verb exists with an initial cluster such as '*nywa*' rather than '*okunywa*', it is sentential, syntactically referring to 'You drink' instead of 'to drink' '*okunywa*'. In this case, the lexical existence of all verbs in Runyankore is represented with infinitive 'to'. Table 6 shows examples of verbs in infinitive form with medial clusters. The fact that these clusters come after infinitive marker *oku-* 'to, they come in the medial position in a word such as [nd] in *okukunda* 'to love'.

Table 6: Verbs in infinitive for with medial clusters

	Orthographic	***Transcription***	***Cluster***	***meaning***
Verbs	okunywa	ɔkunjwa	[njw]	to drink
	okurinda	ɔkurinda	[nd]	to wait
	okutemba	ɔkutɛmba	[mb]	to climb
	okucwera	ɔkutʃwɛra	[tʃw]	to spit

The data on verbs further indicates that all Runyankore verbs at least form a consonant cluster when indicating passivisation. Passivisation is the use of passive voice which involves changing the form of the verb to conform to the new object in a sentence.

Ferreira (2021) argues that passive sentences are not communicatively equivalent to the actives, and therefore active sentence paraphrases sometimes distort the writer's message. This thus affirms that speakers of Runyankore sometimes inevitably use passive form of the verbs. Runyankore verbs introduce a cluster with a combination of a consonant plus a glide (C+G). The cluster forms with the bilabial glide [w] which combines with another consonant such as a stop as in [bw], liquid as in [rw] or nasal as [mw] to change from the infinitive form to passive form as shown in Table 7 below.

Table 7: Passivisation

Infinitve	*Meaning*	*Passive*	*Meaning*	*cluster (C+G)*
okubara	to count	okubarwa	to be counted	[rw]
okurya	to eat	okuribwa	to be eaten	[bw]
okumanya	to know	okumanywa	to be known	[njw]
okutamba	to sacrifice	okutambwa	to be sacrificed	[mbw]

The first two verbs have cluster of two consonants CC and the other two have three consonants CCC; the maximum number of consonants a cluster can have in Runyankore.

The data shows that Runyankore words also have initial consonant clusters; however much they are very minimal. Pierrehumbert (1994) asserts that the inventory of word initial consonant clusters is chiefly explained by the constraints on the syllable onset. For example, in English, stops combine with liquids to form clusters in complex onsets illustrated in words like *tree* /tr/, *blessing* /bl/, *dress* /dr/, and *class* /kl/. In addition, a three-member onset in English mostly has a fricative [s] plus a stop and liquid for example in *spray* /spr/. This argument is affirmed by the results since this study is on clustering in the Runyankore onsets. Results indicate that some Runyankore lexicon such as adjectives, pronouns, and adverbs exist with initial consonant clusters. Table 8 shows examples of words with initial consonant clusters in Runyankore.

Table 8: Initial consonant clusters

	Orthographic	*Transcription*	*Cluster*	*meaning*
Adjective	nkuru	nkuru	[nk]	old
	nsya	nsja	[nsj]	new
	nkye	nkjɛ	[nkj]	small
	mpango	mpangɔ	[mp]	big
Adverbs	mbwenu	mbwɛnu	[mbw]	now/ today
	mpora	mpora	[mp]	slow
	nyenkyakare	njɛnkjakarɛ	[nj]	tomorrow
	bwanyima	bwanjima	[bw]	before
Pronouns	nyowe	njwɔwɛ	[njw]	me
	mwena	mwɛna	[mw]	you/ all of

Furthermore, data shows that initial clusters are also found in some nouns which do not have the initial vowel to show person or number.

Table 9: Nouns with initial clusters

	Orthographic form	***Transcription***	***Cluster***	***Meaning***
Nouns	rwaranda	rwaranda	[rw]	famine
	rwata	rwa:ta	[rw]	a cruel person
	shwento	ʃwɛntɔ	[ʃw]	uncle
	shwenkuru	ʃwɛnkuru	[ʃw]	grandfather

The results from the data show that there are no final clusters in Runyankore because the language does not have closed syllables; it has only open syllables (Taylor, 1985), thus having no final clusters which form closed syllables. The existence of final consonant clusters would mean that a language has closed syllables.

(ii) Runyankore consonant clusters by sonority order

Runyankore consonant clusters can be categorised basing on the sonority status of the consonant members in the cluster. Goldsmith's (2011, p.178) defines of sonority as the method of organizing the segments from a language along a one-dimensional scale, with the ultimate purpose of describing permissible syllables. The data provided was grouped into two major categories of clusters based on sonority. They categories are: ascending sonority clusters and descending sonority clusters.

Ascending sonority clusters have member consonants in the cluster increasing in their sonority status which means a less sonorous consonant is followed by a high sonorous consonant if they are two in the cluster. The ascending order is determined based on the sonority index from the sonority scale. Sonority index is the measure of the relative loudness or resonance of speech sound, typically ranked on the sonority scale showing sonority hierarchy from most sonorous to least sonorous. Clements (1990) assumes a sonority scale with five categories as shown in Table 10 which help in identifying the

figures in the ascending order. This scale combines the class of obstruents; stops, fricatives, and affricates under one sonority index.

Table 10: Sonority scale by Clements (1990)

Sound category	***Sonority index***
Vowel(V)	5
Glides(G)	4
Liquids (L)	3
Nasals (N)	2
Obstruent (O)	1

Obstruent sounds are consonant sounds that are produced by obstructing or constricting airflow in the vocal category which include stops, fricatives, and affricates. The results from Runyankore syllables indicate that all ascending sonority order clusters consist of a consonant and a glide; and conform to the Sonority Sequencing Principle. The ascending order increases from one, two or three to four. Table 11 shows examples of clusters with ascending sonority.

Table 11: Clusters with ascending sonority order

Cluster	***consonant type***	***sonority (index) order***	***word example and meaning***
[mw]	nasal + glide	2, 4	omwana (child)
[gj]	stop + glide	1, 4	akahugye (foolishness)
[rw]	liquid + glides	3, 4	orwiko – (mingling stick)
[sj]	fricative + glide	1, 4	omusyo –(knife)

The second category of clusters by sonority order is the descending sonority clusters where sonority status decreases in the member consonants. The results indicate that in Runyankore syllables, some clusters do not follow the SSP in cases where a cluster's sonority is descending. These clusters consist of a nasal plus an obstruent; sonority index reducing from four to one in that descending order. Table 12 shows the examples of clusters with descending sonority.

Table 12: Clusters with descending order of sonority

Cluster	*nasal+ obstruent*	*sonority (index)order*	*word example and meaning*
[mb]	nasal + stop	2, 1	embaaho–timber
[ntʃ]	nasal + fricative	2, 1	enceka- milk gourd
[nʒ]	nasal + affricate	2, 1	enjangu- cat
[mp]	nasal + stop	2, 1	empeeta - ring
[nt]	nasal+ stop	2,1	entanuuru –kiln

The clusters formed show that a cluster cannot have a nasal [n] with any bilabial stops [b] and [p]. Similarly, the nasal [m] is impermissible with any alveolar stops [t] and [d]. This permissibility phonotactic constraint is due to differences or similarity in the places of articulation. The permissibility is explained in the proximity in distance between the articulators of these sounds. In addition, the two member consonants align with the Minimal Sonority Distance Principle (MSDP) which states that the members of a cluster must be *d* distance apart on the sonority scale, whereby *d* is determined on a language-specific basis (Parker, 2012, Clements, 1990). These clusters are made up of a nasal plus a stop which are a distance apart on the sonority scale. Therefore, besides the sonority factor, the point of articulation of a consonant influences the clustering of consonants in syllables.

The analysis further affirms that more sonorous consonants on the sonority scale, in this case glides followed by nasals, are more permissible than less sonorous consonants like stops and fricatives. For example, nasal /n/ is able to form clusters with stops like [nd], [nt], [nk], with glides [nw], [nj] and with fricatives [ns] and [nz]. Also, it is observed that glides [w] and [j] cluster with almost all consonants in Runyankore words because they are highly sonorous; a reason why they are referred to as semi-vowels. The results indicate that all clusters with two member consonants consisting of a consonant plus a glide conform to the Sonority Sequencing Principle. The theory explains that more sonorous sounds occur closer to the nucleus than less sonorous sounds (Renata, 2021); which is evident in two member clusters with glides. The Tables 13a and 13b below show the permissibility status of a consonant with a glide (C+ G) to form different consonant clusters in Runyankore

syllables. The symbols (+) and (-) represent the permissible and impermissible clusters respectively.

Table 13a: Permissibility of consonants with glide [w] to form clusters

Consonant sound	Cluster with [w]	Word Example	Transcription	Meaning
[p]	+	empwabwoba	ɛmpwabwɔba	brave person
[b]	+	obwengye	ɔbwɛŋyɛ	knowledge
[t]	+	twena	twɛ:na	all of us
[d]	+	endwara	ɛndwara	diseases
[k]	+	Okwezi	ɔkwɛzi	moon
[g]	+	akagwe	akagwɛ	scandal
[f]	+	efwana	ɛfʷana	worms
[v]	-	-	-	-
[ŋ]	+	omucungwa	ɔmutʃuŋwa	orange
[ʃ]	+	shwenkazi	ʃwɛnkazi	aunt
[ʒ]	+	okujwa	ɔkuʒwa	to bleed
[tʃ]	+	encwera	ɛntʃwɛra	cobra
[dʒ]	-	-	-	-
[s]	-	-	-	-
[z]	-	-	-	-
[n]	+	enwa	ɛnwa	wasp
[m]	+	emwe	ɛmwɛ	one
[l]	-	-	-	-
[r]	+	orwaari	ɔrwa:ri	noise
[h]	+	okuhwisa	ɔkuhwisa	to be finished

Table 13a for glide [w] above, it is evident that dental consonant sounds [θ] and [ð] do not form clusters because they are non-existent in Runyankore. The glide [w] is a labial sound and therefore does not form clusters with [v] because it is a labio-dental sound, thus the two would clash in place of articulation making such a cluster unpronounceable. The incompatibility factor applies to sounds like [l] which is very rare or less prominent in Runyankore. The incompatibility means that sound [l] is unable to cluster with [w] or [j] in Runyankore because the combination is not clearly pronounced by native speakers for example if it is name of a place like Lweza, [lw], most Banyakore speakers end up

articulating it with [r] as Rweza [rw]. The consonant [l] is rather common in Luganda. The glide [w] is permissible with all the labial stops [b] and [p], and the labial nasal [m] because of auditory similarity and proximity of the articulators since the sonority is well distributed.

Comparing the two glides, /w/ and /j/, the bilabial glide [w] is more permissible than [j] as seen in Table 13b below.

Table 13b: Permissibility of consonants with glide [j] to form clusters

Consonant sound	**Cluster with [j]**	**Word Example**	**Transcription**	**Meaning**
[p]	-	-		-
[b]	+	ebyangu	ɛbjaŋu	sponges
[t]	+	otyo	ɔtjɔ	yeah
[d]	-	-		-
[k]	+	ekyozi	ɛkjɔzi	pumpkin
[g]	+	obugwagye	ɔbugwagjɛ	peace
[f]	-	-		-
[v]	-	-		-
[θ]	-	-		-
[ŋ]	+	omugyenzo	omugjɛnzɔ	ritual
[ð]	-	-		-
[ʃ]	-	-		-
[ʒ]	-	-		-
[tʃ]	-	-		-
[dʒ]	-	-		-
[s]	+	okwosya	ɔkwɔsja	to burn
[z]	+	eityazyo	ɛitjazjɔ	sharpener
[n]	+	enyama	ɛnjama	meat
[m]	+	emyomyo	ɛmjɔmjɔ	pillar
[l]	-	-		-
[r]	+	buryo	burjɔ	right hand
[h]	-	-		-

Table 13b above for glide [j] clearly indicates that is permissible with both fricatives [s] and [z], nasals [m] and [n]. This glide does not form clusters with [ʃ] and [ʒ] because of

perceptual factors, whereby when they combine with [j], the glide is vowelized and cannot be heard as a consonant.

(iii) Runyankore consonant clusters by cluster size and structure

An individual word can have as many syllables as possible, i.e. polysyllabic words (Cunningham, 1978). Similarly, the syllable structure is affected by the number of consonant members which make up the cluster size. Polysyllabic words also exist in Runyankore which makes the word orthographically appear long. A good example is *mukomanshaija* /*mukomaɲʃaija* / a shrub for making grazing sticks.

The data indicates that the maximum number of consonants can be three consonants in the Runyankore syllable onset. The categories of clusters based on size and structure are triconsonantal like [mbw] and [nʃw], and biconsonantal clusters like [nk] and [rw], with three and two consonant members in a cluster respectively.

The results indicate that biconsonantal clusters are the most prevalent in Runyankore syllables. *Bi* means two; therefore, these biconsonantal clusters have two members in a cluster. This can be illustrated, for example, using clusters of the nasal [n] which clusters with the greatest number of consonants.

a. Biconsonantal clusters with [n] = [nw], [nj], [nt], [nk], [ns], [nz], [nd], [nf], [nv]
b. Triconsonantal clusters with [n] = [nkw], [ntw], [ndw], [ndj], [nkj]

The possibility of one member to cluster with another is dependent on the sonority status as explained in the sonority theory on clustering. From the data, it was established that patterns such as N+G, N+P, F+G form a two-member consonant cluster where N, G, P, F stand for nasal, glide, plosive, and fricative, respectively. Table 14 below shows the permissibility of different consonant clusters in Runyankore syllables. The sign (+) means possible combination and (–) means impossible combination.

Table 14 Permissibility of different consonant clusters in Runyankore syllables

Consonant sound	Glide (G)	Nasal (N)	Liquid (L)	Fricative (F)	Plosive (P)	Affricate (A)
Glide (G)	-	-	-	-	-	-
Nasal (N)	+	-	-	+	+	+
Liquids (L)	+	-	-	-	-	-
Fricatives (F)	+	-	-	-	-	-
Plosives (P)	+	-	-	+	-	-
Affricates (A)	+	-	-	-	-	-

Table 14 indicates that in Runyankore, a glide cannot combine with another glide or come before any other consonant in a biconsonantal cluster. However, glides combine with all other consonants as long as the glide comes after the other consonant (C+G) and closer to the nucleus in the syllable. Other possible clusters of two members have a nasal plus a fricative or a plosive or an affricate. The obstruent's class incurs impermissibility due to their low sonority status on the sonority scale. The results in Table 14further show that Runyankore has a unique cluster, whereby a plosive plus a fricative pattern is possible forming a cluster [ts] as shown in Table 15. It is attested in some dialects of Runyankore.

Table 15: Plosive-fricative unique cluster

Word orthography	***Transcription***	***Meaning***	***cluster***
omutsigazi	ɔmut:sigazi	male teenager	[ts]
amatsiko	amat:sikɔ	hope	[ts]
omutsinzi	ɔmut:sinzi	drunkard	[ts]

Runyankore triconsonantal clusters also manifested in the data; with clusters that have three consonant members. It was identified in the data that all the triconsonantal clusters must possess at least a glide in the cluster in combinations C+C+G or C+G+G as shown in Table 15below.

Table 16: *Triconsonantal clusters glide-possession*

Word orthography	***Transcription***	***Meaning***	***Cluster***
endwano	ɛndwa:nɔ	fights	[ndw]
mbwenu	mbwɛnu	now	[mbw]
okuranzya	ɔkuranzja	to see	[nzj]
kyantsya	kjantsja	breakfast	[nsj]

The table shows that triconsonantal clusters can possess a glide like [w] in the first examples and [j] in the other two examples. It is also evident that a three –member cluster can occur at the initial position as in *mbwenu* 'now'.

(iv) Runyankore consonant clusters by manner of articulation

Consonants in Runyankore can be described based on manner of articulation as stops, fricatives, nasals, liquids, and affricates; similar to other languages like English. The data showed that all these categories of consonants form clusters mostly by combining with a glide. The only phonotactic constraint that influences this consonant-glide combination is the position of the glide, whereby glides come closer to the nucleus as shown in the Table 17 below.

Table 17: Consonant-glide clusters

Sub-category	**Cluster**	**Orthographic form**	**Phonetic Transcription**	**Meaning**
Stop clusters	[tw] [pw] [bw] [kj] [gj] [ndw]	omutwe mpwera obwengye ekyaaro akahugye emandwa	ɔmutwɛ mpwɛra ɔbwɛngjɛ ɛkja:ro akahugjɛ ɛmandwa	head help me knowledge village foolishness deity
Fricative clusters	[sj] [zj] [hw]	omusyo okuhuzya okuhweza	ɔmusjo ɔkuhuzja ɔkuhwɛ:za	knife to distract to see clearly
Nasal clusters	[nw] [mw]	enwa omworeko	ɛnwa ɔmwɔrɛko	wasp exhibition
Liquid clusters	[rw] [rj]	okurwana okurya	ɔkurwana ɔkurja	to fight to eat
Affricate clusters	[tʃw] [ʒw] [ʃw]	emicwe okujwa okushwaza	ɛmitʃwe ɔkuʒwa ɔkuʃwaza	manners to bleed to shame

The data shows that affricates combine only with glide [w] but not with [j] as shown in the last column of the table. On the other hand, fricative sounds [s] and [z] combine with only [j] in Runyankore syllables except for the glottal fricative [h]. The nasal and plosive

consonants have the permissibility freedom to combine with both glides; basing on the fact that glides are highly sonorous.

Another pertinent factor that limits the clustering of the consonants is the disruption in the active or passive articulators that lead to the articulation of these sounds. For example, because sounds [f] and [v] are labiodentals produced at the lips, similarly the articulators of the glide [w] are the lips. Therefore, there is a hindrance in the articulation of a cluster which has these labiodental fricatives with another labial stop [w], making a combination of these less likely in Runyankore syllables with very few words existing with a cluster such as [fw] in efwana 'worms' as seen in Table 13a . The combination [fw] is also evident is sister languages like Rukiga.

(v) Point of articulation and complementary distribution consonant clusters

Complementary distribution is a phenomenon where two or more variants of a linguistic element, such as a phoneme or an allophone, occur in mutually exclusive environments (Crystal, 2008). He argues that this is evident if the two sounds never occur in the same environment. For example, we cannot have /fv/ or /pb/ exist as clusters in English as well as in Runyankore because the two sounds are complementarily distributed in the way they are produced; meaning that they are the exact opposite which prohibits their pair from co-occurring. The data showed that the point of articulation influences this distribution thereby determining some clusters in Runyankore words and syllables illustrated in Table 18.

Clusters with complementary distribution have consonant sounds which occur in different environments because the two cannot pair together in one cluster. The reason behind this difference is two factors, namely place of articulation and voice of the sound. In clusters based on complementary distribution, it is impossible for the two members to cluster because one consonant is voiced (+) and the other is voiceless (-) as indicated in the Table 18 below.

Table 18: Complementary distributed consonant sounds in Runyankore

Sub-category	Cluster	Consonant voice	Orthographic	Phonetic transcription	Meaning
Velar clusters	[nk] [gw]	[k] (–) [g] (+)	e**nk**aito nan**gw**a	ɛnkaitɔ nangwa	shoes actually
Labial clusters	[mb] [mp]	[b] (+) [p] (-)	e**mb**ooko e**mp**azi	ɛmbɔ:kɔ ɛmpazi	caning stick red ants
Alveolar clusters	[nd] [nt]	[d] (+) [t] (-)	e**nd**ogoya e**nt**aama	ɛndɔgɔja ɛnta:ma	donkey sheep
Labiodental clusters	[nf] [nv]	[f] (-) [v] (+)	e**nf**u ma**nv**uuli	ɛnfu manvu:li	burials umbrella

Homorganic clusters are thus a result of the factor of similarity. Similarity means that sounds which share certain features are able to cluster because of being homogeneous. The data shows that in Runyankore words, some labial and alveolar consonants apparently cluster based on similarity in place of articulation as shown in the Table 19 below.

Table 19: Homorganic clusters

Category	Cluster	Orthographic	Phonetic Transcription	Meaning
Homorganic clusters (same point of articulation)	[mbw] [mp] [nd] [bw]	embwa empeta endiboota bwara	ɛmbwa ɛmpɛta ɛndibɔ:ta bwara	a dog a ring luggage thorny plant

In the three-consonant cluster [mpw] or [mbw], all the sounds are labial sounds with a combination of a nasal plus a stop plus a glide (N+S+G). On the other hand, a two-consonant cluster with labials [mp] or [mb] or [bw] and alveolars [nd] or [nt] is also possible in forming homorganic clusters. The results, however, indicate that heterorganic clusters a type of cluster which has two or more consonants from different places of

articulation, is the most dominant in Runyankore syllables. For example, we have combinations such as velar+ labial, glottal+labial, alveolar+ palatal, among others.

Table 20: Heterorganic clusters

Category	Cluster	Orthographic	Phonetic Transcription	Meaning
Heterorganic clusters (different place of articulation)	[rw] [kw] [ʃw]	orwigi okukwata okushwera	ɔrwigi ɔkukwata ɔkuʃwɛra	a door to catch to marry

The table above shows how consonants from different places of articulation can cluster to form a heterorganic cluster. Articulators like velar [k] and lips [w] can lead to formation of a cluster [kw]. In the next, glides interact with other consonants to form different clusters.

(vi) Runyankore consonant clusters by glide interaction

The results indicate that glides are the most prevalent consonant members across all clusters, for example every cluster with three consonants in Runyankore must have a glide [w] or [j]; a phonotactic constraint which will be explained further in the next section 4.3. Runyankore syllables have numerous glide interaction clusters whereby a glide sound combines with at least all other consonant types to form a two- or three-consonant cluster. The data affirms that glides are highly permissible due to high sonority index and consequently are able to cluster with at least a nasal, stop, fricative, and an affricate as shown in the Table 21 below.

Table 21: Consonant clusters by glide interaction

Sub-category	Cluster	Orthography	Transcription	Meaning
Glide-nasal	[nw] [mw]	omunwa omwaga	ɔmwana ɔmwa:ga	mouth cruelty
Glide-stop	[kj] [bw]	ekyaata ekibwana	ɛkja:ta ɛkibwana	heartburn a puppy
Glide-fricative	[sj] [zj]	okwosya okwozya	ɔkwɔsja ɔkwɔzja	to burn to wash
Glide –affricate	[tʃw] [ʒw]	ebicweka enjwangye	ɛbitʃwɛka ɛnʒwaŋjɛ	parts mixture

The section 4.2 has centered on categorising the clusters in different categories and sub-categories based on position, structure, size, manner and point of articulation, similarity and sonority ordering. The next section explains the phonotactic constraints which restrict consonant adjacency and clustering.

4.2 Description of Phonotactic Constraints in Runyankore Syllable Consonant Clustering

Phonotactic constraints govern the permissible combinations of sounds in a language. In Bantu languages such as Runyankore, these constraints manifest in various phonological patterns that influence syllable structure, consonant clusters, vowel sequences, and tone systems. This section describes the phonotactic constraints that restrict the clustering of consonant members in a cluster in Runyankore syllables. It explains how the clusters permitted (permissibility) and how they are blocked (impermissibility). The different constraints are explained in the following subsections.

(i) Constraint of maximal onset

The maximum number of consonants in a complex onset in Runyankore was affirmed to go as far as three members. The existing phonotactics therefore prohibit a four-member onset basing on the phonotactics of this language. The next constraint explains the third member in a CCCV syllable of Runyankore. Selkirk (1982) describes the maximal onset as a constraint in syllabification which agrees that consonants are assigned to the onset of a syllable to the maximum extent possible, as long as the resulting syllable structure is phonologically possible. For example, the maximal onset in English has three consonants in a CCCV structure (Kahn, 1980) as in the words *straight* /str/ and *splash* /spl/. It should be noted that restrictions influence how consonants order and position themselves when clustering. The order from the example given is; fricative + stop + liquid [s + p + l] and follows the SSP. Based on this phonotactic constraint, the maximum number of consonants that make up a cluster in Runyankore syllables is three as shown below in the Table 22 below.

Table 22: The maximum number of consonant members in a cluster

Phonotactic constraint	Word examples with permissible clusters	Phonetic Transcription	Meaning	Impermissible cluster
The maximum number of consonant members in a cluster in the Runyankore syllable onset is three forming the structure CCCV where V stands for the nucleus/ peak.	embwa-[mbw] obusingye-[ngy] endwano-[ndw]	ɛmbwa ɔbusingjɛ ɛndwanɔ	dog peace conflicts	CCCCV cluster

(ii) Constraint of Role of a third consonant member in a three-consonant cluster

The three-consonant cluster phonotactic constraint explains how a third member is restricted in that consonant cluster. The results show that if there are three consonants in the onset cluster, the third must be a glide; which is always the closest to the nucleus. In the same clusters with three members, they usually have at least to highly sonorous sounds; that is a glide and a nasal as shown in Table 23 below.

Table 23: Role of a third member in three-consonant cluster

Phonotactic constraint	Word examples with permissible clusters	Phonetic Transcription	Meaning	Impermissible cluster
Every three-consonant cluster CCC in Runyankore syllables must have the last consonant closest to the nucleus in the cluster as a glide i.e. CC+w or CC+ j.	embwa- [mbw] endwara- [ndw] empwabwoba-[mpw]	ɛmbwa ɛndwara ɛmpwabwɔba	a dog diseases fearless person	mbs ndz mpt str spl

(iii) Constraint of similarity in place of articulation

This holds that similarity in place of articulation plays a role in a three-consonant cluster. In this maximal onset, some clusters have the first two consonants similar in place of articulation such as labial plus labial [mb] and [mp] plus a glide [j] or [w]. Two alveolar

consonants can also combine with a glide, such as [nt] and [nd] to form a maximal onset cluster in Runyankore syllables as shown Table 24 below.

Table 24: Constraint of similarity in place of articulation

Phonotactic constraint	**Word examples with permissible clusters**	**Phonetic Transcription**	**Meaning**	**Impermissible cluster**
Some three-consonant clusters in Runyankore syllables have the first two consonants sharing the place of articulation i.e. [alveolar + alveolar] + glide or [labial +labial] + glide.	ntwara- [ntw]- [n+t] +w mpwera –[mpw] – [m+p] +w	ntwara mpwɛra	take me help me	mdw npw

The table above shows that similarity clusters are evident in only two articulators that is alveolars [t], [d], [n] and lips for labial consonants [b], [w], [p], [m]. The first three phonotactics have explained three-member CCC clusters; the next constraints explore two-member CC clusters.

(iv) Constraint of precedence of nasals before glides

Consonant-glide clusters are the commonest in Runyankore syllables, evidenced from all the respondents and the reference materials used during the data collection. As already indicated in the previous sections, glide consonants have a very high sonority status, closer to that of vowels, a reason as to why they are permissible with most other consonant sounds to form clusters in Runyankore. In phonetics, a glide is also called a semi-vowel or semi-consonant. A glide is a speech sound that is phonetically similar to a vowel but functions as a consonant in syllable structure (Levi, 2011). It is a voiced sound, often appearing between a consonant and a vowel in syllable; that means glides are always nearer the nucleus than other consonants.

The results affirm that glides are more likely to cluster with another consonant in Runyankore syllables than any other sounds. This is because of their high sonority index.

For example, [w] can combine with other consonants like [bw], [kw], [gw], [nw], [rw], [ʒw], [ʃw], [hw], [mw] among others in Runyankore syllables.

This phonotactic constraint shows that nasals must come before the glides when they combine with form clusters in Runyankore syllables. This means that in a syllable where we have two consonants in a CCV structure and the two consonants are nasal and glide, the glide is closer to the nucleus as explained by SSP since glides have higher sonority index as shown in Table 25 below.

Table 25: Constraint of precedence of nasals before glides

Phonotactic constraint	**Word examples with permissible clusters**	**Phonetic Transcription**	**Meaning**	**impermissible cluster**
In a two-consonant cluster which has a glide, the glide must come after that consonant in the Runyankore syllable i.e. C+ G.	omwana – [mw] ebyokurya-[bj]-[rj] omugyenyi – [gj][nj]	ɔmwana ɛbjokurja ɔmugjenji	child food visitor	[wm] [jb], [jr] [jg], [jn]

In addition, a nasal consonant can combine with a glide to form a two-consonant cluster as long as the glide is closer to the nucleus in the syllable as shown in Table 26 below. The glide consonant cluster forms the C+G, whereby the glide must follow the consonant because of the necessity to adhere to the proximity to the nucleus rule according to the SSP. This is dependent on the high sonority status of the glides.

Table 26: Constraint of C+G cluster combination

orthographic	***Transcription***	***permissible***	***Impermissible***	***Meaning***
Amamya	Amanja	[mj]	[jm]	fermented millet/sorghum
Okumanya	ɔkumanja	[nj]	[jn]	to know
Omunwa	ɔmunw	[nw]	[wn]	Mouth
Omwojo	ɔmwɔʒɔ	[mw]	[wm]	Boy

(v) Constraint non-occurrence of glide with a fricative in a cluster

This phonotactic constraint explains the glide-fricative clusters, a sub-category that was earlier discussed in sub-section 4.2 (vi). This phonotactic constraint shows that although fricatives can cluster with glides, they cannot combine with [j] in a cluster in Runyankore syllables. Fricatives [ʃ] and [ʒ] are produced at the alveolar, which is located close to the hard palate where the other glide [j] is articulated. There is a clash in the position of articulators thus phonetically these sounds cannot cluster; something that does not hinder the other bilabial glide [w] which is articulated at the lips. This, therefore, explains why we cannot have a cluster of the glide [j] with these fricative sounds in Runyankore syllables because of articulation point reasons. Table 27 below illustrates this phenomenon.

Table 27: Constraint of glide-fricative clusters

Phonotactic constraint	**Word examples with permissible clusters**	**Phonetic Transcription**	**Meaning**	**Impermissible cluster**
The two post-alveolar fricatives [ʃ] and [ʒ] can occur with only the glide [w] in a cluster but not the other glide [j]	shwenkuru [ʃw] okujwara [ʒw]	ʃwɛnkuru ɔkuʒwara	Grandfather to dress up	[ʃj] [ʒj]

(vi) Constraint of co-occurrence of an affricate with another sound to form a cluster

The phonotactic constraint explains the impermissibility of the affricates especially the post-alveolar affricates [dʒ] which do not form even a single cluster with another sound. Affricate sounds have a very low sonority index but also are articulated in a post- alveolar point which halts them from clustering with other consonant members due to both their place of articulation and manner in which they are produced. Only the affricate [tʃ] is able to combine with the glide [w] to form a cluster [tʃw] as shown in the words in the Table 28 below.

Table 28: Constraint co-occurrence of an affricate with another sound to form a cluster

Phonotactic constraint	Word examples with permissible clusters	Phonetic Transcription	Meaning	Impermissible cluster
Only one affricate [tʃ] is able to combine with the glide [w] to form a cluster [tʃw] in the two post-alveolar affricate consonants. The affricate [dʒ] does not form clusters in Runyankore syllables.	amacwante – [tʃw]- encwera –[ntʃw]	amatʃwantɛ ɛnʃwɛra	saliva cobra	[tʃj] [dʒw]

(vii) Constraint of co-occurrence of a glide and [u] as a nucleus

This phonotactic constrains the nucleus member in a syllable that has glides. Consonant clusters with a glide [w] cannot have vowel sound [u] in their nucleus. It is important to note that a glide must be closer to the vowel or nucleus than other consonants in a syllable basing on the SSP; something applicable in Runyankore syllables. However, this phonotactic constraint restrains [u] from occurring in a syllable with a cluster with [w] as shown in Table 29 because the two sounds are articulated in a similar way, thus cannot coexist.

Table 29: Constraint of co-occurrence of a glide and [u] as a nucleus

Phonotactic constraint	Word examples with permissible clusters	Phonetic Transcription	Meaning	Impermissible cluster
Consonant clusters with a glide [w] cannot have vowel sound [u] in their nucleus.	okwata [kw] omwata [mw] obworo [bw]	ɔkwata ɔmwata ɔbwɔ:rɔ	to pour weeds poverty	[wu] [mwu] [bwu]

(viii) Constraint of precedence of nasal clustering with different consonants

Nasal consonants are produced by allowing air to escape through the nasal cavity, while blocking the oral cavity. In Runyankore, we have three nasal consonants, namely [m], [n] and [ŋ]. Ladefoged (2006) affirms that nasal consonants are characterized by the lowering of the velum, allowing air to pass through the nasal cavity. Nasals are highly sonorous which gives them a possibility to cluster with many consonants. This phonotactic constraint explains that nasals are permissible with fricatives and stops to form consonant clusters. Nasals are higher in sonority than these sounds; thus, the sonority theory poses that they can easily cluster. This phonotactic position is constrained whereby nasals come before fricatives and stops in clusters, forming syllables that do not conform to the SSP as shown in Table 30 below.

Table 30: Constraint of precedence of nasal clustering with different consonant

Phonotactic constraint	**Word examples with permissible clusters**	**Phonetic Transcription**	**Meaning**	**Impermissible cluster**
Nasals come before when they combine with stops or fricatives to form many clusters in Runyankore syllables	embaaho –[mb]	ɛmba:hɔ	timber	bm
	ente- [nt]	ɛntɛ	a cow	tn
	esoonzi –[nz]	ɛsɔ:nzi	mudfish	zn

(ix) Constraint of non-clustering of nasals with non-labial fricatives

This phonotactic constraint supplements the previous constraint which states nasals combine with fricatives and stops. It extrapolates that although nasals are highly permissible, the consonant nasal [m] does not combine with stops which are not labial and fricative. This, therefore, means [m] combines with only [p] and [b] and the glide consonants. The factor of auditory similarity and place of articulation dictates the clustering of nasal [m] as shown in Table 31.

Table 31: Constraint of non-clustering of nasals with non-labial fricatives

Phonotactic constraint	**Word examples with permissible clusters**	**Phonetic Transcription**	**Meaning**	**Impermissible cluster**
The nasal bilabial [m] combines with bilabial stops to form clusters. The sound [m] does not cluster with fricatives in Runyankore syllables.	mpora –[mp] embeba – [mb]	mpɔra ɛmbɛba	slow a rat	md ms mt mk

(x) Constraint of non-combination of glides with labio-dental fricative [v]

This phonotactic clarifies that labio-dental fricative consonant [v] do not combine with glides to form clusters. The consonant only clusters with one consonant [n] to form a cluster [nv] as in the word *manvuuli* *'*umbrella*'*.

(xi) Constraint of closely pronounced sounds

This phonotactic elucidates that the interdental fricatives [θ] and [ð] do not form any consonant clusters in Runyankore syllables. These consonant sounds are non-existent in Runyankore because of articulatory reasons, whereby they are closely pronounced as [s] or [ts] which exist in Runyankore. Runyankore syllables allow alveolar plosive [t] and alveolar fricative /s/ to form a unique cluster [ts] in some Runyankore words as illustrated below. The cluster [ts] does not occur at the beginning of the word because it consists of a stop and fricative, a combination that is made of up of obstruent consonants which make it impermissible to pronounce initially in a word. The obstruent articulation involves obstruction of air, thus prohibits initial occurrence of the cluster in words.

Table 32: Words with closely pronounced consonant sounds [ts]

Word orthography	***Transcription***	***Meaning***	***cluster***
amatsiko	amatsikɔ	hope	[ts]
amatsya	amatsja	scald	[ts]

(xii) Constraint of combination of liquid trill with a glide

This phonotactic explains that the liquid trill [r] combines with only glides to form clusters. In addition, the results show that liquid lateral [l] does not form any cluster in Runyankore syllables because the trill [r] is prominently pronounced in all words with liquid consonants. The restriction is explained in a way that instead of [l], Runyankore speakers use [r].

(xiii) Constraint of non-occurrence of trills in three-consonant clusters

Another constraint is that liquids cannot exist in a cluster with three consonants. The sound [r] does not combine with nasals, fricatives, affricates and stops but with glides in Runyankore syllables as shown in Table 33 below.

Table 33: Non-occurrence of trills in three-consonant clusters

Word orthography	***transcription***	***Meaning***	***Cluster***
okurwana	ɔkurwana	to fight	rw
okurya	ɔkurja	to eat	rj
orwaari	ɔrwa:ri	Noise	rw

(xiv) Constraint of two sounds with the same manner of articulation

This phonotactic clarifies that two sounds of the same manner of articulation cannot cluster except glides. Glides [j] and [w] can co-exist in a three-member cluster [njw] such as *omunywaani* /ɔmunjwa:ni/ 'friend'. Two fricative sounds or two plosives do not combine in Runyankore syllables to form a cluster. If two sounds share both the same point and manner of articulation, the two cannot form a cluster. Therefore, clustering is only possible when the similarity is manifested in place of articulation as seen in labial sounds; though they must have differences in manner of articulation which determines the sonority as shown in table 34.

Table 34: Two sounds with the same place of articulation but different in manner.

Cluster	***Explanation***	***word example***
[mb]	all are labials but [m] is nasal and [b] is a stop	emboga (sauce)
[mp]	all are labials but [m] is nasal and [p] is a stop	empitirizo (needle)
[nd]	all are alveolar but [n] is a nasal and [d] is a stop	endaaki (trench)
[nt]	all are alveolar but [n] is a nasal and [t] is a stop	entoondo (insect)

The above clusters have similarity in place of articulation, one factor that contributes to the clustering of consonants in Runyankore syllables. However, the manner of articulation is different forming one uniform combination [nasal +stop] which clearly entails a highly sonorous sound combines with a less sonorous one. The clusters that result from this category do not follow the SSP in the syllables they form. They follow the MDSP which is explained in the minimum sonority difference between adjacent consonants in a cluster such as the distance between nasal [m] and the stop [b]on the sonority scale is ample to allow a cluster [mb] to be permissible in Runyankore.

Overall, the phonotactic constraints determine permissibility and impermissibility of consonant clusters. Impermissibility refers to the restrictions that prohibit certain combinations in a language. Hayes (2009) asserts that impermissibility results into the sequences or arrangement of sounds which are not allowed in a particular language. These prohibitions rotate around sound combinations, positions, and syllable structures.

4.4 Discussion of results

The findings of this study align with broader trends identified in Bantu phonology and previous studies, particularly the preference for open syllables and simple phonotactic structures. For instance, liquid consonant [r] was found to have only two combinations [rw] and [rj] with the two glides. On the other hand, the qualitative criterion involved giving descriptions and explanations of phonotactic constraints that influence the clustering. For example, the clusters [rw] and [bw] follows the constraint on the precedence of a consonant member before a glide in a CCV structure. Taylor (1985) posits the fact that most clusters in Runyankore –Rukiga are dominated by a consonant combining with a

glide, an assertion this study confirms. However, different other clusters were established by the study as well as giving the description on how the consonant members combine showing the permissibility. The most prevalent clusters involved a nasal or a glide for example nasal [n] had the greatest number of clusters including [nk], [nw], [nt], [nz], [ns], [nf], [nd]. [nʃ], [ntʃ], [nj], [nv].

On sonority in consonant clusters in Runyankore syllables more sonorous consonants cluster with others easily than less sonorous consonants in a Runyankore syllable onset. Bartlett, Kondrak and Cherry (2009) assert that the sonority is determined on the sonority sequencing scale and also affirm that low vowels are the most sonorous while plosive or stop consonants are at the bottom. Therefore, because semi-vowels are highly sonorous, glides [w] and [j] cluster with almost all other consonants because of being very sonorous. The highly sonorous glide [w] is able to cluster with less sonorous plosives such as [tw] in *twena* 'all of us', [ndw] in *endwara* 'diseases', with less sonorous fricatives such as [ʃw] in *shwento* 'uncle' and with affricates [tʃw] in *amacwante* 'saliva'. This shows that highly sonorous glide [w] is able to cluster with plosives, affricates, and fricatives which are less sonorous. In addition, nasals [m] and [n] which come after glides in sonority can form clusters with very many consonants. Nasal consonant [n] is permissible with velar plosive [nk] in *enkaito* 'shoes', alveolar plosive [nd] in *enda* 'stomach', alveolar fricatives [ns] in *ensi* 'earth' and [nʃ] in the word *nshaasha* 'I feel pain'. The sonority theory, therefore, explains how sonorous consonants that have high index value thus cluster easily with consonants with low index value as shown on the sonority scale.

Hyman (2003) notes that many Bantu languages favour CV syllables and tend to avoid complex clusters; an affirmation that was confirmed by the findings of this study on Runyankore. The study on the other hand affirmed that several clusters can exist with CCV and CCCV structure as well; with three consonants as the maximal onset. Katamba (1989) documents cases in Luganda where clusters involving nasals are tolerated, such as /mb/ or /nd/, which is as well identified in results in this study about Runyankore. Some clusters that exist in Luganda such as [lw] and [fw] are typically avoided or simplified in Runyankore, making it more restrictive in its cluster constraints. This distinction positions Runyankore as a particularly conservative member of the Bantu phonological typology.

The study also found some clusters in Runyankore borrowed words and neologisms. It was found out that these words tend to strictly adhere to native phonotactic norms. Newly coined words avoid consonant clusters that violate the CV structure. For example, when a new concept or item requires naming, speakers typically draw on native morphological and phonological resources, combining permissible roots, affixes, and phonemes to create forms that respect the Runyankore permissibility syllable restrictions. For instance, when coining a new term for "mobile phone," instead of adopting an English-like structure, Runyankore speakers derived the word *esimu* from SIM card, where SIM stands for Subscriber Identity Module. The form of the word '*esimu'* conforms to the CV pattern and avoids illicit clusters. Adebyo (2023) asserts that typically the translation of words from a donor language to the recipient language is determined by both the orthography and the phonological properties of the recipient language which follows the phonotactics. Neologisms rarely introduce non-native clusters, reinforcing the productive role of phonotactic rules in lexical innovation in the receptive language like Runyankore. Neologisms that have consonants clusters conform to the existing permissible combinations in the Runyankore syllables as shown in some of the examples in Table 35 below.

Table 35: Neologisms that have consonants clusters conforming to Runyankore

Loanword from English	**Runyankore equivalent**	**Runyankore permissible cluster**
tank	etanka /ɛtanka/	[nk]
government	gavumenti /gavumɛnti/	[nt]
paper	empapura /ɛmpapura/	[mp]
cent	esente /ɛsɛntɛ /	[nt]
sweater	eshweta/ɛʃwɛta/	[ʃw]

As in shown above, loanwords primarily from English and other languages provide a more dynamic context for observing phonotactic accommodation. Given the presence of consonant clusters in donor languages especially in word-final positions, Runyankore often employs phonological repair strategies to nativise these forms. These strategies underscore the resilience of Runyankore's phonotactic system. Even as the language borrows from

more cluster-rich lexicons, it actively reshapes foreign words with their complex clusters to conform to its native syllable structure for example the English word *paper* changes and reshapes to empapura /ɛmpapura/. This resistance to illicit clusters reflects a broader typological tendency among Bantu languages to preserve prosodic simplicity and articulatory ease. The analysis of Runyankore borrowed and loanwords reveals a dynamic phonotactic system that constrains syllable-internal consonant clustering. While neologisms are fully shaped by native phonological patterns, loanwords are systematically adapted through a set of repair strategies. These adaptations highlight how Runyankore maintains phonological coherence and reflects broader patterns in Bantu phonotactic typology.

4.5 Conclusion

This chapter has presented a detailed analysis of the findings under three sections to satisfy the three objectives. The first section of the chapter highlighted on the possible combinations of consonant clusters by focusing on the Consonant Cluster inventory. A number of permissible clusters were mentioned in this section showing the inventory of clusters that exist in Runyankore syllables. Gradually, the interpretation of the results in section two of the chapter gives a categorisation of these clusters basing on the tenets of the sonority and other parameters such as sonority status, consonant type, position of the cluster, the similarity in the consonant members of the cluster and ordering of the members among others. The section gave a detailed analysis of the interaction of consonants in complex onsets of Runyankore. The third section sheds light on the structural restrictions and constraints that govern consonant clustering particularly in Runyankore. In addition, different constraints were developed basing on the existing consonantal sequences in these clusters. Finally, the major findings of this study contribute to the understanding of the phonotactics of Runyankore, thereby providing insights into the unique syllable structure of the language.

CHAPTER FIVE

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The general objective of this study was to investigate the phonotactic constraints that influence consonant clustering in Runyankore syllables. This objective was guided by research goals that included providing a description of the syllable inventory of Runyankore, categorising the consonant clusters that exist in Runyankore words and syllables, and an analysis of the phonotactic constraints that guide the clustering of consonants in Runyankore. This chapter is a summary and presentation of key findings and the original contributions of the study. It highlights some of the limitations of the study and recommendations for future research.

5.1 Summary

This study examined the phonotactic constraints governing consonant clustering within the syllable structure of Runyankore, a Bantu language spoken in Southwestern Uganda. The central focus was to analyze the permissible and impermissible consonant clusters in the language, the sound patterns, and the phonological rules that guide occurrence of the sounds within syllables. In doing so, the research has contributed to a deeper understanding of how Runyankore organizes its syllables and the extent to which it permits consonant adjacency within a syllable segment.

The work lays the groundwork by introducing the study, the research problem, articulating the objectives, and presenting key contributions of this study. Also, it provides the rationale for studying Runyankore, highlighting the limited phonological research on the language, particularly with regard to its syllable structure and consonant-syllable-cluster formation. It emphasizes the theoretical relevance of studying phonotactic constraints within generative phonology and the broader typological importance of understanding the sound system of Runyankore. It presents relevant phonological theories such as the Sonority Sequencing Principle (SSP) under the theoretical framework of this study.

Under literature review, it explores foundational concepts in phonology, focusing on syllable structure, phonotactics, and the nature of consonant clusters such as the work of

Taylor (1985) against which the research gap of this study was identified. Also, it evaluates existing studies on syllabification and consonant clustering in other Bantu languages, revealing a range of strategies such as deletion and assimilation that are employed to maintain well-formed syllables.

A qualitative descriptive design was adopted, with data collected from native Runyankore speakers through elicitation, recorded natural speech, and existing textual sources such as folk narratives and religious texts. The data were transcribed using the International Phonetic Alphabet (IPA) and analyzed through a phonological lens to identify patterns of consonant clustering and their phonotactic environments. A detailed analysis and discussion of the findings is provided. For instance, the phonotactic constraint which explains these stop impermissible clusters [bp], [dk], [tg] is that consonant sounds with the same sonority status cannot combine to form a cluster was explained.

5.2 Limitations of the study

The study faced some limitations. Firstly, there is limited access to some special software required to transcribe speech that was collected from the field. This was solved by transcribing data manually using available data analysis resources. Secondly, this research study was conducted on Runyankore, an African language which has scanty published and reading resources which resulted into limited literature for review. This was counterbalanced by using both primary and secondary sources of data to acquire sufficient information. The data collection process also involved challenges such as language change, extinction of some vocabulary and interference with other languages which has for example has resulted into a single word having different pronunciations like *engaito* / ɛŋaitɔ/ or *enkaito* / ɛnkaitɔ/ shoes. This challenge of different pronunciations was solved by consulting to find out the original form of a word especially elders. However, it was argued that because of language mixing such as Runyankore-Rukiga interaction, some of these words have been adopted in their different versions. The variations in pronunciations were treated with purposive sampling by targeting only Runyankore speakers who could differentiate the two dialects.

5.3 Major Findings

Prevalence of simple CV (consonant-vowel) syllable structure

It was found that Runyankore predominantly adheres to a simple CV (consonant-vowel) syllable structure and exhibits strong restrictions on syllable-internal consonant clusters. For example, the word *ekitakuri* 'sweet potato' has CV syllables and in *ebihimba* 'beans' has most syllables CV with only a single syllable with a cluster [mb]. This shows how clusters are highly restricted as compared to English which has very various clusters. However, the study majorly focused on the complex onsets which have more than one consonant. The most significant finding is the dominance of the glides [w] and [j] in complex onsets in Runyankore. On the number of consonants in a cluster, it was found out that the maximum number is three in a cluster as in [ndw] and [mbw].

Preference for sonorants

In addition, while the Sonority Sequencing Principle (SSP) is not an explicit constraint in Runyankore phonology, the language does exhibit a preference for sonorants mostly nasals in positions where clusters are otherwise avoided. For example, nasal [n] comes before stops in combinations such as [nt] *entomi* 'fist' and [nd] endogoya 'donkey'. In these Runyankore examples, these clusters [nt] and [nd] occur in the onset position, whereas in English they only appear in the coda. This suggests that sonority plays a role in shaping phonotactic acceptability alongside other factors like similarity of consonant members, distance between articulators and proximity of consonants on the sonority scale.

Restriction of clusters at the syllable onsets

The major consonant clusters that appeared in the data collected were analysed based on the two objectives. The clusters were categorised and the phonotactic constraints were explained based on the permissible and impermissible consonant combinations in Runyankore syllables. The results indicated that clusters at the syllable onset are highly restricted, typically involving glides such as /w/ and /j/ following plosives or nasals, which suggests a reliance on sonority hierarchy principles. For example, in *obwoki* / ɔbwɔtʃi/

‘honey’ and *omunwa* /ɔmunwa/ ‘mouth’, there are clusters [bw] and [nw] with plosive and nasal followed by glide [w].

Prohibition of sequences of obstruents/identical consonants

Runyankore prohibits certain consonant clusters altogether, especially those that involve sequences of obstruents or identical consonants. To resolve such violations, the language employs various constraints strategies, including vowel epenthesis, glide insertion, and in rare cases, consonant deletion. For example, in *baiburi* for ‘bible’ involves inserting vowels because the cluster [br] is not possible in Runyankore. Additionally, morphophonemic processes play a role in cluster formation, such as passivization and affixation. For example, passivizing verbs in Runyankore triggers glide [w] insertion, thus avoiding illicit clusters for example *okutemba* ‘to climb’ to *okutembwa*, ‘to be climbed’, *okutiina* ‘to fear’ to *okutiinwa* ‘to be feared’.

Conformity with a rising sonority pattern

A significant insight from the data is that syllable structure in Runyankore is highly regulated to preserve the language’s rhythmic and articulatory economy. Constraints such as the SSP are frequently observed, with permissible onset clusters typically conforming to a rising sonority pattern.

Non-existence of codas

Codas are non-existent in the language, further underlining the existence of only open syllables. As a notable feature, Runyankore typically follows the consonant-vowel CV pattern with syllables existing without codas. The distinct rhythm and phonological structure of Runyankore allows the syllables to end in a vowel.

Glide clusters in passivation

Glide [w] is used to form different clusters when verbs change to passive voice as discussed in the data interpretation chapter. Glide [w] is inserted between a consonant and a vowel to form a C+w combination in passive form of verbs like *teka* ‘cook’ to *tekwa* ‘to be cooked’ and *hinga* ‘dig’ to *hingwa* ‘to be dug’.

Morphological boundaries

Words can be connected to others in English using prepositions such as 'of' in the phrase 'people of Uganda'. In Runyankore, words can be connected morphologically using clusters such as *ebyokurya by'abaana* 'food of children' and *obugenyi bw'okugaitwa* 'wedding party'. In the two phrases, clusters [bj] and [bw] have been used in morphological boundaries to connect words.

Nativisation of loan words through epenthesis

Borrowed words that contain non-native clusters are typically nativised through epenthesis, suggesting a strong phonotactic filter operating in the language. Epenthesis is the insertion of one or more sounds into a word, often to ease pronunciation or to follow the rules of a language's phonology system. For example, in Runyankore it is mostly insertion of vowels as in *furigi* for 'fridge' and *karucureeta /karutʃure:ta/* for 'calculator'. Blevins (2008) argues that phonological rules of consonant epenthesis occur in many languages and it often involves insertion of a glide adjacent to the vowel. For example, *radio* from English into Runyankore introduces a glide [j] adjacent to the vowels to become *eraadiyo /eraadiyo/.*

Overall, the study demonstrates that Runyankore maintains a conservative phonotactic system characterized by limited consonant clustering within syllables, a preference for simple syllable shapes, and active repair strategies that ensure phonological well-formedness.

5.4 Original Contribution to Knowledge

The original contribution of this study has been on expanding the knowledge of consonant clusters in Runyankore by identifying as many as possible and classifying them into different categories. By doing this, sound patterns and the syllable structure of Runyankore are studied and explained to practitioners such as teachers, students, dictionary writers and

lexicographers. The study has implications on practice such as Runyankore teaching whereby it informs the rules of pronunciation and orthographic writing of syllables that exist in Runyankore words. The study informs dictionary writers and lexicographers using the sound patterns explained in this study. The study can also be important for language learning and acquisition since the syllables given are existent in all the Runyankore vocabulary.

This research contributes original knowledge to the field of African linguistics and phonological theory specifically on Bantu languages using Runyankore as a case study. Firstly, it provides a detailed account of syllable structure and consonant clustering in Runyankore, a language that has been less studied in phonological literature. By analyzing the syllable constraints in Runyankore, the study fills a gap in the descriptive grammar of the language and provides empirical data for cross-linguistic phonological comparison with many other languages.

Secondly, the study applies sonority theory principles such as the SSP and the MDSP to a less-studied Bantu language, offering a theoretical explanation for phonotactic phenomena through constraint interaction. It demonstrates how restrictions influence consonants that make up a cluster in a complex onset dominate over faithfulness constraints in shaping acceptable outputs. This supports broader theoretical claims about constraint ranking and phonological universals (McCarthy, 2002).

5.5 Conclusions

Default CV syllable

One major conclusion that has be drawn from this study is that Runyankore, like any other language has strict syllable structure constraints. The default syllable structure in Runyankore is CV, with occurrences of CCV clusters and rarely CCCV clusters that have a glide as the closest consonant to the nucleus V. The maximum number of consonants a complex onset can have is three in Runyankore.

Consonant adjacency within a single syllable

While certain onset clusters are permitted, especially those that align with sonority sequencing, the general phonotactic tendencies point toward strong restrictions against consonant adjacency within a single syllable as was explained in the results. Consonant adjacency which results into clustering was based on constraints regarding sonority, auditory similarity, influence of articulators, and point of articulation of the consonant members in a cluster**.**

Shaping syllable structure and regulating consonant clustering

The findings of this study reveal that phonotactic constraints in Runyankore play a critical role in shaping its syllable structure and regulating consonant clustering. The language's syllabic nature is dominated by simple syllables and some complex onset clusters, which this study closely looks at.

Constraints are governed by sonority, auditory similarity, influence of articulators, and point of articulation

It can be observed that is that phonotactic constraints are governed by sonority, auditory similarity, influence of articulators and point of articulation. Permissible onset clusters generally conform to the Sonority Sequencing Principle. This is evident in the limited clusters that occur, such as stop-glide combinations like [pw], [tw], and [kw] which reflect a rising sonority status from the first to the second consonant.

Adaptation of consonant clusters of loanwords in Runyankore

Consonant-cluster formation constraints affect the formation of neologisms and the adaptation of loanwords, describing the strategies for maintaining phonotactic well-formedness in Runyankore. In Runyankore, as in many Bantu languages, strict phonotactic constraints govern syllable structure, particularly with respect to consonant clustering. Native Runyankore syllables which have complex consonant clusters especially in syllable-initial or syllable-medial positions are highly restricted by conforming to the phonotactic constraints in Runyankore syllabification.

In conclusion, the phonotactic system of Runyankore serves as a regulatory framework that ensures syllable well-formedness and phonological coherence. It reflects broader typological patterns common to Bantu languages while also revealing language-specific strategies for maintaining phonological regularity. This study contributes to the understanding of Bantu phonology and offers a foundation for further investigation into dialectal variation, morphophonemic processes, and the influence of language contact on Runyankore's phonotactic behaviour.

5.6 Recommendations

This research study proposes some recommendations based on the findings. Firstly, I suggest that more educational materials should be developed where phonotactics and syllabification can be incorporated into language teaching materials to help learners understand native word formation patterns. In the Uganda curriculum, this can be done at the more at pre-primary and primary level where language acquisition and learning is very efficiently conducted.

Secondly, I recommend the application of this study's findings to orthography development, lexicographers and language planners. This is to ensure that orthographic representations avoid consonant clusters that do not occur naturally in Runyankore, especially when coining new terms.

Lastly, the study is recommended for translators in translation practices. Translators should adapt foreign terms to conform to the CV syllable structure of Runyankore, using epenthesis or simplification where necessary and understand the CCV or CCCV structures that exist in Runyankore. In addition, the study recommends phonological awareness though programs aimed at early child literacy. Therefore, language learning and teaching should include training on permissible syllable structures to improve pronunciation and reading fluency. This ensures language proficiency and most importantly preservation of our own languages.

5.7 Pointers to Further Research

While this study provides foundational insights into the phonotactic constraints governing syllable-level consonant clustering in Runyankore, several areas of study remain open for future research. The following recommendations give directions for expanding upon this study and addressing areas that could not have been fully explored.

Comparative phonotactic analysis

One of the major areas for further research is the comparative phonotactic analysis with related Bantu languages. One promising direction involves comparing Runyankore phonotactic patterns with those of related Bantu language such as Rukiga, Luganda, and Runyoro-Rutooro. Such comparative studies can help identify shared phonological structures or innovations, and clarify whether certain phonotactic constraints are language-specific or part of broader typology within the Great Lakes Bantu subgroup (Hyman, 2003; Katamba, 1989). This could also contribute to the documentation of the typology and evolution of Bantu syllable structures.

Morpho-phonological influences on consonant clustering

More studies can be conducted on the morpho-phonological influences on consonant clustering. However, much as this study slightly hints on the subject such as findings on how syllables change in Bantu verbs, the interaction between morphology and phonotactics is an area for future research. Morphologically derived forms may create surface consonant clusters not permitted in monomorphemic forms, that is, words which consist of only one morpheme such as run, dog and sun revealing possible exceptions or constraint violations (Myers, 1998). Investigating how affixation, compounding, and reduplication influence syllable structure in Runyankore would provide a more complete picture of phonotactic regulation across morphological contexts.

Language acquisition

Also, further research is recommended in the domain of language acquisition. Investigating how children acquiring Runyankore as a first language internalize phonotactic constraints could shed light on the cognitive basis of these rules (Goad & Rose, 2004). Similarly,

studies involving second-language learners of Runyankore, particularly those whose first languages have different phonotactic inventories, could offer insight into the learnability and transferability of these constraints (Archibald, 1998).

Sociolinguistic variation in phonotactic realization

Sociolinguistic variation in phonotactic realization can also be a target area for future research. Sociolinguistic studies could reveal whether phonotactic constraints vary across different social groups, regions, or age cohorts, among the speakers of Runyankore. For example, younger speakers, or those in urban centers might show more tolerance for non-canonical clusters due to increased language contact, especially with English (Trudgill, 2004). Examining phonetic data can uncover the dynamics of phonotactic change and variation within the Runyankore-speaking community.

Computational modeling of phonotactic constraints

Computational modeling of phonotactic constraints especially in these modern computer times could be a very significant study. Given recent advances in computational linguistics, future researchers could consider developing computational models that simulate Runyankore's phonotactic grammar. Constraint-based frameworks such as Optimality Theory (Prince & Smolensky, 2004) or probabilistic models like Maximum Entropy grammars could be employed to formalize phonotactic rules and generate testable predictions (Hayes & Wilson, 2008).

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APPENDICES

APPENDIX I

FIELD ACCEPTANCE LETTER FROM THE DEPARTMENT

MAKERERE UNIVERSITY

P.O. Box 7062, Kampala, Uganda
Upper Building, Room 11

Telephone: +256 414 530 106
E-mail: dlec.chuss@mak.ac.ug

DEPARTMENT OF LINGUISTICS, ENGLISH LANGUAGE STUDIES AND COMMUNICATION SKILLS

Office of the Chair

Your Ref:
Our Ref:

16 December 2024

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

RE: REQUEST TO COLLECT DATA

This is to introduce to you Mr Joakim Agaba, Reg. No. 2023/HD03/19133U, an MA student in the Department of Linguistics, English Language Studies and Communication Skills, Makerere University.

Mr Agaba is conducting his fieldwork research and his project title is ***Phonotactic constraints in Runyankore syllable consonant clustering***.

As part of this project, he will be carrying out fieldwork in Rukungiri district in the sub-counties Buyanja and Kebisooni. The information to be gathered from this fieldwork is exclusively for academic purposes and it is not intended, in any way, for economic or other purposes.

This is therefore to request you to accord Mr Agaba the necessary cooperation he may require to carry out the fieldwork activities.

Any assistance given to him will be highly appreciated.

Yours faithfully,

Levis Mugumya, PhD
Head of Department

MAKERERE UNIVERSITY
P. O. BOX 7062, KAMPALA
16 DEC 2024
Office of the Chair
DEPT OF LINGUISTICS, ELS & COMM. SKILLS

APPENDIX II

SAMPLE DATA COLLETION SCHEME

Data Collection Scheme Showing Runyankore Consonant Clusters in Words.

(Rukungiri –Buyanja & Kebisoni sub-counties in December 2024 and January 2025)

Researcher's Name: AGABA JOAKIM

Registration number: 2023/HD03/19133U

Research Topic: PHONOTACTIC CONSTRAINTS IN RUNYANKORE SYLLABLE CONSONANT CLUSTERS

Sound	**Cluster**	**Runyankore word examples**	**Phonetic Transcriptions**	**English meaning**
[p]	pw			
[b]	bw			
	bj			
	mbw			
[t]	tw			
	tj			
	ts (variation of /s/ sound)			
[d]	ndw			
	ndj			
[k]	kw			
	kj			
[g]	gw			
	gj			
[f]	fw			
[v]				
[θ]				
[ð]				
[ʃ]	ʃw			
[ʒ]	ʒw			
[tʃ]	tʃ			
[dʒ]				
[s]	sj			
[z]	zj			
[n]	nk			

	nt			
	nj			
	nʃ			
	ng or /ŋ/			
	nz			
	nf			
	nd			
	nʒ			
	ngj			
	ns			
	nʒ			
	nw			
	ngw			
	nkj			
[m]	mb			
	mp			
	mw			
	mbw			
	mj			
[l]	lj			
[r]	rj			
	rw			
[w]				
[j]	njw			
	nj			
[h]	hw			

DATE…… **VILLAGE ……**

APPENDIX III

A DATA SAMPLE SHOWING WORDS, THEIR MEANINGS AND THE CLUSTERS IN THESE WORDS

Word	Meaning	Cluster
embwa	dog	mbw
enyama	meat	ny
ente	cow(s)	nt
enteebe	chair(s)	nt
orutookye	banana plantation	ky
mpora	slow / slowly	mp
mwena	you/ all of you	mw
emwe	one	mw
entaanuru	kiln	nt
okutwara	to take	tw
twena	us / all of us	tw
obutwa	poison	tw
ekyozi	pumpkin	ky
ekyanzi	milk guord	ky
ekyererezi	light	ky
okwezi	moon / month	kw
ekihembo	gift	mb
okucwisa	to reach a point of getting juice	cw
okuhwisa	to get finished	hw
okucwera	to spit	cw
amatsya	burns or scalds	tsy
ekisyori	ogle	sy
amatsiko	hope	ts
enkungu	raised piece of land	nk
endwaara	diseases	ndw
endwaano	conflicts	ndw
endingiri	guitar	nd
enjooka	snake	nj
akakwaate	relationship	kw
okukwaata	to catch	kw
obwooma	pebbles	bw
ekyooma	metal	ky
ekikwasi	safety pin	kw
mbwenu	now	mbw
bwanyima	before	bw

APPENDIX IV

A DATA SAMPLE SHOWING VERBS IN PASSIVATION AND THE GLIDE CLUSTERS FORMED

VERB	PASSIVISATION	MEANING	CLUSTER
okuteera	okuteerwa	to be beaten	rw
okutimba	okutimbwa	to be drilled	mbw
okuteega	okuteegwa	to be shaved	gw
okuhimbisa	okuhimbisibwa	to be praised	bw
okurya	okuriibwa	to be eaten	bw
okunywana	okunywanwa	to be befriended	nw
okutomera	okutomerwa	to be knocked	rw
okwita	okwitwa	to be killed	tw
okubiha	okubihwa	to be lied to	hw
okwinika	okwinikwa	to be bent	kw
okukoma	okukomwa	to be jailed	mw
okurinda	okurindwa	to be protected	dw