WORD STRESS IN CENTRAL KURDISH

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Dedication

To my mother, whose unconditional love and endless support have been a constant source of strength and comfort.

To my son, Edward, the embodiment of my hopes and the light that guides me through life.

Abstract

This thesis explores the distribution of CK word stress, which is manifested in the relative prominence of strong syllables. Cross-linguistically, languages have either free or fixed stress rules, weight-sensitive or weight-insensitive syllables, and bound or unbound stress systems. The language this study addresses is Central Kurdish (CK), which is widely used in the northern parts of Iraq and Iran. The study explains the CK stress system in terms of these typological parameters and locates the position of primary and secondary stress in simple and compound CK words.

The study is divided into six chapters. The first chapter is an introduction to the scope, problem, aim, and the theoretical models adopted. The second chapter provides background knowledge on Kurdish: its origins, population size, linguistic landscape, and dialect groups. The chapter also includes a detailed description of the phonemic inventory of CK. Chapter three addresses CK structure, the distribution of primary and secondary stress in the syllables, and syllable weight and syllable constraints. The foot structure of CK is accounted for in chapter four, in which the CK foot inventory, foot parameters, evidence for foot, and foot metrification are explained. The fifth chapter explains the position of primary and secondary stress in CK non-derived and derived words in light of the metrical theory and OT constraints. Finally, the conclusions the present work has drawn are provided in chapter six.

The theoretical models adopted in this study for data analysis are the metrical formalisms of bracketed grid (Halle & Vegnaud 1987), pure grid (Prince 1983; Selkirk 1984), and the constraint-based formalisms of the syllable and foot analysis in OT (Prince & Smolensky, 2004; Kager 1999). Reference is also given to the moraic theory (McCawley 1968; Selkirk 1981) to account for certain weight sensitivity characteristics of CK syllables, such as compensatory lengthening and gemination.

The study concludes that stress distribution in CK depends on the morphological form of the word. In non-derived words, primary stress is placed upon the last syllable, whereas secondary stress is determined algorithmically according to its distance from the primary; it falls two syllables to the left of the primary stress. In derived words, on the other hand, stress assignment depends on the type and linear order of the affixes attached to the stem of the host word. If the host word has a stress-bearing affix (e.g. definite article), the affix attracts stress onto itself, causing a shift in stress placement. However, if the affix is unstressable, primary stress remains on the last syllable of the stem, in which case the word stress rule is applied.

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One final debt of gratitude is owed to my mother whose guaranteed support and understanding are the foundation of everything I do. With her, I share the joy of completing this work.

Contents

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IPA Symbols

CK Consonants	CK Vowels
p	i
b	ɨ
t	e
d	a
k	u:
g	u
q	o
ʕ	ɑ
ʔ	
f	
tʃ	
dʒ	
s	
z	
ʃ	
ʒ	
x	
ħ	
h	
m	
n	
ŋ	
l	
ɬ	
ɾ	
r	
w	
j	

Key to Abbreviations

C: Consonant

CK: Central Kurdish

CL: Compensatory Lengthening

NK: Northern Kurdish

OT: Optimality Theory

PWG: The Prosodic Word Group

QI: quantity insensitive

QS: quantity sensitive

SK: Southern Kurdish

V: Vowel

μ: Mora

σ: Syllable

F: Foot

ω: Prosodic Word

υ: Utterance

§: section indicator

Chapter 1 Introduction

1.1 Research problem

The research problem is couched in the seeming incompatibility of the current phonological theories with the data available in CK concerning certain stress-related rules and generalisations such as syllable weight, foot structure and parsing direction. CK disobeys the generalisation that only quantity-sensitive languages have phonological processes at the syllable level that exhibit syllable weight. CK is a quantity-insensitive language; however, it sometimes has characteristics of syllable weight. This claim is supported by vowel length contrast (although limited), compensatory lengthening, and gemination. Similarly, CK does not seem to belong to a clear-cut stress distribution typology. Stress assignment in CK is neither free nor fixed since stress is assigned to a stressable word-edge zone, which comprises the ultimate, the penultimate and the antepenultimate. These observations on the data of CK pose a challenge to both the current phonological theories and the researcher.

1.2 Scope of the research

The present study addresses the phonology of word stress assignment and foot and syllable inventory. While the study includes phonological rules, it does not account for the morphological and syntactic features and categories that interact with word stress assignment. For this reason, the study explores stress distribution in nouns, adjectives, and adverbs only. It excludes verbs since CK verbs represent a higher syntactic category than a single word and should accordingly be represented above the word in the prosodic hierarchy. The study describes the CK phonemic inventory and related phonological processes such as vowel lengthening and epenthesis. It also captures the syllable and the foot and the formalisms of their representation. Accordingly, the scope of the study is in the field of theoretical phonology of CK. The description of the CK phonemic inventory serves as an introduction whose aim is to explain the vowels and consonants of CK along with certain phenomena that will be used to explain the data in the subsequent chapters.

Another aspect of the scope of this study is related to the CK dialect group, which is also known as Sorani. CK is a group of subdialects[1] that are predominantly spoken in the Sulaymaniyah and Hawler (Erbil or Arbil) provinces (see figure 2). While the present study refers to certain phonological differences among the two dialects (cf. §2.2.4), it makes

[1] Throughout this work, I use the term ''sub-dialect'' to refer to the variation within the CK dialect group, usually reflecting regional differences. Accordingly, Sulaymaniyah and Hawler are described as subdialects of CK or Sorani.

exhaustive use of the Sulaymaniyah sub-dialect in the description and analysis of the data. Where it serves the purpose of the study, reference is also given to examples of Hawleri sub-dialect.

1.3 Theoretical framework

The theoretical framework employed throughout this study is Bracketed Grid (Halle & Vergnaud, 1987), Pure Grid (Prince, 1983a; Selkirk, 1984), and Optimality Theory's syllable and foot constraints (Prince & Smolensky, 1993; McCarthy & Prince, 1993b; Kager, 1999). Where necessary, the moraic theory (McCawley 1968; Selkirk 1981) is employed to account for syllable weight-related issues in CK. In addition to these well-known theories, the present work adopts Hayes' (1995) cross-linguistic classificatory template of the foot inventory of languages: syllabic trochee, moraic trochee, and iamb.

Since most versions of the OT utilise foot-based representations, similar to metrical theory, the constraints that are employed to account for stress involve the metrification constraint Parse- σ (Prince & Smolensky, 1993) and the Generalised Alignment constraints (McCarthy & Prince, 1993b).

1.4 Research questions

The current research addresses the following questions:

a. What rules of stress assignment operate in CK?
b. Does stress in CK words depend on syllable structure? Syllable weight? Foot structure? Or the individual lexical item?
c. Is extrametricality purely phonological in CK?
d. What stress levels are observed in the distribution?
e. What is the parsing direction of the feet in CK?
f. Which metrical constraints are involved and violated in the assignment of stress in CK?
g. How do these constraints interact and how are they ranked?

1.5 Aims

The aim of the present study is two-fold. First, it aims to analyse the distribution of word stress in CK employing the formal approach of metrical theory and the constraints of OT. Accordingly, the study aims to draw the foot-based formalisms of word stress distribution and utilises the OT constraints that are related to the placement of stress to determine the winning candidate. The study can show the syllable internal structure of CK,

the placement of the different stress levels in the language, the metrical foot structure, and the direction of its parsing. Likewise, the study aims to explain how the foot and stress-related constraints are ranked in CK and which are violable to the rules of stress in the language. The second aim is to fill in the gap in the literature on CK by analysing data on word stress distribution in light of current phonological theories and drawing conclusions accordingly.

1.6 Data collection

The data used in the present study comes from two sources: one is the major books and references available both on Kurdish and, more precisely, on CK, and the other source is my linguistic intuition as a native speaker of the language. Likewise, research on the language available in the literature has been adopted as a further data source. However, since the majority of the research on Kurdish and CK linguistics is conducted by foreign scholars (e.g. McCarus, 1958, 1997; Kahn, 1976; Kreyenbroek, 1992; McDowall, 2000; Gunter, 2003), who either did not know the language or had little knowledge of it, I have not relied primarily on such sources for the phonological data.

1.7 Research outline

The research is composed of an introduction and five chapters. The introduction involves basic ideas on the topic, including the research problem, the scope, the research question, and the research objectives. Chapter two provides background information on Kurdish, its linguistic landscape, the speaking population, and geographical distribution. Chapters three, four and five account for the theory and analysis of the project topic as follows: chapter three addresses the syllable of Kurdish; chapter four addresses the constraints of stress assignment in simple CK words; whereas chapter five offers an analysis of stress distribution in compound and complex words of CK. Chapter six, the last chapter, is dedicated to the conclusions the study draws and suggestions for further research in the field. Finally, a bibliography list is provided at the end of the research.

1.8 Brief review of literature

Stress has been widely studied and well documented in the phonological literature. While earlier work viewed stress as a multi-valued feature, similar to voicing or backness (e.g., Chomsky & Halle 1968), subsequent work has viewed stress as being based on the notion of rhythm (most notably, Halle & Vergnaud 1987; Hayes 1985, 1995; Liberman, 1975; Liberman & Prince, 1977; Prince, 1983).

Cross-linguistically, two different approaches to stress assignment can be identified: bottom-up vs. top-down constructionism. The bottom-up stress assignment includes

traditional approaches to metrical stress theory (e.g. Halle & Vergnaud 1987; Hayes 1985, 1995), which assign stress from the bottom up. Hayes (1995), for instance, accounts for several languages to establish generalisations based on the metrical grid. He utilises the formalisms of Bracketed Grid to classify languages according to the foot structure: whether their foot structure is syllabic trochee, moraic trochee, or iamb. Hayes (1995) also addresses stress assignment in the light of language typologies and formally represents an abundance of stress related domains, such as syllable and foot structure. Among the conclusive generalisations he has made is parsing. He argues that the foot in systems with syllabic trochees is parsed from left to right, whereas in iambic systems, it is parsed from right to left. On the other hand, the second type of studies examine, in detail, the stress pattern of an individual language from a theoretical point of view. Close studies of individual language stress systems are important since they provide a tool for testing the validity of metrical theories. Though some languages have been extensively studied and can be claimed to be fairly well understood, this is far from being true of all languages. This study focuses on the stress system of CK using known phonological theoretical frameworks such as metrical theory and OT constraints.

Unlike most languages, little research on Kurdish[2] is carried out, and even less on its phonological system. This is particularly noticed in the literature of the analytical work on the language. Apart from the work of a few orientalists, whose attempts were primarily to provide general descriptions of Kurdish and its speakers, the earliest work on the language is Wahby (1929). Influenced by the Perso-Arabic orthography, Wahby (1929) was the first to propose a writing system for Kurdish by proposing a phonemic alphabet in which each letter stands for each sound. However, the first scholarly work on the CK variety was conducted by McCarus (1958), who provided a description of the basic grammatical rules, introductory remarks on the consonants and vowels and a brief description of stress and intonation of the Sulaymaniyah sub-dialect, which is a sub-dialect of the CK dialect group. The subsequent work on the Kurdish language is provided by MacKenzie (1962), who offers a relatively detailed description of Kurdish grammar, including CK. Since they provide general descriptions, none of these two studies on Kurdish analyse the data in terms of a theoretical framework. Similarly, in his study on CK grammar, Amin (1979) uses the Sulaymaniyah sub-dialect in his brief description of CK phonology.

[2] I use ''Kurdish'' to refer to research and data on the Kurdish language, including CK, whereas I use ''CK'' to mean research on CK in particular.

The first detailed study on the phonology of Kurdish is offered by Kahn (1976). In her PhD dissertation, Kahn (1976) accounts for borrowing and variation in Northern Kurdish. She also provides a segmental description of Northern Kurdish phonology. Wais (1984) is another study on Kurdish phonetics. He describes the phonemic inventory of Sorani (CK) and accounts for its stress and intonation system. The next detailed account of Kurdish phonology is provided by Ahmad (1986), whose work is a general description of CK phonetics phonology with a particular focus on CK consonants and vowels along with certain phonological processes such as assimilation. In his PhD dissertation, Fattah (1997) offers a more accurate description and analysis of CK generative grammar, including phonology. His work adopts the rule-based approach to address the phonological rules and process of CK. What makes Fattah's work outstanding is that, as far as phonology is concerned, he is the first linguist to explain the rules of stress assignment in CK. Mahwy (2009) suggests a transformational generative account of CK, in which occasional reference is given to some phonological features of CK. One significant claim he makes is on vowel length distinction. He argues that vowels in stressed syllables are longer than vowels in unstressed syllables. This observation indicates that long vowels attract stress in CK. Finally, Hamid (2016) accounts for the prosodic phonology of CK with a detailed analysis of the data on the syllable and the foot structure. However, his work is a general, panoramic account of the CK prosodic phonology with little reference to emphasis on a specific phenomenon.

Apart from these attempts, no other work can be found in the literature of CK phonology. In particular, the absence of studies on word stress in CK with reference to known theoretical frameworks of phonological analysis posits a gap in the literature. Accordingly, the current study will contribute significantly to the description and analysis of CK data in light of current theoretical theories, including metrical theory, both metrical grids and metrical trees, and OT. The present study's analysis of stress rules and the conclusions it draws can be both attested and used in the future by researchers who work on Kurdish phonology, in general and CK, in particular. It will, thus, fill in a valuable gap in the literature on the language.

Chapter 2 Central Kurdish and Its Sound System

2.1 Introduction

The aim of this chapter is to provide a description of the phonemes of Central Kurdish (henceforth, CK). The vowels are described primarily in terms of contrasts in tongue-height, lip-rounding and length, and are plotted on the vowel chart. The consonants, on the other hand, are described according to their place and manner of articulation and are explained in a table that shows their place and manner of articulation. In addition to a detailed description of CK consonants and vowels, the chapter also accounts for phonological processes such as vowel epenthesis and vowel length.

Much of the existing research on CK phonology is relatively new and primarily offers broad descriptions of its vowels and consonants, along with their distribution patterns. In addition, the description of the vowels and consonants of CK is often controversial, reflecting similar controversies surrounding other components of the dialect group. Nevertheless, phonological processes and the analysis of word stress in CK, however, have received minimal attention. In particular, considerable disagreement surrounds the number of the phonemes this dialect group has; namely, vowel length contrast, and the locations of the vowels on the vowel chart. However, less controversy is observed in relation to the description of consonants. This account follows primarily Fattah (1997) and makes occasional reference to Friend (1985), Ahmad (1986), and McCarus (1997). Where no previous work is available on a specific aspect, the description and analysis rely on my intuition, as a native CK speaker, and my knowledge of phonetics and phonology.

The present chapter consists of an introduction and four major sections. In 2.2, a detailed description of the Kurdish language and CK dialect are provided: speakers, origins, linguistic landscape and geographical distribution. In section 2.3, the phonemic inventory of CK is explained with several examples. This is divided into two subsections of consonants and vowels. It also accounts for two important phonological processes; namely, vowel epenthesis and vowel length.

2.2 Kurdish language

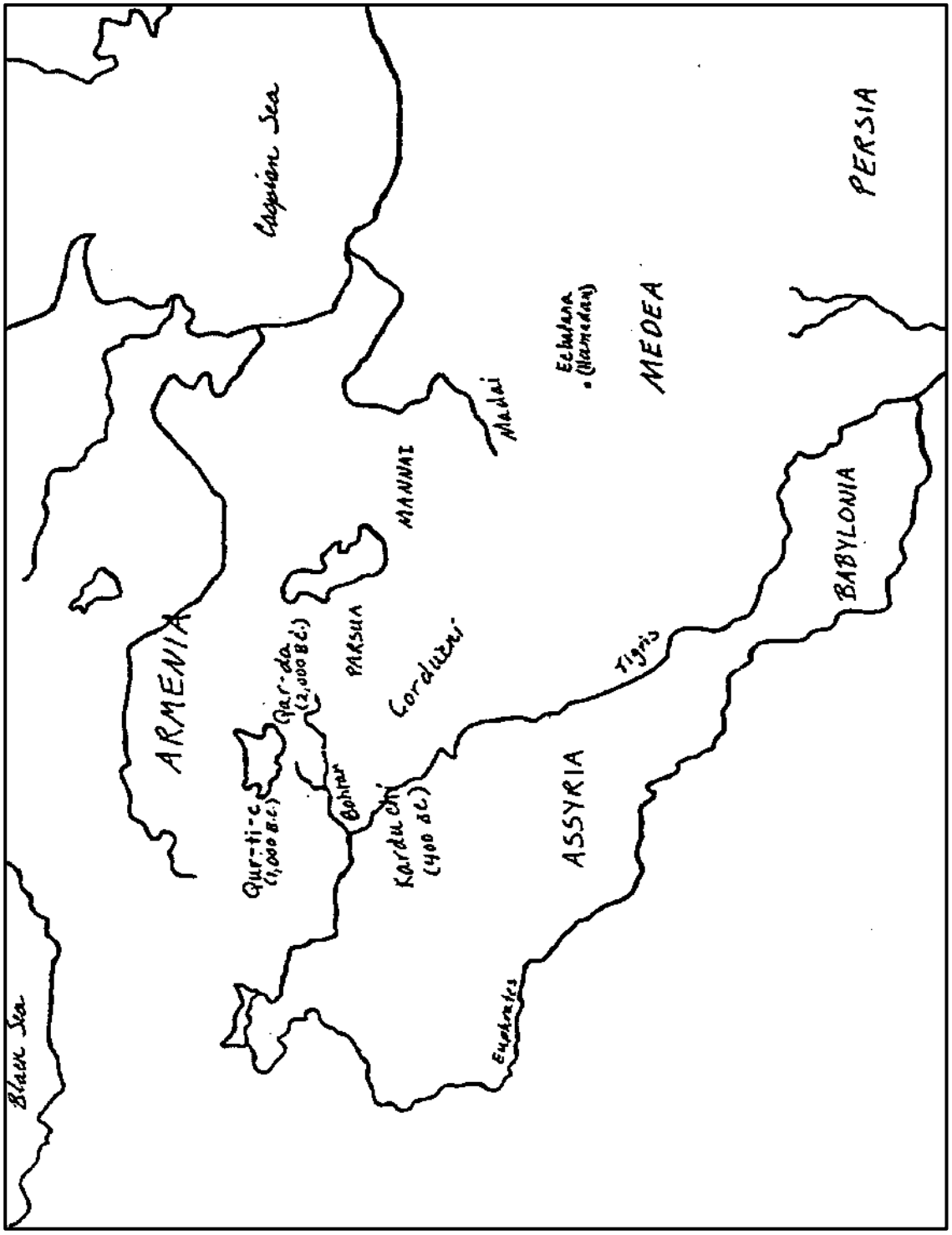
2.2.1 Origins

The Kurds are one of the indigenous peoples who have continuously lived in the Middle East for more than three thousand years; however, the origins and early history of the Kurds and their language are both uncertain and ambiguous. While most scholars agree that they are

descendants of a mixture of Indo-European peoples formed of indigenous inhabitants and subsequent immigrants who settled the areas where the Kurds live now, none seem to agree on who exactly were these peoples and when their migrations took place (Meho, 1997: 7).

The uncertainty that surrounds the origins of the Kurds can be attributed primarily to the predominance of ancient peoples who inhabited the area and to the linguistic relationship the names of some of these ancient peoples have with the present-day term 'Kurd' (Friend, 1985: 8). For instance, on a Sumerian clay tablet dated to as early as 2000 BC, there is reference to a people known as Karda (or Qarda) who lived south of Lake Van. Likewise, the name Qurtie was mentioned by the Assyrian king Tiglath-Pileser around 1000 BC to refer to the people living in the mountains west of Lake Van. In his expedition, Xenophon reports that the Greek were attacked by warriors of a people called Karduchi, who were inhabiting the left bank of the Tigris River, circa 400 BC. A philologically related name to Karduchi is Cordueni, which is thought to refer to the people who lived near the Tigris River near Mount Judi in the first century BC (Driver, 1923: 393, cited in Friend, 1985: 8-9). In addition to the Karda, Qurtie, and Karduchi, the present-day Kurds often ascribe their origins to the Medes, who established the Median Empire which ruled vast areas of the Middle East between 612 and 549 BC. However, this claim of an ethnic connection between the Kurds and the Medes has been challenged on linguistic grounds (cf. MacKenzie 1961). For example, it is believed that the Kurds originally lived farther to the south than where the Medes lived, and that at some stage the Kurdish tribes migrated to the north and settled in eastern Anatolia (Kreyenbroek, 1992: 53). Yet others relate their origins to the Gutis, who were a group of people that established a ruling dynasty in the region between 2250 and 2120 BC (Meho, 1997: 7). Figure 1 below shows where these ancient peoples lived in areas of the Middle East.

Figure 2.1 Map of areas inhabited by ancient Kurds (cited from Friend, 1985)



No recorded reference is given to the name of the Kurds nor to their land, Kurdistan, between the period of the collapse of the Median Empire in 549 BC and the Islamic conquest in the 7th century AD. After that, three centuries of Islamic rule passed until the Kurds began establishing a sequence of Kurdish dynasties that ruled large areas of the region. Among those dynasties were the Buwayhid Daylamites (932-1062), the Ayyubids (1169-15th century), the

Shaddadids (951-1174), the Mamlanids or the Rawwadids (920-1071), the Hasnawayhids (959-1015), and the Marwanids (983-1085). From the beginning of the 13th century, the ruling Kurdish dynasties gradually declined, as a consequence of the Mongol and Turkic invasions of the region and the subsequent military struggles between the Persians and the Ottoman Turks which ultimately led to the division of Kurdistan in 1514 after the battle of Chaldiran. The Ottomans allowed the Kurds to organise themselves into semi-independent principalities ruled by Kurdish princes and notable families until the beginning of the 19th century (Meho, 1997: 7-9).

2.2.2 Kurdish speech area

Kurdish is a member of the Iranian language group, which in turn is a branch of the Indo-Iranian group of the Indo-European language family (Kreyenbroek, 1992: 54; McDowall, 2000:8; Mahmoodi-Bakhtiari, 2005: 515). The Indo-Iranian group is further divided into northern and southern branches. Kurdish belongs to the north-western while Persian belongs to the south-eastern languages (Friend, 1985: 25).

The Kurdish speech area is divided among the five neighbouring countries of Turkey, Iran, Iraq, Syria, and Armenia, which have subjected the dialects to state policies ranging from linguicide[3] (Turkey, Iran, Syria) to officialisation on the local (Iraq before 2005, former USSR) and national levels (Iraq since 2005)[4]. Under this heterogeneous, uneven geopolitical division of power, Kurdish is now one of the two official languages of Iraq while it is denied many rights including mother tongue education in all neighbouring countries (Hassanpour *et al.* 2012: 2). The geographic extent of area that is inhabited mainly by Kurdish speakers is known as Kurdistan, which literally means 'land of the Kurds'. Although it has no official status nor internationally recognised borders, Kurdistan is the cover term used by the Kurds to refer to the areas occupying South West Turkey, North West Iran, North East Iraq, and the narrow strip of land in North Syria which stretches along the southern borders of Turkey. There are also small, scattered areas that are chiefly inhabited by Kurds in Central and West Turkey, as well as in West Armenia (see figure 2). It should also be mentioned that the name 'Kurdistan' first appeared in the twelfth century when the Saljuqs, who were a Turkish dynasty ruling Asia Minor, created a province with that name, which coincides with the

3 The deliberate killing of language

4 Parcelled out among the five nation-states of Iraq, Turkey, Syria, Iran, and Armenia according to the World War I Sykes-Picot Agreement of 1916, Kurdistan is a divided land with a tragic history, where the indomitable Kurds have continuously fought to control their own destiny (See Gunter, 2011: 2, 282-3).

modern-day area of Iranian Kurdistan. However, the term did not come into common usage until the sixteenth century (Yildiz, 2004: 7).

2.2.3 Kurdish speaking population

Occupying some of the Middle East's most strategic and richest terrain, the Kurds are the largest ethnic group in the world without a state to call their own (Bird, 2004: 8). However, in the absence of unprejudiced censuses in the countries where they live, the population figures of the Kurds are either imprecise or uncertain. Nevertheless, it is reported that there are approximately 15 million Kurds in Turkey (20% of the population), 6.5 million in Iran (11%), 4 to 4.5 million in Iraq (17 to 20%), and 1 million in Syria (9%). There is also growing Kurdish diaspora of more than 1 million in Western Europe (Gunter, 2011: 3-4). Similarly, it is believed that a Kurdish population of around 200,000 live in Azerbaijan (2.8% of the population) and 75,000 in Armenia (1.8%) (Yildiz, 2004:9). According to Ethnologue, the population of CK speakers is 3,500,000 in Iraq (2009), while Northern Kurdish has some 2,800,000 speakers in Iraq (2004)[5]. Yet, in the absence of a reliable census, these figures remain uncertain. The Kurdistan Regional Government (henceforth, KRG) official website claims that the Kurdish population in the region is today 5.2 million[6].

2.2.4 Kurdish dialects

Much controversy surrounds the classification of the Kurdish dialects. Most of these classifications do not seem explicitly justified, but employ a mix of geographic, historical, sociological, ethnic and linguistic criteria. This is particularly noticed in the accounts suggested by Hassanpour (1992) and Izady (1992).

Five different classifications have been put forth both by Kurdish and non-Kurdish scholars. A group of scholars argue that Kurdish has two major dialects: Northern (Kirmanji) and Southern (Sorani) (Kahn, 1976; McDowal, 2000; Gunter, 2003). Another group classify it into three dialectal groups: Northern (Kirmanji and Bahdini), Central (Sorani), and Southern (Lori or Laki) (Mackenzie, 1961; Kreyenbroek, 1992). The third group distinguish four dialects: North Kirmanji, Central Kirmanji, South Kirmanji, and Gorani (Fuad, 1971; Nebez, 1976; Kourshid, 1985). Yet a fourth group argue for the existence of two major dialects, comprising North Kirmanji and Central Kirmanji, and a group of minor or subdialects, including Southern Kirmanji, Gorani, and Zaza (Friend, 1985; Meho, 1997; Yildiz, 2007). A fifth classification is suggested by Fattah (2000) who, based on an extensive study of linguistic

5 < http://www.ethnologue.com/country/IQ/languages>.
6 According to the Kurdistan Regional Government official website (www.krg.org).

and extra-linguistic criteria, claims that there are three major dialect groups (Northern, Central, and Southern Kurdish) along with two relatively distinct subgroups (Zazaki and Hawrami). Agreeing with this later view, the following classification of Kurdish dialects is maintained throughout this work:

Kurdish group	Kurdo-Caspian group
I. Northern Kurdish (Kirmanji)	I. Zazaki
II. Central Kurdish (Sorani)	II. Hawrami (Gorani)
III. Southern Kurdish (Kelhori)	

For convenience, the abbreviations NK, CK, and SK are employed to refer to Northern Kurdish, Central Kurdish and Southern Kurdish respectively.

A further complexity in the exploration of the Kurdish dialect areas arises from their heterogeneous division upon the five nation states whose policies have, except for Iraq, denied the Kurdish speakers linguistic rights from disallowing research on the language and its speakers to officially banning the use of the language in public and private life. In Turkey, Syria, and Armenia NK is spoken. In Iraq and Iran, on the other hand, the NK, CK, and SK dialects are spoken, though the majority speak CK. In Kurdistan Region (henceforth, KR), CK is the major communication and official language in three Kurdish provinces and is therefore the official language of the Kurdistan Regional Government (henceforth, KRG) (cf. Bruinessen, 1992:22; McDowall, 2000:9-10).

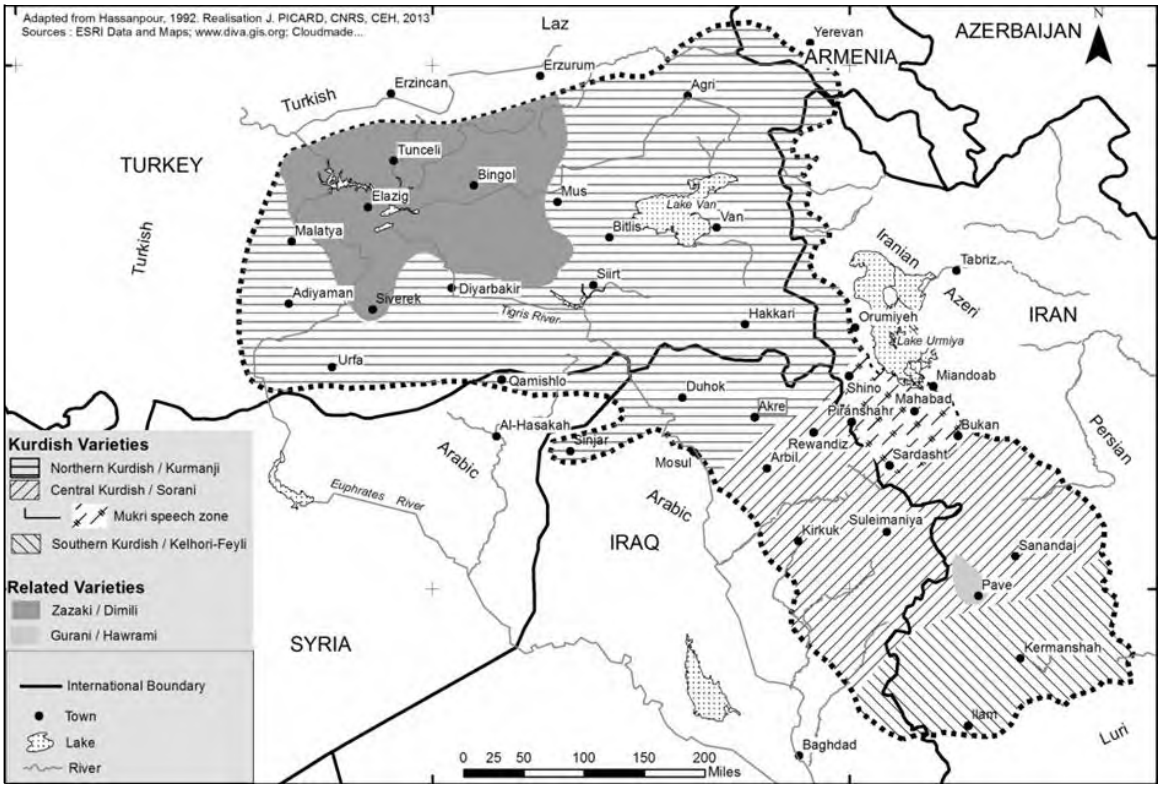
A last, yet equally important, issue related to the classification of Kurdish dialects is the distinction between language and dialect, for the boundaries between these two are fuzzy and imprecise. A classical criterion is what is known in sociolinguistics as ‘mutual intelligibility’: speakers of different dialects can understand each other while those of different languages cannot (cf. Trudgill, 2000). Nonetheless, this criterion seems to fail to account for cases like the dialects of the Dutch-German border and the Kurdish dialects. In the former case, even though the dialects of Dutch and German that are spoken on both sides of the border are highly mutual intelligible, they are perceived as two different languages (due to political factors). On the other hand, NK and CK are largely mutually unintelligible for most of their speakers, due to the lexical and grammatical differences they have, yet they are classified as dialects of the same language. The size of linguistic variation found between NK and CK has convinced some scholars to doubt if Kurdish is one language, and if so, which varieties should belong to it. As explained above, the mutual intelligibility criterion is fundamentally flawed, and would almost certainly yield contradictory results if applied to Kurdish (Haig and Öpengin, 2014: 103).

These cases exhibit the fact that linguistic criteria alone are not enough to distinguish dialects from languages. Other social, cultural, political, and historical factors need to be taken into account (Finch, 2000: 2018). Therefore, Crystal (1997: 248) adds "common/different cultural history" to "mutual (un)intelligibility". In a situation where these two criteria do not match, the status of the given dialects will not be decided. Likewise, Trudgill (2000) makes a distinction between "autonomous" and "heteronomous" varieties. According to this view, an autonomous variety is an independent code, recognised as such for purposes of media and education without necessary reference to an over-arching variety. A heteronomous variety, on the other hand, is considered a variant of some autonomous code. This distinction is useful in the context of languages with state-sanctioned status, but it is of restricted relevance for the group of dialects that constitute Kurdish, and many other languages with restricted official status. While the mutual intelligibility criterion does not yield a convincing answer to the case of Kurdish, the speakers' perception of their own dialect in relation to others does. In this case, there seems to be a broad consensus among speakers of CK and those of NK that their respective dialects belong to the Kurdish language. Similar perceptions may hold for speakers of SK (Fattah, 2000) and for some varieties of Gorani (Haig and Öpengin, 2014: 102).

It should be noted that the term CK refers primarily to Sulaymaniyah and Hawler subdialects[7]. Spoken in the two provinces of Sulaymaniyah and Erbil, these two subdialects exhibit a very limited number of lexical and phonological differences. For example, the velar nasal /ŋ/ is absent in the Hawler sub-dialect (Fattah, 2010). However, due to its limitation, the present study does not account for these differences in the description and analysis of its data. However, CK is not exclusively spoken in Kurdistan Region of Iraq, it is also used in Iranian Kurdistan. This is because the two subdialects form a dialect continuum that covers the Kurdish populated areas close to the Iraq-Iran borders in the north-west of Iran, including Mihabad, Sardasht, Baneh, and Saqiz. In Kurdistan Region of Iraq, the Hawler sub-dialect of CK is spoken in Hawler, Khabat, Koysinjaq, Soran, Ranya, Qaladiza, Khalakan, and Dukan. The Sulaymaniyah sub-dialect is used in Sulaymaniyah, Chwarta, Sharazur, Darbandikhan and Qaradakh (see Matras (2019) for certain phonological variation between the two subdialects, e.g. the pharyngeal substitution of /ḥ/ to /ʕ/ and /ʕ/ to /ḥ/).

[7] Some scholars (e.g. Mackenzie, 1961) call them varieties.

Figure 2.2 Map of greater Kurdistan and the distribution of its major dialect groups (Öpengin, 2013, cited from Haig and Öpengin 2014: 111)



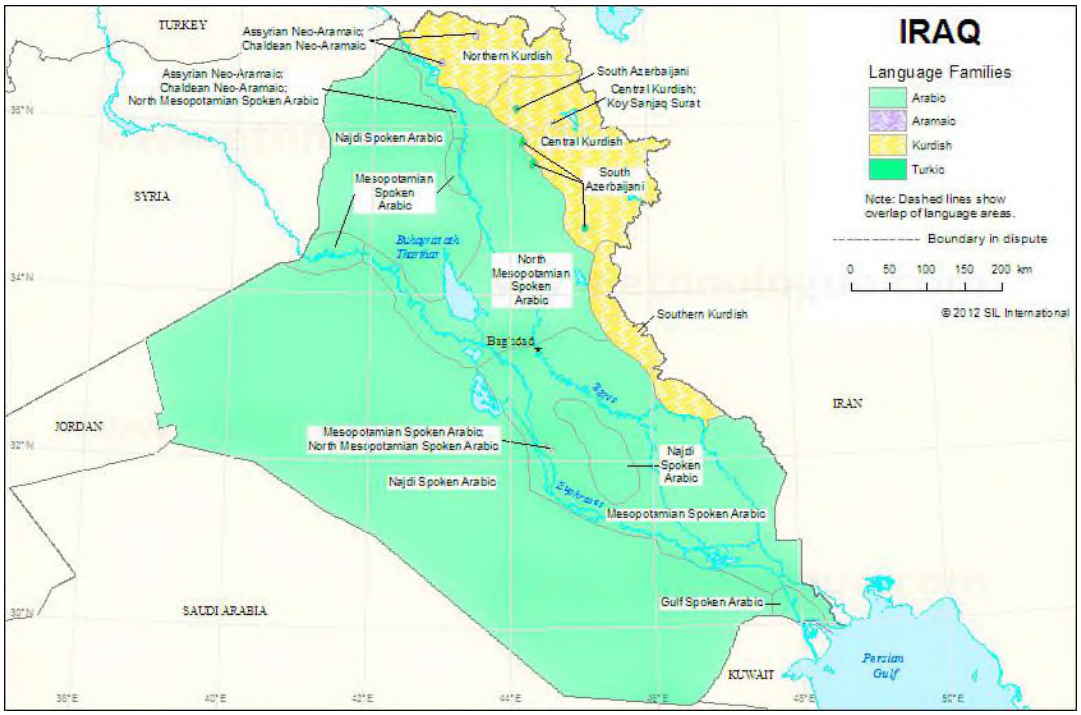
Moreover, the distribution of the Kurdish-speaking population among five countries has been reflected in the writing system of the dialect groups of the language. In Turkey, Northern Kurdish is written in a modified Turkish script (which is based on the Roman alphabet) developed originally by Bedir Khan in the 1930s and 1940s, while those of Armenia use a modified version of Cyrillic. In Syria, Arabic was the language of education and administration in the Kurdish inhabited areas until 2011. However, with the establishment of the autonomous territories, the Kurds of Syria made Northern Kurdish the official language and adopted the Turkish modified alphabet used in Turkey as their writing system. The official writing system used by the Kurds of Iraq and Iran is a modified Arabic alphabet, which was developed mainly after the Second World War. The new alphabet introduced diacritic marks for Kurdish phonemes not found in either of the other two.

2.2.5 Linguistic landscape of CK

KR is an autonomous region that occupies an area of 40,643 square kilometres in the north of Iraq. It comprises four provinces: Erbil (the capital city), Sulaimani, Duhok, and Halabja. CK is spoken in Erbil, Sulaimani, and Halabja, whereas NK is spoken in Duhok. Other dialects or subdialects such as Hawrami and Kelhori are spoken by smaller populations living in the

western and southern parts of the region respectively. Likewise, the three dialect groups are the language of communication for the Kurdish populations living outside the officially recognised borders of KR. CK is widely spoken in the city of Kirkuk, NK in Mosul, and SK in some parts of Diyala province. In addition to Kurdish, Chaldean Neo-Aramaic, Assyrian Neo-Aramaic, and Turkmani are spoken by minority communities living in the Kurdistan Region of Iraq and in other parts of Iraq with considerable Kurdish populations[8] (see figure 3 below).

Figure 2.3 Map of Linguistic landscape of Kurdistan Region of Iraq (cited from www.ethnologue.com)



2.3 The CK sound system

Similar to other aspects of the language, studies on the sound system of CK are both few and imprecise, with considerable disagreement on many important aspects of the phonology of the language. These range from disagreement over the number of the CK phonemes to the description of each individual phoneme or its features. The following is a brief account of the vowels and consonants of CK along with two phonological phenomena of the language: vowel epenthesis and vowel lengthening[9].

8 The Kurdistan Regional Government official website (www.krg.org).

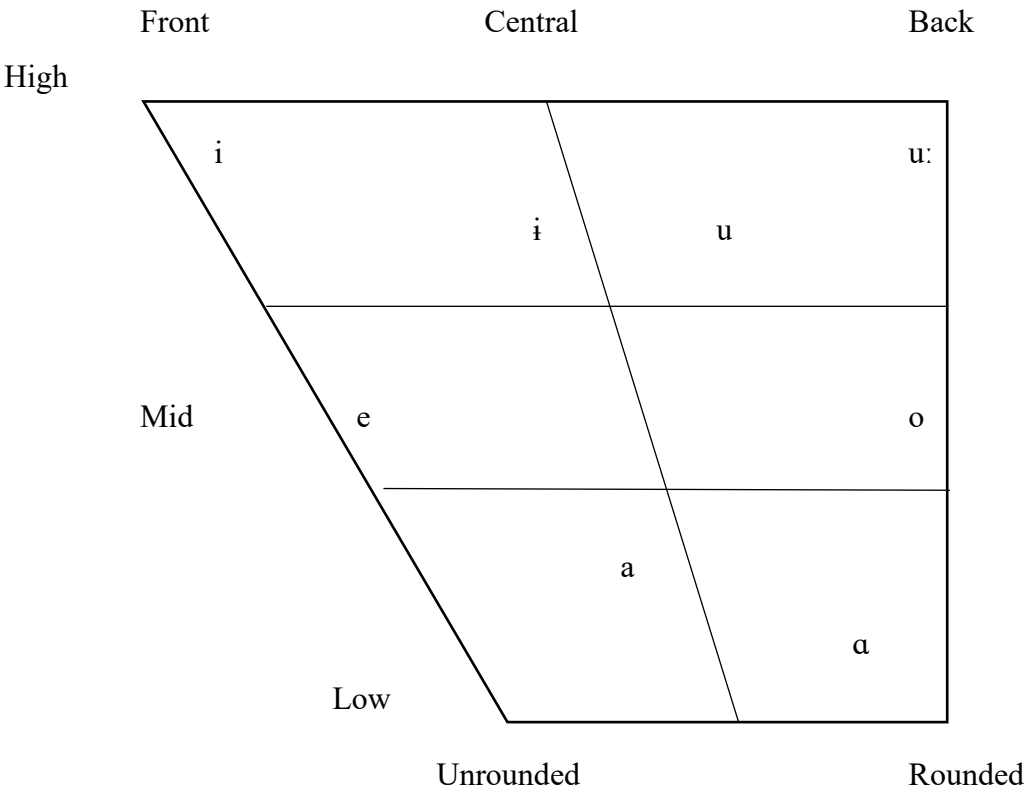
9 I have depended primarily on the work of Fattah (1997) and Hamid (2016) for the description of the CK vowels and consonants. In particular, I have followed Hamid's work in the presentation of the data.

2.3.1 Vowels

The literature of CK phonetics and phonology shows no consensus on the description of its vowel system. This is particularly due to the disagreement on the presence or absence of vowel length contrast and diphthongs in the language. Some scholars, for example, claim that CK has eight vowels (e.g. Ali 1989; McCarus 1958, 1997; Dizayee *et al.* 2013), others argue for nine (e.g. Friend 1985; Fattah 1997), while some list as many as ten (Ahmad 1986). Likewise, while the CK vowel inventory offered by Mackenzie (1962) and Aziz (1976) includes diphthongs, McCarus (1958, 1997), Ahmad (1986) and Fattah (1997) do not list any diphthongs in their account of the inventory. The present work agrees with Ali (1989) and McCarus (1997) and argues for eight vowels in CK. It also suggests that the language has no diphthongs and that vowel length contrast is observed only in a few instances of the upper back rounded /u/ and the upper front unrounded /i/ vowels.

The present work assumes that the CK vowel inventory includes eight vowels, which can be described in terms of three articulatory parameters: tongue height, tongue frontness or backness, and lip shape or rounding. Based on the tongue height parameter, three contrastive degrees are observed: high (or close), mid (or half close/half open), and low (or open) (cf. Katamba 1989: 9-10; Gussenhoven & Jacobs 1998: 7-8; Carr & Montreuil 2013: 8; among others). In CK, the high vowels are /i, ɨ, uː, u/; the low /ɑ, a/ and the mid /e, o/. Horizontally, three contrasts in the tongue position are observed: front /i/, central /ɨ/, and back/o/. In addition, vowels are classified either as rounded or unrounded according to the lip shape parameter. The vowels /uː, u, o/ are rounded whereas / i, ɨ, ɑ, a, e/ are unrounded. Since these various parameters are not entirely independent of each other, they can be combined to represent points of articulation on a vowel chart like figure 4 below:

Figure 2.4 CK vowel inventory chart



Adding the roundedness feature to the vowel chart, each of the CK vowels can be described in a three-term fashion (adopted from Fattah 1997: 15):

/i/: high, front, unrounded

/ɨ/: high, central, unrounded

/u:/: high, back, rounded

/u/: high, central, rounded

/e/: mid, front, unrounded

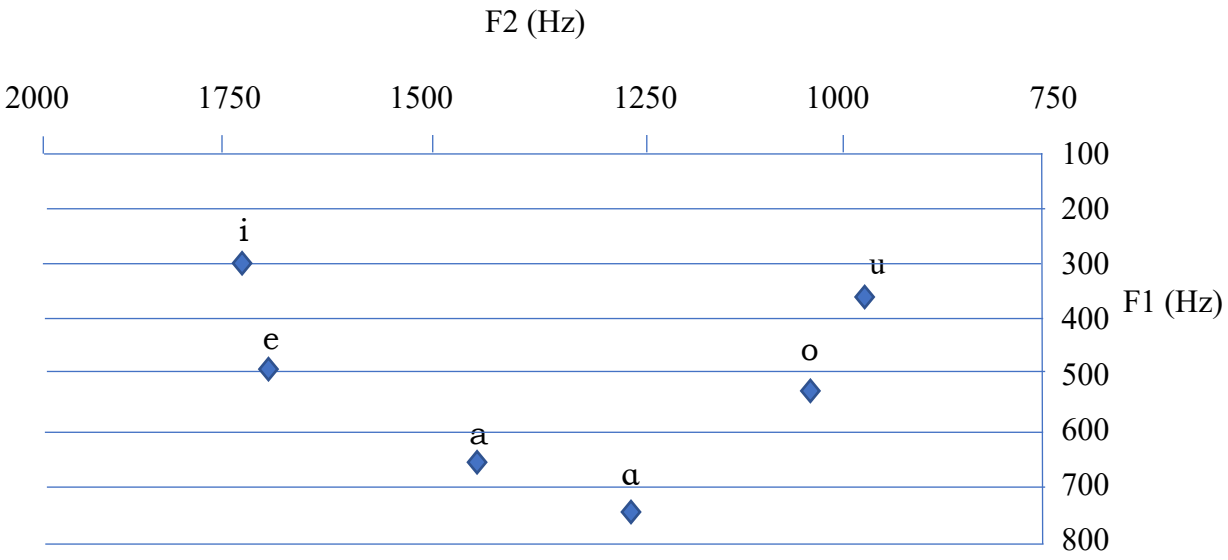
/o/: mid, back, rounded

/a/: low, central, unrounded

/ɑ/: low, back, unrounded

While the vowel chart given in figure 5 offers a useful tool for the description of the articulatory points of the CK vowels, it is not as precise as vowel charts based upon measurements made by digital means (e.g. computer) from recorded sounds (Zsizga 2013: 58). For this reason, and in the absence of a precise description of the CK vowels, Hamid (2016) carried out an acoustic analysis of voice recordings of five native speakers of CK. For the task, each speaker was required to read out a list of 15 tokens for each vowel. Using the PRAAT software, the obtained measurements were then employed to plot the vowels on a chart, such as figure 5 below:

Figure 2.5 Format values of CK vowels (adopted from Hamid: 2016)



2.3.2 Vowel epenthesis in CK

Vowel epenthesis refers to the insertion of a vowel to an utterance[10]. Affecting both the word level and structures above the word, it comprises heterogeneous processes that manifest considerable variation in their characteristics. Where it occurs, vowel epenthesis plays an important role in repairing an input that does not meet structural requirements of a given language. Controversy surrounds the motivation of epenthesis. It is believed to be triggered by the need for the syllabification of stray consonants (Ito, 1989), by particular sequences of

[10] Hall (2006) distinguishes between two types of vowel insertion: epenthesis and intrusion. The main difference between these two, according to her, is that while epenthetic vowels are phonological segments that repair certain structures, intrusive vowels are phonetic transitions between consonants and that they do not form syllable nuclei. Hall draws the distinction between an intrusive vowel and an epenthetic one according to differences in their phonological properties. Two of the differences are of practical importance for this study: A) An epenthetic vowel repairs an illicit structure while an inserted one does not, and B) It forms syllable nuclei. Since the unrounded vowel /ɨ/ and its allophonic realisation /ʉ/ have a structural repairing function and form syllable nuclei in CK, the present study assumes that CK has vowel epenthesis rather than vowel intrusion.

consonants, regardless of syllable structure (Broselow, 1982), by minimum word weight requirements in some languages (Olson, 2003), or by word stress assignment rules when the final syllable assumes stress (Fagyal, 2000) (cf. Hall, 2011: 1576-8).

In CK, the epenthetic vowel /ɨ/ requires special attention. It is a defective vowel since it is not an intrinsic vowel of any lexical word but is epenthesised to meet the CK syllable structure requirement. It is triggered by the need for repairing underlyingly consonant clusters of words, roots and affixes. In such structures, the epenthetic vowel systematically occurs between two consonants hence forming a syllable nucleus (1).

(1)

a. br ~ bɨr 'amount'

b. x ʃ ~ xɨʃ 'root of the word scrape'

c. tɾ ~ tɨɾ 'suffix: more, other'

In structures of underlyingly two consonant clusters, whether complete words or parts of a word, epenthesis follows the same rule and leads to syllabification (2).

(2)

a. mn ~ mɨn 'I'

b. pɾd ~ pɨɾɨd 'bridge'

b. kɾdn ~ kɨɾdɨn 'doing'

c. gɾŋg ~ gɨɾɨŋg 'important'

Certain word final cases, however, form an exception to this rule. When the fricative obstruents /s/ or /ʃ/ or the liquid sonorants /ɾ/ or /ɬ/ precede the stop obstruent /t/, or when the nasal /n/ precedes the stop /d/, epenthesis does not occur since CK words allow for such final two-consonant clusters (3).

(3)

a. mast 'drunk'

b. mɨʃt 'fist'

c. kuɾt 'short'

d. sałt 'single'

e. ʃɑnd 'delegate'

f. bɨłɨnd 'high'

The epenthetic vowel is lost when syllabification takes place in a number of words. Common cases include the addition of definite and indefinite markers word finally (4).

(4)

a. kɨtʃ ‘girl’ ~ kɨ.tʃaka ‘the girl’

b. pɨrɨd ‘bridge’ ~ pɨr.daka ‘the bridge’

b. bɨzɨn ‘goat’ ~ bɨz.nek ‘a goat’

It should finally be noted that the CK epenthetic vowel also has two allophonic realisations: /ʉ/ when following a rounded sound and /ɨ/ elsewhere (5).

(5)

a. jʉ.wɑn ‘round de vou’

b. pɨ.jɑz/ ‘onion’

However, where the word structure is compound or complex and is originally made of a base form, word initially, ending in a rounded sound /u:/, now epenthetic vowel /ʉ/ is inserted. Instead, the rounded vowel at the end of the first part of the word is shortened: /u:/ ~ /u/. Consider the following example:

(6)

a. du.wɑn ‘two’

The word *du.wan* ‘two’ is basically composed of the base *du* ‘two’ and the suffix *-an* (plural morpheme). Since CK has no zero onset syllable, when the suffix *-an* is added to the base *du*, syllabification occurs with the insertion of the approximant /w/ in the onset, thus forming *–wan.* The insertion of the approximant shortens the preceding vowel /u:/ in realisation to /u/.

2.3.3 Vowel length in CK

Vowel length is the phonological correlate of variations of duration among vowel segments; therefore, it is related to the concept of quantity. As a phonological attribute, length (or duration) distinctions are discrete mental categories, not physical measurement, that are captured as binary oppositions in generative theories (Odden, 2011). Phonetic factors that affect the duration of a vowel segment include a speaker’s speech tempo, voicing, and tongue position (i.e. vowel quality). In some languages, like English, vowel length is tied to stress: stressed vowels are longer than unstressed vowels (Zsiga: 2013, 67).

Establishing vowel length in a language is not always straightforward. Scholars often disagree on whether or not they should consider the contrast in the vowels of certain pairs as one of length. For instance, there is disagreement on whether English has vowel length contrast or not. Accordingly, the contrast between “beat” and “bit” is treated as one of long versus short vowels (Halle 1977) or as tense versus lax vowels (Chomsky and Halle 1968). In the same way, scholars working on Kurdish disagree on whether CK has pairs of long and short vowels and whether they are in contrastive or complementary distribution. While most scholars argue that CK exhibits vowel length contrast (e.g. Ahmad, 1986, Fattah, 1997, McCarus, 1997), Mahwy (2009) claims that the difference in vowel length is not contrastive and that short and long vowels are in complementary distribution in the language. Agreeing with Mahwy (2009), the present work assumes that length differences are observed among both the high and mid vowels in specific environments; however, these differences are not contrastive since the long and short vowels are in complementary distribution. In fact, these long and short vowels seem to have equal length in similar phonetic contexts. The length distinction depends on the specific contexts where factors such as syllable structure and stress position are involved. The long vowels occur either in open stressed syllables (cf. 7a, 7b, 7c and 7d) or in closed stressed syllables with a simple coda sonorant (cf. 7e, 7f, 7g and 7h).

(7)

a. siː ‘lung, thirty’

b. muː ‘hair’

c. peː ‘foot’

d. noː ‘nine’

e. ʃiːɾ ‘milk’

f. buːn ‘being’

g. feːɬ ‘trick’

h. boːn ‘smell’

On the other hand, the relatively short vowels occur in closed syllables with a simple voiceless obstruent coda (cf. 8a, 8b, 8c, and 8d) or a complex coda cluster ending with a voiceless stop (cf. 8e, 8f, 8g, and 8h).

(8)

a. pit ‘letter’

b. tuk ‘body hair’

c. ʃet ‘crazy’

d. koʃ ‘lap’

e. bist ‘twenty’
f. kurt ‘short’
g. pest ‘skin’
h. dost ‘friend’

As a general rule, unstressed syllables in bi- and multi-syllabic words include relatively shorter vowels compared to vowels of the stressed syllables irrespective of the presence of coda consonants (cf. 9). The sole exception to this rule occurs when the short low vowel /a/ appears in either the initial or final syllable of a word, in which case it receives stress regardless of its inherent vowel length (cf. 9).

(9)
a. ʃi.ˈɾiːn ‘sweet’
b. pe.ˈɾeː ‘the day before yesterday’
c. me.ˈʒuː ‘history’
d. biɾ.ˈdoːz ‘theory’
e. ba.ˈɾa ‘political block/front’
f. pa.ˈɾa ‘money’
g. ˈda.ɾa.wa ‘outside’

Example (9g) also forms an exception to the stress distribution in CK words in that it is the word initial syllable, not the final, that receives stress. As seen, in this case, vowel quantity (weight) does not affect stress assignment.

However, the high rounded vowels [u] and [uː] do not obey the above rule and establish a contrastive opposition in a few words, forming minimal pairs and near minimal pairs:

(10)
a. kur ‘boy, son’ vs. kuːr ‘hunchbacked’ vs. koːr ‘symposium’
b. quł ‘short’ vs. quːł ‘deep’ vs. qoːł ‘arm’
c. qut ‘upright’ vs. quːt ‘lump’
d. kul ‘blunt’ vs. luːl ‘fizzy, spiral’

Similar to lexical vowels, a minimal pair can also be established between the (short) epenthetic vowel /ɨ/ and a (long) lexical vowel; in which case, the length distinction is contrastive, as in (11).

(11)

a. ʒɨn ‘woman, wife’ vs. ʒiːn ‘life’
b. pɨna ‘wooden pastry board’ vs. piːna ‘patch’
c. bɨɾoː ‘eye brow’ vs. biːɾoː ‘eczema’
d. bɨst ‘a hand’s length measurement’ vs. bist ‘twenty’

In some cases, lengthening a short vowel results in a category of a higher prosodic hierarchy level (e.g. a prosodic word ‘PrWd’ to an intonational phrase ‘IP’ with a different stress position in the IP). This is true both for lexical and epenthetic vowels (cf, 12).

(12)

a. tʃun ‘like’ vs. tʃuːn ‘They have gone/been to…’
b. ʃɨna ‘breeze’ vs. ʃiːna ‘It is blue’
c. nɨma ‘light rain’ vs. niːma ‘I don’t have it’

While the length distinction between the high and mid vowels, except for the few cases of the vowels [u] and [uː], they do not form a contrastive opposition (i.e. the vowels are in complementary distribution), the distinction between the low vowels /a/ and /ɑ/ is contrastive. In other words, the length distinction is allophonic between the high and mid vowels and phonemic between the low vowels. Such differences between the high and mid vowels, on the one hand, and the low vowels, on the other, show that the concept of vowel length in CK is far from perfect and that it is related both to quantity and quality. Consider the following examples:

(13)

a. la ‘in, from’ vs. lɑ ‘side’
b. kaɾ ‘donkey’ vs. kɑɾ ‘work’
c. tʃaw ‘gravel’ vs. tʃɑw ‘eye’
d. mast ‘drunk’ vs. mɑst ‘yogurt’

2.4 Consonants

Before we start to describe the CK consonants, the following observations regarding their articulatory-based classification should be considered[11]:

[11] These observations are primarily cited from Fattah (1997: 18-22); however, where necessary, I have elaborated on some aspects of the discussion and have provided a different account if we have not agreed with the scholar’s viewpoint.

1. Similar to the case of the vowels, scholars working on CK disagree on the number of consonants attested in the language. For example, McCarus (1958: 12; 1997: 692) recognizes thirty-one, Mackenzie (1961), Ahmad (1986: 55), Ali (1989: 36) and Fattah (1997: 19) identify twenty-nine, Dizayee *et al.* (2013) argue for twenty-six whereas Friend (1985: x) lists twenty-five consonants plus three glides. These disagreements are primarily due to the confusion over the original and borrowed sounds. Following Fattah (1997), we argue that CK has twenty-five consonant sounds that occur in native (not borrowed) Kurdish words. These include /p, b, t, d, k, g, f, s, z, ʒ, dʒ, ʃ, tʃ, m, n, ŋ, l, ɫ, ɾ, r, w, j, x, h, and ʔ/. This argument is based on the ability of these consonants to occur at syllable margins and to establish a contrastive opposition in minimal pairs of Kurdish native words.
2. There is also disagreement on the places of articulation of the phonemes /s, z, ʃ, ʒ, tʃ, and dʒ/. For instance, McCarus (1958: 12) and Wais (1984: 66) describe /s/ and /z/ as dental, while Mackenzie (1961: 1), Ahmed (1986: 55), Ali (1989:32) and Hassan (1991:36) consider them alveodental.
3. Although there is consensus on the manner of articulation of the CK phonemes, Marif (1976:19) disagrees with other scholars and treats the approximants /w/ and /j/ as fricatives.
4. Some studies have excluded the phoneme /q/ from the inventory of CK consonants (e.g. Wahbi and Edmonds. 1966) because they have considered it a loan sound found only in loan words. The present study, however, has included /q/ in the phonemic inventory of CK. This is primarily because a) it forms a contrastive opposition with other phonemes (cf. 14); b) it occurs in any word positions; 3) it is found in a few words of seemingly Kurdish origins (cf. 15), and 4) it has been established as a regular phoneme in several words of the language.

(14)

a. qal ‘turkey’ vs. kal ‘a mountain summit’
b. maqɑm ‘type of song’ vs. maɾɑm ‘bad intention’
c. raq ‘hard’ vs. raʃ ‘black’

(15)

a. qaław ‘fat’
b. ʃaqɑm ‘street’
c. tʃaq ‘centre’

5. The voiceless fricative /x/ and voiced /ʁ/ have been considered two distinct phonemes of CK. Nevertheless, in many cases they are in dialect or regional variation word medially (cf. 16)

and finally (cf. 17), and in a few cases word initially (cf. 18). The choice, however, depends on geographic distribution: while in Sulaymaniyah sub-dialect, speakers use the voiceless /x/, in Hawler sub-dialect, speakers use the voiced /ʁ/.

(16)

a. kɑxaz -- kɑʁaz ‘paper’
b. bɑxawan -- bɑʁawan ‘gardener’
c. bɑxtʃa – bɑʁtʃa ‘garden’

(17)

a. bɑx -- bɑʁ ‘orchard’
b. sɑx – sɑʁ ‘healthy’
c. wiłɑx -- wiłɑʁ ‘horse, cattle’

(18)

a. xam -- ʁam ‘sorrow’
b. xiɾat -- ʁiɾat ‘daring (n.)’
c. xuntʃa -- ʁuntʃa ‘bud’

However, they are not generally interchangeable word initially (cf. 19), and they establish a minimal pair as in (cf. 20).

(19)

a. xu: ‘habit’ but not *ʁu:
b. xɑk ‘soil’, but not *ʁɑk
c. puxta ‘summary, gist’, but not *puʁta
d. ʃɑx ‘mountain’, but not *ʃɑʁ

(20)

a. xɑɾ ‘thorn’ vs. ʁɑɾ ‘gallop’

Fattah (1997: 20) accounts for the case of these two fricative sounds in CK in terms of neutralization and relevance. That is, where the /x/ versus /ʁ/ opposition ceases to operate (as in cases of word medially and finally), then it is the case of neutralisation, whereas it is the case of relevance where the opposition is phonetically realised (mainly word initially). He also regards both consonants, except for the word initial position, as members of the same archiphoneme

because their opposition becomes neutralised word medially and finally. In addition to neutralisation, the choice between the two phonemes seems to be a matter of geographical distribution of speech community. In areas where CK is spoken, /x/ is far more widely used than /ʁ/ both in spoken and written forms of the language. Therefore, we have included /x/, but not /ʁ/, in the CK consonant inventory in this work.

6. The voiced pharyngeal fricative /ʕ/ is excluded by some scholars (e.g. Wahby and Edmonds, 1966) from the CK phonemic inventory. Their view is based on the fact that /ʕ/ occurs in Arabic loan words (except for baʕa 'sheep'), and it is not generally found word finally (except for yaʕ 'disgusting, yuck'). However, this work has included it in the consonant inventory since it is widely attested in CK, especially in the spoken language.[12]
7. The voiced labio-dental fricative /v/ has not been regarded a CK phoneme since it is limited to words of the NK dialect origin (cf. 21) and a few onomatopoeic words where it is often in free variation with the voiceless labio-dental fricative /f/ (cf. 22).

(21)

a. vɨyɑn 'love'
b. tɑvga 'waterfall'
c. mɨɾov 'human being

(22)

a. gɨva 'whizzing'
b. vɨra-vɨr -- fɨra-fɨr 'whirring'
c. vɨŋa-vɨŋ -- fɨŋa-fɨŋ 'howling'

Consonants are usually described from an articulatory point of view; that is, their place of articulation, manner of articulation and voicing, Following is a description of CK consonants in articulatory terms:

[12] The status of certain loan phonemes (q, ʕ, ħ and ʁ) in Kurdish is ambiguous and controversial. While most of those who have worked on Kurdish phonology (e.g. MacCarus, 1959, Whabi and Edmonds, 1966, Aziz, 1976, and Fattah, 1997, among others) assume that these phonemes are borrowed from Arabic, I believe that they are borrowed from Neo-Aramaic and Arabic, due to language contact, over a long period of time. It should be noted that, historically, the Kurds and the Assyrians either lived in neighbouring areas in the Middle east or coexisted in the same areas (Syria and Iraq in particular) long before the arrival of the Arabs and the invasion of the region in the seventh century. Therefore, it can be assumed that due to language contact between Neo-Aramaic and Kurdish, these phonemes were first borrowed from Neo-Aramaic to Kurdish and were then reintroduced to the language through Arabic with the arrival of the Arab Muslims to the region. However, I have not found tangible evidence or research to support this claim.

2.4.1 Stops

There are nine stops in CK: five voiceless /p, t, k, q, ʔ/ and four voiced /b, d, g, ʕ/. These can be described as follows:

/p/ is a voiceless bilabial stop that is aspirated before vowels word initially and medially, and unaspirated word finally or before a voiceless fricative or a liquid:

(23)

a. pʰɑra ‘money’
b. ʃapʰol ‘wave’
c. kopla ‘a short part of a song’
d. tʃɑp ‘print’

/b/ is a voiced bilabial stop:

(24)

a. bɑʃ ‘good’
b. rebaɾ ‘guide, leader’
c. nɑyɑb ‘excellent’

/t/ is a voiceless alveo-dental stop that is aspirated before vowels, word initially and medially, and unaspirated word finally:

(25)

a. tʰam ‘fog’
b. dastʰa ‘set’
c. sɑt ‘moment’

/d/ is a voiced alveo-dental stop:

(26)

a. doł ‘valley’
b. sɑda ‘simple’
c. dɑd ‘justice’

/k/ is a velar voiceless stop that is aspirated before vowels word initially and medially, and unaspirated word finally:

(27)

a. kʰɑm ‘which’

b. dukʰał ‘smoke’

c. tʃɑlɑk ‘active’

/g/ is a voiced velar stop:

(28)

a. gor ‘grave, tomb’

b. regɑ ‘way’

c. guɾig ‘wolf’

/q/ is a voiceless uvular stop:

(29)

a. qap ‘bowl’

b. ʃaqɑm ‘street’

c. boq ‘frog’

/ʕ/ is a voiced pharyngeal stop which is found in Arabic loan words:

(30)

a. ʕasiɾ ‘afternoon’

b. ʃiʕiɾ ‘poetry’

c. yaʕ ‘yucky’

/ʔ/ is a glottal stop which usually occurs word initially and word finally in the onset of the syllable:

(31)

a. ʔɑw ‘water’

b. ʔɑɾazu: ‘desire’

c. naʔ ‘no’

However, in a few Arabic loan words, the glottal stop occurs word medially:[13]

(32)

a. kaʔɑba ‘depression’

b. baɾɑʔat ‘innocence’

[13] In addition, In the Sulaymaniyah sub-dialect of CK, the dental /d/ is generally realised as a glottal stop word initially. This is similarly found word medially when it is the onset of a word medial verb: naʔaroy ‘wouldn’t/shouldn’t have gone/left’.

2.4.2 2.3.2 Affricates

The voiceless affricate consonant /tʃ/ and voiced /dʒ/ occur widely in the CK lexicon in the initial, medial, and final word positions (33).

(33)

a. tʃɑw ‘eye’
b. katʃał ‘bald
c. suːtʃ ‘corner’
d. dʒoɾ ‘type’
e. lɑdʒɑn ‘sideburn’
f. bɑdʒ ‘tax’

2.4.3 Fricatives

CK has eight fricative consonants. Of these, six are voiceless /f, s, ʃ, x, ħ, h/ and two voiced/z, ʒ/. Like the affricates, they are widely distributed in the CK lexicon in the initial, medial, and final word positions, except for /h/, which does not occur word finally. These are as follows:

/f/ is a voiceless labio-dental fricative which occurs in all word positions: initial, medial, and final, as shown in (34) below:

(34)

a. fika ‘whistle’
b. bafiɾ ‘snow’
c. kaf ‘foam’

As stated previously, its voiced counterpart /v/ is not considered a CK phoneme since its distribution is limited to words of NK origin. In several CK words, the voiced NK /v/ is replaced by the approximant /w/; the words are the same otherwise. The replacement is mainly observed in the medial and final positions.

(35)

	NK	CK
a.	ʔavin	ʔawin ‘love’
b.	ʃav	ʃaw ‘night’

The fricative alveolar consonants /s/ and /z/ have been introduced as labio-dentals by Fattah (1997). In this work, however, they are considered alveolar since they are produced by

the stricture found between the front of the tongue and the alveolar ridge. They both occur frequently in the CK lexicon and in all word positions.

(36)

a. siɾ ‘garlic’
b. dɑstɑn ‘epic’
c. dɑs ‘sickle’
d. zaryɑ ‘ocean’
e. nɨzgaɾa ‘hiccup’
f. rez ‘respect’

It should be noted that these two consonants are velarised when they are the syllable onset followed by a back or central vowel and the voiced velar /g/ or the alveolar /ɬ/:[14]

(37)

a. sˠag ‘dog’
b. sˠɑɬ ‘year’
c. zˠɑɬ ‘dominant’
d. zˠoɬ ‘villain’

The examples in (37) demonstrate the case of feature spreading. Since the /a/ and /ɑ/ vowels have a [+ back] feature, velarisation spreads to the left of the vowel affecting the consonant in the onset. However, if the vowel has a [+ front] feature, velarisation does not occur as in *sat* ‘moment’ and *zam* ‘wound’.[15]

The voiceless post-alveolar /ʃ/ and voiced /ʒ/ have a high frequency of occurrence in the CK lexicon in the word initial, medial, and final positions (38).

(38)

a. ʃɑɾ ‘city’
b. piːʃa ‘profession’
c. dʒoʃ ‘enjoyment’
d. ʒam ‘meal’
e. meʒu ‘history’

[14] Similarly, in one particular word ‘sad’, /s/ is velarised while the final stop /d/ becomes voiceless since CK has word final consonant devoicing: sˠat ‘hundred’.
[15] Since /sˠ/ and /s/ does not establish minimal pairs in CK, they are not treated as lexical segments. Their variation is therefore considered allophonic in the literature of Kurdish phonology (cf. Wais 1984, Mahwi 2008, and Fatah 2010).

f. roʒ ‘day’

When in the onset position, /ʒ/ does not seem to allow for the round vowel /o/ to follow when it occurs word initially, whereas it allows this in the word medial position:

(39)

a. kiʒoła ‘young girl’
b. kɑɾʒoła ‘kid’

The voiceless fricative uvular /χ/ is another consonant that is widely distributed in the CK words, initially, medially, and finally as shown in (40). As explained in note (5) on the consonants, in many cases, the voiceless /χ/ is in free variation with the voiced /ʁ/ word medially (cf. 16) and word finally (cf. 17), and in a few cases word initially (cf. 18)[16].

(40)

a. xezɑn ‘family’
b. baxtawaɾ ‘lucky’
c. ʃox ‘beautiful’
d. xam -- ʁam ‘sorrow’
e. bɑxtʃa -- bɑʁtʃa ‘garden’
f. qaɾɑx -- qaɾɑʁ ‘edge, brink’

The voiceless pharyngeal fricative /ħ/ is primarily observed in Arabic loan words (41) or in Persian loan words whose voiceless glottal fricative /h/ is realised as /ħ/ in CK (42).

(41)

a. ħawʃa ‘yard’
b. baħis ‘research’
c. ruːħ ‘soul’

(42)

Persian	CK
a. hafɨt	ħawt ‘seven’
b. hafta	ħafta ‘week’
c. gunɑh	gunɑħ ‘sin’

[16] The choice is between the voiceless /χ/ is and the voiced /ʁ/ is a matter of regional variation: In Sulaymaniyah sub-dialect, /χ/ is used whereas in Hawler /ʁ/ is used.

Apart from Arabic and Persian loan words, /ħ/ is also found in a few CK words, initially, medially and finally, as in (43).

(43)

a. ħapa ‘a dog’s low barking’
b. tʃalaħɑne ‘chatter, meaningless conversation’
c. biɬiħ ‘ugly’

However, in the word initial position, /ħ/ is not followed by the vowel /e/ in CK words.

The voiceless glottal fricative /h/ has a defective distribution in the CK lexicon since it does not occur in the coda or word final positions. It is, therefore, found word initially and word medially (intervocalically), forming the onset in both positions, as in (44).

(44)

a. hɑwin ‘summer’
b. faɾhaŋ ‘dictionary’
c. baḫɑ ‘value’
d. raḫand ‘dimension’

2.4.4 Nasals

CK has three nasal consonants: the voiced bilabial /m/, the voiced alveo-dental /n/, and the voiced velar /ŋ/. While /m/ and /n/ occur widely on the CK lexicon, /ŋ/ has a defective distribution since it occurs only syllable or word finally (45) in simple words, and word medially in a few compound and complex words whose second part (word or suffix) starts with a consonant, thus becoming the onset of the syllable (46).

(45)

a. mɑɾ ‘snake’
b. komak ‘aid’
c. ʒam ‘meal’
d. naw ‘name’
e. tʃanɑga ‘chin’
f. dan ‘tooth’

(46)

a. daŋdɑn ‘voting’

b. bɑŋkɨɾdɨn ‘calling’

c. paŋxwʉardu ‘stuck’

In cases where syllabification occurs, /ŋ/ becomes the onset of the coming syllable. This is usually observed in compound and complex words whose second part (word or suffix) starts with a vowel (47).

(47)

a. raŋ ‘colour’ raŋɑła ‘a colourful object’

b. maŋ ‘moon’ mɑŋɑna ‘monthly’

When the nasal /n/ is directly followed by the velar /g/ or alveo-dental /d/ in the same syllable, they are realised as /ŋ/, as in (48a, 48b, and 48c). The difference is that in the case of /g/, the /ŋ/ realisation is obligatory whereas it is optional with /d/, as in (48d, 48e, and 48f) below:

(48)

a. daŋ ‘voice, sound’

b. dɨrdoŋ ‘complex’

c. qɨŋ ‘buttocks’

d. daɾband ⟶ daɾbaŋ ‘gorge’

e. govand ⟶ govaŋ ‘party’

f. hoʃmand ⟶ hoʃmaŋ ‘aware, intellect’

2.4.5 Laterals

CK has two lateral consonants that are contrastively distributed in its lexicon: /l/ and /ɬ/[17]. The main articulatory difference between these two consonants lies in the back of the tongue. The voiced alveo-dental lateral /l/ is articulated with a closure in the centre of the alveolar ridge and lateral escape of airflow, whereas the velarised voiced alveolar /ɬ/ is articulated when the tip of the tongue touches the alveolar ridge and the body of the tongue is slightly retracted and raised towards the velum. Unlike the alveo-dental lateral /l/, which occurs more frequently in the CK

[17] CK is one of the few languages in the world to in have /l/ and /ɬ/ as distinct phonemes that establish minimal pairs in a few words.

lexicon and in the initial, medial, and final word position, the velarised alveolar /ɬ/ has limited distribution and does not occur word initially. Consider the examples in (49):

(49)

a. la ‘side’
b. kulaka ‘courgette’
c. kel ‘tomb stone’
d. mɑɬ ‘home, house’
e. bałen ‘promise’
f. pełu ‘eyelid’

The contrastive opposition between these two laterals is established in the following minimal pairs:

(50)

a.	kal ‘luxated (tooth), summit’	vs.	kał ‘brave, valiant’
b.	tʃɨl ‘forty’	vs.	tʃɨɬ ‘twig’
c.	pala ‘haste’	vs.	pała ‘stain’
d.	gul ‘leper’	vs.	guł ‘flower’

2.4.6 Rhotics

In cross-linguistic terms, rhotics include a wide range of heterogeneous articulations: trills, taps, approximants, and fricatives. In articulatory terms, these groups are not similar. For example, taps and trills involve contact between the active and passive articulators, whereas fricative rhotics close approximation between the articulators. Therefore, their classification into different groups is a phonological task (Davenport and Hannahs, 2010: 32).

CK rhotics include the alveolar trill /r/ and the alveolar flap /ɾ/, which are in complementary distribution in the language (which are observed mainly with the central /a/ and back /ɑ/ vowels as in (51).

(51)

a.	kaɾ ‘donkey’	vs.	kar ‘deaf’		
b.	baɾa ‘front’	vs.	bara ‘rug’		
c.	pɑɾ ‘last year’	vs.	pɑr ‘chapter’	vs	par ‘feather’

The trill and tap do not seem to differ in the degree of stricture. However, their difference is that with the trill the tongue blade vibrates repeatedly against the alveolar ridge, while with

the tap the tongue blade taps the alveolar ridge once. In terms of their occurrence in the CK lexicon, the trill occurs word initially, medially and finally, while the flap occurs only word medially and finally (52).

(52)

a. tuɾ ‘turnip’
b. piɾsa ‘funeral’
c. kamaɾ ‘waist’
d. riz ‘row, line’
e. rega ‘road, way’
f. koraw ‘exodus’

2.4.7 Approximants

The approximants include the voiced bilabial /w/ and the voiced palatal /j/. When they are articulated, the articulators make no contact between them. Phonetically, they act like vowels, whereas phonologically they function as consonants, occurring only at syllable margins (cf. 53). Therefore, they are called semi-vowels in some phonetics and/or phonology books.

(53)

a. wena ‘picture, photo’
b. kawɑna ‘bracket’
c. ʃaw ‘night’
d. jɑɾi ‘game’
e. bajɑni ‘morning, tomorrow’

One significant function of the approximants is their ability to act as consonants separating adjacent vowels in case of hiatus.

(54)

a. si ‘lung’ + -aka ‘def. sg. marker’ ⟶ siyaka ‘the lung’
b. pe ‘foot’ + -akɑn ‘def. pl. marker’ ⟶ peyakɑn ‘the feet’
c. lu ‘tumor’ + -aka ‘def. sg. marker’ ⟶ luwaka ‘the tumor’

The description of the CK consonants in terms of place and manner of articulation can be shown in a table like table 1.

Table 2.1 CK consonantal inventory

	Bilabial	Labio-dental	Alveo-dental	Alveolar	Post-alveolar	Palatal	Velar	Uvular	Pharyngeal	Glottal
Stop	p b		t d				k g	q	ʕ	ʔ
Affricate					tʃ dʒ					
Fricative		f		s z	ʃ ʒ			x	ħ	h
Nasal	m		n				ŋ			
Lateral			l	ɬ						
Vibrant: flap trill				 ɾ r						
Approximant	w					j				

2.5 Summary

The origins of the Kurds and their language are not clear; however, there is considerable agreement among scholars that they are descendants of Indo-European peoples who settled in the region through immigrations. Kurdish is an Iranian language, which is a branch of the Indo-Iranian group of the Indo-European language family. The Indo-Iranian group comprises two branches: northern and southern. Kurdish belongs to the north-eastern branch. Most scholars agree that the language has three major dialect groups: Northern Kurdish (Kirmanji), Central Kurdish (Sorani) and Southern Kurdish (Kelhori). Central Kurdish is spoken in the north of Iraq and Northwest of Iran.

The vowel system of CK consists of eight vowels and twenty-five consonant sounds. The vowels are described in terms of tongue height, tongue advancement, and lip shape or rounding. Based on tongue height, these can be high (close), mid (half close/half open), and low. The consonants can occur at syllable margins and form minimal pairs.

The CK syllable structure requires an epenthetic vowel to repair underlyingly consonant clusters, since it does not favour consonant clusters. The epenthetic vowel systematically occurs between two consonants, forming their syllable nucleus.

While CK seems to exhibit differences in vowel length, in the high and mid vowels in specific environments, such differences are not contrastive since the long and short vowels are in complementary distribution.

Chapter 3 The Syllable in Central Kurdish

3.1 Introduction

This chapter aims to provide a detailed theoretical account of the notion of syllable with an analysis of the structure of the syllable in CK in light of current phonological theories. It also describes CK syllable weight and examines its influence on stress placement. The chapter makes three basic assumptions: (a) that the syllable of CK starts with an onset, (b) that the onset does not include clusters, and (c) that the syllable of CK can have coda clusters of a maximum of two consonants. The analytical tools adopted in this chapter are primarily the formalisms advanced by Optimality Theory (OT): the constraints pertinent to syllable structure.

In addition to the introduction and conclusion, the chapter involves four sections, each addressing a specific domain closely related to the syllable and its relation to stress assignment in CK. Section 3.1 is an introduction to the chapter. Section 3.2 provides a theoretical introduction to the concept of the syllable, its structure and evidence for its existence as a distinct phonological unit. In 3.3, the relation of sonority hierarchy to syllable structure is explained with reference to CK. In 3.4, syllable structure is accounted for, whereas syllable weight and how CK syllables display characteristics of weight sensitivity are accounted for in section 3.5. Finally, in 3.6, an OT analysis of the syllable of CK is provided along with the markedness and faithfulness constraints that govern the syllable, its internal organisation and its distinct processes are provided with examples.

3.2 The syllable

While there is solid consensus amongst phonologists that the syllable is one of the most fundamental components of phonological representation, less consensus is observed among linguists on what it exactly is or how its internal structure is organised (Ladefoged, 2002: 226)[18]. This can, in part, be attributed to the fact that cross-linguistically syllable structures vary, since the syllable is not a single sound segment but an essential abstract unit in phonology with no explicit and unified phonetic counterpart (Kenstowicz, 1994: 250). Likewise, evidence for the syllable internal structure is less common compared to the arguments presented for the syllable as a phonological constituent (Bosch, 2011:21). It can also be owing to the fact that the syllable has been described both phonetically and

[18] Throughout this work, I use the terms 'syllable structure' and 'syllable-internal structure' interchangeably to refer to the structure of the syllable along with the constituents that build it.

phonologically, each utilising distinct tools of description and analysis based upon different methods, theories, and sources of evidence.

Phonetically, the syllable is explained in articulatory and auditory terms. In articulatory phonetics, each syllable is said to correspond to a peak in the flow rate of pulmonic air. In auditory terms, it is defined by peaks of sonority; that each peak of sonority corresponds to the centre of a syllable (cf. Giegerich, 1992: 131-2; Catford, 2001: 168; Ashby & Maidment, 2005: 7; Ladefoged & Johnson, 2011: 245-7, among others). However, sonority is also extensively employed in phonological theory as an argument for the syllable and its constituents (see Blevins 1995, Davis & Baertsch 2012).

From a phonetic point of view, a few theories have been offered to account for the syllable and its defining characteristics. For instance, the chest pulse (or motor) theory, which was presented by Stetson (1951), describes the syllable in terms of chest pulses. According to this theory, each syllable corresponds to a chest pulse[19]. In this sense, languages are said to have an inherent rhythmic organisation, based on bursts of timed initiator ('initiator' meaning the pulmonic egressive machinery), each initiator-burst having a single peak. In this sense, the syllable is a minimal chunk of initiator activity that is bounded by intra-foot retardations or by foot boundaries (Catford, 1977: 90, cited in Lass, 1984: 248-50). However, this definition of the syllable seems to serve the analysis of syllable-timed languages (such as French) where each initiator-burst is a power-curve, rising to a peak of emitted acoustic energy and then tailing off. It does not seem to fit for the analysis of stressed-timed languages (like English) where both the syllable and stress are more complex. In English, for example, a foot boundary may coincide with the syllable (Lass, 1984: 249).

An alternative phonetic approach is the prominence theory, which defines the syllable in auditory or perceptual terms. The basic assumption of the theory is that, in a string of sounds, some are more sonorant than others. These prominent sounds form the peaks of sonority and tend to occur at the centre of the syllable (Crystal, 1987). Different language sounds have different degrees of sonority. The vowels, for example, are the most sonorous sounds, while the voiceless stops are the least sonorant sounds (cf. figure 2). Based on this view, language sounds are divided into two main groups: the group of the vowels, nasals, and liquids, which are [+sonorant] and can occupy the peak of the syllable, and the group that involves the rest of the sounds, which have the share feature [-sonorant] feature and can only occur at the margins of the syllable.

[19] This view has been strongly rejected.

In early phonological theories, the syllable was not considered a phonological constituent. In their Sound Pattern of English (1968) (henceforth, SPE), Chomsky and Halle proposed that a phonological representation is simply a string of feature bundles, provided with a set of boundary symbols reflecting the morphological and a labelled bracketing system which represent the syntactic organisation of the words. In other words, their account included rules but not syllable boundaries. Subsequent phonological theories addressed not only syllable edges but also the syllable as a domain for rules. They viewed the syllable as a constituent higher than the phoneme yet distinct from the word or morpheme (Collins & Meese, 2008: 284; Gimson, 2008: 47). This in turn served as an element for expressing phonological generalisations (Carr & Montreuil, 2013: 168). It is also described as a unit that imposes constraints on the permitted sequences of sound segments in individual languages (Gussenhoven & Jacobs, 2005: 20).

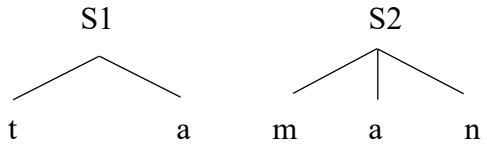
Arguments advanced in support of the syllable as a phonological constituent are abundant. Most important of these can be summarised as the following:

1. The syllable as a natural domain for the operation of phonotactic and well-formed constraints
2. Reference to the edge of syllables
3. The syllable as a prosody-bearing unit for the purposes of stress and intonation rules
4. Reference to the syllable as a domain of feature spreading
5. The syllable as prosodic targets of morphological processes such as reduplication
6. Native speakers' intuitions about the number of the syllables in a word or utterance. However, native speakers' judgements are also advanced in defence of the syllable internal constituents (cf. Selkik 1982: 329-35; Durand 1986: 306-10; Kenstowics 1994: 250-2; Blevins, 1995: 207-10, van der Hulst and Ritter, 1999: 14-21; among others).

Various models of syllable structure representation and theories of syllable analysis have been suggested since the forties of the previous century. They reflect, in part, the development of the descriptive tools and analytical frameworks of the syllable from the classical flat models to the recent OT accounts. Most of these models and theories share their recognition of the syllable as a hierarchical unit in phonological representation (e.g. Pike and Pike (1947), Fudge (1969, 1999), Liberman and Prince (1977), Selkirk (1978, 1982, 1999), McCarthy (1979b), Halle and Vergnaud (1979, 2007), Blevins (1995), Hayes (1995), Ewen and van der Hulst (2001), among others). Following Blevins (1995:212), however, we can list four main approaches with reference to examples of CK:

a) Flat structure: the syllable consists only of segments with no subconstituents (Kahn, 1976, Clements and Keyser, 1983). Kahn (1976), for instance, proposes a simple, two-tier structure in which syllable nodes, symbolized by "S", are associated directly with the discrete sound segments. Accordingly, each maximal sequence of the segments that is dominated by a single node "S" constitutes a syllable. Kahn's flat Autosegmental theory claimed no internal structure for the syllable. For example, a disyllabic word like *temen* /taman/ "age" can be represented as follows:

(1)



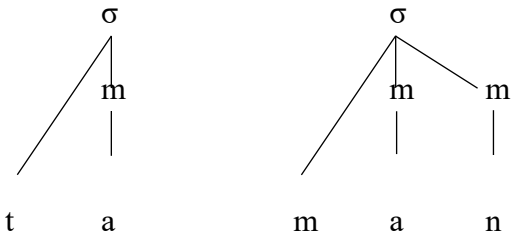
In (1), "S1" and "S2" refer to syllable nodes, which are linked to the maximal sequences [t, a] [m, a, n] respectively.

b) Moraic approaches: the syllable consists of weight-bearing units that are explicitly represented and measured by morae (m). The main generalisations of this conception are the following:

i. Heavy syllables consist of two morae
ii. Light syllables consist of one mora

This approach accounts best for stress-related phenomena in quantity-sensitive languages, in which stress assignment is usually associated with the weight of the syllables. Hence, languages that are insensitive to weight, such as CK, require an alternative formalism of syllable structure (Prince 1983a, McCarthy and prince 1986, Hayes 1989b). Example (2), below, shows how the syllables of the word *temen* /taman/ "age" could be represented in this view:

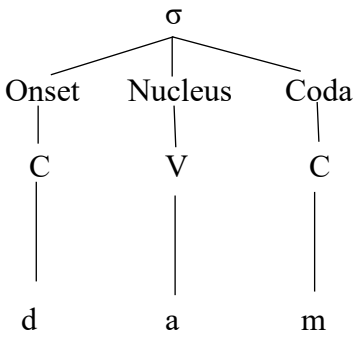
(2)



In (2), the symbol "σ" refers to syllable nodes, whereas "m" designates a mora. The first syllable has one mora and is, according to this example, light (L). The second syllable contains two morae and hence is considered heavy (H)[20].

c) Ternary branching: this view suggests a tripartite division of the syllable involving the onset, nucleus, and coda. Among these constituents, however, the nucleus enjoys a special status since it is considered the only obligatory constituent of the syllable (Hockett 1955, Haugen 1956, Davis 1985). According to this view, for example, a monosyllabic word like *dem* /dam/ "mouth" has the following structure:

(3)

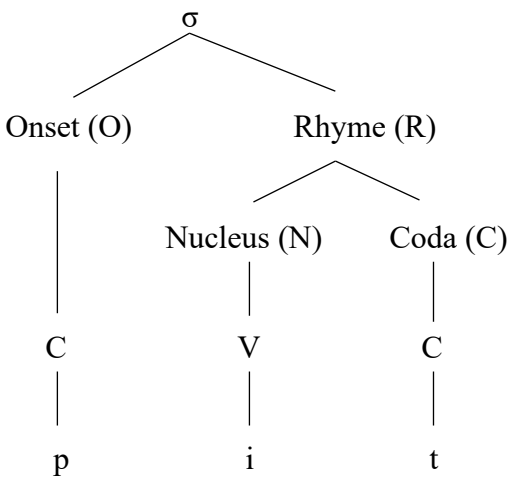


As shown in (3), the onset comprises the syllable-initial consonant [d], the Coda the syllable-final consonant [m], whereas the Nucleus involves the vowel [a].

d) Binary branching: With the development of the hierarchical representations of syllable structures, two formats have been advanced: binary branching with rhyme (or onset-rhyme model) and binary branching with body. The binary branching with rhyme, which is by far the more conventional type, posits a structural division between the Onset and the rest of the syllable grouped as the rhyme. The rhyme is further divided to the Nucleus and the Coda. The onset-rhyme division is accredited to Pike and Pike (1947), while arguments for the division are offered by Fudge (1969), Halle & Vergnaud (1980) and Selkirk (1982). However, this is the view adopted in this work for the representation of the CK syllable structure. In example (4), below, the monosyllabic word *pît* /pit/ 'letter' is structured hierarchically into its constituents and represented by a tree diagram:

(4)

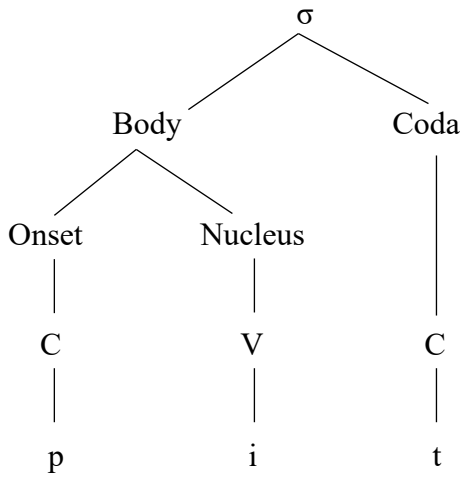
[20] This example is provided for the purpose of explanation, since CK is a quantity-insensitive language, and its syllables do not generally exhibit weight distinctions.



The structure in (4) represents a syllable with a branching onset and a branching rhyme, where the latter constituent dominates the two further branching constituents: the nucleus and the coda, However, the onset-rhyme model as a syllable constituent does not seem to fit into the general structure of the prosodic hierarchy which groups units of the same type: syllables into feet, feet into words, words into phrases, etc. (Nespor and Vogel, 1986).

According to the second assumption, the binary branching with body, the syllable comprises the constituents' body and coda. The body is the unit that is composed of onset and nucleus (McCarthy 1979, Vennemann 1984, Yoon & Derwing 2001). Consider example (5) below.

(5)

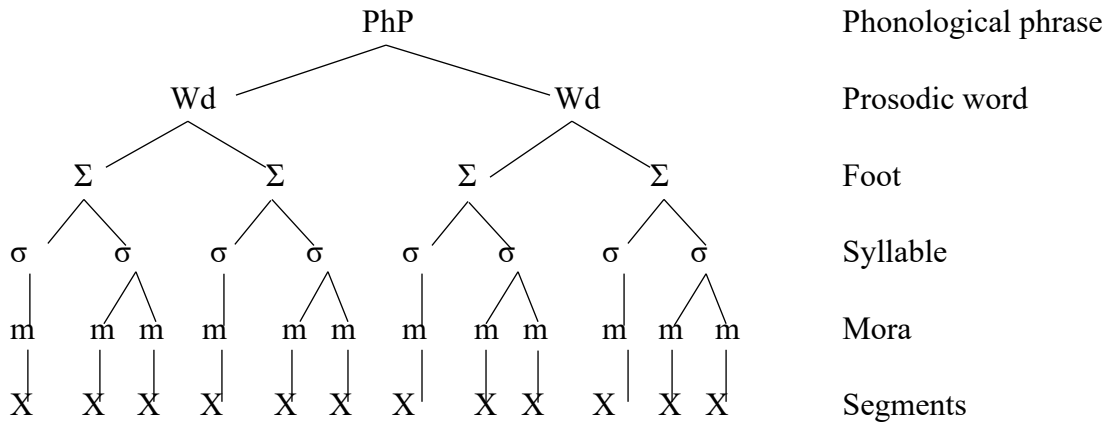


It should be noted that while syllable structures do not always comprise these three units, the core syllable (i.e. the C-V structure) seems to be found in every language, regardless to whether or not the language also allows more complex syllables (Roca and Johnson, 1999:

240). Typologically, literature has shown that all languages allow syllables to have onsets and that a few require every syllable to start with an onset. Conversely, all languages allow syllables to lack a coda, and some languages do not even allow their syllables to have one. In other words, it seems that while all languages allow open syllables, a few do not allow closed syllables (Bernhardt & Stemberger, 1998: 111)[21].

However, the hierarchical representation of the syllable has contributed to the introduction of the prosodic hierarchy theory (e.g., Selkirk 1980, Selkirk and Shen 1990), which positions the syllable in a larger hierarchical plane, the prosodic plane, along with the prosodic foot, the prosodic word, and the higher-level constituents (Blevins 1995:210).

Figure 3.1 The prosodic plane showing the universal prosodic hierarchy



3.3 Sonority and CK syllable

An important aspect of syllable structure is the degree of segment eligibility for the syllabic locations. Cross-linguistically, it is observed that vowels are the most likely segments to occupy the nucleus whereas the voiceless stops are the least likely. This observation is related to the notion of sonority. Sonority is a scalar property of speech sounds: some sounds are more sonorous than others. Voiced segments, for instance, are more sonorous than their voiceless counterparts (Carr & Montreuil, 2013:171).

In acoustic terms, sonority is defined as the relative loudness of a segment compared to other segments, everything else being equal. Accordingly, differences of sonority are claimed to reflect differences in the amount of the acoustic energy of segments. However,

[21] The binary branching principle adopted in the government phonology theories also allowed what is known as a 'degenerate syllable'; that is, a syllable that consists of an onset only. Perhaps this idea has influenced recent moraic approaches to have moras that lack a syllable (Baghemil, 1991), headless syllables (Nepveu, 1994), or moraless syllables (Shaw, 1993) (van der Hulst and Ritter, 1999 :25).

voicing and degree of stricture of airstream play a crucial role in determining the relative sonority of segments (Giegerich, 1992:132; Ladefoged, 1993: 227; Gussenhoven & Jacobs, 1998: 138). Given these two factors, segments can be organised onto a scale of sonority hierarchy (figure 2).

Figure 3.2 Sonority Hierarchy (adapting Bernard & Stemberger 1998)

Sonority	Index	Sounds
High sonority		
	9	low vowels
	8	mid vowels
	7	high vowels/glides
	6	glides
	5	liquids
	4	nasals
	3	voiced fricatives
	2	voiceless fricatives
	1	voiced stops
	0	voiceless stops
Low sonority		

As noticed in figure 2 above, the low vowels exhibit the maximal degree of sonority while the voiceless oral stops the minimal. All other segments are therefore located between these two extremes of highest and lowest sonority degree.

In phonological theory, sonority is employed to explain the nature of the syllable structure. There is general agreement that sonority degree increases as one proceeds from the syllable margins (i.e. onset and coda) towards the nucleus, and it decreases as one moves conversely (Blevins, 1985:210; Carr & Montreuil, 2013:171). This generalisation has been observed in a wide range of literature (Jespersen 1904; Saussure 1914; Grammont 1933; Hooper 1976; Kiparsky 1979, 1981; Steriade 1982; Selkirk 1984; Clements 1990). It has also led to the formulation of the Sonority Sequencing Principle (SSP) (Hooper 1976; Kiparsky

1979, 1981; Steriade 1982; Selkirk 1984; Levin 1985; Clements 1990). Within this literature, a recent line of research (e.g. Kiparsky 1979; Steriade 1982; Selkirk 1982; Clements 1990) has aimed at establishing formal characteristics of SPP. Following Gussenhoven and Jacobs (1998: 138), the SSP can be stated as follows:

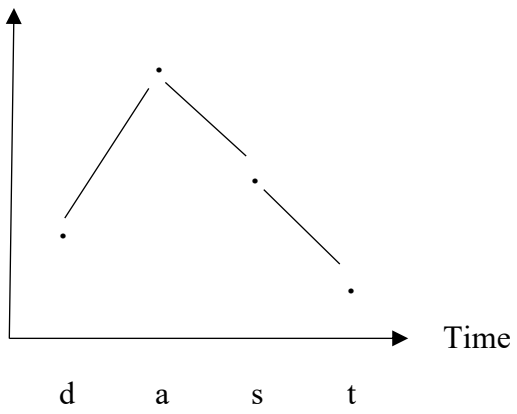
Sonority Sequencing Principle

Syllable nuclei are consistently associated with sonority contour peaks in a one-to-one fashion, with the qualification that for this procedure, some languages ignore peaks below a certain threshold.

According to the SSP, every syllable contains a nucleus, the most sonorous element, preceded and optionally followed by segments of progressively lower sonority. However, it should be noted that while sonority sequencing is universal, its application is language specific. In addition, while syllable structures of languages seem to conform to the generalisation of SSP, the presence of clusters that do not obey the pattern prescribed by the principle challenges its universality. For instance, English [s] in complex onsets and codas forms an exception to the SSP ordering (Giegerich, 1992: 137). Accordingly, it seems that the SSP can be best characterised as a universal tendency rather than an absolute universal.

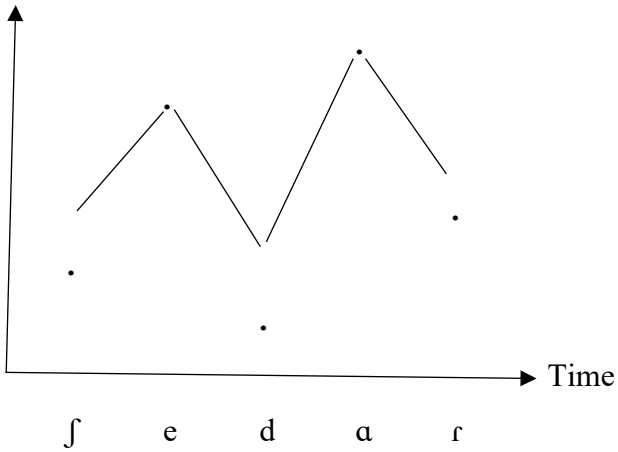
As syllables are associated with peaks of sonority, we can explain the nature of CK syllable structure and determine the ordering of its segments in the light of the sonority hierarchy. Knowing that CK syllables do not have onset consonant clusters (see section 3.3), we will pay particular attention to the order of the segments of the rhyme. In a monosyllabic word like *dast* /dast/ “hand”, /d/ is according to the sonority scale less sonorous than /a/. /a/ is also more sonorous than /s/, which in turn is more sonorous than the final /t/. In a graphic representation, the sonority profile of /dast/ shows a single sonority peak as in (6) below:

(6) Sonority



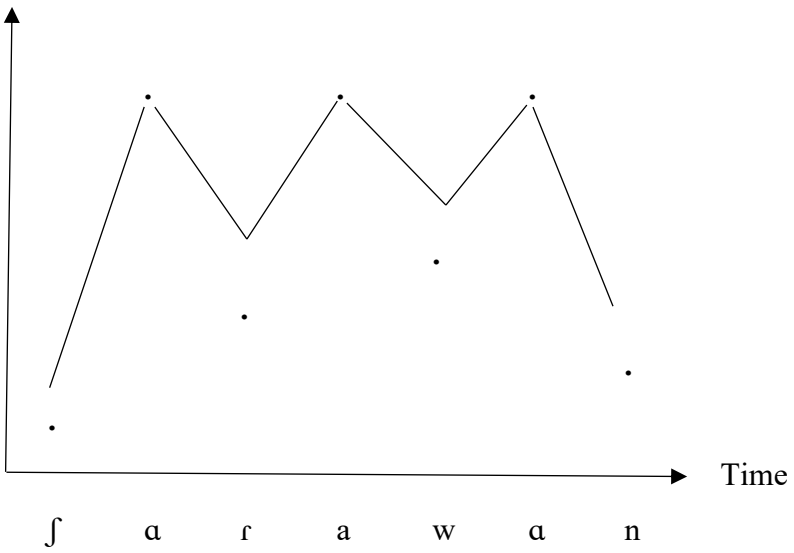
A disyllabic word such as *şêdar* / ʃedɑɾ/ “humid” can represented in the same graphic form:

(7) Sonority



In example (7), the two peaks of /e/ and /a/ represent the two syllables of the word. However, since /ɑ/ is the most sonorous segment, it is ranked the highest. As shown, sonority decreases as one proceeds from the margins towards the nucleus of both syllables. This holds true for multisyllabic words. For instance, in *şarewan* /ʃɑɾawɑn/ “mayor” (8), the three peaks reflect the fact that the syllable consists of three syllables. As one moves from the onsets to the nucleuses, sonority increases, whereas it decreases once one proceeds from the nucleus towards the codas. Thus, /ɑ/ is more sonorous than /ʃ/and is therefore ranked higher. The same is true for the ordering of each of /ɾ/ and /a/ in the second syllable, and /w/, /ɑ/ and /n/ in the third.

(8) Sonority



3.4 Syllable structure of CK

While there is consensus among scholars that, unlike Italian or Japanese, CK can have open and closed syllables, no such consensus is enjoyed when it comes to the structure of the CK syllable. This is particularly noticed regarding consonant clusters. Each scholar seems to suggest a different set of consonant clusters permitted in the CK syllable. Fattah (1997: 38-41), for example, claims that CK syllables allow bi-consonantal cluster syllables word initially and finally. Based on this assumption, he suggests nine syllable patterns: V, CV, CVC, CCV, CVCC, VCC, VC, CCVC, and CCVCC. Hassan (1991: 59-61), on the other hand, believes that CK syllables can have bi-consonantal clusters word initially, whereas Ahmad (1986: 90) and McCarus (1997: 701) argue that CK syllables can only have final two-consonant clusters, with no reference to restrictions on the type of the consonants allowed in the coda position.

One important characteristic of the CK syllables is that their onset is obligatory since they do not start with a vowel. Syllables that are claimed to start with a vowel (e.g. by Fattah, 1997) are in fact initiated by an epenthetic glottal stop /ʔ/, which is inserted both to prohibit vowel-initial syllables and reinforce the production of the nucleus vowel sound. Evidence for this counterargument can explicitly be found in several CK words such as *aş* /ʔɑʃ/ 'mill', *êsta* /ʔes.tɑ/ 'now', and *azadî* /ʔɑ.zɑ.di:/ 'freedom' (cf. Fattah, 1997: 36; McCarus, 1997: 696; Mahwy, 2009: 147)[22].

Furthermore, CK syllables do not seem to start with consonant clusters if they occur word initially. Disagreeing with Fattah (1997), we presume that when two consonants occur in the onset of a word initial syllable, the unstressed epenthetic vowel (/ɨ/ or /ʉ/) is usually inserted after the initial (onset) consonant, hence rendering a CV structure and meeting the vowel presence criterion of the CK syllable. For instance, /tre/ 'grape' and /słau/ 'salute' would become /tɨ.ɾe/ and /sɨ.łau/respectively. In a similar vein, examples like /dwa:n/ 'two', /pya:z/ 'autumn', and /fro:/that are provided by Fattah (1997: 37-9) to support his argument for the initial consonant cluster can instead be rendered as /dʉ.wɑn/, /pɨ.jɑz/, and /fɨ.ɾo:/ respectively.

Missing this fundamental rule of the Kurdish syllable, MacKenzie (1961: 16-17) argues for the existence of two- and three-consonant clusters in the onset position of word initial syllables. However, that the epenthetic vowel /ɨ/ that is found in the CK syllables requires special attention for several reasons. First, it does not represent a similar case of vowel

[22] The universality of this phonological rule or phenomenon, which was first claimed by Abercrombie (1967), is controversial. In addition, it is exploited differently in the languages claimed to observe the rule. However, a language like English does not seem to obey this rule.

epenthesis found in some languages such as Farsi or Japanese, in which vowel epenthesis is a process typical of loanword adaptation to satisfy constraints on phonotactics and syllable structure in the recipient language. Secondly, in CK, it is usually found in words of Kurdish origins; that is, not in loan words. Thirdly, in such cases of the CK syllables, it is not epenthesised but is rather an intrinsic part of the syllable structure. Fourthly, it is sometimes elided with word affixation when re-syllabification occurs. Finally, it is often found in Kurdish words that contain no lexical vowel, i.e. it is the only vowel of such words as /mɨl/ 'neck, /pirɨd/ 'bridge', and /ʃɨ.kɨst/ 'failure'.

While consonant clusters are not allowed in the onset, CK syllables allow for a maximum of two consonants in the coda; therefore, CVCC can be regarded as the maximal structure of CK syllables, as in *mest* /mast/ 'husband', *beheşt* /ba.haʃt/ 'heaven', and *karmend* /kɑɾ.mand/ 'employee'. This indicates that CK has three basic syllable structures: CV, as in the word *pê* /pe/ 'foot'; CVC, as in *ser* /sar/ 'head'; and CVCC, as in *Mest* /mast/ 'drunk'. Of these, the coda C is optional while the onset C and nucleus V are obligatory. This view is principally similar to the account offered by Ahmad (1986) and McCarus (1997)[23]. It should be noted that cross-linguistically the CV syllable is considered the core syllable. Evidence for this claim comes from two sources: a) early child language, which consists of CV syllable patterns; and b) some languages only have CV syllables (Roca and Johnson, 1999: 240-241).

Moreover, Fattah (1997) suggests that two less common CK syllable structures with initial consonant clusters are formed due to the elision of the unstressed lax vowel /ɨ/ before word-medial CV. These are CCVC, as the second syllable in /barz.trin/ 'the highest' (derived from /ba.rɨz/ 'high' + /tɨ.rin/ '-est, the most' with resyllabification), and CCV, as in /barz.tri.na/ 'is the highest', where the second syllable marks morpheme boundary (in this case, the addition of the superlative morpheme). However, we believe that this view lacks the crucial function of the epenthetic vowel (see § 2.3.2), which is inserted between the two onset consonants to avoid a violation of the basic CK syllable structure. Accordingly, the structure is CV.CVC rather than *CCVC. Accordingly, the example given comprises four syllables and can be represented as /ba.rɨz.tɨ.ri:n/.

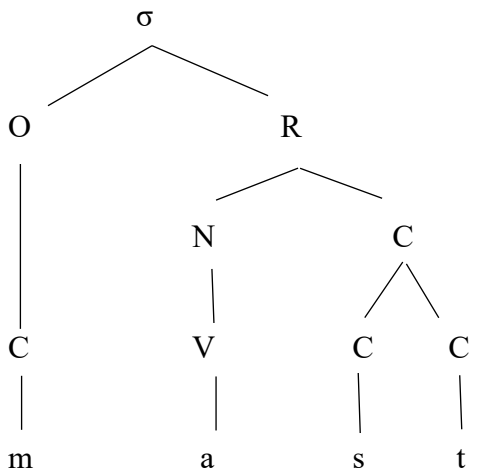
The restrictions on the syllable internal structure seem to obey the sonority hierarchy: the last consonant in the sequence (i.e. syllable edge) is one of the lowest sonority level; the voiceless alveolar stop /t/ preceded by either the voiceless alveolar fricative /s/ or the voiceless post-alveolar fricative /ʃ/. Similarly, it can be the voiced alveolar stop /d/ or the

[23] As for the vowels, it should be borne in mind that CK does not allow vowel sequences (see McCarus, 1997:699).

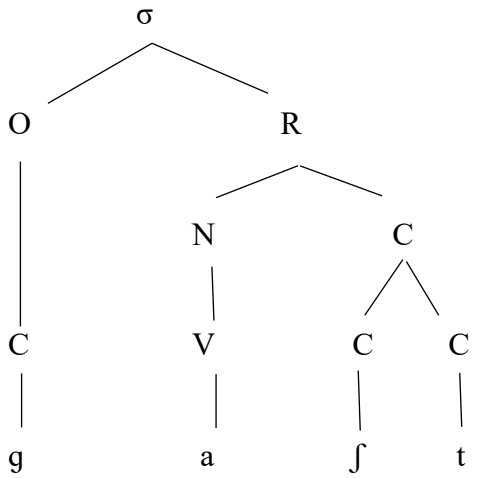
voiced post-alveolar affricate /dʒ/ preceded by the nasal /n/. These can be formally represented by the following examples:

(9)

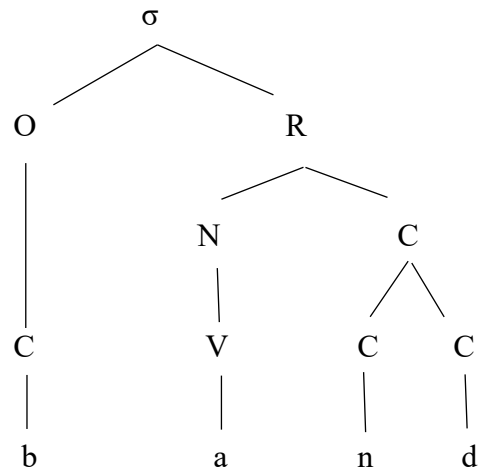
a. /s+t/



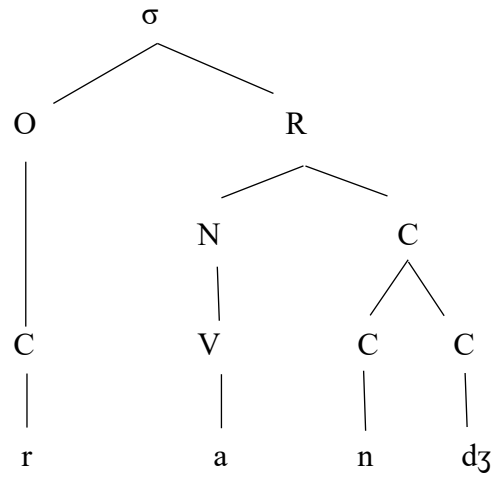
b. /ʃ+ t/



c. /n+d/



d. /n+dʒ/



These confirm the claim that every CK syllable must have a vowel; in other words, the number of the vowels in a word indicates the number of the syllables (McCarus (1958: 23), Mahwy (2009: 175). However, the maximum permissible number of syllables in a CK word may reach six, as in the word *beřêweberêtî* /ba.re.wa.ba.ɾe.tiː/ 'directorate'.

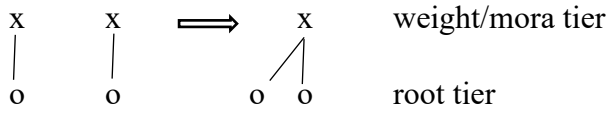
Two significant observations on the CK syllable structure are that a) although no restrictions on the set of consonants in the syllable coda are found, the consonants agree in voicing with the first segment if it is a fricative or a nasal, as shown in (9); and b) the voiceless glottal affricate /h/ does not occur in the coda of CK syllables.

3.5 Syllable weight

Syllable weight can be defined as the property which distinguishes syllables based upon the prosodic behaviour they display (Gordon, 2006: 1). For examples, syllables are considered

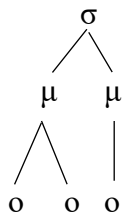
light or heavy. Light syllables are those that contain a short vowel followed by no consonant. Heavy syllables, on the other hand, are those that contain a short vowel followed by a consonant, or a long vowel or diphthong. Weight in phonological theory is related to the concept of the mora and represented by its formalisms. The mora was employed in the generative phonology by McCawley (1968), yet it was not treated as a prosodic constituent by phonologists such as Selkirk (1981) and Nespor and Vogel (1986). The hierarchical moraic model was introduced in Hyman (1985) and was subsequently included as a constituent of the prosodic hierarchy (e.g. Piggot, 1995; Ito and Mster, 2003, 2012). The major impact of the moraic theory has been on the treatment of compensatory lengthening (Hayes, 1989), which is observed in several languages, including CK. In the early version of the moraic theory, a mora was referred to as a weight unit was formally represented by an 'x'. The result was a formalism such as (10), in which 'o' stands for onsets:

(10)



In Hayes' (1989) version of the theory, the x-tier was replaced by a mora tier (μ) in all cases (cf. 11),

(11)



One important implication of moraic theory is related to distinguishing weight variations: a short vowel is said to project one mora whereas a long vowel is considered bimoraic; that is, a long vowel is considered heavier than a short one (van der Hulst, 1999:31).

CK is argued to be a quantity-insensitive language (i.e. syllable weight does not affect phonological rules such as stress assignment); nevertheless, the CK syllables exhibit some behaviours of weight sensitivity through contrastive vowel length contrast, gemination, and compensatory vowel lengthening. This shows that although vowel length distinction is a well-

known property of quantity-sensitive languages, classifying languages as being either sensitive to syllable weight or insensitive to it does not seem to offer a conclusive outcome. The contrastive oppositions found in CK can be cited as evidence for this claim (cf. § 2.3.3).

3.5.1 Contrastive vowel length

According to Hayes (1989), language systems that display contrast in phoneme length show distinction in syllable weight as well. Conversely, those that do not manifest length distinction, do not have syllable weight distinction. However, CK offers evidence of weight distinction although its syllables are insensitive to weight. The examples in (12) show minimal pairs based on vowel length contrast (in the low vowels):

(12)

a.	baɾ 'product'	vs.	bɑːɾ 'load'
b.	tam 'fog'	vs.	tɑːm 'taste'
c.	ka 'that, which'	vs.	kɑː 'hay'
d.	mast 'drunk'	vs.	mɑːst 'yogurt'
e.	ʧaw 'pebble'	vs.	ʧɑːw 'eye'
f.	xaw 'sleep'	vs.	xɑːw 'slow'

An important observation here is that in the CK phonemic system, the low vowels /a/ and /ɑ/ do not differ much in quality; the difference here is one of quantity. While the examples in (12) show the length distinction between monosyllabic words, similar contrasts can be observed in multisyllabic words as well. Consider the pairs in (13) below:

(13)

a.	bɑɾɑn	'rain'	vs.	baɾɑːn	'ewe'
b.	dɑna	'item'	vs.	dɑnɑː	'wise'
c.	pała	'stain'	vs.	pɑːła	'worker, worker honey bee'
d.	naxoʃ	'ill'	vs	nɑːxoʃ	'unpleasant'

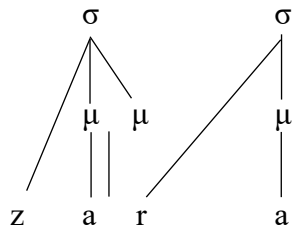
3.5.2 Gemination

Many languages including Persian, Arabic, Turkish, among others have geminate consonants; nonetheless, neither the phonetic manifestation nor the phonological nature of geminates is explicitly explained. Similar ambiguities surround their cross-linguistic similarities and differences. Both in phonetics and phonology, gemination is described in terms of contrasts in consonant length which is mainly indicated by consonant duration (Kubozono, 2017:2).

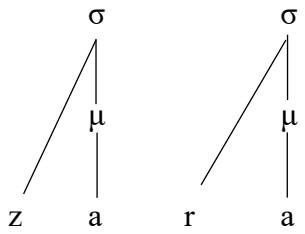
Geminate consonants serve as a second source of support for syllable weight distinction in CK. Hayes (1989) argues that geminate consonants are underlyingly moraic (show weight) whereas singleton consonants are non-moraic. The coda consonants that are adjoined to the syllable, in the derivation, are assigned a mora by language-specific rules of assigning weight by position. According to Hayes (1989) one of the basic requirements of underlyingly assigning moras lies in attesting gemination in a given language. Accordingly, the gemination found in CK is another argument for syllable weight. This is explicitly shown in (14), in which (14a) has a geminate consonant coda.

(14)

a. zarra ‘a tiny amount’



b. zara ‘barking’



3.5.3 Compensatory lengthening

Compensatory lengthening (CL) serves as another source of evidence for syllable weight. Hayes (1989) believes that CL is observed only in language systems that have syllable weight distinction. This claim posits that, based on syllable weight sensitivity, languages can either be sensitive or insensitive to syllable weight.

The derivational based analysis of CL is a two-step process: Firstly, the sound segment that is related to mora is deleted; and secondly, a floating mora re-associates with the preceding sound segment and this, in turn, triggers the lengthening of the adjacent vowel. While it is claimed that CL is part of syllabification of individual languages, the data on CK shows that CL cannot always be part of syllabification especially when the process is triggered by vowel loss. In the pronunciation of some Arabic and Persian words, CK speakers show variation as to observe CL or not. The choice to use the underlying or surface form can be attributed to sociolinguistic factors (literacy, education, donor language, etc.). Educated

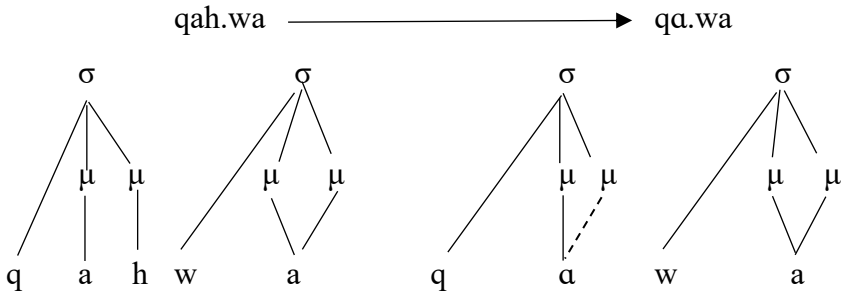
CK speakers tend to pronounce the underlying forms of the Persian and Arabic loan words, whereas uneducated speakers, who have no knowledge of the orthography of the donor languages, may use the surface form where CL is attested. Consider the examples in (15) show this process:

(15)

a. ˌkah.ɾa.ˈbɑ ⟶ ˌkɑ.ɾa.ˈbɑ ‘electricity’
b. maʕ.ˈnɑ ⟶ mɑ.ˈnɑ ‘meaning’
c. qah.ˈwa ⟶ ˌqɑ.ˈwa ‘kofee’
d. ˌqah.ɾa.ˈmɑn ⟶ ˌqɑ.ɾa.mɑn ‘champion’
e. ʧah.ˈɾa ⟶ ʧɑ.ɾˈa ‘face’
f. rah.ˈbaɾ ⟶ rɑ.ˈbaɾ ‘leader’
g. ʃahɾ ⟶ ʃɑɾ ‘city’

In (15), examples *a, b*, and *c* are Arabic loan words, while *d, e, f* and *g* are Persian loan words. The formal moraic representation of the CL in the word *qahwa* ‘coffee’ can be as follows:

(16)



In (16), the deletion of the coda consonant has led to the lengthening of the immediately preceding vowel. This has made the syllable that has undergone coda deletion and CL the heavy syllable, hence represented by two moras on the diagram, while the syllable that has not undergone CL is light.

3.6 Syllable constraints and OT

The syllable and its structure have received considerable attention in the phonological theory, particularly with the advent of Optimality Theory (OT). Introduced in 1993 (McCarthy & Prince 1993b; Prince & Smolensky 1993), as a constraint-based approach to the analysis of phonological data, OT has been one of the most influential theoretical frameworks of phonological analysis in recent years. It marks a sharp departure from the post-SPE ear of rule-based phonology to sets of cross-linguistic constraints on explicit well-formedness

principles (cf. McCarthy & Prince 1993b; Burzio 1994; Prince & Smolensky 1997; McCarthy 2001, inter alia)[24].

There are three basic types of OT constraints: markedness constraints, faithfulness constraints, and alignment constraints. Markedness constraints account for specific structural configurations. For instance, *CODA expresses the universal tendency for languages to prefer syllables without codas. On the other hand, ONS is the constraint that expresses cross-linguistic tendency for languages to prefer syllables with onsets. Markedness constraints usually prohibit some phenomenon or impose restrictions on the occurrence of certain segments. Examples of such markedness constraint related to the syllable are given in (17):

(17)

a. Syllables must not have codas (*COD)

b. Syllables must have onsets (ONS)

c. Obstruents at coda position must not be voiced (*VDOBS(CODA))

d. Obstruents must be voiced (VDOBS)

On the other hand, the aim of the faithfulness constraints is to enforce similarity between input and output. It makes sure that the output segments are faithful; that is, they match the input segments. Thus, an output is considered less faithful to an input if it has had segments deleted, added, or changed in some way. For instance, all morphosyntactic features in the input are to be overtly realized in the output. Kager (1999) lists some typical examples of faithfulness constraints that are available in most languages. Examples of faithfulness constraint include the following:

(18)

a. The output must present all segments present in the input (DEP-IO)

b. Elements adjacent in the input must be adjacent in the output (CONTIGUITY)

c. Input segments must have counterparts in the output (MAX-IO)

d. The specification for place of articulation of an input segment must be preserved in its output correspondent (IDENT-IO(PLACE))

[24] See §5.8 for a detailed account of OT.

It should be noted that both markedness and faithfulness constraints are ranked in a language-specific order. In an analysis, different markedness and faithfulness constraints usually do conflict, so the ranking of the constraints decides the right candidate as the output depending on the violation (of constraints) pattern.

The alignment constraints are utilised to ensure structural alignment between various linguistic structures. They may, for instance, make sure that the right edge of a word coincides with the right edge of a syllable.

In all these three constraints, if a candidate violates a high-ranking constraint, it cannot be a winner by satisfying lower-ranked constraints. Here, violability ensures that the optimal candidate is not required to satisfy all constraints. It may violate a constraint and still win as the optimal candidate, if it satisfies the top-ranked candidate(s). Finally, the constraint ranking and their interaction among the input candidates are typically represented by tableaux in the OT analysis. In such a tableau, the candidates are listed vertically while the constraints are ranked in the horizontal line (cf. Kager, 1999: 3-22; Davenport and Hannahs, 2010: 198- 200; among others).

OT examines several restrictions available in the phonological processes in a language and relevant constraints are formed to account for those restrictions. Syllable structure is one of the prominent topics in the research activities in the OT framework. Féry and van de Vijver (2003), for example, have presented a collection of studies on this topic that opens new ways of further research on several issues of syllable structure. Nonetheless, to date OT is relatively a less preferred methodology among researchers who work in CK phonology.

To account for the syllable in CK and for the different phonological processes that operate in the syllable domain, we present constraints relevant to each process and then employ OT formalisms (i.e. OT tabloid) to represent examples. We begin by presenting and ranking basic syllable constraints required to erect basic syllable structure in OT. Based on a generalization stating that languages neither forbid onsets nor require codas, Clements and Keyser (1983) suggest that cross-linguistically the primary set of core syllable types includes CV, V, CVC and VC. Of these, CV is the least marked type. Prince and Smolensky (2004) consider the CV as the universally optimal syllable which is allowed in all languages. The basic constraints that govern syllable structure fall into two groups of markedness and faithfulness. Markedness constraints refer only to output form, requiring it to satisfy certain well-formedness criteria, whereas faithfulness constraints refer to both input and output, and require the output to keep the features of the input (Prince & Smolensky, 2004: 106). The basic markedness constraints are given in (19):

(19) Markedness Constraints

a. PARSE-SEG Segments must belong to syllables
b. ONS: Syllables must have onsets.
c. *COD: Syllables may not have codas.

The data on CK syllable structure shows that two constraints ONS and PARSE-SEG are never violated in the language, while *COD is violable as seen in the basic CK syllable types. The markedness constraints interact with faithfulness constraints which penalise any change we may observe between the input and the output.

Faithfulness Constraints, on the other hand, include the following:

(20) Faithfulness Constraints

a. MAX: Input segments may have output correspondents. (no deletion)
b. DEP: Output segments may have input correspondents. (no insertion)

To determine the status of these constraints, we will first need to find out whether onsets are required and whether codas are prohibited or not. This step will help us rank markedness constraints ONS and *COD with respect to faithfulness constraints. The next step is to find out how this onset requirement and/or coda prohibition is enforced in CK to correctly capture the ranking of MAX and DEP. Based on the data we have explained in this chapter, we can see that the onset position in CK syllables is obligatorily, filled with a consonant. This helps us rank ONS higher than MAX and DEP. In other words, it shows that ONS dominates both MAX and DEP. The ranking is represented as follows:

ONS >> DEP, MAX

A mono-syllabic word like *to* ‘you’ can be represented in a tableau like (21) to explain how the constraints are ranked in relation to the input:

(21)

Input: /to/	ONS	MAX	DEP	*COD
☞ a. to				
b. tol			*!	*
c. or	*!	*	*	

The most important interaction in (21) is between ONS >>*COD which has resulted in an output with onset but without coda. The optimal output in (21) is faithful to the input. Also, ONS, MAX and DEP are ranked equally as indicated by the interrupted lines.

For more complex syllable structures, we can utilise the following markedness constraints:

(22)

a. *COMPLEXONS syllables must not have more than one onset segment.
b. *COMPLEXCODA syllables must not have more than one coda segment.

For example, a word like *past* 'upset', which has a complex coda, can be represented on a tableau like (23). We should bear in mind that ONS and *COMPLEXONS with the faithfulness constraints are equally ranked since there is no evidence that proves otherwise; i.e. that one of them outranks the other. Input indicates the phonological representations from Lexicon and morphological elements such as affixes before the application of any phonological processes. Consider tableau (23) below:

(23)

Input: /mast/	ONS	*COMPLEXONS	MAX	DEP	*COD	*COMPLEXCODA
a. ast	*!		*		*	*
b. mas			*!		*	
c. masti		*		*	*	*
d. ma			*!*			
☞ e.mast					*	*

In (23), MAX and DEP are equally ranked for the input. The fact that MAX outranks DEP; this ranking results in crucial consequences in the CK syllable structures and types. Likewise, the tableau has showed that DEP takes priority over each of *COD and *COMPLEXCODA. This reflects the fact that vowel epenthesis is not utilised as a general strategy to avoid coda and complex coda in CK syllables.

The two winning candidates in tableaux (21) and (23) were identical to the input. However, this is not how CK syllables always behave. The insertion of an epenthetic vowel, appearing in the output is a very common phonological process in the CK syllables.

Another example of how OT constraints operate in the syllable domain is the epenthetic vowel. The epenthetic vowel /ɨ/ gives us significant insights both into the syllable as a prosodic constituent and the general principles of prosodic phonology. As we stated in chapter two, the main function of vowel epenthesis is to amend syllable structures that are otherwise not allowed in a given language (cf. §2.3.2). In other words, we can conclude that epenthesis is limited to syllable and that it is closely related to language specific phonotactics.

Except for a very limited number of cases, CK syllables indicate that they do not tolerate consonant clusters at their edges, particularly in the onset. This phenomenon of low tolerance of consonant clusters which leads to the breakup of clusters is claimed to be the most noticeable aspect of syllable structures in Kurdish (Kahn, 1976). Moreover, CK syllables seem to allow for strings of consonants without underlying vowels. In this case, sonority imposes certain constraints, hence the syllable template triggers epenthesis to form well-formed syllables. Consider the examples provided in (24), which show epenthesis for forms with no underlying vowels:

(24)

a. ml → mɨl 'neck'
b. kʧ → kɨʧ 'girl'
c. pʃt → pɨʃt 'back'
d. mɾdn → mɨɾdɨn 'death'
e. ʧɬkn → ʧɨɬkɨn 'dirty'

In OT terms, the analysis of the epenthetic vowel /ɨ/ sheds light on syllabification and syllable structure in CK. In this case, markedness constraints of syllable shape requirements interact with faithfulness constraints; MAX and DEP. Languages employ different constraint rankings to force strings of segments to comply with language specific syllable templates. If MAX outranks DEP, then epenthesis will function as the repair strategy. However, if DEP outranks MAX, the repair strategy will be segment deletion. Therefore, one of the faithfulness constraints should be violated in order to satisfy the highly-ranked markedness constraints. The constraints involved in repairing vowelless strings of consonants in CK are the constraints in (19), (20) and (22). These constraints cane be ranked as follows:

(25) PARSE-SEG, ONS, *COMPLEXONS**,** MAX>> DEP, *COD

Example (26) explains this with an OT tableau of the mono-syllable /mɨl/ 'neck'.

(26)

Input: /mɨl/	PARSE-SEG	ONS	*COMPLEXONS	MAX	DEP	*COD
☞ a. mɨl					*	*
b. ml	*!					*
c. ɨl		*		*		*
d. mɨ				*!	*	
e. mlɨ			*!		*	

In the tableau, candidate (26.b) has suffered the most serious violation since it is only composed of a string of consonants, hence lacking the crucial part of the nucleus. On the other hand, since candidate (26.a) has no serious violations, it is considered the winning candidate.

The OT constraints can similarly account for other syllable related processes such as compensatory lengthening, syllable phonotactics, stress assignment, etc. However, for the purpose of the limited scope of the present work, I believe the above three cases are sufficient.

3.7 Summary

This chapter accounted for CK syllable structure along with the properties and processes that contribute to establishing its definition. No agreement is found on the syllable structure of CK words except for the fact that CK has open and closed syllables. The set of consonant clusters permitted in the language is not clear. For example, CK syllables do not start with consonant clusters if they occur at the beginning of the word. An epenthetic vowel is inserted after the initial consonant producing the required CVC or CV syllable structure. However, CK syllables allow for a maximum of two consonants in the coda. This shows that CK permits three basic syllable structures: CV, CVC, and CVCC. The coda C is optional whereas the onset C and nucleus V are obligatory.

In terms of syllable weight, CK is believed to be a quantity-insensitive language, that syllable weight is irrelevant to phonological rules like stress assignment. However, contrasts in vowel length, compensatory vowel lengthening and germination prove that CK syllables display certain behaviours of weight sensitivity. It follows that CK cannot be conclusively argued to be a quantity-sensitive language or not.

In OT terms, the two constraints ONS and PARSE-SEG are never violated in the CK syllable structure. Nonetheless, the basic CK syllable types show that *COD is a violable constraint. The markedness constraints interact with faithfulness constraints which penalise any change that can be observed between the input and the output.

Chapter 4 The Foot Structure of CK

4.1 Introduction

The foot and stress are two closely related domains of phonological inquiry. Most of the arguments supporting the existence of the foot in generative phonology, and particularly in metrical theory, are based on stress assignment[25]. Metrical theory accounts for stress as a hierarchically organised rhythmic structure (Prince, 1976; Liberman & Prince, 1977). Within this framework, the foot is argued to play a crucial role in expressing stress rules (Hayes, 1995: 26, 40). Accordingly, the aim of this chapter is to provide the foot inventory of CK and explain its relation to the assignment of word stress. The analyses are couched mainly in terms of the Bracketed Metrical Grid formalisms (suggested by Hayes 1995). The foot-related constraints of OT (e.g. NONFINALITY) (Prince & Smolensky, 1993), PARSE-SYL and ALIGN (Ft, Left, PrWd, Left) (Kager, 1999) are accounted for in the final sections of the chapter.

This chapter consists of an introduction and six sections. Section 4.1 accounts for the notion of the foot along with its parameters. In section 4.2, arguments for foot structure in CK are presented along with examples from the language. Section 4.3 is dedicated to explaining extrametricality and its relation to word stress placement. In 4.4, a metrical account of CK foot structure as a disyllabic iamb is provided based on Hayes (1995) Bracketed Metrical Grid, whereas in 4.5 a detailed OT analysis of the foot inventory of CK is given. Section 4.6 summarises the main arguments of the chapter and the phonological evidence available to support them.

4.2 Foot inventory

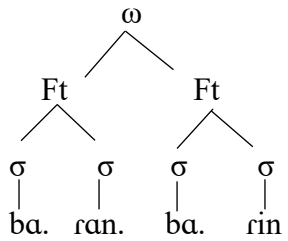
4.2.1 *Defining the foot*

The foot refers to a rhythmical unit of approximately regular intervals of stressed and unstressed syllables (cf. Goldsmith, 1990; Hayes, 1995; Nespor and Vogel 2007). In metrical phonology, it represents a basic unit of metrical structure, consisting of syllable rhymes and organised into constituents that make up the phonological word. That is, the metrical foot (Ft) represents an intermediate prosodic constituent that intervenes between syllables (σ) and the larger prosodic word (ω) containing those syllables (Liberman 1975, Liberman & Prince

[25] Alongside the metrical foot-based frameworks suggested by Liberman (1975), Liberman & Prince (1977) and Selkirk (1980), some authors (e.g. Selkirk, 1984; Walker; 1995, 1996; Gordon, 2002a) believe that it is more convenient to analyse stress placement in non-metrical terms, with little or no reliance on a foot-like constituent structure; however, this position has encountered criticism (see Nespor and Vogel, 2007: 83-4).

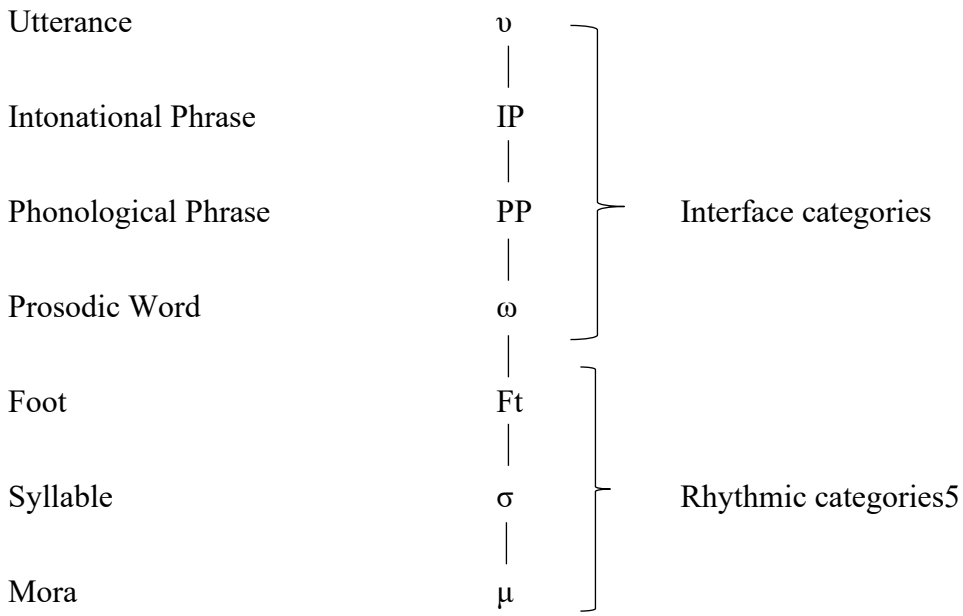
1977, Selkirk 1980, 1984, Hyman 1985, among others). In (4.1) below, the metrical prosodic hierarchy of a two-foot word like *baranbarîn* /bɑ.ɾɑn.bɑ.ɾin/ ‘raining’ is shown:

Figure 4.1 Metrical prosodic hierarchy



This hierarchical organization of the phonological constituents is known as the prosodic hierarchy, which was introduced by Selkirk (1978, 1980, 1986) and adopted by other authors including Nespor and Vogel (1986), McCarthy and Prince (1986, 1996), and Hayes (1989a). The basic idea is that smaller units (e.g. syllables) comprise and are dominated by successively larger units (e.g. feet) and so forth. The foot and successively higher units are sometimes referred to as domains, as they may act as a locus or domain of application for particular processes (Selkirk 1986). More recent work in phonology has aimed at establishing a cross-linguistically viable version of the prosodic hierarchy. Martínez-Paricio (2013), for example, offers the Universal Prosodic Hierarchy (UPH), which borrows the terms 'interface' vs. 'rhythmic' categories from Itô and Mester (2007).

Figure 4.2 The Universal Prosodic Hierarchy (PHT)[26]:



The benefit of this version is documented by detailed research in particular languages. For instance, it has been shown that rather than targeting arbitrary segments in the phonological string, the rhythmic patterns of languages (i.e. the assignment of lexical and post-lexical stress or tone) and the specific properties of certain phonological and morphophonological processes (e.g. fortition, reduplication, etc.) are best modelled by referring to the small set of innate constituents in (4.2) and the universal way in which they are organised. This confirms the claim that both these constituents and their domination relations are phonological in nature (Martínez-Paricio, 2013:7-8).

The prototypical foot type is disyllabic: a paring of a stressed or strong (S) syllable and an unstressed or weak (W) syllable. The foot that consists of two syllables is termed 'bounded', while one that is not subject to any restrictions on size is known as 'unbounded'. Furthermore, depending on the stress alternation of the pair of syllables, most versions of metrical theory adopt two types of feet: iambs and trochees. In an iambic foot, the second syllable receives stress and is therefore right-headed; whereas in a trochaic foot, the stress is placed on the first syllable and is left-headed (cf. Hammond, 1995:318; Gussenhoven & Jacobs, 2005:17; Carr & Montreuil, 2013: 189, among others).

[26]Though this is the standard version of the Prosodic Hierarchy, it has led to debate on whether or not additional categories should be added. Authors like Nespor & Vogel (1986) and Hayes (1989a), for example, suggested the *clitic* group as an additional universal category above the prosodic word. However, subsequent studies (e.g. Selkirk 1996) have shown that there is no need for such a constituent.

4.2.2 *Foot parameters*

The metrical structure assigned to any foot is the result of the setting of a number of parameters that specify the choices available to a given language with respect to the formation of its feet (Ewen and van der Hulst, 2001: 219; Carr and Montreuil, 2013: 190). Therefore, to capture the foot structure of CK in a detailed fashion, we will adopt Hayes' (1980) proposal which parameterises feet for the following:

a. Headedness: Is the strongest element of the foot on the left edge or the right?

Headedness is a central notion in the analysis of both stress and syllable structure. A fundamental observation about sequences of phonological units is that they can be grouped into constituents in which one unit is always specifically marked as the head to which the rest become subordinates or dependents. This is especially true for syllable stress and foot structure (Halle, 1990: 150-1). For example, in the Halle and Vergnaud (1987) framework, stress is characteristically assigned only to certain phonemes in a string and never to others. In the most familiar cases, only heads of syllables (normally the nucleus part of the rhyme) can be stress-bearing; all other phonemes in the string are not stressed. Likewise, applying the notion of headedness to the domain of the foot embodies the claim that every foot usually one primary stress, which is stronger than the others and is located either at the left or the right edge of the foot. This leads to a property known as the culminativity of stress: the property that constrains every content word to contain one stressed syllable (Ewen and van der Hulst, 2001: 220). It should also be noted that the idea of headedness does not apply to degenerate feet, since it consists of a single syllable and, hence, there is no question of stating which syllable is more prominent or not[27] (Carr & Montreuil, 2013: 195).

To recall what we suggested in chapter three, primary stress in CK is usually placed upon the last syllable of simple words. In complex words, on the other hand, primary stress assignment depends on the type and linear order of the affixes attached to the stem of the host word. Moreover, as strong and weak syllables are distributed at regular intervals in the language, secondary stress is determined algorithmically according to its distance from the primary; it falls two syllables to the left of the primary stress (cf. McCarus, 1958: 34 & 1997: 693; Ahmed, 1986: 82; Fattah, 1997:47; Rahimpour & Dovaise, 2011:77). Based on these, and since the strongest element of the foot in CK is located at the right edge, foot in CK can

[27] Contrary to this dominant view, Giegerish (1985) posits that even the degenerate foot has a binary branching structure in which the node (i.e. syllable) dominates what he terms a "zero syllable". However, this position seems too untenable to defend, especially with regard to the syllable that dominates this zero syllable and the distribution of stress on the structure. It is, therefore, not adopted in this work.

be classified as right headed. This in turn leads to another closely related, yet crucial, conclusion about CK feet; that they are head-final. In example (1) below, *a,* and *b* are simple words, while c, *d* and *e* are complex ones. In (1.d), a stressed suffix (i.e. the definite singular marker) is attached to the word, whereas (1.e) is a word with an unstressed suffix (the indefinite singular marker).

(1)

	(x)	
	(. x)	
a.	ha. ˈʒɑɾ	‘poor’
	(x)	
	(x) (. x)	
b.	ˌʃɑ. ɾa.ˈzɑ	‘expert’
	(x)	
	(. x) (. x)	
c.	bɑ.ˌʒe. ɾa.ˈwɑn	‘mayor’
	(x)	
	(x) (. x)	
d.	ˌku. ra. ˈka	‘the boy’
	(x)	
	(. x) < . >	
e.	paɾ. ˈtu. kek	‘a book’

An important difference between the structures of (1.d) and (1.e) can be noticed here. While both (1.d) and (1.e) end in the suffixes, they represent two different cases. In the initial syllable of (1.d), there is a lexical vowel in the nucleus. Yet since it is a monosyllabic constituent and because Kurdish allows only for the construction of disyllabic feet, it has been regarded as a degenerate foot. On the other hand, (1.e) demonstrates the case of

extrametricality (cf. §4.4). An extrametrical syllable is a monosyllable that falls outside the rules of stress assignment and is located at the peripherals. However, this claim is based on the fact that an unstressed affix is added to the right edge of the word; therefore, the primary stress does not shift to the word final syllable but remains on the last syllable of the stem (or the last vowel of the host word), leaving the suffix to be treated as extrametrical (see Fattah, 1997: 51 and McCarus, 1997: 693 for stress placement in Kurdish).

b. Boundedness: Are feet binary or unbounded?

A stress system makes use of bounded feet if there is an upper limited to the number of syllables that may be grouped into a foot. Hayes (1981) posits that bounded feet are universally limited to disyllabic feet, known as binary feet, and monosyllabic feet, called degenerate feet (van der Hulst and Smith, 1985: 34). Further, as bounded feet can be either left-headed or right-headed, an intersection of boundedness with the headedness parameter will yield four options in languages: bounded left-headed, bounded right-headed, unbounded left-headed and unbounded right-headed (Goldsmith, 1990:171). CK is a bounded right-headed language since a) it has disyllabic feet, and b) the feet head is located on the right edge of the string.

As mentioned earlier, CK tends to have well-formed rhythmic patterns of weak and strong syllables, with iambic feet. It constrains the number of syllables that make up its feet; it allows only a maximum of two syllables to construct its foot. This suggests that the language is characterised by a footing system of even numbers. Words that comprise an odd number of syllables will have peripheral constituents falling outside the foot structure, forming either a degenerate foot or an extrametrical element. Accordingly, CK can be categorised as a bounded language with a disyllabic foot structure. Example (2) shows how the alternating two-syllable structures group together to form two- and three-foot words.

(2)

a. (. x) (. x)
(σ ˌσ) (σ ˈσ)
/ˌpi.ʃa. sɑ.ˈzi/ ‘industry’

b. (. x) (. x) (. x)
(σ ˌσ) (σ ˌσ) (σ ˈσ)
/bɑ.ˌre. wɑ.ˌbɑ. ɾe.ˈti/ ‘directorate’

c. *Directionality:* Are feet built left-to-right or right-to-left?

Directionality refers to whether feet are constructed rightward from the beginning of the word, or leftward from the end of the word. It is an important parameter for bounded, binary foot construction since it shows how a degenerate foot at the end of a word with an odd number of syllables is formed. The importance of this parameter lies in determining which syllables group together to form feet and which ones fall outside the allowed foot structure to create a degenerate foot. For instance, in applying a rule of alternating stress (that is, bounded, binary foot construction), if a word has an odd number of syllables to be gathered into binary feet, then there will be one syllable left over (Goldsmith, 1990: 172).

However, parsing direction is closely related to the position of the head or dominant syllable that usually receives the primary stress in a word. This suggests that the construction of foot in a given language is dependent on the type of the foot: whether it is an iambic foot or a trochee. To apply the argument to Kurdish, one can say that the fact that CK feet are right-headed and that the primary stress falls upon the end of the structure leads to the conclusion that Kurdish feet are constructed leftward; that is, from the right end of the word to the beginning. Consider example (3) below:

(3)

		Parsing direction
a. / ʔaʒ.ˈnɒ/	'knee'	(σˈσ) ←
b. /ˌkɑ.ɾɑ.ˈma/	'skilfull'	(ˌσ) (σˈσ) ←
c. /pi.ˌʃa.sɑ.ˈzi/	'industry'	(σˌσ) (σˈσ) ←

In (3.b), since the word is trisyllabic, it is by virtue of directionality that we know which edge of the word will be left with the peripheral monosyllable degenerate foot. In this case, it is the rightmost syllable.

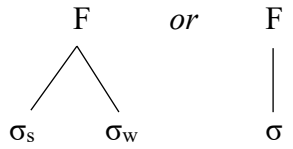
d. *Quantity-sensitivity*: Are feet quantity-sensitive or quantity-insensitive?

Languages differ in the way they interpret quantity distinctions for the sake of foot construction. In most quantity-sensitive stress systems, the internal structure of the syllable is crucial in determining the location of stress. According to Hayes (1995), all iambic stress systems are quantity-sensitive, dividing the syllable into light and heavy syllables. Therefore, to establish the stress foot correctly in these languages, access to syllable weight is required (Goldsmith, 1990: 176). Based on this claim, Hayes (1995) proposes three basic foot types:

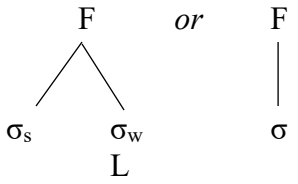
quantity-insensitive trochees, quantity-sensitive trochees, and quantity-sensitive iambs (see example 11 below). In quantity-sensitive systems, the binary stress count is calculated at the level of the mora rather than the syllable. Heavy syllables consist of two moras, and demand to be stressed as they appear in the head position. Light syllables, on the other hand, comprise one mora, and do not usually assume the head position (Goldsmith, 1990: 178). In addition, feet are minimally bimoraic, consisting of one heavy syllable or two light syllables.

(4)

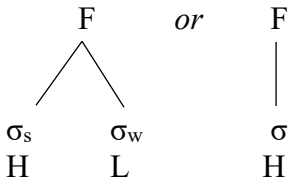
a) Q-insensitive



b) Q-sensitive



c) Q-determined



However, quantity-sensitivity plays a role in a number of languages with non-binary stress system. For example, many single stress languages display quantity-sensitivity. Single stress systems that display quantity-sensitivity are called 'unbounded' stress systems by Hayes (1995). It is also assumed that all heavy syllables in unbounded stress systems carry at least secondary stress, and that an edgemost stress is promoted to primary stress (Gordon, 2011: 151-2). Of particular relevance here is Hayes' (1995) argument that languages with iambic rhythm typically have quantitative adjustment rules. These include vowel lengthening in the stressed syllables of the foot, geminating the consonant after such a stressed vowel, and rules that reduce the vowel in the unstressed syllable. These rules, Hayes (1995) maintains, are not found in languages with a trochaic rhythm. Based upon this claim, we can say Kurdish manifests some feature of quantity sensitivity since, as we explained, it has compensatory vowel lengthening in loanwords when a postvocalic consonant is lost. However, to understand the position of CK, we will need to discuss the notion of quantity sensitivity in relation to

syllable weight. The main question to be addressed here is whether CK feet are sensitive to syllable weight or not.

According to Hayes (1995: 71-3), the foot inventory of the world's languages comprises three basic types: the syllabic trochee, the moraic trochee, and the iamb. He argues that syllabic trochees are normally left-headed weight-insensitive feet, while moraic trochees, whose feet consist of two moras, are weight-sensitive systems. See example (5) below:

(5) Foot inventory:

a. Syllabic Trochee (x .)
σ σ

b. Moraic Trochee (x .) or (x)
σ̆ σ̆ σ̄

c. Iamb (. x) or (x)
σ̆ σ σ̄

It should also be explained that in moraic systems, a foot consists of exactly two moras (Ewen and van der Hulst, 2001: 225). This explains why we capture the distinction between long and short vowels that was claimed by Mahwy (2009) as a source of evidence for syllable weight sensitivity in CK. Example (6) explains how the mora theory formalism measures vowel length (in a quantity-sensitive language with iambic foot structure):

(6)

a. (. x)
μ μ
\ |
σ̄

b. (. x)
μ μ
| |
σ̆ σ̆

Furthermore, in some languages, weight sensitivity is argued to be noticed in the foot in which a distinction is made between light and heavy syllables. The importance of this distinction is the fact that heavy syllables can bear stress whereas light syllables cannot. Such

a distinction is determined by factors such as vowel length and syllable closure; i.e. whether it is open or closed (Ewen and van der Hulst, 2001: 223).

The notion of syllable weight in CK is both ambiguous and controversial. CK syllables seem to have some characteristics of weightlessness and some others that demonstrate weight distinction. To begin with, it can be claimed that the CK syllable is weightless depending on two phonological facts about the language. First, except for a few cases, CK does not generally demonstrate a contrast of vowel length, for long and short vowels in CK are in complementary distribution (Mahwy, 2009: 184). Evidence of this claim comes from the absence of minimal pairs of long and short vowels in CK. Secondly, the placement of stress in CK is to a great deal fixed, with the stress located upon the last vowel of the word stem (McCarus 1958, 1997; Fattah 1997). This implies that stress assignment in CK is more likely quantity-insensitive, since quantity insensitivity of stress placement is considered an important factor in classifying the syllable of any language as weightless (see Gordon 2002).

On the other hand, CK exhibits some features of weight distinction. One type of evidence for this claim is the fact that CK has compensatory vowel lengthening, which is, according to Hayes (1995: 110), a strategy used by languages sensitive to weight to make an initially light syllable bear stress. Furthermore, according to Mahwy (2009: 184), CK does show some level of vowel length distinction: vowels in stressed syllables are longer than vowels in unstressed syllables. This implies that long vowels attract stress in CK. Accordingly, the evidence used to support the existence of weightless syllables does not serve this line of argument, for non-contrastiveness of long and short vowels does not necessarily indicate that no such vowel distinction is found in the language. Finally, yet more importantly, even if the stress assignment in CK proves insensitive to syllable weight, it does not mean that its syllables are weightless[28].

However, although right-headed weight-insensitive systems are reported to be rare in the languages of the world (e.g. Ewen and van der Hulst, 2001: 225) the present work endorses the claim that CK syllables do not generally demonstrate weight distinction.

To summarise, based on the parameters, the foot structure of CK along with the distribution of stress can be straightforwardly captured under the following assumptions:

[28] Perhaps of relevance to the discussion here is Hayes' (1991: 71) Iambic-Trochaic Law:
a. Elements contrasting in intensity naturally form groupings with initial prominence.
b. Elements contrasting in duration naturally form groupings with final prominence.
This leads us to us to conclude that CK acts a syllable-timed language with final prominence.

i. Words in CK are subdivided into binary metrical feet, each consisting of two syllables.
ii. CK feet are bounded iambic.
iii. Usually, the rightmost syllable is assigned primary stress.
iv. Secondary stress falls two syllables to the left of the primary.
v. Parsing is leftward: the construction of feet begins at the right edge of the word and proceeds leftward.

4.3 Arguments for foot structure in CK

In addition to the abovementioned discussions, three broad classes of arguments for foot structure are usually referred to. These include phonological processes, prosodic morphology, and poetic meter. Different languages make use of different types of these processes. English, for instance, makes use of flapping, poetic meter, locus of infixation, and language games as well (Hammond, 2011: 966). Likewise, other languages are reported to use reduplication, minimum word constraint, and hypocoristic structures. In CK, phonological evidence for foot structure involves, most importantly, the rhythmic stress patterns that construct feet. Morphological evidence, on the other hand, includes processes such as reduplication and hypocoristic structures. Following is a brief explanation of each of these sources of evidence with relevant examples:

In CK, primary and secondary stress are assigned to even-numbered syllables counting from the end of the word (i.e. from the left edge to the right). To recall, the following examples exhibit how these can be represented:

(7)

a. ejno / ʔaʒ.ˈnɒ/ ‘knee’ σˈσ

b. karame /ˌkɑ.ɾɑ.ˈma/ ‘skilful’ ˌσσˈσ

c. pîşesazî /pi.ˌʃa.sɑ.ˈzi/ ‘industry’ ˌσσ σˈσ

The foot structures corresponding to the examples in (7) are thus as in (8):

(8)

a. ejno / ʔaʒ.ˈnɒ/ ‘knee’ (σˈσ)

b. karame /ˌkɑ.ɾɑ.ˈma/ ‘skilful’ (ˌσ) (σˈσ)

c. pîşesazî /pi.ˌʃa.sɑ.ˈzi/ ‘industry’ (ˌσσ) (σˈσ)

The core evidence for foot structure comes from patterns of rhythmic (i.e. alternating) stress. As shown, primary stress in CK is generally placed upon the last vowel of the stem. Once primary stress is assigned, the next syllable on left is assigned weak stress. The third syllable to the left receives secondary stress, while the fourth gets weak stress and, thus, repeats the alternation of weak and strong syllables. The secondary-weak stress alternation is applicable to other possible syllables in the word. These rhythmic alternations of weak and strong syllables forming the feet of a word make CK a bounded iambic system. Consider the example:

(9) Syllabic iambs

						x		
	x			x			x	
(σ	σ)	(σ		σ)	(σ		σ)	
(tʃɑ.	ˌpa.)	(ma.	ˌni)		(ja.ˈkɑn)			‘publications’

Reduplication provides another source of argument for foot in CK. Hayes (1983:356) argues that reduplication rules in the Ilokano language are stated as prosodic categories, including the metrical foot. Moreover, following the template constraints suggested by McCarthy and Prince’s Prosodic Morphology Hypothesis (1990), the reduplicative affixes found in CK can be considered as foot templates similar to the disyllabic iamb metrical structure.

(10)

a. /ʃɑn/ ‘shoulder’ ⟶ /ˌʃɑn. ʃɑ.ˈnen/ ‘pushing with shoulders’

b. /bɑz/ ‘jump’ ⟶ /ˌbɑz. bɑ.ˈzen/ ‘jumping’

Note that the reduplicative affixes of (10.a) and (10.b) are disyllables with the second syllable more prominent than the first syllable. However, through the phonological rule of re-syllabification, the reduplicative affixes copy the root word plus /en/ (Hamid, 2013: 10).

A third source of evidence comes from what is known as hypocoristic names. By definition, a hypocoristic name is a diminutive form of a given name, used as a nickname or term of endearment to denote intimacy. In CK, hypocoristic names are used as a nickname or a term of endearment, and indicate more intimate situations or calling one’s name. However, the construction of such structures in CK is subject to the bi-syllabic requirement. Consider example (11) below:

(11)

a. /ra.ʃid/ ⟶ /ra.ˈʃa/

b. /ʔaħ.mad/ ⟶ /ʔa.ˈħɑ/

4.4 Extrametricality in CK

Liberman and Prince (1977) introduced the notion of extrametricality to account for the apparent invisibility to stress rules of final -y in English. They believed that "-y functions as a kind of 'extrametrical' syllable;" and that "it simply does not take part in the metrical calculation" (p. 293). Likewise, recognizing the potentially wide range of applications, Hayes (1980) proposed the general formulation for extrametricality rules in (12), where the initial or final constituent of a particular domain is designated as extrametrical.

(12) Extrametricality formalism

$$C \rightarrow [+\text{extrametrical}] / \begin{bmatrix} \_\_\_\_] D \\ D [\_\_\_\_ \end{bmatrix}$$

However, the primary function of extrametricality is to directly demonstrate ways in which certain forms need to be modified in order for the metrical theory inventory to work correctly (Goldsmith, 1990: 203). Syllables that do not count in the assignment of stress are considered extrametrical. For instance, in (13) the last syllable plays no part in the assignment of stress to the foot, which is iambic constructed from right to left:

(13)

a.

(x)
(x x) <x>
ʃa. ˈqɑ. mek 'a street'

b.

(x)
(x x) <x>
paɾ. ˈtuk. mɑn 'our book'

Thus, as examples (13.a) and (13.b) show, usually unstressed syllables at the right edge create extrametricality.

Extrametricality is a parametric option in accentual patterns. It is generally restricted to peripheral constituents, i.e. those that occur at the left or right edge of some domain (Vergnaud and Halle, 1978). Thus, the notion of extrametricality enables phonologists to account for these peripheral foot types and handle the stresslessness of peripheral syllables. Furthermore, Hayes (1995: 57) claims that the right edge is the "unmarked edge for extrametricality" (Ewen and van der Hulst, 2001:236)[29]. Similarly, Kager (2007) posits that extrametricality of final syllables is highly common in iambic languages. These two features of extrametricality are common in CK. Further, Hayes' (1995) four criteria proposed for extrametricality seem to meet the rightmost stressless suffixes that are found CK:

a. Only constituents (segment, syllable, foot) may be marked extrametrical.

b. A constituent may be marked extrametrical if it is at a designated edge of its domain (left or right) of its domain.

c. The unmarked edge for extrametricality is the right edge.

d. An extrametricality rule is blocked if it would render the entire domain of the stress rules extrametrical.

Extrametricality is observed in different lexical items in different languages. In CK, it is usually observed in complex nouns with an odd number of syllables (e.g. trisyllabic words). In this case, usually nouns with unstressed suffixes provide cases of extrametricality in CK. This is because the addition of an unstressed affix does not cause stress shift; thus, the primary stress remains on the last syllable of the stem. These suffixes involve the indefinite singular marker /-ek/ and the clitics /-ɨm, -mɑn, -ɨt, -tɑn, -i, -jɑn/ (Fattah, 1997: 51). In example (13), (13.a) is a noun with an indefinite marker suffix, while (13.b) shows the case of a noun with a clitic that has formed the extrasyllable unit.

[29] While the vast majority of extrametricality and non-finality effects have been found at the right edges of prosodic domains, a few languages have been argued to exhibit extrametricality effects at the left edge. In most such cases, however, alternative analyses are readily available (Hyde, 2003: 1047).

4.5 The metrical foot in OT

Research on metrical phonology within the OT framework is rich and abundant. In OT, stress patterns are viewed as a domain of potentially conflicting forces. For the choice of every specific parameter, there is a competition among various alternatives. For example, rhythm manifests conflict between perfect well-formed patterns and irregular stress intervals. OT is the theory that is well equipped to account for the interactions of conflicting forces and to address interactions between prosodic levels. This implies that constraint ranking matches the choice of parameters in metrical phonology. Further, different rankings of the constraints in different languages can account for the interactions of cross-linguistic variations found between the metrical systems (Kager, 1999).

The OT constraints that govern metrical phonology are fundamental components of the theory itself. For instance, the constraints that require foot binarity FT-BIN and PARSE-SYL (McCarthy and Prince, 1993:160), are proposed based on the common patterns of grouping rhythmic units into alternative stressed and unstressed syllables, which is a phonological phenomenon found in languages. This is a basic requirement of the foot to be binary (see also Hayes, 1995). Based on these observations, we will have two OT metrification constraints such as (14) and (15) below:

(14) FT-BIN
Feet are binary under moraic or syllabic analysis.

(15) PARSE-SYL
Syllables are parsed *by feet.*

The two constraints can be formally employed in an OT tableau of a syllable of even numbers, such as /ʃɑ.ɾa.wɑ.ni/ ‘municipality’ in (15). Thus, (13) and (14) can exhaustively parse the syllables without conflict.

Likewise, the OT provides other constraints that are used to analyse foot related data in the light of theory. Following is a brief account of some of these constraints along with their definitions (cf. McCarthy and Prince, 1993:48):

(18) **ALL-FT-LEFT**
Every foot stands at the left edge of the ω.

(19) **ALL-FT-RIGHT**
Every foot stands at the right edge of the ω.

(20) **HEAD -TO-LEX**

Assign one violation mark for each prosodic head which is contained in a function word.

(21) **IAMB**

Assign one violation mark for every foot which is not iambic (σˈσ) or (ˈH).

Examples (16) and (17) explain these foot related constraints:

(16) /ʃɑ.ˌɾa.wɑ.ˈni/ ‘municipality’

ʃɑ.ˌɾa.wɑ.ˈni	FT-BIN	PARSE-SYL
☞ a. (ʃɑ.ˌɾa.) (wɑ.ˈni)		
b. (ʃɑ.)(ˌɾa.) (wɑ.ˈni)	*!	
c. (ʃɑ.)(ˌɾa.ˈwɑ.) ni		*!

In (16), since the two constraints are equally ranked, any violation of either of them results in ruling out the candidate(s). It should, however, be noted that the constraint FT-BIN is inviolable in CK while PARSE-SYL is violable.

Likewise, syllables that compose of an odd number can be faithfully and exhaustively parsed into feet without incurring any violations of the constraints. Consider example (17) below:

(17) /ˌʃɑ. ɾa.ˈwɑn/ ‘mayor’

ˌʃɑ. ɾa.ˈwɑn	FT-BIN	PARSE-SYL	IAMB
☞ a. (ˌʃɑ.) (ɾa.ˈwɑn)			
b. (ˌʃɑ.ɾa.wɑˈn)	*!		
c. (ˌʃɑ.ɾa.) (ˈwɑn)			*!
d. ˌʃɑ. (ɾa.ˈwɑn)		*!	

In example (17), candidate (17b) violates the binarity of the foot and candidate (17d) violates the exhaustive parsing constraint; i.e., PARSE-SYL. Candidate (17c) does not violate

any of the above-mentioned constraints, yet it has not been the optimal candidate since it shows that parsing in CK gives priority to foot binarity on the basis of syllable (σˈσ). That is, it is the FOOT-TYPE=IAMB that ultimately makes the choice of the optimal candidate and not the two other candidates.

4.6 Summary

This chapter defined the foot structure in CK and explained the phonological properties of the CK foot along with the OT constraints involved in the analysis of the language's foot.

In CK, primary stress is usually assigned to the last syllable of simple words, whereas in complex words, it depends on the type and linear order of the affixes attached to the stem of the host word. In addition, since CK strong and weak syllables are distributed at regular intervals, secondary stress is assigned algorithmically according to its distance from the primary stress; it falls two syllables to the left of the primary stress. This means that the strongest element of the foot in CK is located at the right edge. Therefore, the foot of CK can be argued to be right headed. This also leads to another conclusion: the CK feet are head-final.

Furthermore, CK constrains a maximum of two syllables to construct its foot, that is, it is characterised by a footing system of even numbers. Words that consist of an odd number of syllables have peripheral constituents falling outside the foot structure, forming either a degenerate foot or an extrametrical element. Therefore, CK is categorised as a bounded language whose foot structure is disyllabic.

Finally, phonological and morphological evidence is available to support the foot structure in CK. Phonological evidence includes the rhythmic stress patterns that construct the feet, while morphological evidence includes processes such as reduplication and hypocoristic structure.

Chapter 5 Word Stress Distribution in CK

5.1 Introduction

The aim of this chapter is to explain the distribution of CK word stress with the formal tools offered both by Metrical Theory and Optimality Theory (OT). Both theories offer formal tools for the analysis of stress-related phenomena. While Metrical Theory employs metrical tress and grids to represent stressed and unstressed patterns of syllables, OT explains how stress-related constrains are ranked, satisfied and/or violated on the outputs of a tableau in order to formally capture the distribution of stress.

The chapter consists of an introduction and six parts. In 5.2, the notion of stress is defined. 5.3 addresses typological properties of stress whereas 5.4 provides a brief introduction to the rhythmic characteristics of stress. In 5.5, the major theories of stress assignment are explained. Section 5.6 accounts for metrical theory and 5.7 for the application of metrical formalisms to analyse CK word stress distribution. Finally, 5.8 provides an introduction to OT followed by an OT analysis of CK word stress.

5.2 Defining stress

Stress is defined both in phonetic and phonological terms. Phonetically, stress is primarily described in terms of acoustic and perceptual correlates. In acoustics phonetics, stressed syllables are argued to be characterised by a strong breath pulse. This view was originally proposed by Stetson (1928) and was endorsed by Ladefoged (1967). However, while this view is not conclusive, since stressed syllables can also be produced without a breath pulse. Perceptual correlates of stress include loudness, duration, and pitch. It is claimed that stressed syllables are louder than unstressed syllables. Similarly, it is argued that syllables that have a longer duration are more likely to be perceived as stressed syllables. In fact, duration is the phonetic manifestation of vowel length, which is usually addressed in phonology. Moreover, altering the pitch contours is argued to be directly related to stress perception. However, loudness is said to be less related to stress compared to duration and pitch (Hayes 1995: 6).

Since the syllable is the unit that bears stress, syllables are said to be either stressed or unstressed (1995:49). A stressed syllable is relatively more prominent than the surrounding syllables (Trask, 1996: 336). Yet prominence is not an intrinsic property of stressed syllables, but a matter of relative strength between strong and weak syllables (Kager, 2007: 195). However, a prominent syllable is usually louder, longer, has a different vowel quality and intensity, and displays more variation in pitch than its neighbours (Gussenhoven, 2004:14-

5)[30]. In stress languages, a distinction is often made within a word between certain levels of stress: primary stress, secondary stress, tertiary stress, and unstressed syllables (Kager, 2007: 195; Davenport and Hannahs, 2010: 79). Yet not all languages with stress have secondary stress, and in those that do have it, there is variation in the degree of importance of secondary stress (Spencer, 1996:241).

From a structural point of view, stress is a property of rightmost or leftmost syllable of the foot. Foot is a sequence of a stressed syllable plus one or more unstressed syllables (Carr and Montreuil, 2013: 189). The prototypical foot type is disyllabic: a paring of a stressed or strong (S) syllable and an unstressed or weak (W) syllable. Left-headed feet have an S-W sequence and are termed trochees, whereas right-headed feet have a W-S sequence and are called iambs (Gussenhoven & Jacobs, 2005:17).

Based on stress assignment and feet, languages are typologically described in terms of certain parameters. One such parameter concerns the position of primary stress in the foot; i.e. whether it is left-headed or right-headed. Closely related to this is the direction of parsing: whether foot parsing is from left to right or from right to left. Another parameter is whether the stress system of a given language is bounded or unbounded. In a bounded system, stress falls within a particular distance of a boundary or another stress, whereas in an unbounded system, stress can fall on an unlimited distance from a boundary or another syllable. A bounded foot contains no more than two syllables, while an unbounded foot is not subject to any restrictions on size. A further parameter is that of fixed versus free stress languages. Fixed stress is predictable in its location, and is usually derived by an algorithm, while free stress is unpredictable and must be lexically listed. Yet another parameter is that of quantity-sensitivity. In a quantity-sensitive system, stress assignment is sensitive to the phonological weight of the rhyme, while in a quantity-insensitive system, the assignment of stress is irrelevant to the rhyme weight. Likewise, a further distinction is made between stress-timed languages, in which the stressed syllables recur at regular time intervals under certain conditions, and syllable-timed languages, in which syllables occur at regular time intervals (cf. Durand, 1990: 220-2; Hayes, 1995: 31-3, 54-55; Kager, 1996: 370-1; Carr and Montreuil, 2013: 188, among others).

Following Fattah (1980b), it can be claimed that CK is neither a fixed-stress nor a free-stress language. It is a language that demonstrates ‘limited freedom of stress’ (p.182), with the stressable zone comprising the last three syllables of the word (ultima, penult, and

[30] van der Hulst (2012: 1494-521) argues that the term ‘stress’ is ambiguous and should therefore be replaced by a set of more accurate terms that cover stress along with its correlates; i.e. accent (A), edge prominence (EP), rhythm (R) and weight (W). Accordingly, he offers the four terms of $stress^{A}$, $stress^{EP}$, $stress^{R}$, and $stress^{W}$.

antepenult). That is, stress in CK falls on the ultima in general, but if the indefinite marker /-ek/ or the clitics /- ɨm, -mɑn, -ɨt, -tɑn, -i, -jɑn/ are attached to the word, stress shifts to penult. If both the indefinite marker and clitics are present, then stress falls on the antepenult. Likewise, it is difficult to categorise CK as either strictly syllable-timed or stress-timed. On the one hand, two facts support the claim that Kurdish is a quantity-insensitive language: that the long and short vowels are non-contrastive and that stress usually falls upon the last vowel of the word stem. On the other, it seems that there is some element of weight distinction in the language. That the long and short vowels are in complementary distribution in Kurdish does not exclude their existence in the language. Regularly, vowels in stressed syllables are longer than those in unstressed syllables. Similarly, the insensitivity of stress assignment to syllable weight does not prove the claim that syllables are weightless. One piece of evidence that can be used to argue for a syllable weight distinction in Kurdish is that it has compensatory vowel lengthening, especially in loan words, when the following consonant is lost. For instance, the /a/ vowel in the Arabic word /ba.ħiθ/ is lengthened while the following consonant is lost, hence it is realised as /bɑs/. A further type of evidence involves the vowel distinction found between open, stressed syllables and closed, unstressed syllables, as in /ban.ˈda/ ‘slave’, where the second vowel is longer than the first (Hamid, 2013: 2-3).

Where placed, three levels of stress are recognised in Kurdish: primary, secondary, and tertiary[31]. As a rule, primary stress falls upon the last syllable of simple and compound words, except in verbs[32], regardless of the number of the syllables (McCarus, 1958: 34; Fattah, 1997:47; Rahimpour & Dovaise, 2011:77). The position of secondary stress is predictable and is determined by primary stress: secondary stress tends to occur at a two-syllable distance to the left of the primary stress[33]. The remaining syllables take unstressed (Ahmad, 1986:80-1). In a four-syllable word like /mɑ.ˌmos.tɑ.ˈjɑn/ ‘teachers’, for instance, the primary stress falls on the last syllable /ˈjɑn/. The antepenultimate syllable /ˌmos/ receives secondary stress, whereas /mɑ/ and /tɑ/ are unstressed syllables. Nonetheless, the three degrees of stress seem not to be phonologically significant in CK words since they are not contrastive. More importantly, careful consideration of the morphological nature of the word should be taken when determining the placement of stress in CK. Based on this, a distinction

[31] Unlike the unstressed syllables of English (e.g. the schwa /ə/), in Kurdish even unstressed syllables seem to carry some amount of stress. This is the reason why Fattah (1997) terms them ‘tertiary’. However, for the purpose of my analysis, I use the terms ‘weak’ and ‘unstressed’ to mean ‘tertiary’.

[32] Verbs are excluded because: a) their stress placement is different depending on the morphological structure of the verb and its grammatical categories of tense, aspect, voice, person and number; and b) they have a complex, morphologically rich, nature and can include the subject and object and act as a sentence.

[33] Another possible position of secondary stress is the first syllable of disyllabic words, as in /ˌlɑ.ˈwɑz/ ‘weak’.

can be drawn between 'isolated' and 'derived' words. Isolated words consist of one or more morphemes, including simple and compound words. Derived words, on the other hand, involve items that consist of at least one morpheme, free or bound, plus one or more derivational or inflectional affixes (Fattah, 1997: 46-7).

Typologically, CK can be categorised as a bounded language. This claim is supported by the fact that CK tends to have well-formed rhythmic patterns (i.e. regular intervals between weak and strong syllables) and that its feet are iambs. Likewise, since primary stress falls on the last syllable of isolated words, foot in CK can be categorised as right-headed (i.e. head-final), and its parsing direction maps right to left.

5.3 Typological properties of stress

Typologically, world stress systems have one or more properties and obey certain rules. Hayes (1995) suggests certain typological properties of stress, claiming that they can be observed in the stress assignment rules of all languages though variations are found in terms of how each individual language employs a specific property. Following is a brief account of these properties:

a) Culminativity

One distinctive phonological characteristic of stress is that it is normally culminative, in the sense that each word or phrase has a single strongest syllable bearing the main stress (Liberman and Prince, 1977:262). The domain of culminativity may differ from language to language. For example, in English, stress is culminative at the word level (every content word has a single strongest stress), at the level of the intonational phrase, and possibly at other levels as well, such as the phonological phrase (Nespor and Vogel, 1986). In French (Dell,1984) and Italian (Nespor,1988 :225-26), stress is culminative at the phrasal level, but not necessarily at the word level, since rules of destressing may eliminate word stresses on the surface. Possible expectations to culminativity are noted in the literature. Some languages have been claimed to lack culminativity at all levels; that is, there can be completely stressless utterances.

b) Rhythmic distribution

Stress is rhythmically distributed (Selkirk,1984), in the sense that syllables bearing equal levels of stress tend to occur spread at roughly equal distances, falling into alternating patterns. Thus in many languages, six syllable words are regularly assigned the stress pattern σ́ σ σ́ σ σ́ σ (σ=syllable).

c) Stress hierarchies

Stress is hierarchical (Liberman and Prince, 1977: 262), in the sense that most stress languages have multiple degrees of stress: primary, secondary, tertiary, and so on. Such degrees of stress can appear within the phonology. In contrast, ordinary, features have a limited, predetermined number of contrasting phonological values, held by some scholars to be just two. An example of multiple "deep" phonological value for stress was presented in the preceding chapter.

d) Lack of assimilation

Hayes (1995) claims that a phonological universal that has no exceptions is the fact that stress does not assimilate. That is, a stressed syllable does not induce stress on the immediately preceding or following syllable. In this respect stress differs from most substantive features: assimilation of [round] or [back] or [nasal] and so on is characteristic phonological process.

5.4 Stress as rhythm

a) Culminativity

Culminativity in stress systems can be deduced from a metrical representation, given certain postulates (Liberman and Prince, 1977:263). The crucial assumption is that parsing of phonological material into hierarchical structure is obligatory at all levels. Examples of this principle in other domains include syllabification (see for example Ito, 1986), or the theory of phonological phrasing (i.e. the Prosodic Hierarchy: Selkirk, 1980a; Nespor and Vegol, 1986; Hayes, 1989a).

X	b. X	c. X
X1 X2	X1 X2	X1 X2 X3

In other words, the forms above depict not simply a sequence of stacks of X's but a relative prominence relation between the grid marks on the subscripted layer.

b) Rhythmic distribution

Spacing of beats is characteristic of rhythm in other domains. In addition, note that equal spacing of stresses tends to occur at multiple levels.

c) Multiple Levels

The existence of multiple levels of stress reflects the hierarchical nature of rhythmic structure (Liberman and Prince, 1977:263).

d) Lack of assimilation

The absence of stress assimilation follows from the absence of a feature [stress] to assimilate. In principle, we might expect grid marks to be associated with more than one syllable, but this would go against the nature of rhythmic stress: a rhythmic beat, which is what a grid mark represents, forms a point in time rather than a sequence (Lerdhal and Jackendoff, 1983:18).

e) The limits of rhythm in language

Stress serves multiple purposes: it creates phonemic contrasts, marks phonological and syntactic structure, signals the distribution of focus, and so on.

5.5 Theories of stress assignment

Generally, two types of mainstream theories of stress can be listed: Principles and Parameters theories and OT. Following is a brief explanation of how each of these two approaches address stress.

A. Principles and parameters

In the Grid theories (Liberman and Prince 1977, Prince 1983), there is a strong tendency toward rhythmic alternations of stressed and unstressed syllables addressed by mapping to the perfect grid:

```
  x   x   x    x   x   x
x x x x x x x  x x x x x x
```

Within this framework, mapping to the perfect grid has two binary parameters:

a. Directionality parameter: Right-to-left, Left-to-right.
b. Starting parameter: Begin with peak, Begin with trough.

Prince (1983) proposed End Rules which, according to him, strengthen rightmost/leftmost stresses by adding one grid mark above them. He formulates these parameters as follows (Prince, 1983: 27):

ER(L,Wd): place a grid mark above the leftmost (initial) grid mark on the Ft level.
ER(R,Wd): place a grid mark above the rightmost (final) grid mark on the Ft level.

This means that the End Rule parameter for a given language can either be Left or Right. The operation of the End Rules is in fact subject to a well-formedness condition which is called the Continuous Column Constraint. Following prince (1983), Hayes (1995: 61) uses

End Rule (Left/Right) to describe a metrical rule:

a. Create a new metrical constituent of maximal size at the top of the existing stricture
b. Place the grid mark forming the head of the constituent in the leftmost/rightmost available position.

He suggests that for every grid mark not on the bottom layer, there must be a grid mark in the same column on the layer below.

The basic Principles and Parameters approach with the grid can be summarised as follows:

a. Principles (Universals):

– The Perfect Grid
– The Continuous Column Constraint

b. Parameters (Ways languages can differ):

– Directionality
– Start with Peak/Trough
– End Rule Left/Right

The data on CK is analysed in the light of the grid and foot parsing direction in the next section (5.6). However, contemporary Principles and Parameters theories use foot-based representations such as:

1. FootType={Trochaic, Iambic}
2. HeadFoot={Left, Right}
3. AlignFoot={Left, Right}

B. Optimality theory (OT)

OT does not employ parameters, but only constraints. Yet most versions of OT theories use foot-based representations. The following are some of these constraints, which are used to analyse stress in section 5.8 of this chapter:

1. Parse-Syllable: Syllables should be in feet.

2. BinaryFoot: Feet should contain exactly two syllables.

3. Trochaic: Feet should be trochaic.

4. Iambic: Feet should be iambic.

5. Align(Ft,L): Align feet to the left edge of a word.

6. Align(Ft,R): Align feet to the right edge of a word.

7. Align(HeadFoot,L): Align the head foot to the left edge of a word.

8. Align(HeadFoot,R): Align the head foot to the right edge of a word.

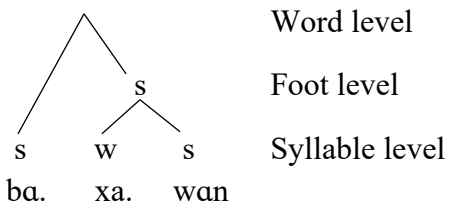
5.6 Metrical theory

Metrical theory is a module of generative phonology which posits a hierarchical structure to represent stress patterns in natural languages (Hammond, 1995: 313). It was introduced by Liberman (1975) and developed by Liberman & Prince (1977) as a direct reaction to the linear analysis of stress proposed within the Sound Pattern-framework developed by Chomsky & Halle (1968)-- in which stress is considered a property of individual segments (i.e. vowels)-- and developed by e.g. Prince (1983), Hayes (1995), Gordon (2002a), etc. In metrical phonology, stress is seen as a relational property obtaining between constituents, expressed in metrical trees as a binary relation between sister nodes which are labelled weak or strong or in metrical grids. In fact, metrical phonology is considered a cover term that includes several nonlinear theories of stress. Two of the theories that are widely used are the metrical tree and metrical grids.

5.6.1 *The metrical tree*

The metrical tree is a formalism for representing the hierarchical nature of stress by means of a constituent structure similar in nature to that of syntactic representations (Goldsmith, 1990: 169). It was introduced by Liberman 1975, Liberman & Prince 1977, and Hayes 1984. Within this framework, stress is represented as a hierarchy of binary branching structures, with nodes labelled as either weak (w) or strong (s). In the metrical tree, however, stress represents a relational property: a node is strong only by virtue of the fact that it is the sister of a weak node. A strong syllable is the stronger syllable in a pair not a strong one *per se* (Hogg and McCully, 1987:65-6; Duran, 1990: 226; Kager, 1996:368). Consider the metrical tree of the trisyllabic word *baxewan* /ˌbɑ.xa.ˈwɑn/ ‘gardener’, in (1.a).

(1.a)



5.6.2 *Metrical grids*

A metrical grid is another formal representation of stress distribution which was introduced by Liberman and Prince (1977) and developed by Prince (1983), Selkirk (1984), and Gordon (2002a). According to this theory, stress is represented by a hierarchy of gridlines (X's in this work), with higher columns representing greater prominence. The construction of metrical grids follows two main rules:

a) Assign to each syllable an asterisk (or an x) on metrical grid.
b) Assign a further asterisk above any syllable labelled 's' at any point on the metrical tree (Duran, 1990: 231 ; Carr and Montreuil, 2013: 199).

These two steps are explained by example (1.b) below:

(1.b)

		x	Line 2 (word level)
x		x	Line 1 (foot level)
x	x	x	Line 0 (syllable level)
bɑ.	xa.	wɑn	

5.7 Metrical representations

Following Garde (1976: 312), it is assumed here that word stress distribution cannot be captured unless grammatical facts (i.e. the morphological structure of the formatives) are taken into consideration. In this analysis, the CK lexicon is classified into 'non-derived' and 'derived' words. By 'non-derived' we mean words that consist of one or more free morphemes. Non-derived words, therefore, cover both simple and compound words in this account. These, in turn, are classified according to syllable number into monosyllabic, disyllabic, trisyllabic, and four-syllable forms. 'Derived' words, on the other hand, denote words that consist of at least one morpheme, free or bound, plus one or more derivational or

inflectional affixes. Following this classification of the CK lexicon, the formal modules of Metrical Theory are employed in order to capture word stress distribution in CK.

5.7.1 *Stress in non-derived words*

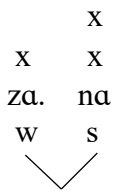
As stated previously, CK words predominantly take primary stress on the last syllable. Except for verbs, this principle seems to work equally well for all lexical items; nouns, adjectives, and adverbs. To capture stress assignment more explicitly, our analysis of word stress in CK will rely upon a classification of the lexical items according to the number of their syllables. However, as monosyllabic words contain only one syllable, hence stress falls on their only syllable, they do not seem to serve our purpose. This is because they cannot show S and W tree nodes or higher and lower grids. Examples include /ˈʃɑ/ 'king', /ˈmez/ 'table', /ˈʔɑst/ 'level', etc.

A) Stress in disyllabic words

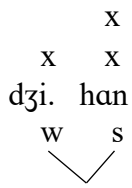
Since stress in CK words is assigned left to right (i.e. right-headed), in disyllabic words primary stress falls on the second (final) syllable. Accordingly, the first syllable, is weak or unstressed. Consider (2a), (2b), and (2c):

(2)

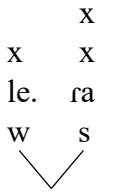
a. /zɑ.ˈnɑ/ 'wise':



b. /dʒi.ˈhɑn/ 'world'



c. /le.ˈɾa/ 'there'



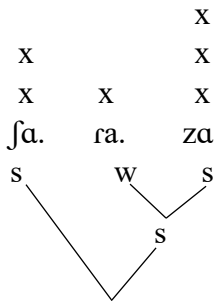
In examples (2a), (2b) and (2c) above, the second syllable is represented by more asterisks (ie X's) since it constitutes the strong syllable as compared to the first syllable, which has received one asterisk as it the weak syllable.

B) Stress in trisyllabic words

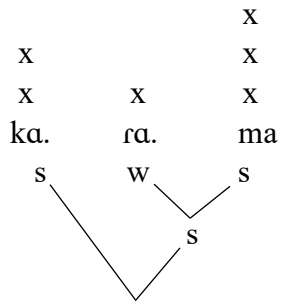
In trisyllabic words, the final syllable receives the primary stress. Accordingly, based on what we argued for previously, the secondary stress can be determined if we move away from the primary stress two syllables leftward; in other words, it falls on the first syllable.

(3)

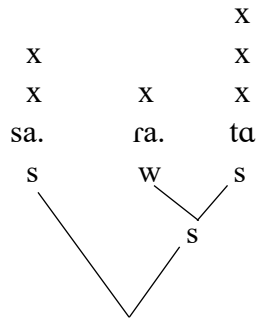
a. /ˌʃɑ. ɾa.ˈzɑ/ 'expert'



b. /ˌkɑ.ɾɑ.ˈma/ 'skilful'



c. /ˌsa. ɾa.ˈtɑ / 'beginning'



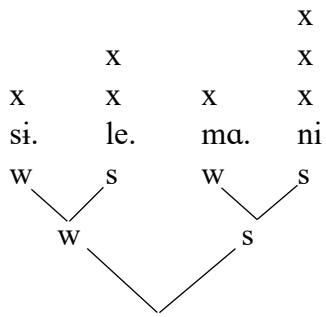
In (3a), (3b) and (3c), since the words consist of three syllables, three levels of asterisks are represented. The stressed syllable, located at the end of the word, has received the highest number of asterisks, indicating the location of primary stress. Following the stress distribution rule (that stress syllables do not occur adjacent to each other), the first syllable has received secondary stress whereas the second syllable is the weakest in the word. In addition, their structures display two hierarchical levels. The first level has represented the strong and weak sequencing of the three syllables, while the second level has indicated strongest level only.

C) Stress in four-syllable words

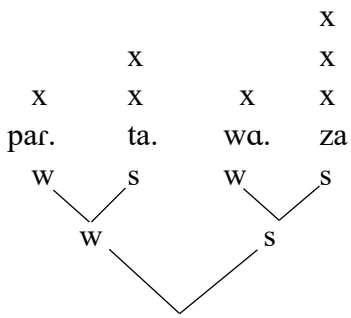
Similarly, in four-syllable words the primary stress placement occurs on the final syllable. The secondary stress, accordingly, falls on the antepenultimate syllable, while the initial and the penultimate syllables remain weak or unstressed.

(4)

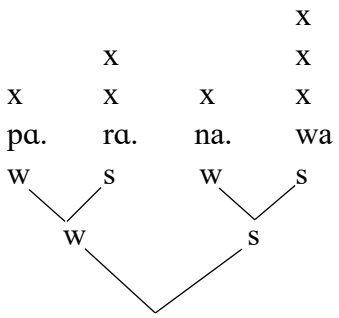
a. /siˌle.maˈni/ ‘name of a city: Sulaimani’



b. /parˌta. waˈza/ ‘dispersed, scattered’



c. /pɑ.ˌrɑ. na.ˈwa/ ‘begging’



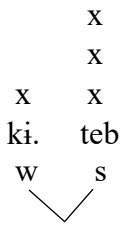
Since examples (4a), (4b) and (4c) are four syllable words, four levels of asterisks are represented above the syllables, along with two layers of weak and strong syllables. As noted, the syllable located at the right end of the word has received the strongest stress, while the secondary stress has fallen on the second syllable. The two remaining syllables (first and third) are weak. It can equally be noted that here syllable weight does not affect stress assignment. Although first syllable has the long vowel /ɑ/, it is weak. Conversely, the final syllable contains the short vowel /a/, yet it has received the primary stress.

It should be noted that the above-mentioned rule for stress distribution is also true for all loan words, regardless of the distribution of the primary stress in the language of origin (Fattah, 1997: 48).

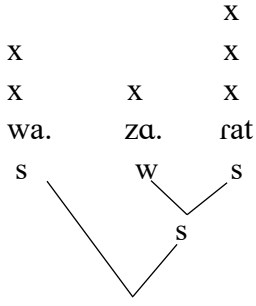
Loan words borrowed from Arabic include:

(5)

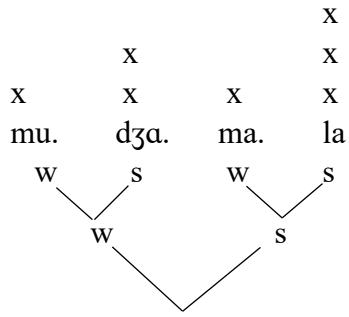
a. /ki.ˈteb/ ‘book’



b. /ˌwa.zɑ.ˈɾat/ ‘ministry’

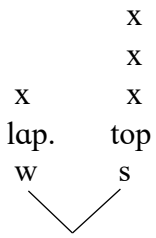


c. /mu.ˌdʒɑ.ma.ˈla/ ‘courtesy’

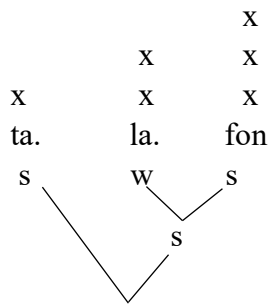


Loan words borrowed from other languages include:

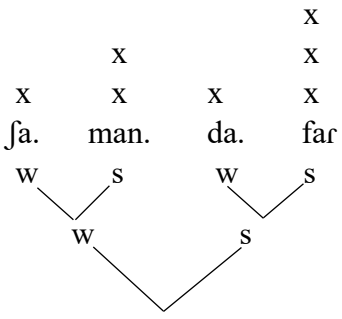
(6)
a. /lɑp.ˈtop/ ‘laptop’



b. /ˌta.la.ˈfon/ ‘telephone’



c. /ʃa.ˌman.da.ˈfaɾ/ ‘train’



5.7.2 *Stress in compound words*

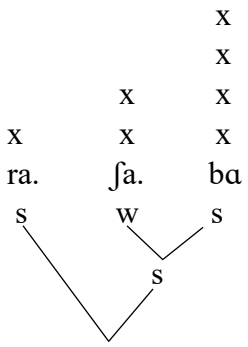
The stress distribution rule formulated for the simple, non-derived, words similarly applies to most compound words in CK (Fattah, 1997: 49). The primary stress falls upon the last syllable of the second element of the compound, while the secondary stress is regularly positioned according to its distance to the primary stress: two syllables from to the left of the primary stress. However, compounds fall into three classes:

A) Compounds that are linked with the vowel /a/:

(7)

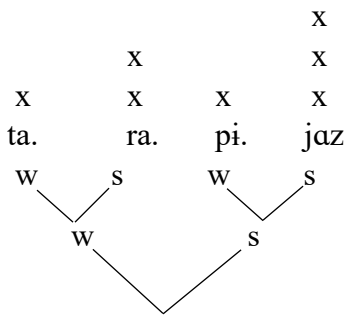
a. /ˌra.ʃa.ˈbɑ/ ‘strong wind’

(/raʃ/ ‘black’ + /a/ *izafa* marker +/bɑ/ ‘wind’)



b. /ta.ˌra. pɨ.ˈ jɑz/ ‘green onion’

(/tar/ ‘wet’ + /a/ ‘*izafa* marker’ +/pɨ.yɑz/ ‘onion’)

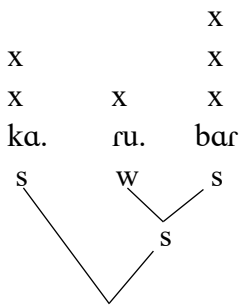


B) Compounds that are linked with the vowel /u/:

(8)

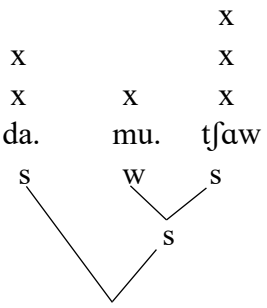
a. /ˌkɑ.ɾu.ˈbɑɾ/ ‘business status’

(/kɑɾ/ ‘work’ + /u/ +/bɑɾ/ ‘status’)



b. /da.mu.tʃɑw/ ‘face’

(/dɑm/ ‘mouth’+ /u/ +/tʃɑw/ ‘eye’)



As it is noticed, in compounds of the type A and B, syllabification often occurs. In such cases, the *izafa* marker forms a new syllable with the coda of the first element of the compound structure. In (7.a), for instance, the change in syllable structure can be explained as follows:

raʃ + a *izafa* + bɑ ⇨ ra. ʃa. bɑ

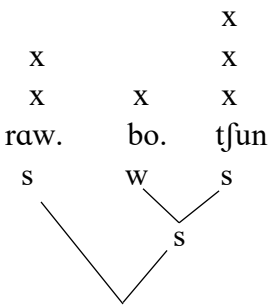
CVC + a *izafa* + CV ⇨ CV CV CV

If the syllable is open (i.e. lacks coda), then the *izafa* marker fills in the coda position, functioning as a consonant:

(9)

/ˌɾɑw.bo.ˈʧun/ ‘opinion’

(/ɾɑ/ ‘opinion’ + /w/+ /bo.ʧun/ ‘attitude’)

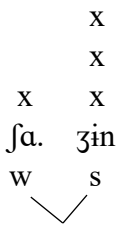


Compounds that lack connecters; i.e. word + word compounds:

(10)

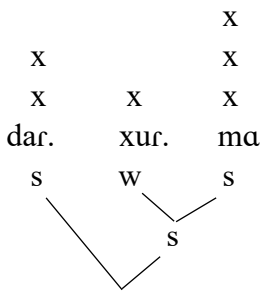
a. /ʃɑ.ˈʒɨn/ ‘queen’

(/ʃɑ/ ‘king’ + /ʒɨn/ ‘wife’)



b. /ˌdɑ ɾ.xuɾ.ˈmɑ/ ‘palm tree’

(/dɑɾ/ ‘tree’+ /xuɾmɑ/ ‘palm’)



5.7.3 *Stress in derivatives and affixes*

In CK derivative items, the placement of the primary stress varies depending on the type of affix attached to the base; i.e. whether the affix is stressable or unstressable, and on their linear order when more than one affix is found. Accordingly, when a derived word contains a stressable affix, the affix attracts the stress onto itself, causing a shift in stress. If the affix is unstressable, the primary stress remains on the last syllable of the stem, hence applying the word stress rule. For example, if we add the affixes/-aka/ ‘the’ and /-ɑn/ ‘plural marker’ to the word /kɑɾ.ˈmand/ ‘employee’, the primary stress will be pulled over by the affixes, hence /kɑɾ.ˌman.da.ˈka/ ‘the employee’ and /kɑɾ.ˌman.da.ˈkɑn/ ‘the employees’. On the other hand, if an unstressed affix such as /-ek/ is added to the word, the primary stress remains on the last syllable of the stem as the affix fails to attract the stress to itself, hence /kɑɾ.ˈman.dek/ (Fattah, 1997: 51; Rahimpour & Dovaise, 2011:78).

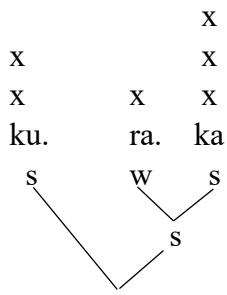
However, to capture stress distribution on CK affixes, we can classify them in two groups: stressed and unstressed affixes. The stressed affixes of CK include the definite marker /-aka/, the plural marker /-ɑn/, the comparative marker/-tɨɾ/, and the superlative marker /-tɾin/. Below is a detailed explanation of these.

5.7.3.1 Stressed affixes

As stated, these affixes attract the stress of the word, hence shifting the stress to the final syllable of the word. However, citing from Ahmad (1986), Fattah (1997), and Rahimpour & Dovaise (2011), the following can be listed as the most common affixes of this class:

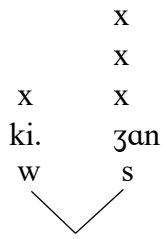
A) The definite marker /-aka/ 'the':

(11)
/ˈkur/ 'boy' ⟹ /ˌku.ra.ˈka/ 'the boy'



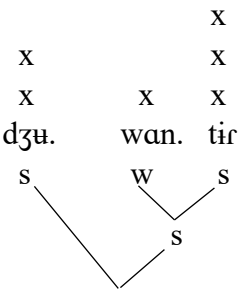
B) The plural marker /-ɑn/:

(12)
/ˈkiʒ/ 'girl' ⟹ /ki.ˈʒɑn/ 'girls'



C) The comparative marker/-tɨɾ/ 'more':

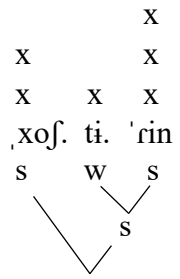
(13)
/dʒʉ.ˈwɑn/ 'beautiful' ⟹ /ˌdʒʉ. wɑn.ˈtɨɾ/ 'more beautiful'



Note that in this example, despite the fact that the epenthetic vowel /ɨ/ is the shortest vowel, the syllable has received the primary stress.

D) The superlative marker /-tɨɾin/ ‘the most’

(14)
/ˈxoʃ/ ‘pleasant’ ⟹ /ˌxoʃ. tɨ.ˈɾin/ ‘the most pleasant’

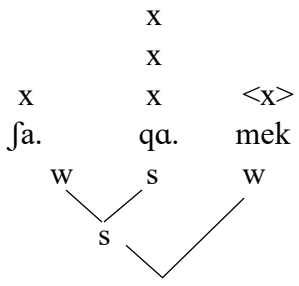


5.7.3.2 Unstressed affixes

The addition of an unstressed affix does not cause stress shift; therefore, the primary stress remains on the last syllable of the stem (Fattah, 1997: 51). This means the addition of these affixes does not affect foot parsing directionality but they cause syllabification: the coda of the syllable locates at the right edge of the word becomes the onset of the extrametrical syllable (4.4). Three common types of this class are listed by Ahmad (1986: 84). These include indefinite singular marker /-ek/, the clititics /-ɨm, -mɑn, -ɨt, -tɑn, -i, -jɑn/, and the postpositional affixes /-dɑ/ and /-awa/. Below is their description with examples.

A) The indefinite singular marker /-ek/ ‘a/an’[34]:

(15)
/ʃa.ˈqɑm/ ‘street’ /ʃa.ˈqɑ.mek/ ‘a street’[35]



[34] Monosyllabic words are an exception to this rule, where the tress falls on final syllable.

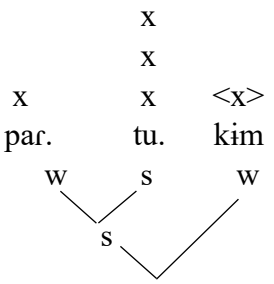
[35] More precisely speaking, the /-mek/ part of the word is extrametrical, and is therefore invisible to the prosodic hierarchy. Represented as <-mek>, it is one of the reasons why the metrical grid is favoured over the metrical tree. However, I have represented the tree branch for only to show where it stands in the tree.

B) The clititics /-ɨm, -mɑn, -ɨt, -tɑn, -i, -jɑn/, which play the role of the subject while attached to the direct object of the verb. However, /-ɨm/ indicates first-person singular, /-mɑn/ first-person plural, /-ɨt/ second-person singular, /-tɑn/ second-person plural, /-i/ third-person singular, and /-jɑn/ third-person plural:

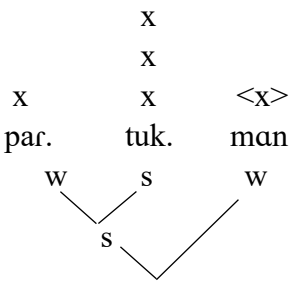
(16)

/paɾ.tuk/ ‘book’, can have the following options:

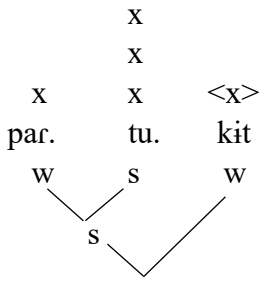
a. /paɾ.ˈtu.kɨm/ ‘my book’



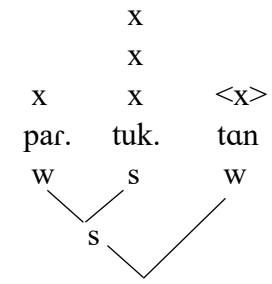
b. /paɾ.ˈtuk.mɑn/ ‘our book’



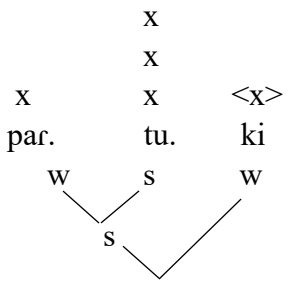
c. /paɾ.ˈtu.kɨt/ ‘your book’



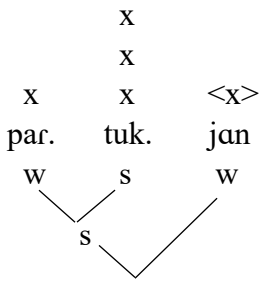
d. /paɾ.ˈtuk.tɑn/ ‘your book’



e. /paɾ.ˈtu.ki/ ‘his/her book’



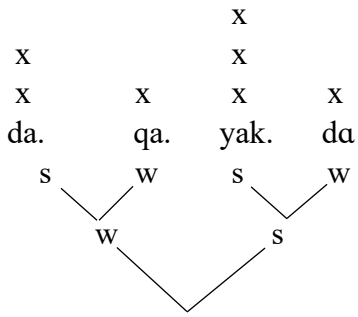
f. /paɾ.ˈtuk.jɑn/ ‘their book’



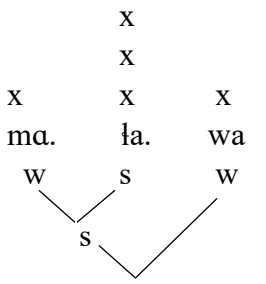
C) The postpositional affixes /-dɑ/ and /-awa/: these complete the reference of a spatial or temporal preposition; hence, they do not occur alone with the words they are attached to. Consider (17.a and b) below:

(17)

a. /lɑ. ˌda.qa.ˈyak.dɑ/ ‘in a minute’



b. /lɑ. mɑ.ˈła.wa/ ‘at home’



5.8 Optimality theory

Optimality theory (OT) is a constraint-based model which was introduced by Alan Prince and Paul Smolensky in an article in 1993. Since its launch, OT has been developed by other scholars, most notably McCarthy and Prince (1993, 1995), Archangeli and Langendon (1997), Kager (1999), and McCarthy (2007a, 2007b, 2008)[36]. In fact, OT advanced in response to what Prince and Smolensky (2004) described as a "conceptual crisis" in phonological thought, particularly regarding the role of output constraints. Although initially applied to phonology, OT has since been widely adopted in other linguistic fields, such as syntax and semantics (Legendre, Grimshaw, & Vikner 2001).

Unlike the previous rule-based approaches of phonological analysis, such as autosegmental phonology and linear phonology (SPE), OT assumes that the observed forms of language arise from the interaction between conflicting constraints. It proposes that the grammar of a language is a system that provides mappings from inputs to outputs. The inputs are considered underlying representations and the outputs are their surface realisations. The surface representations are evaluated with respect to a set of conflicting constraints. Three significant characteristics should be mentioned here. The first is that the phonological constraints are violable by the phonetic forms of their underlying representations in the OT structure. The seriousness of a violation is defined in terms of hierarchies of constraints; the violations of higher ranked constraints are the most serious. This notion leads to the second characteristic of OT, which is indicates that these constraints are not of equal importance: the ranking of the constraints is language specific. This implies that different languages have different ranking of a set of constraints, and that some constraints are more important than others in that language. The ranking process of the constraints is very crucial here, because it is the most important criterion that chooses the optimal candidate as output. EVAL chooses the out from a set of candidate starting from two to an infinite number (n). The third characteristic is that the constraints are said to be universal. All human languages share the same set of phonological constraints; however, they differ in how these constraints are ranked. In other words, they are ranked on the basis of a language-specific hierarchy of relative importance. This in turn suggests that the language-specific constraint ranking determines the inventory of the surface forms. In OT, the generation of an utterance involves two important functions; namely, the generator (known as GEN) and the Evaluator (EVAL). A generating

[36] The origins of OT go back to a talk given by Prince and Smolensky 1991, yet the theory was not published until it was developed and introduced by the authors in 1993. However, reference to the work in this study is given as 2004 since the manuscript of the theory was finally published in a book in 2004.

function (GEN) provides the output candidates for a given input. It can add, delete, change feature, etc. This results in a set of candidates. The candidates are theoretically an infinite set of randomly generated outputs from a single underlying form. An evaluation function (EVAL) determines which of these outputs is the optimal candidate (the winning candidate), which is referred to with a pointing finger (☞). In fact, the optimal candidate is the one that incurs the least serious violations. It should, however, be noted that OT does not make any claim about what a possible surface representation or a possible input looks like. This is because OT is not a theory of representation, but one of computation (cf. Prince & Smolensky 1993/2004; Kager 1999, McCarthy 2007b, 2008; Kramer 2012, among others).

Based on the OT, a grammar of a language comprises four parts: the Lexicon, the set of Constraints, the Generator, and the Evaluator. These are the building blocks of the theory and can be explained, along with what Candidates mean, as follows:

1. The Lexicon: This is the set of underlying representations which are acquired for each individual language.
2. CON: This refers to the set of universal constraints and comprises three basic types:

a) Markedness constraints: They deal with specific structural configurations of surface representations. They make no reference to the input but simply evaluate the well-formedness of the outputs. An example is the claim that there is universal tendency among world language that prefers syllables without codas.
b) Faithfulness constraints: These are related to the input-output mapping. Their aim is to ensure that output segments match input segments; in other words, outputs are faithful to inputs.
c) Alignment constraints: They are employed to ensure structural alignment between various structures. For example, they ensure that the edge of a word coincides with the left edge of a syllable.

3. GEN: This is the function that generates output candidates. The GEN can add or delete segments, change features, etc. the result is the set of candidates.
4. CAND: This refers to the potentially infinite set of surface representations which are randomly generated from a single underlying from. Once evaluated, the winning candidate is called optimal.
5. EVAL: This function evaluates the optimal output from the set of the generated candidates according to their harmony with the constraints in their language-specific ranking or hierarchy.

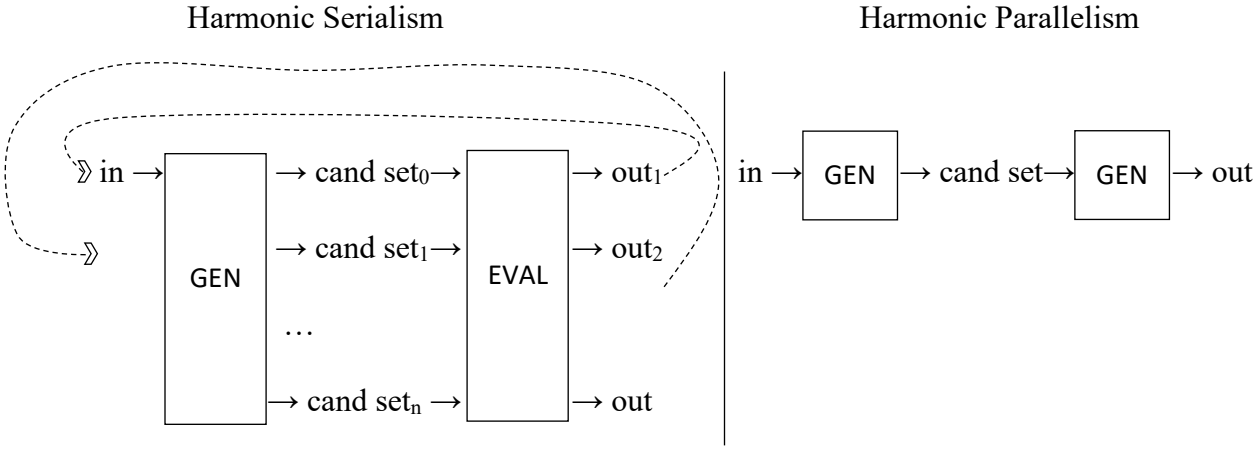
These phonological operations are formally represented in OT by means of a tableau. In it, an asterisk in a cell indicates that given candidate has violated the constraint. An exclamation mark that follows an asterisk means a 'fatal violation'. A shaded cell indicates its irrelevance to further evaluation of the candidates. Consider (17) as an example of how the final obstruent devoicing in CK is represented in a tableau:

(17) Tableau for CK sat 'hundred'

Input: /sad/	NOVOICED CODA	IDENT-IO (voice)
sad	*!	
☞ sat		*

It should be noted that, in their original introduction of OT, Prince and Smolensky (2004) refer to two ways of doing OT analysis: serial and parallel. Accordingly, two approaches are known in the literature of OT; namely, harmonic serialism and harmonic parallelism. This is explained in the following diagram (McCarthy, 2000):

Figure 5.1 Serial and Parallel Architectures for OT (adopted from McCarthy: 2000)



The majority of the work done in OT analysis follows a parallel implementation. This is also the approach that has been followed in the current study. The set of OT constraints we can employ to for the analysis of word stress distribution in CK words include:

(18)

a. FT-FORM: feet are syllabic Iambs in CK.

b. PARSE-SYL: As part of the prosodic word, syllables are parsed.

c. FT-BIN: Feet are binary at the syllable level.
d. NON-FINALITY: Stressed syllables are not final.
e. STRESS-WELL: No stressed syllable may be adjacent to the head syllable of the prosodic word (Halle & Vergnaud, 1987)
f. ALIGN (PWd, R, HEAD, R): Align the right edge of the prosodic word with the right edge of the head of the prosodic word.

By means of the OT formalisms, the distribution of stress in a disyllabic word like *qa.ˈław* 'fat' can be explained in the example below. In (19) the input *qełew* /qaław/ is plotted in a tableau with different candidates, including the optimal one. These candidates are listed and are then evaluated according to a number of stress assignment OT constraints. Among the generated candidates, one of them will be the winning candidate; that is, the optimal candidate.

(19) qa.ˈław 'fat'

qa.ˈław	FT-FORM	PARSE-SYL	ALIGN (PWd, R, HEAD, R)	STRESS-WELL	NON-FINALITY
☞ a. [(qa.ˈław)]					*
b. [(ˈqa. ław)]	*!		*σ		
c. [(qa.(ˈław)]		*!			*
d. [(ˈqa.) ław)]	*!	*	*σ		
e. [qaław]		*!			
f. [(ˈqa.)(ˈław)]	*!		*	*	*

In (19), the constraints are ordered as follows:

FT-FORM, PARSE-SYL, ALIGN (PWd, R, HEAD, R), STRESS-WELL >> NON-FINALITY.

The above order of the constraints indicates that in CK, the constraint FT-FORM is ranked higher compared to the others. Accordingly, a violation of this constraint is considered fatal. Conversely, the constraint NON-FINALITY is ranked the lowest since CK do not obey the constraint.

Six candidates are generated for the input *qa.ˈɬaw* ‘fat’, which have been evaluated according to the constraints. The constraint FT-FORM requires that the foot structure of the word must be iambic: disyllabic with the stress on its rightmost syllable (σ ˈσ). Since candidate (19b) indicates a fatal violation to this constraint, it is ruled out. In candidates (19c, 19d, 19e), the syllables are not parsed by feet. Accordingly, they exhibit a fatal violation to the constraint PARSE-SYL, and are therefore ruled out by an asterisk and an exclamation mark. Since candidate (19a) only shows a violation to the constraint NON-FINALITY, which is ranked below the other candidates, it is considered the optimal.

A three-syllable input like /ˌra. ʃa.ˈbɑ/ ‘strong wind’ is plotted on the OT tableau as follows:

(20) ˌra. ʃa.ˈbɑ ‘strong wind’

ˌra. ʃa.ˈbɑ	FT-FORM	PARSE-SYL	ALIGN (PWd, R, HEAD, R)	STRESS-WELL	NON-FINALITY
a. [(ˌra.) (ʃa.ˈbɑ)]			*!		*
b. [(ˈra. (ʃa. bɑ)]	*!	*	*σ		
c. [(ˌra.) (ˈʃa. bɑ)]	*!				
d. [(ra.ˈʃa.) bɑ)]	*!	*	*σ		
☞ e. [(ˌra. ʃa.)(ˈbɑ)]					*
f. [(ˈra.ˈʃa.)(bɑ)]	*!		*	*	

In tableau (20), the constraints are ordered as follows:

FT-FORM, PARSE-SYL, ALIGN (PWd, R, HEAD, R), STRESS-WELL >> NON-FINALITY.

The input /ˌra. ʃa.ˈbɑ/ seeks an output whose foot structure is iambic (FT-FORM), whose syllables are parsed (PARSE-SYL), that is right-headed (ALIGN (PWd, R, HEAD, R)), and that has no adjacent stressed syllables (STRESS-WELL). Based on these constraints, candidate (e) is considered optimal, since all the other candidates contain a fatal violation of the constraints.

5.9 Summary

This chapter provided a definition of stress and an analysis of word stress distribution in CK in view of two theories: the metrical theory and OT. Stress was defined as the relative prominence of a syllable compared to the other syllables in the structure. Four levels of word stress are distinguished among stressed languages: primary stress, secondary stress, tertiary stress, and unstressed syllables; nevertheless, there is cross-linguistic variation in the existence of secondary stress and its degree of importance. Structurally, stress is closely related to the foot: it is a property of rightmost (iambs) or leftmost (trochees) syllable of the foot. The archetypal foot type is disyllabic with one stressed or strong syllable and one unstressed or weak syllable.

Typologically, languages are described in terms of certain stress related parameters: left-headed versus right-headed, direction of foot parsing from left to right versus from right to left, bounded versus unbounded stress system, fixed versus free stress languages, stress-timed or syllable-timed languages, and quantity-sensitive versus quantity-insensitive systems. Similarly, stress assignment in world stress systems demonstrates certain typological properties such as culminativity, rhythmic distribution, stress is hierarchies, and lack of assimilation.

In CK, stress does not straightforwardly fall into specific parameters. While CK is categorised as a bounded language and its foot as right-headed (head-final), it is neither a fixed-stress nor a free-stress language, but one that exhibits somelimitedfreedom of stress, although stress is usually assigned to the last syllable of the word. Similarly, it is not strictly syllable-timed or stress-timed nor quantity-sensitive or quantity-insensitive.

Employing the formal representations of the metrical tree and metrical grids, non-derived words of CK, words stress in CK is formally represented via a hierarchy of grid based levels. In disyllabic words, the right most syllable receives the most grids since it is the strong stress, regardless of vowel length, while the first syllable is weak (unstressed). In trisyllabic and four-syllable words, in addition to the primary stress, the first syllable receives secondary stress, while the rest are weak. Similar rules apply to loan words and compound words. Likewise, the primary stress in CK words with unstressed affixes remains on the last syllable of the stem.

Within the OT framework, CK stress distribution is captured by means of a set of universal constraints that are said to be generated randomly. The optimal candidate is the one that does not contain a serious violation of these constraints. In CK syllables, the constraints

ONS and PARSE-SEG are not violated in the language, whereas the *COD constraint is violable as noted in the basic CK syllable types.

Chapter 6 Conclusions and Recommendations for Future Research

6.1 Conclusions

This thesis has accounted for the distribution of stress in CK words. It has identified CK word stress patterns in terms of world stress typologies (Hayes, 1995), evaluating the available evidence advanced for the relationship of stress to syllable weight sensitivity, particularly in the light of the mora theory. It has also accounted for stress in terms of the formalities of Metrical Theory, Pure Grid (Prince 1983a; Selkirk 1984) and Metrical Bracketed Grid (Halle & Vegnaud 1987), and the constraint-based formalisms of the syllable and foot analysis in OT (Prince & Smolensky, 2004, Kager 1999).

In terms of syllable structure, the thesis concludes that an essential characteristic of the CK syllables is that their onset is obligatory since they do not start with a vowel. Syllables that are claimed to start with a vowel are, in fact, initiated by an epenthetic glottal stop /ʔ/, which is inserted both to prohibit vowel-initial syllables and reinforce the production of the nucleus vowel sound. Furthermore, CK syllables do not start with consonant clusters if they occur word-initially. This thesis presumes that when two consonants occur in the onset of a word initial syllable, the unstressed epenthetic vowel (/ɨ/ or its allophonic variation /ʉ/) is usually inserted after the onset consonant, hence rendering a CV structure and meeting the cross-linguistic vowel presence criterion of the syllable structure. While consonant clusters are not allowed in the onset, CK syllables allow for a maximum of two consonants in the coda; therefore, the CVCC can be regarded as the maximal structure of CK syllables. Accordingly, we can conclude that CK has three basic syllable structures: CV, CVC, and CVCC. Of these, the coda C is optional, while the onset C and nucleus V are obligatory.

Furthermore, the thesis concludes that while CK is a quantity-insensitive language whose syllables do not show weight distinction, it manifests some features of weight sensitivity. Weight in phonological theory is related to the concept of the mora and is represented by its formalisms (McCawley 1968; Selkirk 1981). The primary application of the moraic theory in phonological inquiry has been in the treatment of compensatory lengthening, which is a characteristic of weight-sensitive systems. CK is a quantity-insensitive language; nevertheless, the CK syllables exhibit some behaviours of weight sensitivity through contrastive vowel length contrast, gemination, and compensatory vowel lengthening. This draws the generalisation that although vowel length distinction is a well-known property of quantity-sensitive languages, classifying languages as either sensitive to syllable weight or

insensitive to it does not seem to offer a conclusive outcome. In the OT framework, the thesis concludes that the two constraints ONS and PARSE-SEG are never violated in the language, while *COD is violable, as seen in the basic CK syllable types.

Likewise, another crucial conclusion the thesis has drawn is that the primary stress in CK is usually placed upon the last syllable of simple words. In complex words, on the other hand, primary stress assignment depends on the type and linear order of the affixes attached to the stem of the host word. Moreover, as strong and weak syllables are distributed at regular intervals in the language, secondary stress is determined algorithmically according to its distance from the primary; it falls two syllables to the left of the primary stress.

As for the foot structure, the thesis concludes that CK has well-formed rhythmic patterns of weak and strong syllables with iambic feet. It constrains the number of syllables that make up its feet; it allows only a maximum of two syllables to construct its foot. This suggests that CK is characterised by a footing system of even numbers. Words that comprise an odd number of syllables will have peripheral constituents falling outside the foot structure, forming either a degenerate foot or an extrametrical element. A last conclusion related to the foot structure is that CK feet are right-headed and that the primary stress falls upon the end of the structure, suggesting that CK feet are constructed leftward; that is, from the right end of the word to the beginning. The right headedness of the CK feet leads to another closely related yet crucial conclusion about the CK feet: that they are head-final. Arguments for foot structure in CK involve, most importantly, the rhythmic stress patterns that construct feet. Morphological evidence, on the other hand, includes processes such as reduplication and hypocoristic structures.

Another conclusion related to the foot structure is that extrametricality is not purely phonological in CK. Extrametrical syllables, which are peripheral structures that fall outside the assignment of stress, are usually found in CK complex nouns with unstressed syllables. These suffixes are the indefinite singular marker /-ek/ and the clitics /- ɨm, -mɑn, -ɨt, -tɑn, -i, -jɑn/. When they attach to the right edge of a word, primary stress remains on the last syllable of the word. Since these suffixes do not attract stress, the position of primary stress becomes penult in the complex word.

As stated, primary stress in CK is generally placed upon the last vowel of the stem. Once primary stress is assigned, the next syllable on the left is assigned weak stress. The third syllable to the left receives secondary stress, while the fourth gets weak stress and, thus, repeats the alternation of weak and strong syllables. The secondary-weak stress alternation is

applicable to other possible syllables in the word. These rhythmic alternations of weak and strong syllables forming the feet of a word make CK a bounded iambic system.

The thesis concludes the rules of word stress and posits that monosyllabic CK words predominantly take primary stress on the last syllable whereas disyllabic words receive primary stress on the second (final) syllable. Trisyllabic words receive primary stress on the final syllable, while the secondary stress can be determined if we move away from the primary stress two syllables leftward. In four-syllable words, the primary stress placement occurs on the final syllable. Accordingly, the secondary stress falls on the antepenultimate syllable, while the initial and the penultimate syllables are unstressed. In compounds, the primary stress falls upon the last syllable of the second element of the compound, while the secondary stress is regularly positioned according to its distance to the primary stress: two syllables to the left of the primary stress.

Finally, in CK derivative items, the placement of the primary stress varies depending on the type of affix attached to the item; i.e. whether the affix is stressable or unstressable, and on their linear order when more than one affix is found. Accordingly, when a derived word contains a stressable affix, the affix attracts the stress onto itself, causing a shift in stress. If the affix is unstressable, the primary stress remains on the last syllable of the stem, hence applying the word stress rule. In other words, stress placement in CK words is straightforward in non-derived words, whereas in derived words, the type of affix determines where stress is placed. Except for verbs, this principle is true for all lexical items: nouns, adjectives, and adverbs. These observations suggest that syllable structure and syllable weight do not determine stress placement in the language. Likewise, stress is not assigned according to the individual lexical item or the foot structure, which is iamb.

6.2 Recommendations for future research directions

The stress system of CK represents a fertile field of linguistic inquiry that provides extensive avenues for research on phonetics, phonology, sociolinguistics, and cross-linguistic typology. From a phonetic point of view, future research can explore the phonetic correlates of word stress in CK. For example, research can explore the acoustic correlates (e.g. duration, pitch, intensity, etc.) that are associated with the stressed and unstressed syllables of CK words. Such research will significantly advance the empirical understanding of CK phonetics by identifying the specific acoustic features that function as perceptual cues for speakers in stress identification. This will provide a more robust account of how stress is perceived and

produced in CK, further contributing to both theoretical and applied linguistic studies of the language.

In the field of phonology, future research can examine the assignment of stress in CK verbs since they are excluded in the present work. Similarly, in prosodic phonology, research can account for how word stress interacts with rhythm and intonation in CK. This will offer a more detailed explanation of the role word stress has in the prosodic structure of CK. Likewise, another phonological approach to the analysis of stress assignment in CK words can be undertaken specifically within the OT framework. Such an analysis can focus on the interaction of OT constraints governing the foot structure and prosodic stress patterns (e.g. PARSE-σ, FT-BIN, ALIGN-LEFT or ALIGN-RIGHT, and TROCHAIC or IAMBIC) along with their ranking.

Another future direction can adopt a sociolinguistic (dialectological) approach. For example, research can investigate variations of stress assignment across different CK subdialects, speech communities or regions. It can also address variations of stress assignment in Kurdish dialects. Likewise, future research can account for cross-linguistic similarities and variations of stress patterns among different languages. For example, it can locate where the stress system of CK is located in light of the typological generalisations of Hayes (1995).

References

Abdulla, J. 1980. *Some aspects of language purism among Kurdish speakers*. PhD, University of York.

Abdulla, J. and E. McCarus. 1967. *Kurdish Basic Course: Dialect of Sulaymaniyah, Iraq*. Ann Arbor: University of Michigan Press.

Ahmad, R. 1986. *The Phonemic System of Modern Standard Kurdish*. PhD, University of Michigan.

Alderete, J. 1999. 'Head dependence in stress-epenthesis interaction'. In B. Hermans and M. van Oostendorp, (eds) *The derivational residue in phonological optimality theory*. Amsterdam: John Benjamins. 29-50.

Ali, T. 1989. *Kurdish Phonology and the Phenomenon of Simplification of Phonemes in Sulaimani Dialect*. MA, Salahaddin University.

Allen, M. 1979. *Morphological Investigations*. PhD, University of Connecticut.

Amin, W. 1979. *Aspects of the verbal construction in Kurdish*. MPhil, University of London.

Amini, A. 1997. 'On stress in Persian.' *Toronto Working Papers in Linguistics* 16: 1–20.

Anderson, R. (2011) 'Clitics'. In M. van Oostendorp, C. Ewen, E. Hume, and K. Rice, (eds) *The Blackwell Companion to Phonology*. Oxford: Wiley-Blackwell. 2002-2019.

Archangeli, D. 1991. 'Syllabification and prosodic templates in Yawelmani.' *Natural Language & Linguistic Theory* 9: 231-283.

Archangeli, D. and D. T. Langendoen. 1997. *Optimality Theory: An Overview*. Oxford: Blackwell Publishers.

Aziz, O. 1976. *Some Aspects of Kurdish Phonology and Phonetics*. MA, University of Leeds.

Bakovic, E. 2007. 'Local Assimilation and Constraint Interaction'. In P. de Lacy (ed.) *The Cambridge Handbook of Phonology*. Cambridge: Cambridge University Press. 335-351.

Baser, B. 2015. *Diasporas and Homeland Conflicts: A Comparative Perspective*. Ashgate Publishing.

Bennet, R. 2012. *Foot-conditioned phonotactics and Prosodic Constituent*. PhD, University of California, Santa Cruz.

Bensoukas, K. and A. Boudlal. 2012. ‘The Prosody of Moroccan Amazigh and Moroccan Arabic: similarities in the phonology of schwa’. In T. Borowsky, S. Kawahara, T. Shinya, and M. Sugahara (eds) *Prosody Matters: Essays in Honor of Elisabeth Selkirk*. Sheffield, UK: Equinox. 3-42.

Bermudez-Otero, R. 2006. ‘Morphological structure and phonological domains in Spanish denominal derivation’. In S. Colina, and F. Martinez-Gil (eds) *Optimality-theoretic studies in Spanish phonology*. Amsterdam: John Benjamins. 78-111.

Bird, C. 2004. *A Thousand Sighs, a Thousand Revolts: Journeys in Kurdistan*. New York: Ballentine.

Blevins, J. 1995. ‘The Syllable in Phonological Theory’. In J. Goldsmith (eds) *The Handbook of Phonological Theory*. 5th ed. Oxford: Blackwell Publishing. 206-245.

Booij, G. 1983. 'Principles and parameters in prosodic phonology'. *Linguistics* 21: 249-280.

Booij, G. 1996. 'Cliticization as prosodic integration: The case of Dutch'. *The Linguistic Review* 13: 219 -242.

Bosch, A. R. 2011. ‘Syllable-Internal Structure’. In M. van Oostendorp, *Blackwell Companion to Phonology*. Vol. 2. Malden, Mass: Wiley-Blackwell.

Brockhaus, W. 1991. ‘Final Devoicing and Neutralisation’. *UCL Working Papers in Linguistics* 3: 303-330.

Broselow, E. 1982. 'On predicting the Interaction of Stress and Epenthesis'. *Glossa: An International Journal of Linguistics* 16: 115-132.

Bruinessen, M. V. 1992. *Agha, Shaikh and State: The Social and Political Structures of Kurdistan*. London: Zed Books Ltd.

Cairns, C. and E. Raimy. 2011. *Handbook of the Syllable*. Leiden and Boston: Brill.

Carr, P. and J. P. Montreuil. 2013. *Phonology*. 2nd ed. Basingstoke: Palgrave Macmillan.

Chomsky, N. and M. Halle. 1968. *The Sound Pattern of English*. New York: Harper & Row.

Clements, G. and S. Keyser. 1983. ‘CV Phonology: A Generative Theory of the Syllable’. *Linguistic Inquiry Monographs* 9: 1-191.

Collins, B. and I. M. Mees. 2008. *Practical Phonetics and Phonology: A Resource Book for Students*. London: Routledge.

Côté, M. 2000. *Consonant cluster phonotactics: A perceptual approach*. PhD, Massachusetts Institute of Technology Press.

Crothers, J. 1978. 'Typology and Universals of Vowel systems'. In J. Greenburg, C. Fergusen,and E. Moravcsik (eds) *Universals of Human Language*. Stanford: Stanford University Press. 93-152.

Crowhurst, M. 1991. *Minimality and Foot Structure in Metrical Phonology and Prosodic Morphology*. PhD, University of Arizona.

Crystal, D. 1997. *The Cambridge Encyclopaedia of Language*. 2nd ed. Cambridge: Cambridge University Press.

Crystal, D. 2008. *A Dictionary of Linguistics and Phonetics*. 6th ed. Oxford: Blackwell Publishing.

Curtis, E. 2003. *Geminate Weight: Case Studies and Formal Models*. PhD, University of Washington.

Davenport, M. and S. J. Hannahs. 2010. *Introducing Phonetics and Phonology*. 3rd ed. London: Hodder Education.

Davis, S. 1985. *Topics in Syllable Geometry*. New York & London: Garland Publishing.

Davis, S. 2006. 'Syllabic Constituents'. In E. Brown, R. Asher, and J. Simpson (eds) *The Encyclopaedia of Language and Linguistics*. 2nd ed. Oxford and New York: Pergamon Press. 326-336.

Davis, S. 2011. 'Quantity'. In J. Goldsmith, J. Riggle, and C. Alan (eds) *The Handbook of Phonological Theory*. 2nd ed. Oxford: John Wiley & Sons. 103–141.

De Lacy, P. 2007. 'The interaction of tone, sonority and prosodic structure'. In P. de Lacy (eds) *The Cambridge Handbook of Phonology*. Cambridge: Cambridge University Press. 281–309.

Dizayee, A M, D. T. Mohammed and D. A. Salih. 2013. *Fonetik u Fonolojî* (Phonetics and Phonology). Erbil: Hevi Printing House.

Driver, G. R. 1923. *The Name Kurd and Its Philological Connexions*. The Journal of the Royal Asiatic Society of Great Britain and Ireland, 1923(3), 393–404.

Durand, J. 1990. *Generative and Non-Linear Phonology*. London: Longman Group.

Elfner, E. 2009. *Syllabification and stress-epenthesis interactions in Harmonic Serialism*. Massachusetts: University of Massachusetts Amherst.

Elfner, E. 2012. *Syntax-Prosody Interactions in Irish*. Ph.D, University of Massachusetts.

Ewen, C. J. and H. van der Hulst. 2001. *The Phonological Structure of Words: An Introduction*. Cambridge: Cambridge University Press.

Fattah, I. 2000. *Les dialectes kurdes méridionaux: étude linguistique et dialec-tologique*. Louvain: Peters.

Fattah, M. 1980. 'On the Stress System of Kurdish'. *Zanko*, *The Scientific Journal of the University of Sulaimani (Humanities Series)* 6: 181-92.

Fattah, M. 1997. *A Generative Grammar of Kurdish*. PhD, University of Amsterdam.

Fattah, M. 2010. 'Řênusî Kurdî la řiwangey Fônetîkewe' (Kurdish Orthography from a Phonotect Perspective). In S. Khoshnaw and S. Qadir (eds) *Lêkôłînewe Zimanewaniyakan (Linguistic Investigations)*. Erbil: Rozhalat Press. 41-68.

Fitzgerald, C. 2012. 'Prosodic Inconsistency in Tohono O'odham'. *International Journal of American Linguistics* 78: 435-463.

Foley, W. 1991. *The Yimas Language of New Guinea*. California: Stanford University Press.

Fox, A. 2000. *Prosodic features and prosodic structure: the phonology of suprasegmentals*. Oxford: Oxford University Press.

Friend, R. 1985. *Some Syntactic and Morphological Features of Suleimaniye Kurdish*. PhD, University of California, Los Angeles.

Fuad, M. 1971. *The Major Kurdish Dialects and Their Geographical Distribution*. Baghdad: University of Baghdad Press.

Fudge, E. 1969. 'Syllables'. *Journal of Linguistics* 3: 253-286.

Giegerich, H. J. 1985. *Metrical phonology and phonological structure: German and English*. Cambridge: Cambridge University Press.

Goldsmith, J. A. 1990. *Autosegmental and Metrical Phonology*. Oxford: Basil Blackwell Ltd.

Goldsmith, J. 2011. 'The Syllable'. In J. Goldsmith, J. Riggle, and C. Alan (eds) *The Handbook of Phonological Theory*. 2nd ed. Oxford: John Wiley & Sons. 164–193.

Gordon, M. 1999. *Syllable weight: phonetics, phonology, and typology*. PhD, University of California, Los Angeles.

Gordon, M. 2002. 'A Factorial typology of quantity-insensitive stress'. *Natural Language & Linguistic Theory* 20: 491-552.

Gordon, M. 2004. 'Syllable weight'. In B. Hayes, R. Kirchner, and D. Steriade (eds) *Phonetic Bases for Phonological Markedness*. Cambridge: Cambridge University Press. 277-312.

Gordon, M. 2006. *Syllable Weight: phonetics, phonology, typology*. New York: Routledge Taylor & Francis Group.

Gordon, M. 2011. 'Stress systems'. In Goldsmith, J., J. Riglle, and C. L. Y. Alan (eds) *The Handbook of Phonological Theory*. 2nd ed. West Sussex: Blackwell Publishing Ltd. 141-196.

Gouskova, M. and N. Hall. 2009. 'Acoustics of epenthetic vowel in Lebanese Arabic'. In S. Parker (eds) *Phonological argumentation: Essays on Evidence and motivation*. London: Equinox. 203-225.

Guerssel, M. 1986. 'Glides in Berber and syllabicity'. *Linguistic Inquiry* 17: 1-12.

Gunter, M. M. 2003. *The A to Z of the Kurds*. Lanham, Maryland: Scarecrow Press, Inc.

Gunter, M. M. 2011. *Historical Dictionary of the Kurds*. 2nd ed. Lanham, Maryland: Scarecrow Press, Inc.

Gussenhoven, C. 2004. *The Phonology of Tone and Intonation*. Cambridge: Cambridge University Press.

Gussenhoven, C. and H. Jacobs. 2005. *Understanding Phonology*. 2nd ed. Routledge.

Goldsmith, J. A. 1990. *Autosegmental and Metrical Phonology*. Oxford: Basil Blackwell Ltd.

Haig, G. and E. Öpengin. 2014. 'Kurdish: a critical research overview'. *Kurdish Studies* 2: 99-122.

Hall, N. 2006. 'Cross-linguistic patterns of vowel intrusion'. *Phonology* 23: 387-429.

Hall, T. 1999. 'German phonotactics and the prosodic structure of function words'. In T. Hall,and U. Kleinhenz. (eds) *Studies on the Phonological Word*. Amsterdam: Benjamins. 99–131.

Halle, M. and W. Idsardi. 1995. 'General Properties of Stress and Metrical Structure'. In Goldsmith, (ed.) *The Handbook of Phonological Theory*. 1st ed. Oxford: Blackwell Publishing. 403–444.

Halle, M. and J. Vergnaud. 1978. *Metrical Structures in Phonology*. Cambridge, Mass: Massachusetts Institute of Technology Press.

Halle, M. and J. Vergnaud. 1987. *An Essay on Stress*. Massachusetts: Massachusetts Institute of Technology Press.

Hamid, T. S. 2013. *Foot Structure in Kurdish: An OT Analysis*. Unpublished Paper, University of Newcastle.

Hamid, T. S. 2016. The Prosodic Phonology of Central Kurdish. PhD, Newcastle University.

Hammond, M. 1995. 'Metrical Phonology'. *Annual Review of Anthropology* 24: 313–342

Hammond, M. 2011. 'The Foot.' In M. van Oostendorp, C. J. Ewen, E. Hume and K. Rice (eds) *The Blackwell Companion to Phonology*. West Sussex: Blackwell Publishing Ltd. 1028-1051.

Harris, J. 1983. *Syllable structure and stress in Spanish: a nonlinear analysis*. Cambridge, Mass: Massachusetts Institute of Technology Press.

Harris, J. 2009. 'Why final obstruent devoicing is weakening'. In K. Nasukawa, and P Backley (eds) *Strength relations in phonology*. Berlin: Mouton de Gruyter. 9–46.

Hasan, A. 2012. *Kurdish Intonation with Reference to English*. PhD, University of Ulster.

Hassanpoor, J. 1999. *A Study of European, Persian and Arabic Loans in Standard Sorani*. PhD, Uppsala University.

Hassanpour, A. 1992. *Nationalism and Language in Kurdistan 1918-85: The Language Factor in National Development*. Toronto: Edwin Mellen Press.

Hassanpour, A., J. Sheyholislami, and T. Skutnabb-Kangas. 2012. 'Introduction. Kurdish: Linguicide, resistance and hope'. *International Journal of the Sociology of Language* 1-18.

Hayes, B. 1979. 'Ternary stress feet in English'. *Massachusetts Institute of Technology Working Papers in Linguistics* 1: 88-94.

Hayes, B. 1980. *A metrical theory of stress rules*. PhD, Massachusetts Institute of Technology.

Hayes, B. 1982. ‘Extrametricality and English Stress’. *Linguistic Inquiry* 13: 227–276.

Hayes, B. 1984. ‘The phonology of rhythm in English’. *Linguistic Inquiry* 15: 33–74.

Hayes, B. 1985. *A Metrical Theory of Stress Rules*. New York: Garland Publishing.

Hayes, B. 1989. ‘The Prosodic Hierarchy in meter’. In P. Kiparsky and G. Youmans (eds) *Rhythm and Meter*. Orlando: Academic Press. 201–260.

Hayes, B. 1989. ‘Compensatory Lengthening in Moraic Theory’. *Linguistic Inquiry* 20: 253–306.

Hayes, B. 1995. *Metrical Stress Theory. Principles and Case Studies*. Chicago: The University of Chicago Press.

Hein, J. 2015. Stress Pattern and Theory: Introduction to Tress (Lecture).

Hirsch, A. 2014. ‘What is the domain for weight computation: the syllable or the interval?’ *Proceedings of the Annual Meetings on Phonology* 1: 1.

Hogg, R. and C. B. McCully. 1987. *Metrical phonology: a coursebook*. Cambridge: Cambridge University Press.

Holmberg, A. and D. Odden, 2005. ‘The noun phrase in Hawramani’. Paper presented at *First International Conference on Aspects of Iranian Linguistics*, Leipzig, 2006.

Hulst, H. van der. 1995. ‘Metrical phonology’. *Glot International* 1:3–6.

Hulst, H. van der. 1999. ‘Theories of the syllable’. In Hulst, H. van der & N. Ritter (eds) *The syllable: views and facts*. Berlin: Mouton de Gruyter. 13-52

Hulst, H. van der 2009. ‘Brackets and grid marks or theories of primary accent and rhythm’. In E. Raimy and C. Cairns, (eds) *Contemporary views on architecture and representations in phonological theory*. Cambridge, MA: Massachusetts Institute of Technology Press. 225–245.

Hulst, H. van der. and N. Smith. 1985. *Advances in nonlinear phonology*. Dordrecht: Foris Publications.

Hulst, H. van der and N. Ritter. 1999. *The syllable: views and facts*. Berlin: Mouton de Gruyter.

Hulst, H. van der 2012. ‘Deconstructing Stress’. In J. Rooryck (ed.) *Lingua* 122, 13: 1494-1521.

Hyde, B. 2011. ‘Extrametricality and Non-finality’. In M. van Oostendorp, C. J. Ewen, E. Hume and K. Rice (eds) *The Blackwell Companion to Phonology*. Vol. 2, 2011. West Sussex: Blackwell Publishing Ltd. 1028-1051.

Hyman, L. 1985. *A Theory of Phonological Weight*. Dordrecht: Foris.

Hyman, L. 1992. ‘Moraic mismatches in Bantu’. *Phonology* 9: 255–265.

Itô, J. 1986. *Syllable Theory in Prosodic Phonology*. PhD, University of Massachusetts, Amherst.

Itô, J. 1989. ‘A Prosodic Theory of Epenthesis’. *Natural Language & Linguistic Theory* 7: 217–259.

Itô, J. and A. Mester. 2003. *Weak layering and word binarity*. Santa Cruz: University of California, Santa Cruz.

Itô, J. and A. Mester. 2007. ‘Prosodic Adjunction in Japanese compounds’. *Massachusetts Institute of Technology Working Papers in Linguistics 55: Formal Approaches to Japanese Linguistics* 4: 97– 111.

Itô, J. and A. Mester. 2007b. ‘Categories and projection in prosodic structures’. Paper presented at *The 4th Old World Conference in Phonology*, Rhodes, Greece.

Itô, J. and A. Mester. (2009) ‘The extended prosodic word’. In J. Grijzenhout, and B. Kabak, (eds) *Phonological Domains: Universals and Deviations*. Berlin: Mouton de Gruyter. 135–194.

Itô, J. and A. Mester. 2012 ‘Recursive Prosodic Phrasing in Japanese’. In T. Borowsky, S. Kawahara, T. Shinya and M. Sugahara (eds) *Prosody Matters: Essays in Honor of Elisabeth Selkirk*. Sheffield, UK: Equinox. 341–373.

Itô, J. and A. Mester. 2013. ‘Prosodic Subcategories in Japanese’. *Lingua* 120: 20–40.

Iverson, G. and J. Salmons. 2007. ‘Domains and directionality in the evolution of German final fortition’. *Phonology* 24: 121-145.

Jacobs, H. 1990. ‘On Markedness and Bounded Stress Systems’. *The Linguistic Review* 7: 81-119.

Jun, S. 2005. ‘Prosodic typology: the phonology of intonation and phrasing’. In S. Jun (ed.) *Prosodic Typology*. Oxford: Oxford University Press. 430–458.

Kabak, B. and A. Revithiadou. 2009. ‘An Interface Approach to Prosodic word Recursion’. In J. Grijzenhout and B. Kabak (eds) *Phonological Domains: Universals and deviations*. Berlin: Mouton de Gruyter. 105–135.

Kabak, B. and R. Schiering. 2006. ‘The phonology and morphology of function word contractions in German’. *Journal of Comparative Germanic Linguistics* 9: 53-99.

Kager, R. 1992. ‘Are there any truly quantity-insensitive systems’? *Proceedings of the Eighteenth Annual Meeting of the Berkeley Linguistics Society*. University of California: Berkeley. 123 –132.

Kager, R. 1995. *The Metrical Theory of Word Stress*. In Goldsmith, J. A. (ed.) *The Handbooks of Phonological Theory*. Oxford: Blackwell Publishers Ltd. 368-402.

Kager, R. 1999. *Optimality Theory*. Cambridge: Cambridge University Press.

Kager, R. 2007. ‘Feet and metrical stress’. In P. de Lacy (ed.) *The Cambridge Handbook of Phonology*. Cambridge: Cambridge University Press. 195–228.

Kager, R., H. van der Hulst and W. Zonneveld. 1999. *The prosody-morphology interface*. Cambridge: Cambridge University Press.

Kahn, D. 1976. *Syllable-based Generalizations in English Phonology*. PhD, Massachusetts Institute of Technology.

Kahn, M. 1976. *Borrowing and Variation in a Phonological description of Kurdish*. PhD, University of Michigan.

Kainada, E. 2009. *Phonetic and phonological nature of prosodic boundaries: evidence from Modern Greek*. PhD, University of Edinburgh.

Kaisse, E. 1985. *Connected Speech: The Interaction of Syntax and Phonology*. San Diego: Academic Press.

Kavitskaya, D. 2002. *Compensatory Lengthening: Phonetics, Phonology, Diachrony*. New Yorkand London: Routledge.

Kayne, R. 1994. *The antisymmetry of syntax*. Cambridge: Massachusetts Institute of Technology Press.

Kenstowicz, M. 2010. ‘Loan phonology and Enhancement’. Paper presented at *Proceedings of the Seoul International Conference on Linguistics, Universal Grammar and Particular Languages*. Seoul, South Korea.

Kiparsky, P. 2000. ‘Opacity and Cyclicity’. *The Linguistic review* 17: 351–367.

Kiparsky, P. 2003. ‘Syllables and Moras in Arabic’. In C. Féry and R. Vijver (eds) *The Syllable in Optimality Theory*. Cambridge: Cambridge University Press. 147–183.

Kiparsky, P. 2011. ‘Compensatory Lengthening’. In E. Cairns and E. Raimy (eds) *Handbook of the Syllable*. Leiden and Boston: Brill.

Kisseberth, C. 1970. ‘On the functional unity of phonological rules’. *Linguistic Inquiry* 1: 291–306.

Kreyenbroek, P. G. 1992. ‘On the Kurdish language’. In P. G. Kreyenbroek and S. Sperl (eds) *The Kurds: A contemporary overview*. London: Routledge. 53-64.

Kubozono, Haruo. 2017. ‘Introduction to the phonetics and phonology of geminate consonants’. In H. Kubozono (ed.) *The Phonetics and Phonology of Geminate Consonants*. 1st ed. Oxford: Oxford University Press. 1-10.

Ladd, D. 1986. ‘Intonational phrasing: The case for recursive prosodic structure’. *Phonology Yearbook* 3: 311–340.

Ladd, D. 2008. *Intonational Phonology*. Cambridge: Cambridge University Press.

Ladefoged, P. 1967. *Three Areas of Experimental Phonetics*. Oxford: Oxford University Press.

Ladefoged, P. and I. Maddieson. 1996. *The sounds of the world's languages*. Oxford: Blackwell.

Ladefoged, P. and P. Johnson. 2011. *A Course in Phonetics*. 6th ed. New York: Nelson Education, Ltd.

Lass, R. 1984. *Phonology: An introduction to basic concepts*. Cambridge: Cambridge University Press.

Lerdahl, F. and R. Jackendoff. 1983. *A Generative Theory of Tonal Music*. Cambridge, MA: MIT Press.

Levi, S. 2004. *The representation of underlying glides: a cross-linguistic study*. PhD, University of Washington.

Levin, J. 1985. *A Metrical Theory of Syllabicity*. PhD, Massachusetts Institute of Technology.

Liberman, M. 1975. *The Intonational System of English*. PhD, Massachusetts Institute of Technology.

Liberman, M. and Prince, A. 1977. 'On Stress and Linguistic Rhythm'. *Linguistic Inquiry* 8: 249-336.

Lombardi, L. 2001. 'Why place and voice are different: constraint interactions and feature faithfulness in Optimality Theory'. In L. Lombardi (ed.) *Segmental Phonology in optimality Theory*. Cambridge: Cambridge University Press. 13–46.

Ludwig, P. 2008. *Kurdish Language: History of the Kurdish Language*. <http://www.iranicaonline.org/articles/kurdish-language/> (accessed 11 January 2016).

MacKenzie, D. N. 1961. *Kurdish Dialect Studies*. Vol I. London: Oxford University Press.

MacKenzie, D. N. 1962. *Kurdish Dialect Studies*. Vol II. London: School of Oriental & African Studies.

Mahmoodi-Bakhtiari, B. 2005. 'Indo-European: Indo-Iranian Languages'. In Stranzy, P. (ed.) *Encyclopaedia of Linguistics*, Vol. 1. Oxon: Taylor & Francis Books, Inc. 515-517.

Mahwy, M. 2009. *Fonolojî (Phonology)*. Sulaymaniyah: Sulaimani University Press.

Martínez-Paricio, V. 2013. *An exploration of minimal and maximal metrical feet*. PhD, University of Tromsø.

Matras, Y. 2019. 'Revisiting Kurdish dialect geography: findings from the Manchester database'. In S. Gündoğdu, E. Öpengin, G. Haig and E. Anonby (eds) *Current issues in Kurdish linguistics*. Bamberg: University of Bamberg Press. 225-241.

McCarthy, J. 1979. *Formal Problems in Semitic Phonology and Morphology*. PhD, Massachusetts Institute of Technology.

McCarthy, J. 1999. 'Sympathy and phonological opacity'. *Phonology* 16: 331–399.

McCarthy, J. 2000. 'Harmonic Serialism and Parallelism'. *NELS* 30: 501-24. <https://scholarworks.umass.edu/linguist_faculty_pubs/98> (accessed 26 April 2018)

McCarty, J. 2001. *A Thematic Guide to Optimality Theory*. Cambridge: Cambridge University Press.

McCarthy, J. 2002. *A Thematic Guide to Optimality Theory*. Cambridge: Cambridge University Press.

McCarthy, J. 2007a. ‘What is Optimality Theory?’ *Language and Linguistics Compass* 1: 260-291. <https://scholarworks.umass.edu/linguist_faculty_pubs/93> (accessed 13 March 2017).

McCarthy, J. 2007b. *Hidden Generalizations: Phonological Opacity in Optimality Theory*. London: Equinox Publishing.

McCarthy, J. 2008. *Doing Optimality Theory: Applying Theory to Data*. Oxford: Blackwell Publishing.

McCarthy, J. and A. Prince. 1990. ‘Foot and word in prosodic morphology: The Arabic Broken Plural’. *Natural Language and Linguistic Theory* 8: 209-283.

McCarthy, J.and A. Prince. 1993b. ‘Generalized Alignment’. In G. Booij and J. van der Marle (eds) *Yearbook of Morphology*. 79-153. Dordrecht: Kluwer.

McCarthy, J. and A. Prince. 1996. *Prosodic Morphology*. University of Massachusetts Linguistics Department Faculty Publication Series.

McCarus, E. 1958. *A Kurdish Grammar Descriptive Analysis of the Kurdish of Sulaimaniya, Iraq*. New York: American Council of Learned Societies.

McCarus, E. 1997. ‘Kurdish Phonology’. In S. Kaye (ed.) *Phonologies of Asia and Africa*. Indiana: Eisenbraus. 691–706.

McDowall, D. 2000. *A Modern History of the Kurds*. 2nd ed. London: I.B. Tauris Publishers.

Meho, L. I. 1997. *The Kurds and Kurdistan. A Selected and Annotative Bibliography*. London: Greenwood Press.

Montoya, I. 2014. ‘Getting your Gutturals out of the Mind: An Assessment of the Role of Phonology in the Patterns of Historical Gutturals in Modern Hebrew’. *University of Pennsylvania Working Papers in Linguistics* 20: 229–241.

Morén, B. 2000. ‘The puzzle of Kashmiri stress’. *Phonology* 17: 365–396.

Myrberg, S. 2013. ‘Sisterhood in prosodic branching’. *Phonology* 30:73–124.

Myers, S. 2012. ‘Final devoicing: Production and perception studies’. In T. Borowsky, S. Kawahara, T. Shinya and M. Sugahara, (eds) *Prosody Matters: Essays in Honor of Elisabeth Selkirk*. Sheffield, UK: Equinox Press. 48–80.

Nespor, M. and I. Vogel. 2007. *Prosodic Phonology*. Berlin: Mouton de Gruyter.

Nespor, M., M. Shukla. and J. Mehler. 2011. ‘Stress-timed vs. Syllable-timed Languages’. In M. van Oostendorp, J. Hume and R. Keren (eds) *The Blackwell Companion to Phonology*. Oxford: Wiley-Blackwell. 1124–1147.

Nespor, M. and I. Vogel. 1986. *Prosodic Phonology*. Dordrecht: Foris.

Odden, D. 1995. ‘Phonology at the Phrasal Level in Bantu’. In F. Katamba ‘(ed.)’ *Bantu Phonology and Morphology*. München and Newcastle: LINCOM Publishers. 40–68.

Odden, D. 2011. ‘The Representation of Vowel Length’. In M. van Oostendorp, *Blackwell Companion to Phonology*. Vol. 1. Malden, Mass: Wiley-Blackwell.

O’Grady, G. 2013. *Key Concepts in Phonetics and Phonology*. Basingstoke: Palgrave MacMillan.

Oostendorp, M., C.J. Ewen, E. Hume, and K. Rice. (n.d.) *Syllable-Internal Structure*. 1st ed. Malden, Mass.: Wiley-Blackwell.

Pak, M. 2008. *The postsyntactic derivation and its phonological reflexes*. PhD, University of Pennsylvania.

Paradis, C. and LaCharité, D. 1997. ‘Preservation and minimality in loanword adaptation’. Journal of Linguistics 33: 379–430.

Paradis, C. and LaCharité, D. 2001. ‘Guttural Deletion in Loanwords’. Phonology 18: 255–300.

Peperkamp, S. 1996. ‘On the prosodic representation of clitics’. In U. Kleinhenz, ‘(ed.)’

Interfaces in Phonology. Berlin: Akademie Verlag. 104–128.

Perlmutter, D. 1995. ‘Phonological Quantity and Multiple Association’. In J. Goldsmith, ‘(ed.)’ The Handbook of Phonological Theory. Oxford: Blackwell.

Piggott, G. 1995. ‘Epenthesis and Syllable Weight’. *Natural Language & Linguistic Theory* 13:283–326.

Pike, K. and E. V. Pike. 1947. ‘Immediate constituents of Mazateco syllables’. *International Journal of American Linguistics* 13: 78-91.

Poser, W. 1990. ‘Evidence for foot structure in Japanese’. *Language* 66: 78–105.

Prince, A. 1976. *Applying Stress*. Amherst: University of Massachusetts.

Prince, A. 1980. ‘A metrical theory for Estonian quantity’. *Linguistic Inquiry* 11: 511–562.

Prince, A. 1983. ‘Relating to the grid’. *Linguistic Inquiry* 14: 19-100.

Prince, A. 1985. ‘Improving Tree theory’. *Proceedings of the Eleventh Annual Meeting of the Berkeley Linguistics Society*. University of California, Berkeley. 471–490.

Prince, A. and P. Smolensky. 1993. *Optimality Theory: Constraint Interaction in Generative Grammar*. Technical Report No. 2, Rutgers University Center for Cognitive Science (RuCCS), New Brunswick, NJ.

Prince, A. and P. Smolensky. 2004. *Optimality Theory: Constraint Interaction in Generative Grammar*. Oxford: Blackwell Publishing.

Rahimpour, M. and M. S. Dovaise. 2011. ‘A Phonological Contrastive Analysis of Kurdish and English’. In M. C. P. Couto (ed.) *International Journal of English Linguistics* 1: 73-82.

Rachel. 1996. *Prominence-Driven Stress*. Manuscript, University of California, Santa Cruz.

Revithiadou, A. 2011. ‘The Phonological Word’. In M. van Oostendorp, M. Colin, J. Ewen, E.Hume, and K. Rice (eds) *The Blackwell Companion to Phonology*. Oxford: Wiley Blackwell. 1204–1228.

Rosenthall, S. 1997. ‘The Distribution of Prevocalic Vowels’. *Natural Language & Linguistic Theory* 15: 139–180.

Rosenthall, S. and H. van der Hulst. 1999. ‘Weight-by-Position by Position’. *Natural Language & Linguistic Theory* 17: 499–540.

Samuels, B. 2009. *The Structure of Phonological Theory*. PhD, Harvard University.

Selkirk, E. 1972. *The Phrase phonology of English and French*. PhD, Massachusetts Institute of Technology.

Selkirk, E. 1980. ‘The Role of Prosodic Categories in English Word Stress’. *Linguistic Inquiry* 11: 563–605.

Selkirk, E. 1981. ‘On Prosodic structure and its Relation to Syntactic Structure’. *Nordic Prosody II*. Trondheim: Tapir.

Selkirk, E. 1982. ‘The syllable’. In H. van der. Hulst, and N. Smith (eds) *The Structure of Phonological Representations*. Dordrecht: Foris. 337–383.

Selkirk, E. 1984. *Phonology and Syntax: The Relation between Sound and Structure*. Cambridge, MA: MIT Press.

Selkirk, E. 1986. ‘On derived domains in sentence Phonology’. *Phonology Year Book* 3: 371–405.

Selkirk, E. 1996. ‘The prosodic structure of function words’. In J. Morgan and K. Demuth (eds) *Signal to syntax: Bootstrapping from speech to grammar in early acquisition*. Mahwah, NJ: Lawrence Erlbaum. 187–214.

Selkirk, E. 2009. ‘On Clause and Intonational Phrase in Japanese: The Syntactic Grounding of Prosodic Constituent Structure’. *Journal of the Linguistics Society of Japan* 136: 1–39.

Selkirk, E. 2011. ‘The syntax--phonology interface’. In J. Golds, J. Riggle and A. Yu (eds) *The Handbook of Phonological Theory*. 2nd ed. Oxford: Blackwell Publishing.

Spencer, A. 1996. *Phonology: Theory and Description*. Oxford: Blackwell Publishers Ltd.

Steriade, D. 1982. *Greek Prosodies and the Nature of Syllabification*. PhD, Massachusetts Institute of Technology.

Steriade, D. 1991. ‘Moras and other slots’. *Formal Linguistic Society of Mid-America* 1: 254–280.

Steriade, D. 2012. ‘Intervals vs. syllables as units of linguistic rhythm’. Handouts, EALING. Paris.

Stetson, R.H. 1928. *Motor Phonetics: A Study of Speech Movements in Action*. Amsterdam: North-Holland Publishing.

Topintzi, N. 2011. ‘Onsets’. In M. van Oostendorp, J. Colin, E. Ewen, and K. Rice (eds) *The Blackwell Companion to Phonology*. Oxford: Wiley-Blackwell. 1285–1309.

Trask, R. L. 1996. *A Dictionary of Phonetics and Phonology*. London: Routledge.

Trudgill, P. 2000. *Sociolinguistics: An Introduction to Language and Society*. London: Penguin Books Ltd.

Van Oostendorp, M. 2013. ‘σ strikes back: A defence of headedness and constituency in phonology’. The Linguistic Review 30: 347–371.

Vaux, B. 2004. ‘The Appendix’. Paper presented at *Symposium on Phonological Theory: Representations and Architecture*. 2004. New York.

Vigário, M. 2010. ‘Prosodic structure between the Prosodic Word and the Phonological Phrase: recursive nodes or an independent domain’? *The Linguistic Review* 27: 485–530.

Vogel, I. 1999. ‘Subminimal Constituents in Prosodic Phonology’. In S. J. Hannahs and M. Davenport (eds) *Issues in Phonological Structure*. Amsterdam and Philadelphia: John Benjamins Publishing Company. 249–267.

Vogel, I. 2009. ‘The Status of the Clitic Group’. In J. Grijzenhout, and B. Kabak (eds) *Phonological Domains: Universals and Deviations*. Berlin: Mouton de Gruyter. 15–47.

Wahby, T. 1929. *Destúrí Zimaní Kurdi* (Rules of the Kurdish Language). Baghdad: Dar al-Tiba'a al-Haditha.

Wais, G. 1984. *Phonetics*. Baghdad: Al-Adeeb Press.

Wasow, T. and J. Arnold. 2005. ‘Intuitions in linguistic argumentations’. *Lingua* 115: 1481–1496.

Wolf, M. 2008. *Optimal Interleaving: Serial Phonology-Morphology Interaction in a Constraint-Based Model*. PhD, University of Massachusetts, Amherst.

Yildiz, K. 2004. *The Kurds in Iraq*: The Past, Present and Future. London: Pluto Press.

Zec, D. 1995. ‘Sonority constraints on syllable structure’. *Phonology* 12: 85–129.

Zec, D. 2003. ‘Syllable Weight’. In C. Fery, and R. vander de Vijver (eds) *The Syllable in Optimality Theory*. Cambridge: Cambridge University Press. 123–147.

Zec, D. 2007. ‘The syllable’. In P. de Lacy (ed.) *The Cambridge Handbook of Phonology*. Cambridge: Cambridge University Press. 161–194.

Electronic references

Encyclopaedia Iranica. 2017. ‘Kurdish Language’. Last accessed 13 May 2017, from: http://www.iranicaonline.org/articles/kurdish-language/.

Ethnologue. 'Central Kurdish'. 2015. Last accessed 20 January 2018, from: http://www.ethnologue.com/language/ckb/.

Kurdistan Regional Government’s official website. Last accessed 19 July 2017, from: http://www.krg.org.