A Phonological Analysis of English Loanwords in Mirpur Pahari: Exploring Variable Adaptation in Optimality Theory

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Abstract

Loanwords are a typical by-product of a language contact situation. In the realm of loanword phonology many studies have captured phonological variation using Optimality Theory (OT) as a framework (Yip, 1993; Jacobs&Gussenhoven, 2000; Ito &Mester, 1995; Davidson&Noyer1996; Broselow, 2004; Kenstowicz& Atiwong, 2006, inter alia). Other studies have focused on phonological variation within and among the speakers of the same speechcommunity(ordialect)byusingOT(Anttila,1995,1997;Anttila&Cho,1998;Auger2001; Nagy&Reynolds,1997;Zubritskaya,1997).However, few of these studies have either modelled phonological variation in loanword adaptation patterns at the suprasegmental level (involving syllable phonotactics or stress) using OT or exploited the possibilities that OT offers for exploring the factorial typology of variation in loanword adaptation, to predict possible loanword grammars.

The current study focuses on loanword adaptation patterns from English into Mirpur Pahari (MP) based on generalisations derived from native speaker intuitions (for speakers in Pakistan) and elicited data (for a UK-speaker).The adaptation patterns at suprasegmental level in MP loanwords are found to undergo different modifications in different MP speaker groups (namely, Monolinguals (*ML*),Late-bilingual(*LB*) and Early-bilingual(*EB*));–some adaptations reflect aspects of MP phonology, but others have no correlate in MP phonology. The central tenet of this thesis is that variations in loanword adaptation patterns can by modelled by using OT (Prince and Smolensky,1993/2004) as a main framework.I argue that OT can be used to analyse inter-speaker variation in loanwords by reranking constraints.Intra-speaker variation can be captured by using Partially Ordered Constraints (POC) as proposed by Anttila (1997).A factorial typology analysis of the range of MP loanwords grammars is presented using OTSoft, as a by-product of checking constraint rankings.The factorial typology strongly suggests an influence of orthography in constraining variation in loanword adaptation.Overall,this thesis demonstrates that investigation of loanword adaptation in a complex language context situation-like that of MP- must take both internal and external factors into account.

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Author's Declaration

I declare that this thesis is the presentation of the original work and I am the sole author. This work has not previously been presented for an award at this, or any other, University. All sources are acknowledged as References.

I declare that part of the results of my thesis was presented in these conferences:

25th Manchester Phonology Meeting, 2017
PAPLA conference (co-authored), University of Cologne, Germany, 2017
Lang UE, 2017
WDRTC (white Rose), 2017
PARLAY, 2017
BAAL workshop 2017
BFLA workshop 2017
New Sounds 2015
East Coast Phonology Network (ECP), 2016

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1 Introduction

The present study focuses on loanword adaptation patterns from English into Mirpur Pahari (MP). The adaptation patterns at the suprasegmental level (namely, in terms of syllable structure and stress assignment) in MP loanwords display different modifications – some reflecting aspects of native MP phonology and others having no correlate in MP phonology.

To better understand the MP loanword adaptation patterns, I compiled a corpus of MP loanwords comprised of 1219 established loanwords. Based on my intuitions as a native speaker, the adaptation patterns in the corpus data are divided into two categories, namely those typically produced, in my experience, by Monolinguals (*ML*) and those produced by Late-Bilinguals (*LB*). To complement the corpus data which represents the realisation of loanwords by *ML* and *LB*, production data was collected with an Early-Bilingual (*EB*) speaker in the UK. The MP loanword data thus cover different levels of bilingualism in the MP speech continuum and are found to show a range of variation in adaptation patterns. This thesis attempts to answer the following research questions:

RQ1) What is the permitted syllable structure and stress system of MP?

RQ2) Can a formalisation of the MP grammar in OT account for variation in adaptation patterns at inter/intra-speaker level in MP loanwords?

To analyse the variation in the observed adaptation patterns, I adopt Optimality Theory (Prince and Smolensky, 1993/2004) as a framework which can model variation at inter-speaker level. OT models typological variation in phonological patterns cross-linguistically by proposing that constraints on phonological structure are universal but that variation in the relative ranking of constraints results in surface differences between languages. In the realm of loanword phonology, many phonological studies have captured phonological variation cross-linguistically using OT (see also Yip, 1993; Katayama, 1998; Jacobs and Gussenhoven, 2000; Ito and Mester, 1995, 1999; Davidson& Noyer, 1996; Broselow 2004; Kenstowicz& Atiwong 2006: inter alia). Other studies have focused on the intraspeaker variation within a single language (or dialect), again using the OT framework (see Anttila, 1995, 1997, 2002; Anttila & Cho, 1998; Auger 2001; Cardoso, 2001; Nagy & Reynolds, 1997; Zubritskaya, 1997). However, to my knowledge, there is no prior study which has modelled variable adaptation of loanwords at the prosodic or suprasegmental level

in general, and more specifically in MP, using the OT framework and thus exploiting the opportunity to apply a factorial typology approach.

1.1 Significance of the study

This study is significant in three ways. Firstly, it is the first in-depth study of English loanwords in MP that investigates not only syllable phonotactics but also explores loanwords at suprasegmental level (specifically, syllable phonotactics and stress). Secondly, the study serves as a documentation of the dialect itself, i.e. MP. MP is spoken by many millions of speakers in Pakistan and the UK,but we have only limited phonological description available (Stow &Pert,2012).This thesis establishes the syllable structure patterns and stress assignment rules displayed in native MP phonology and proposes a constraint ranking for native MP in an OT analysis in chapter 5.The third key role of this study is that it outlines the adaptation processes seen in English loanwords as typically produced by MP speakers with different levels of exposure to the source language English (i.e. *ML*, *LB* & *EB*). In this regard this thesis contributes to current theoretical arguments regarding the adaptation of loanwords by speakers with different levels of proficiency in the donor language.

1.2 Organisation of Chapters

The thesis is divided into nine chapters as follows, where chapter one is the introduction to the work. Chapter two sets out the general background of the MP language, including information on relevant linguistic topics including the classification of MP, phonemic inventory of MP and the status of English loanwords in MP.

Chapter three reviews the literature on the process of lexical borrowing in general and discusses some past studies on loanword phonology including the dominant prior debate between two models of loanword phonology, i.e.the phonological versus the perception approach. The role of level of bilingualism and of orthography are then discussed as potential external factors relevant to the current work. Optimality Theory is then discussed in detail, as the main framework used in the thesis to model the variable adaptation of loanwords by MP speakers.

Chapter four introduces the procedure use to elaborate the corpus of MP loanwords and explains all the steps followed to organise the data ready for analysis of the adaptation patterns of syllable phonotactics and stress assignment in the MP loanword corpus.

Chapter five establishes the native phonology of MP with reference to syllable phonotactics and stress assignment. This is the first description of MP at the suprasegmental

level and is a necessary foundation for the following analysis of variation in loanword adaptation patterns.

Chapter six examines the adaptation patterns of syllable phonotactics and stress assignment as typically produced by *ML speakers.* It attempts to answer the main research question, namely, whether loanword adaptation patterns can be explained by the native (MP) grammar, or not.

Chapter seven considers the loanword adaptation patterns of syllable structures, in onset and coda position, and stress assignment in *LB*. The chapter provides a comparison between *ML* and *LB* and shows that we cannot account for *LB* adaptation patterns within the native MP phonology. This chapter also reveals variation in the adaptation patterns within this group of speakers, i.e. *LB*. The OT analysis models *LB* loanword adaptation in terms of a variable grammar which alternates between faithfulness to native MP phonology and the source language.

Chapter eight presents the loanword adaptation patterns of syllable phonotactics and stress assignment in an early-bilingual (*EB*). This is a case study of one female speaker who lives in the UK. This is the third and final speaker category and captures the full range of variation in adaptation patterns in that EB has a different grammar which is the most English-like among all of the speaker categories. This chapter thus allows the thesis to model the full picture of interspeaker variation in loanword adaptation in MP.

Chapter 9 summarizes the main findings of the thesis and discusses their interpretation within the field of loanword phonology. This is achieved in part through reflection on the factorial typology of loanword adaptation patterns in both syllable phonotactics and stress assignment in MP. The factorial analysis confirms all the constraint rankings discussed in the previous chapters and shows the full set of predicted possible grammars for adaptation of MP loanwords. This chapter concludes that OT can model the variations in loanwords at both inter- and intra-speaker level.The analysis also captures an observed language universal phenomenon, namely the observed onset-coda asymmetries found in the data explored in chapters 6, 7 & 8 and thus across all three of the MP speaker categories. It also demonstrates that another external factor besides level of bilingualism must constrain the range of phonological variation which the data suggests is likely to be orthography.

2 Language Context

2.1 Mirpur: Geography and Population

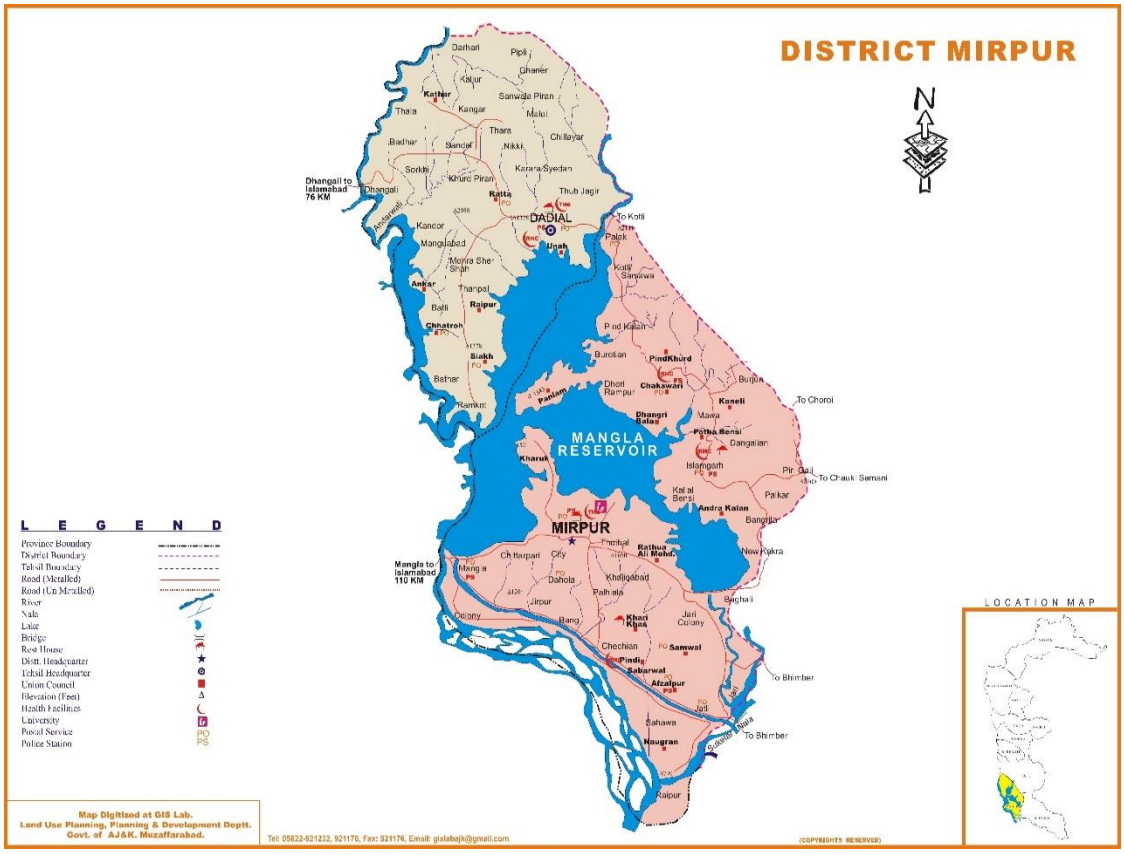
Azad Jammu & Kashmir (AJK, henceforth, as it is popularly called) is a self-governing administrative division of Pakistan. At an international level, it is commonly identified as a part of Pakistan. Mirpur district is one of the ten districts of AJK; it is named after the city of Mirpur. Administratively, Mirpur district is sub-divided into two Tehsils[1] namely, Dadyal and Mirpur. Geographically, Mirpur district shares a boundary with Kotli district on the north and east, Pothohar[2] region on the west and Bhimber district to the south. Mirpur is mainly hilly, with some plains areas. Overall, the climate of Mirpur is very hot and dry, especially in summer. According to the report, 'Azad Jammu & Kashmir at a Glance 2014' issued by AJK Planning and Development (2014), the total area of Mirpur is 1,010km2 (390 sq. miles) and its total population (based on the census of 1998) is 0.464 million. According to Lothers and Lothers (2012), a very large number of people living in this district have emigrated to the UK. Therefore, the main sources of income in Mirpur come through its expatriate community.

2.2 History of Mirpur Pahari

The most commonly spoken local dialect in Mirpur is a variety of the Pahari language called 'Mirpur Pahari' (hereafter referred to as MP). MP is also sometimes referred to as 'Mirpuri' or 'Pahari' only. Historically, Pahari is an ancient and prestigious language which was spoken in South Asia during the reign of Buddhist empires. In those times, Pahari was written in the Sharda Script, named after the place Sharda, which is claimed to be home to the first ever university in South Asia (Karnai, 2007). With the passage of time, different scripts replaced the use of Sharda script, namely, Dev Nagri script and Persian script. Pahari can now be written in Urdu script but there is no publishing in the language.

[1] A tehsil is a local administrative unit consisting of an area, which forms a sub-division of the main district; it may include many towns and number of villages.
[2] Pothohar is a plateau in north-eastern Pakistan, forming the northern part of Punjab.

Figure 2.1 **Map of Mirpur District adapted from P&D Department, AJ&K**



2.3 Previous Work on Mirpur Pahari

There has been very limited research on Pahari language in general and particularly on the phonological aspects of Pahari. Tabassum (1996), in his MA thesis entitled 'Phonological Analysis of Pothwari/Mirpuri Language', claims that Pahari (MP) comprises 38 consonants and 22 vowels and does not allow diphthongs or triphthongs. Karnai (2007) also describes a phonemic inventory for the Pahari language but uses Urdu orthography to represent different sounds instead of using IPA symbols.

More recently, Khan (2012) has re-investigated the sound inventory and syllable structures of the Poonch dialect, another dialect of Pahari, spoken in Rawalakot. His study particularly focuses on stress patterns and syllabification of the Poonch dialect in the framework of Optimality Theory. Baart (2003, 2014) carried out a general linguistic survey of the languages spoken in the northwest of Pakistan, which included Pahari-Pothwari. However, his analysis was based on the dialect of Pahari-Pothwari which is spoken in Pakistan only (that is, in the Murree Hills, Hazara and Rawalpindi districts). Apart from these academic endeavours, according to my review of academic literature, no other substantial work has been done on the varieties of Pahari spoken in Azad Jammu and Kashmir.

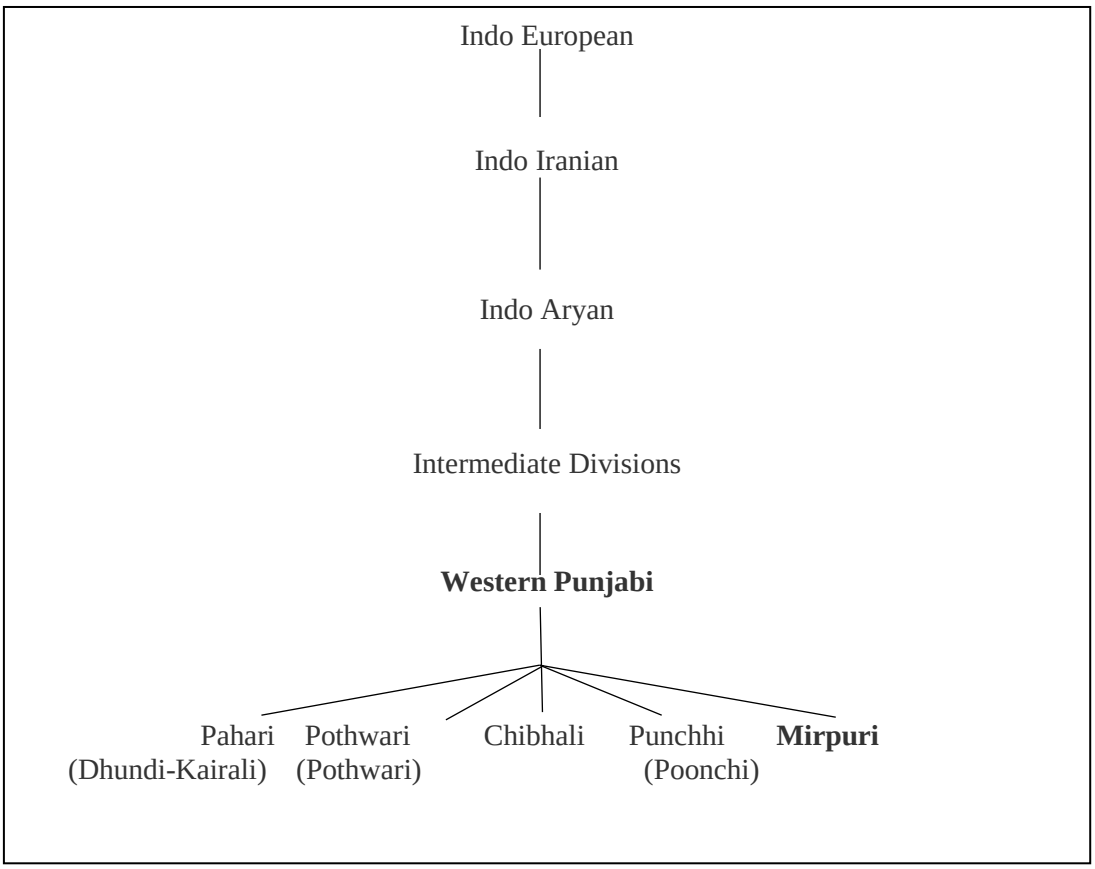
2.4 Language Classification of MP

Pahari comes under the family of Indo-Aryan languages, which is an offshoot of the Indo-European family. Grierson (1917) classified Pahari with some other Indo-Aryan languages in a group called 'Lahnda' which refers to Western Punjabi. Grierson (1917:211) claims:

> "The Pahari language falls into three main groups. In the extreme east, there is KhasKura or Eastern Pahari, called Nepali, the Aryan language spoken in Nepal. Next in Kumaon and Garhwai, we have the central Pahari languages Kumaoni and Garhwali. Finally, in the West, we have the west Pahari spoken in Jaunsar, Bawar, the Shimla Hill, Kulu, Mandi and Suket, Chamba, and Western Kashmir."

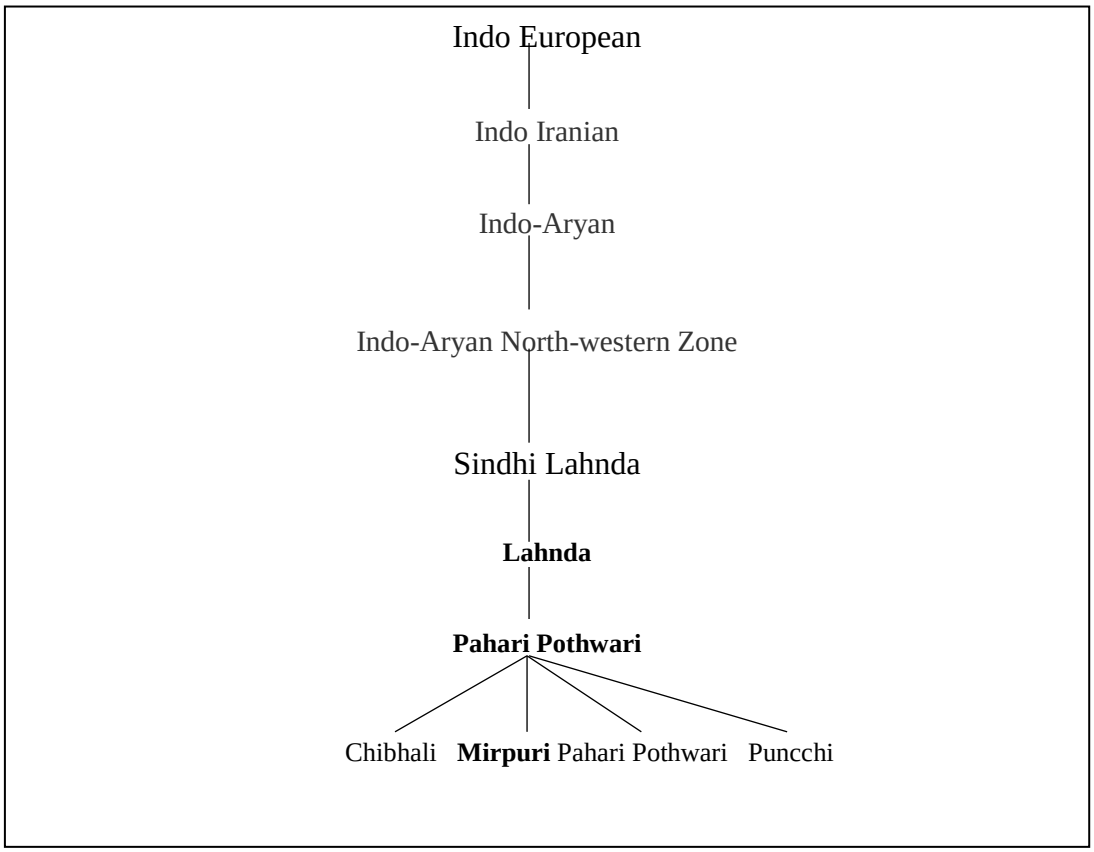
Another classification of Pahari-Pothwari language is that of the Ethnologue (Eberhard, David M., Gary F. Simons, and Charles D. (eds.), 2019) which categorizes MP under the Western Punjabi language group (as shown in Figure 2.2).

Figure 2.2 **Classification of Pahari-Pothwari (Gordon, 2005)**



Another language classification which is more widely accepted is the one proposed in Glottolog (Hammarström, H., Forkel, R.& Haspelmath,2018) as shown below (*Figure 2.3*).

Figure 2.3 **Classification of Mirpur Pahari in Glottolog (Hammarström et al., 2016)**



This language classification (in *Fig*.2.3) shows that MP is a very fluid dialect. The reason to include Pahari in Western Punjabi may be due to 76%-84% lexical similarity in these varieties of Western Punjabi (Lothers & Lothers, 2010). However, Shackle (1970) argues that Punjabi speakers in Pakistan have difficulty in understanding speakers of Pahari.

The above classification also indicates the complex language contact situation of MP. Mirpur has geographical boundaries which are adjacent to the areas where mainly Punjabi and Pothwari are spoken. Urdu is also spoken and understood by most people living in Mirpur, as the national language of Pakistan, and is taught in schools. The younger generation who are mostly well-educated learn Urdu at school alongside any home languages. In Mirpur, Urdu is considered a symbol of sophistication, power and prestige. Therefore, MP speakers typically learn Urdu after MP, and then English. The reason to learn Urdu before English is that Urdu is in more common usage and is widely understood in Pakistani society. Urdu is also easily learned because of the degree of lexical similarity between Urdu and Punjabi (as MP is assumed to be a dialect of Punjabi). Mizokami (1978) reflects that the interference of Urdu into Punjabi is primarily morphemic and lexical. Similarly, phonemic interference from Punjabi is perceptible in the Urdu produced by Punjabi speakers (Mizokami, 1978).

2.5 Advent of English Language in Pakistan

In Pakistan, English is also a factor in the language contact situation. According to Weinreich (1953), language contact arises due to a number of factors, including migration alongside a range of neighbourhood, socio-cultural, political and economic factors which cause speakers of different languages to come in contact with each other.

Historically, the connection of English to the subcontinent (South Asia) goes back to the time of pre-partitioned India (partition occurred in 1947 when India was split into India and Pakistan). This period is remembered as the 'British Raj' in the subcontinent (including Pakistan, Bangladesh and India). According to Spear (1965), the downfall of the Mughal era presented the British with an opportunity to increase their power. In 1818, Britain gained virtually full control of the subcontinent and replaced Persian, a language of Mughal courts with Urdu. However, with the passage of time, another scenario developed in the subcontinent in which language, as a reflection of identity, was used as a tool to divide the people into two groups: Urdu and Hindi. As a result, in British India Hindus supported use of Hindi whereas Muslims supported use of Urdu.

In this political scenario, a colonial policy known as Wood's Despatch of 1854 was introduced. According to this policy, the medium of higher education/college education was to be English. The most prestigious and highly paid jobs, such as jobs in the Indian Civil Service (ICS), were only available to those with good English proficiency. Other less attractive and less prestigious jobs did not have English proficiency as a selection criterion. According to Rahman (1999), this language criterion caused major controversy, and led to the division of society into the sections of "salariat". The term "salariat" stands for the different classes of wage earners.

As a result of this intervention, English spread, out of social and economic necessity, and above all for the survival of workers' wellbeing in society. People had to learn English either through direct contact with native speakers (which was minimal) or through formal missionary schools. In 1947, after Independence from Britain, contact with native English speakers was further reduced. As a result, South Asian English evolved as a non-native variety. Baumgardner (1993) identifies the reduced native English input as the main reason for 'nativization' of English in India and Pakistan. Baumgardner describes the variety of English spoken in Pakistan as Pakistani English (referred to as PE hereafter), which is widely used by relatively small, but extremely influential, percentage of the population. Due to this language contact situation, Pakistanis (especially those who are well-educated) are typically now bilingual or multilingual and speak Urdu and English along with their regional languages.

2.6 Status of English in Pakistan

English is a fast-growing foreign language in Pakistan. According to Manan et al. (2017), 65 different languages are spoken in Pakistan (6 major languages and 59 minor languages, Rahman 2006). Among these, Urdu is the national language and English has an official status in Pakistan. There are eighteen million people (11% of the total population) who speak English in Pakistan, which makes Pakistan the third largest English-speaking population in Asia (Bolton, 2008). In his travelogue "Passage to Peshawar", Reeves (1984) noted the popularity of English in Pakistan and called it virtually a "Second English Empire".

English and Urdu are held up as the best carriers of symbolic, cultural and economic value because state policies have "benignly neglected" the development of indigenous languages (Manan et al., 2015:2). Likewise, from a social perspective, English is considered as the most powerful and prestigious language. Therefore, education and proficiency in the English language are viewed as a token of success and as the key to social and economic mobility and prestige in Pakistan (Abbas 1993; Rahman 2007; Coleman & Chapstick 2012; Manan et al.2015). Due to its elevated position, in the language hierarchy of Pakistan, English stands first, and Urdu has the second position (Rahman, 1996; Ayres, 2003; Mansoor, 2005; Mustafa, 2011).

As far as the usage of English is concerned, Rahman (1991) draws attention to the sub-varieties of non-native varieties of English spoken in Pakistan. Rahman explains that in Pakistan, there are four varieties of English based on educational background and exposure to the language. For instance, there is a variety which can be called *Anglicized English* (spoken by the highly educated class who have been exposed for a long time to SBE[3], spoken in the RP[4] accent). Other varieties include: *acrolect* (spoken by the elite class who are also highly educated but have later exposure to SBE and RP), *mesolect* (used by the middle class who have been taught in Urdu medium schools and whose English is distinct in every way from SBE) and *basilect* (English used by the less educated class, which is less intelligible to speakers of the other varieties of English).

In recent decades, English has become so influential and contagious that no dialect (or regional language) is left in Pakistan which does not borrow lexical items from English. For instance, an English word 'school' is borrowed as /ɪskuːlu/ in Sindhi (Bughio, 2001), in Punjabi as /səkuːl/ (Mahmood et al., 2011) and in Poonch dialect as /səkuːl/ (Khan & Bukhari, 2011). So, the overwhelming majority of Pakistani speakers are now bilinguals or multilinguals as a result of the language contact situation in Pakistan. The borrowing of

[3] SBE stands for Standard British English.
[4] RP stands for Received Pronunciation (Roach 2004).

English lexical items can thus be seen in Mirpur Pahari (MP) as well, though in the case of MP there is an additional factor shaping the patterns of borrowing which is discussed in the next section.

2.7 Influence of chain migration on English loanwords in MP

About 75% of Pakistanis in England are from Mirpur district (Imran, 1997). According to a BBC Pakistan Connection Diaspora Audience Research Report (2009), 7.9% of the UK population describe themselves as belonging to a minority ethnic group; of this percentage, 4% comprises the Asian group. The Pakistani heritage population makes up 1.3% of the population of the UK or 16.1% of the minority ethnic population. Most of the Pakistani heritage population in the UK have origins in the Mirpur district, and they are mostly based in the north of England (e.g. Bradford, Leeds). Ballard (1990) writes that no other district in Pakistan has seen a higher proportion of its population engaged in chain migration than Mirpur and from nowhere else in Pakistan have a higher proportion of such migrants successfully established themselves in Britain.

There is political background to this mass migration of people from Mirpur and its adjacent areas to the UK. According to Ansari (1969), there were two main causes of the migration of people from Mirpur to England. The first was the displacement of people from their native land in large number due to Mangla Dam Hydroelectric Generation Project in 1960s. The second factor driving migration was the demand for labour in the textile industry of Britain. As a result, from 1970 onwards it became a trend for Mirpuri families to settle in England.

However, despite migration to the UK, Mirpuris maintained their ties with their homeland due to diverse cultural practices. According to Ballard (1990), one of the primary factors is a trend of arranging marriages back in Pakistan and the main motivation for this practice is to preserve ‘patrilineal tribal’ and ‘religious’ identity. Ali (2007) indicates further reasons, in addition to those mentioned by Ballard, for visits by British Mirpuris to Mirpur: visiting sick relatives, burying deceased family members, attending marriage ceremonies and to bring their children to visit Pakistan on spring or summer vacations.

The basic motive behind all these reasons is that Mirpuris in the UK want to familiarize the younger generation with the culture and traditions of their forefathers. The continuous chain migration and regular visits of these British Mirpuris contribute towards making English a heavily borrowed-from language in Mirpur Pahari. According to some researchers (e.g. Thomason and Kaufman 1988; Trudgill 1986), migration is a key extra-linguistic factor leading to externally-motivated change in borrowing from a language. In every case of migration (except where a homogeneous group of people moves to an isolated

location), language or dialect contact arises. So, as Shaheen (2017) also indicates, Mirpuri British visitors have a great impact upon the vocabulary of Mirpuri Pahari language.

2.8 The Sound Inventories of Mirpur Pahari

In the following section, the phonemic inventory will be shown which is based on the segmental phonology of Pahari in general, and of the Poonch dialect (PP hereafter) in particular (Khan, 2012). The reason for reporting the PP inventory is that the segmental inventory of both dialects (i.e. PP and MP) is largely similar, since both dialects derive from a common source i.e. Pahari/Punjabi.

2.8.1 Consonantal Inventory of Mirpur Pahari

Tabassum (1996) claims that there are 38 consonants in MP; in contrast Khan (2012) shows that there are thirty consonants in the phonemic inventory of PP, which is used in all the dialects of Pahari spoken in Azad Kashmir including Mirpuri Pahari. The consonantal distribution is as follows: there are twelve stops, which are produced at four places of articulation, namely, bilabial /p, b, pʰ/, dental /t̪, d̪, t̪ʰ/, alveolar /t, d, tʰ/ and velar /k, g, kʰ/. In addition, there are eight fricatives: labio-dental /f, v/, alveolar /s, z/, palatal /ʃ/, velar /x, ɣ/ and glottal /ɦ/. MP has three palatal affricates, /tʃ, dʒ, tʃʰ/. As for nasal sounds, Pahari has three nasals, /m, n, ŋ/ and three liquids / l, r, ɽ /. However, Tabassum (1996) does not include alveolar stop consonants (/t, d/) in the Mirpur Pahari inventory. Overall, there is a three-way contrastive distribution of plosives (consonants), namely, voiced, voiceless and aspirated consonants in Pahari. In contrast to English, aspiration is phonemic, but in contrast to Hindi-Urdu, only voiceless consonants are aspirated. Figure 2.4 shows the consonant inventory in Pahari.

Figure2.4 **Pahari Consonantal Phonemic Inventory (Khan, 2012)**

	Bilabial	Labio-dental	Dental	Alveolar	Retroflex	Palatal	Velar	Uvular	Glottal
Stops	p b		t̪ d̪	t d			k g		
	pʰ		t̪ʰ	tʰ			kʰ		
Nasals	m			n			ŋ		
Fricatives		f v		s z		ʃ	x ɣ		ɦ
Affricates						tʃ dʒ tʃʰ			
Lateral				l					
Trill				r					
Flap					ɽ				
Glides						j			

2.8.2 Vocalic Inventory of Mirpur Pahari

Pahari comprises six short and six long vowels, namely, /iː/, /ɪ/, /eː/, /e/, /æː/, /æ/, /ə/, /aː/, /o/, /oː/, /ʊ/ and /uː/ across the three dimensions of height, frontness/backness and lip positioning. Out of these twelve vowels, six (i, e, æ, ə, o, ʊ) are short vowels and the remaining six (iː, eː, æː, aː, oː, uː) are long vowels. Pahari lacks back open vowels, i.e. /ʌ/, /ɔː/, /ɑː/, /ɒ/. It is noteworthy that Khan (2012) argues that the vowel /ɐ/, as an equivalent of schwa /ə/ in English, nevertheless behaves differently in Pahari than English /a/ does. In MP, /ɐ/ is pronounced like a long central vowel /ɐː/ rather than a front open vowel. Contrary to the claim of Tabassum (1996) that there is no diphthong in Pahari, in fact Pahari has six diphthongs which are further divided into closing diphthongs i.e. /oɪ/, /oe/, /aɪ/, /ae/, /ao/ and a central diphthong i.e. /oə/(Khan,2012). Pahari does not exhibit any triphthongs.

In MP, vowel nasalisation is both phonemic and allophonic. Khan (2012) shows that there are four nasal vowel phonemes in Pahari, namely, /ĩː ẽː ãː ũː/. For instance [bĩː] ‘seed’ ~ [biː] ‘old lady’ is a minimal pair involving nasalised vowels. These nasalised vowels are long. In contrast, the three short oral vowels /ɪ, ə, ʊ/ also appear nasalized, but this is conditioned by a nasal context (VN(C)) as in [bə̃ŋg] ‘bangle’; similarly, /aː/ is nasalized in an NV context, as in [mãː] ‘mother’.

Figure2.5 **Pahari Vocalic Phonemic Inventory (Khan, 2012)**

	Front	Central	Back
Close	iː		uː
	ɪ	ʊ	
Mid	eː e		o oː
		ə	
Open	æː æ	aː[5]	

Figure2.6 **Nasal vowels in Pahari (Khan, 2012)**

	Front	Central	Back
Close	ĩː		ĩː
Mid	ẽː		
		ãː	
Open			

2.9 Does MP have lexical tones?

Punjabi, as spoken in Pakistan, is considered to be a tone language. Bhatia (1993) suggests that Punjabi has three tones, namely: a low tone which is associated with low-rising pitch, high tone with rising-falling pitch and lastly the mid tone which is not characterized by any fixed pitch specification. Shackle (1979) argues that lexical tone in Punjabi is correlated with inherent stress patterns, though there is no data provided to support his claim. However, Masica (1991) and Yip (2002) claim that syllable stress and historically aspirated consonants are relevant in the realisation of tone in Punjabi. They support their claim by providing a set of minimal triplets which contain words with the following tones: level tone as in /kōRaa/ 'whip', falling tone as in /kòRaa/ 'horse' and rising tone as in /kóRaa/ 'leper'. However, neither Masica nor Yip indicate which of these lexical words contains or contained aspirates in their orthography. Bowden (2012) also agrees with Masica (1991) and Yip (2002) that tone only occurs in those phonological environments in Punjabi which were historically aspirated (i.e. containing aspirated consonants).

There is a difference of opinion in research on Punjabi grammar regarding the number of tones, with claims ranging from two to four tones. However, most Punjabi

[5] Khan (2012) used this symbol /a/ to represent the central vowel /ɐ/ for typographic convenience.

grammars support having three tones in Punjabi, with the tones classified as neutral, high or rising, low or falling. Shackle (1979), Tolstaya (1981), Masica (1991), Campbell (1991), Yip (2002) among others support the three-tone system in Punjabi.

MP is closely related to the Punjabi language and, therefore, assumed by some authors to be a tonal language. Tabassum (1996) argues that MP is a tonal variety of Punjabi and has four contrastive tones. However, the data provided by Tabassum does not provide examples of this contrast to support his claim. Baart (2003, 2014) reported that many languages (13 out of 30) spoken in north-western part of Pakistan (including Azad Kashmir) are tonal languages. He (Baart) divided these tone languages into three types such as Punjabi-type, Shina-type, and Kalami-type. He argues that Pahari-Pothwari (commonly known as Pahari) comes under the "Punjabi-type" tone language category and has a three-way tone system, i.e. mid, high-falling, and a low-rising tone, on the stressed syllables.

Baart (2003, 2014) agrees with Yip (2002) that tone realisation in 'Punjabi type' tone languages is linked to the historically aspirated consonants. With the passage of time, these historically aspirated consonants have lost their breathy-voiced consonants such as / b^h, d^h, $\underline{ɖ}^h$, g^h/ which have merged into their regular-voiced counterparts /b, d, $\underline{ɖ}$, g/, respectively. In some varieties of the Punjabi-type languages, these breathy-voiced consonants merge with their voiceless counterparts /p, t, $\underline{ʈ}$, k/ in word-initial position and elsewhere appear as the regular voiced counterparts.

In a similar vein, Bowden (2012) also draws attention to the fact that, in Punjabi, the tone is derived from the consonants which are etymologically voiced aspirated consonants. Baart's analysis is based on those dialects of Pahari which are mostly spoken in the areas of Murree Hills and Rawalpindi (Pakistan) and which are considerably different from MP in terms of accent and vocabulary.

Now the question arises: how it is possible that a language is tonal (e.g. Punjabi) but its dialect (Pahari) is non-tonal? This may seem unlikely but there are examples where a tone language may have a non-tonal dialect. For example, Svantesson & House (2006) discuss Khmer, which is an offshoot of Mon-Khmer (an Austroasiatic language family) and which is a tone language. Khmer has three main dialects, Eastern, Northern and Western Kammu. Among these dialects, Eastern Kammu is a non-tonal variety, and the other two are tonal varieties of Khmer. By analogy, therefore, we cannot rule out the possibility of MP being a non-tonal variety of Punjabi-type language.

I agree with the observations of Baart (2014) regarding the characteristics of Punjabi tone languages in Pakistan and can relate this to MP as well, though to a limited extent. Baart (2014) says that - when the voiced aspirated consonants were introduced into Punjabi from

Urdu, they (voiced aspirated consonants) lose their breathy voice quality, but the low pitch characterising these consonants is preserved in their Punjabi counterparts.

Similarly, when Urdu words enter MP via Punjabi, lexical items with voiced aspirated consonants in word-initial position merge with their voiceless counterparts in their laryngeal settings but show contrastive tones. For instance, MP words with the voiceless velar consonant /k/ are etymologically the counterparts of words with the voiced aspirated velar consonant /gʰ/. Therefore, words which have the voiceless velar consonant /k/ in word-initial position carry low tone as in [kòːɽɑ] '*horse*' [kòːl] '*mix*' with their voiced counterparts in Urdu being [gʰoːɽɑ] and [gʰoːl] respectively. However, we also find a counterexample in MP in which a voiced consonant retains aspiration in word-initial position, in [bʰɑːri] '*broom*'.

An extra-linguistic factor that may be relevant is that MP speakers have access to Urdu in terms of reading, writing and speaking, and that both MP and Punjabi use the Urdu written script. Therefore, another possibility is that MP is perceived as being a tonal variety due to orthographic influence. The tone in words with initial voiceless constants is predictable because these words show the reflex of the aspiration in an orthographic representation < ھ> in Punjabi, which is borrowed into the MP written form as well. For instance, 'broom' is pronounced [bʰaːri] by educated MP speakers who may retain the voiced aspiration because they are aware of the orthographic representation, whereas the old/aged speakers pronounce the same word as [paːri], which is a homophone with two lexical meanings, 'broom' and 'heavy', because they do not know its orthographic representation.

In sum, there may be a few words where tone has an influence on MP due to borrowing from Punjabi as one of the dominant regional languages, but tone does not play a dominant role in distinguishing lexical words on a larger scale in MP vocabulary. We should note that Punjabi is also analysed as having stress as well as tone. Like Pahari, in Punjabi stress is assigned based on the weight of syllables contained within a word (Bhatia, 1993; Dhillon, 2007). Regardless of the status of tone in MP therefore, it is not a contradiction to say that MP has stress, and investigation of the MP stress system is a major goal of this thesis.

2.10 Chapter Summary

The aim of this chapter was to provide some background information about MP. Important geographical and historical facts about MP have been reported, and some previous research on the areal classification of MP was also discussed. The status of English loanwords in general, and the extra-linguistic factors involved in borrowing of English words in MP, are described, and the language contact situation in MP is also discussed. A discussion of whether MP is a tonal variety of Punjabi is also presented. Overall, this chapter

reveals the range of extra-linguistic factors at work in the MP language contact situation, which may be a source of phonological variation in MP loanwords. The next chapter reviews the theoretical background to the thesis.

3 Literature Review: Loanwords and Related Adaptation Theories

3.1 Borrowing Process

In a contact situation, speakers of different languages interact, and their languages can influence one another, but predicting the outcome of a contact situation remains a challenging task (Matras, 2009; Sankoff, 2002; Siemund, 2008). Nevertheless, one can easily observe the immediate results of language contact and communication in the phenomenon of lexical borrowing, which is viewed as the importing of linguistic structure or forms from one language to another (cf. Haugen, 1950).

In the process of borrowing, the linguistic items which are transferred or introduced from one language to another are called loanwords. The language from which words are adopted is often referred to as the 'source', 'lending' or 'donor' language (interchanged with *L2*) whereas the language into which those words are adopted is labelled as the 'recipient', 'borrowing 'or 'native' language (also interchanged with *L1* throughout the thesis). Haugen (1950) classifies three main types of borrowing, known as loanwords, loanblends, and loanshifts, as follows:

> "1. LOANWORDS: show morphemic importation without substitution. Any morphemic importation can be further classified according to the degree of its phonemic substitution: none, partial, or complete.
>
> 2. LOANBLENDS: show morphemic substitution as well as importation. All substitution involves a certain degree of analysis by the speaker of the model that he is imitating; only such 'hybrids' that involve a discoverable foreign model are included here.
>
> 3. LOANSHIFTS: show morphemic substitution without importation. These include what are usually called 'loan translations' and 'semantic loans'; the term 'shift' is suggested because they appear in the borrowing language only as functional shifts of native morphemes'' (Haugen 1950: 214-215).

Similarly, Sankoff (2001) defines loanwords as the incorporation of single *L2* words (or compound words function as single word) into the conversation of the *L1*, which results in phonological changes in the *L1*. Such phonological changes may include processes that apply not only to the non-native vocabulary, but which may also spread to the native vocabulary. To identify loanwords, Cohen (2009) describes three contexts which are not associated with loanwords phenomenon:

> a."Words which are part of the bilingual conversation
>
> b. words which are merely speaker-specific idiosyncratic productions

c.words which are unique one-time productions mimicking some *L2* phonetic form'' (Cohen, 2009:14).

In a similar way, Poplack and her colleagues argue that the status of a loanword is "traditionally conferred only on words which recur relatively frequently, are widely used in the speech community and have achieved a certain level of recognition or acceptance, if not normative approval" (Poplack et al. 1988: 52).

3.1.1 Types of loanwords

Haugen (1950) divides loanwords into two types: *importation* and *substitution* which he defines as:

> "If the loan is similar enough to the model so that a native speaker would accept it as his own, the borrowing speaker may be said to have *imported* the model into his language, provided it is an innovation in that language. But insofar as he has reproduced the model inadequately, he has normally substituted a similar pattern from his own language. This distinction between *importation* and *substitution* applies not only to a given loan as a whole but to its constituent patterns as well, since different parts of the pattern may be treated differently." (Haugen 1950:212)

In this definition, Haugen used the word 'model' for 'original patterns' (in the source language). He links the adaptation patterns (i.e. less or more distorted loan forms) with the degree of bilingualism. For example, in English the French word *café* is a less distorted form of the foreign word and thus is an example of importation. However, when the French word '*rendezvous*' is borrowed, English speakers cannot produce the uvular [ʁ] of French and replace it by using their approximant [ɹ] instead. This shows a (phonemic) substitution.

Other researchers (Campbell, 2013:59; McMahon, 1994: 205) have also categorised the loanwords in the same sense but they typically have replaced the terms 'importation' and 'substitution' with 'adoption' and 'adaptation' respectively. Likewise, Poplack, Sankoff, and Miller (1988) divide loanwords into two types, 'nonce forms' and 'established words', based on the frequency and level of integration needed to become acceptable in the native language (*L1*). Thus, established loanwords are the words which are widely used in the community and are fully integrated in *L1*(or language community) from a linguistic point of view, whereas nonce forms are also integrated forms but are less frequent in use and therefore, have less acceptability in the language community. In the current study, the corpus of MP loanwords is based on established loanwords which are common and frequently used across the MP speech community in Pakistan.

The distinction between loanwords (i.e. nonce forms) and codeswitches is another controversial issue in the language variation literature. Since single-word code-switches are

also theoretically possible, some researchers take code-switching and borrowing (i.e. of nonce forms) to be part of the same continuum (see, e.g., Haspelmath, 2009; Myers-Scotton 1993, 2002, 2006; Van Coetsem 1988; Thomason 2003). In contrast, some researchers (e.g. Sankoff & Poplack 1981; Poplack &Sankoff, 1984; Poplack & Dion 2012; MacSwan 1999; MacSwan & Colina 2014; Poplack, 1985; 2017) consider nonce forms (borrowing) and codeswitches to be two essentially distinct processes which can thus be distinguished.

In her argument, Poplack (2018) says that the misconception between nonce borrowing and codeswitching is due to methodological difficulties in distinguishing single borrowed words (i.e. nonce words) in context from single code-switched items, found in patterns of bilingual behaviour. Poplack et.al (1988) earlier categorised that nonce forms as unattested *L2* items uttered once by exactly one speaker, whereas established loanwords are items occurring twice or more, and code-switches are multiword fragments of *L2* produced in the *L1*. Another criterion to distinguish between loanwords and codeswitches is the grammar of recipient language, as a benchmark between (nonce) loanwords and codeswitches. Poplack and Dion (2012) summarise the diagnostics for distinction of different language variations (i.e. nonce forms, established loanwords and codeswitches) as shown in Table 3.1.

Table 3.1 ***Characteristics of three types of language variation (Poplack and Dion, 2012) (adapted from Poplack, 2018)***

Diagnostics	**Multiword codeswitch**	**Nonce borrowings**	**More frequent borrowings**
Linguistic			
lexical constitution	content words ≈ function words	preponderance of nouns lack of function words	
syntactic integration	L_D	L_R	
Morphological integration	L_D	L_R	
phonological integration	variable	variable	variable
Extralinguistic			
Knowledge of L_D	required		unnecessary
level of diffusion	restricted		diffused
Frequency	rare		frequent

Note: L_D stands for donor language and L_R for recipient language

Table (3.1) shows that nonce borrowings are different from established loanwords in the extralinguistic (external) features of frequency and acceptability in language community, because we know that nonce borrowing is only done by bilinguals. However, from a linguistic point of view (i.e. at the morpho-syntactic level) nonce borrowing behaves similarly to that of established loanwords by following the structure or grammar of the native language (*L1*), and thus varies from the codeswitches.

I will review literature in the next sections which describes the various types of loanword adaptation patterns that emerge once loanwords enter a borrowing language. Haspelmath (2009: 42) defines loanword adaption as a process in which phonological, orthographic and morphological structures of the source word are modified, to fit into the borrowing language. Winford (2010:173) also referred to this as 'loanword integration'. This empirical review will be followed by discussion of different theories proposed by phonologists regarding loanword adaptation. These theories mainly focus on how the adaptation takes place with reference to the role of phonetics and phonology of the native

language (*L1*) and source language (*L2*). However, external factors (non-phonological), which are also considered as a contributing factor towards variation in adaptation of loanwords, will be a part of the discussion as well. The current study focuses on the phonological adaptation of English loanwords in MP and the main focus will be on how the syllable phonotactics and stress system of the source language (English) undergo the adaptation process in the native language (MP).

3.2 Phonological Adaptations in Loanwords

Cross-linguistically, loanword adaptation at the phonological level has been investigated in a wide range of languages which include Cantonese (Silverman, 1992; Yip, 1993), Japanese (Itô & Mester 1995; Shinohara, 2000), Fula (Paradis & LaCharite, 1997), Huave (Davidson & Noyer, 1997), Selayarese (Broselow, 1999), Fijian (Kenstowicz, 2007), Mandarin (Miao, 2006) and Korean (Kang, 2003; Boersma & Hamann, 2009) and many others. Kang (2010b) argues that when loanword adaptation occurs at the phonological level, it affects all aspects of phonological structures which may include segments, phonotactics, suprasegmental features and even affectingthe morpho-phonological restrictions of the recipient language. For example, at the segment level, Hock and Joseph (2009) argue that if some phonemes in the source word are not present in the phonemic inventory of the native language (*L1*), they will be replaced by their closest match in the native phonemic inventory of the borrowing language. For instance, English loanwords which start with the dental fricatives /θ, ð/ are replaced with dental alveolar stops /t̪ʰ, d̪ʰ/ in Hindi (Hock 1991). Similarly, fricative /f/ in English is replaced by the aspirated bilabial plosive /pʰ/ in Burmese (Chang, 2009).

In the same way, if the syllable structure of the borrowing language is stricter than the source language, it will undergo phonotactic adjustments. The most common repair strategies which are used to adapt the syllable phonotactics of the source language (*L2*) are epenthesis and deletion. For example, Hawaiian has a very limited syllable structure, i.e. CV only. When an English loanword such as /skuːl/ '*school*' with an illicit onset consonant cluster and simple coda consonant enters Hawaiian, it undergoes adaptation via epenthesis and deletion of the onset consonant to conform to the native phonology and thus we get [kula] (Adler 2006).

Likewise, loanwords also undergo adaptation at the suprasegmental level in which the mapping of stress or tone from the source language to the borrowing language takes place (e.g. Silverman, 1992; Davidson & Noyer 1997; Broselow, 1999; 2009; Shinohara, 2000; Kenstowicz, 2007). For instance, when English stress is mapped to Cantonese tones, a

stressed syllable is assigned a high [H] tone, and a non-final unstressed syllable receives a mid [M] tone, as in "BUFfet" > /pow [H] fey [M]/ (Miao, 2005:1).

3.2.1 Categories of Loanword Adaptation Patterns

In the general process of loanword adaptation, some adaptation patterns do not conflict with the native phonology of the borrowing language. However, some apparently idiosyncratic patterns emerge which are unexpected in that they conflict with native alternations. Kang (2010a) divides the puzzling patterns identified in the loanword literature into five broader categories.

One pattern is called the *'too many solutions'* pattern (Steriade 2001), or *'differential faithfulness'* (another name given to the same pattern by Broselow, 2009). This type of adaptation appears in a loanword when, even though other possible loanword repair strategies are possible which can allow the adapted form to conform to the native phonology of the borrowing language, the adaptation 'converges' on a specific strategy and there is no apparent evidence for that process in the native language. For instance, Alder (2006) mentions Hawaiian, which has no voiced stop /b/ in its phonemic inventory. Although /b/ is not attested in this language, when the English loanword 'boulder' with a /b/ segment appears in Hawaiian, it surfaces as the voiceless bilabial stop /p/, as in [poluˈkaː]. Now the question arises why given all the other bilabial options in the Hawaiian inventory such as /m/ and /w/, yet adaptation often converges on a specific strategy (voicing substitution) resulting in /p/, even when speakers have no apparent evidence for that process in their native language, i.e. Hawaiian.

Similarly, another puzzling pattern is reported by Kenstowicz (2007) which is called *'divergent repair'*. This is also known as a 'ranking reversal' as named by Broselow (2009). As the name shows, this adaptation pattern contradicts the usual native repair strategy. For example, Peperkamp et al. (2008) report that in Korean, obstruent+nasal clusters are disallowed, therefore, when a potential obstruent+nasal cluster might appear it is repaired by nasalising the obstruent consonant via assimilation; for instance, in the word /kuk-muɪ/→[kuŋ-muɪ] 'soap'. But, when Korean borrows English loanwords, epenthesis is used as a repair pattern; e.g. the word 'picnic' becomes [pʰikʰɨnik] by inserting an epenthetic /ɨ/ between the word-medial /k/ and /n/ consonants.

There is also another category of adaptation pattern which Peperkamp (2004) refers to as '*unnecessary adaptation'*. Golstan and Yang (2001) report this pattern in the case of French loanwords in Hmong in which /ʒ/ is adapted as /j/ in French loanwords. Even though

/ʒ/ is part of the phonemic inventory of Hmong (e.g. /ʒɔ̃/ 'well') it is still replaced with /j/, apparently unnecessarily; e.g. /ʒo.zef/ 'Joseph' becomes [jɔ.sè] instead of *[ʒɔ˩.sè].

Another confusing pattern which appears during loanword adaption is called '*differential importation'*. Kang (2010a) refers to '*importation'* as a situation where a structure is not attested in the native word of borrowing language, but it is exceptionally allowed in loanwords. In this regard, Alder (2006) mentions Hawaiian which has no alveolar /t/ but has two equally acceptable loan variants for the English word 'truck', as [kə.la.ka] and also as [tə.la.ka], in which /t/ does not undergo adaptation. This suggests that native constraints may be relaxed in loanwords by allowing the source forms to appear as they are, without adaptation. Another pattern is called '*retreat to the unmarked'* mentioned by Kenstowicz (2005). This repair pattern requires stricter conformity to structural requirements in loanwords than in the actual native phonology, despite having more a faithful form available in the language. For example, Kertész (2003) considers Hungarian to have this pattern. In Hungarian, monosyllabic loanwords which end with voiceless obstruents are geminated, in an apparent requirement for syllables to be heavy (e.g. 'shock' → [sokk], *[sok]), even though Hungarian does not have a requirement for syllables to be heavy.

Among these categories, we shall see that a '*differential importation'* pattern can be served in stress patterns of English loanwords in MP, where the native MP constraint ranking is relaxed in loanwords (i.e. for some groups of MP speakers). As a result, in the output, the stress pattern (for some words) conforms to the source language phonology rather than the native MP stress rules (see section 7.2.3). In the next section, I will discuss theories developed to account for loanword phonology and to what extent these theories are likely to be able to explain the adaptation patterns in MP loanwords.

3.3 Theories related to Loanword Adaptations

There are two main, 'opposing' theories proposed by researchers to account for the phenomenon of loanword adaptations cross-linguistically: namely, the phonological approach and perceptual approach. In the following subsection, I discuss both theories in detail and show which theory is selected as the best fit to the type of data explored in the current study.

3.3.1 The Phonological Approach

The phonological approach is a *production-oriented* approach. The main proponents of this approach are Haugen (1950), Hyman (1970), Jacobs & Gussenhoven (2000), Paradis & LaCharité (1997), LaCharité & Paradis (2002, 2005) and Paradis & Tremblay (2009). Paradis and LaCharité (1997) claim that bilingual speakers perceive the phonetic details of the non-native sounds in source words without any alteration and thus, in perception there is

no change to the underlying form of the source language (*L2*). The identical loanword form becomes the input to the production stage and adaptation occurs under category preservation or proximity principles where (loanword) segments are matched on the basis of the phonological categories of the native grammar, i.e. the *L1* (cf. Paradis & LaCharité, 1997; LaCharité & Paradis, 2005). For example, English /ɪ/ and /ʊ/ are acoustically closer to Mexican Spanish /e/ and /o/ than to /i/ and /u/. Nevertheless, they are adapted as /i/ and /u/ respectively in almost all cases of English loanwords in Mexican Spanish (LaCharité & Paradis 2005: 233-7).

To defend the phonological stance, Paradis and LaCharité proposed a formal constraint-based model, called the Theory of Constraints and Repair Strategies (TCRS henceforth) (Paradis and LaCharité 1997: 381). The central notion of the TCRS model of loanword adaptation is that it considers the phonology of any language as comprised of both universal and non-universal constraints, and in cases when violation of these constraints is found, repair strategies (e.g. insertion, deletion, assimilation etc) must be applied. The TCRS model is comprised of four principles: The Preservation Principle, which requires maximal segmental information to be preserved; the Threshold Principle, which restricts the amount of repair to up to three steps; the Minimality Principle, which ensures that illicit structures (originating in the source language) will be repaired as economically as possible; and finally, the Precedence Convention, which gives priority to repairing higher phonological levels. (For details on this theory, see Paradis & Lacharité, 1997). We can see an application of the TCRS principles in French loanwords into the Fula language, in which onset clusters are not permitted (Paradis & Lacharité, 1997). To follow the Preservation Principle (i.e. preservation of maximal segmental information), it is necessary to insert a vowel. The complete repair can be accomplished in two steps, meeting the Minimality Principle: 1. insertion of vowel position; 2. spreading of vocalic features from the following vowel to 'fill' the inserted nucleus. Since, this set of steps falls within the threshold cost (i.e. two steps), the repair is acceptable, and Fula therefore adapts French /klas/ → [kalaːs] 'classe'.

In the current work, we expect that TCRS will not be well-equipped to account for the adaptation patterns to syllable structure and stress in MP loanwords. An important caveat in adoption of the TCRS model is that it assumes that competent bilinguals are the originators of loanwords and have complete access to the source phonology; if true we might expect a suprasegmental feature such as stress to be preserved as much as possible, as it should have priority according to the Precedence Convention. However, as we shall see, in loanword adaptation patterns in MP, stress shift is very common, to allow the loanword to conform to the native MP phonology (e.g. /ˈgluː.kəʊz/→ [gəl.ˈkoːz] '*glucose*').

We also find variation in the adaptation patterns at intraspeaker level where in some cases stress falls on a different syllable in a structurally parallel word, this time to maintain the source phonology and ignoring the native MP stress rules (e.g. /ˈvæk.siːn/→[ˈvæk.siːn] 'vaccine'). Similarly, in coda phonotactics, there is variation in the adaptation patterns within the same coda cluster types. For example, in the word 'silk' the illicit coda cluster /lk/ is maintained in surface representation (e.g. /sılk/→ [sılk]) but the same cluster /lk / is broken by an epenthetic vowel in the case of 'milk', to conform to the native MP phonology (e.g. /mılk/ → [miːlək] 'milk').

Although TCRS is phonologically informed, it was clear at an early stage in the analysis that the TCRS model would not be the ideal tool to use to account for this type of variable adaptation in MP loanwords.To capture the range of phonological variation observed in MP loanwords, the theoretical model I utilize is instead Optimality Theory (OT), as discussed further below (in section 3.5). The advantage of using OT is that it can capture the variable adaptation (for loanwords) and inter-/intra-speaker variation (for native phonology in other languages). Cross-linguistically, inter-/intra-speaker variation has been investigated within OT in various languages including Finnish (Anttila, 1995;1997;2002; Anttila & Cho, 1998), Vimeu Picard, a dialect of Northern France (Auger, 2001; Cardoso, 2001), Brazilian-Portuguese (Cardoso, 2007), Faetar, a Franco-provincial dialect spoken in southern Italy (Nagy & Reynolds, 1997), modern Russian (Zubritskaya, 1997) and many others. In the next subsection, I turn to the perceptual model which is also commonly used to account for patterns in loanword phonology.

3.3.2 The Perception or Phonetic Approach

The proponents of the perception approach (e.g. Silverman, 1992; Yip, 1993; Peperkamp & Dupoux, 2003; Kenstowicz, 2003; Boersma & Hamann, 2009; Hamann, 2009 ; Peperkamp, Vendelin & Nakamura, 2008; Kang, 2003, among others) argue that borrowers do not have access to the underlying representation of source structures (in the *L2*), so non-native sounds are mapped onto the phonetically closest native sounds (in the *L1*). A prominent case which demonstrates that adaptation of loanwords takes place in the perception is the presence of illusory epenthetic vowels in the consonant clusters in Japanese.

Dupoux et al. (1999) show that Japanese speakers perceive illusory epenthetic vowels in the consonant clusters of loanwords which conform to the syllable structure requirements of their native language (*L1*). Dupoux et al. compared Japanese listeners with French listeners in their perception of consonant clusters in six nonce words with an epenthetic vowel [u] in a syllable detection task (e.g. [abuno], [akumo], [ebuzo], [egudo] etc.). During the task, the duration of the vowel [u] was gradually reduced to zero

milliseconds. Participants were asked whether the token (nonce word) they heard contained the sound [u] or not. In contrast to the French participants, the Japanese participants reported the presence of a vowel at all levels of vowel duration, even when the vowel had been completely removed from the nonce words. Conversely, most of the time (i.e. about 90%) French participants judged that the vowel was absent in no-vowel condition and in 50% of the intermediate cases they judged that the vowel was present. These results were further confirmed in other experiments as well, which have led Dupoux and colleagues to conclude that the influence of native language phonotactics can be so strong that the listeners perceive illusory vowels to accommodate illicit consonant clusters in their *L1*. Similarly, Kabak and Idsardi (2007) show that Korean listeners perceive illusory vowels within consonant clusters that are illicit in their native syllable phonotactics (e.g. [a.i.sɯ.kʰɯ.rim] *'ice-cream'*, [khɯ.ri.sɯ.ma.sɯ] '*christmas*').

The primacy of *L1* in the perceptual approach has been questioned due to its restrictive nature; that is, because it excludes any potential effect of the source language phonology. In opposition to a conservative perception approach, recent perceptual studies assert that some adaptation patterns can only be explained when the phonetic details of both languages, i.e. the source language (L2) and the native language (*L1*) are considered. Some scholars (e.g. Bundgaard-Nielsen et al. 2011; Kwon 2017; Nomura & Ishikawa 2018; Hamann & Li 2016; Kang & Schertz, 2017) argue that perception is mediated by borrowers' and/or listeners' knowledge of *L2* sound structure, rather than by the influence (or function) of native language (*L1*) perception as applied to *L2* phonetic details (i.e. acoustic cues). In the current work, the main corpus of MP loanwords is not derived from production data, but rather based on native speaker intuitions; as a result, it is not within the scope of this study to attempt to explain loanword adaptation patterns from a perceptual perspective, as we do not have production data as input to acoustic analysis. Although investigation of the role of acoustic-phonetic detail in the loanword adaptation process will be an important future research goal, in the present work the decision was taken to work within the phonological approach, in the first instance, in order to test whether a purely phonological approach is able to explain the patterns observed in MP. In the next section, I will turn to non-phonological (external) factors which can affect adaptation patterns in loanwords: namely, level of bilingualism and orthography.

3.4 External Factors in Loanword Adaptation Process

The language contact situation which is the context of loanword adaptation into Mirpur Pahari (MP) is complex (see chapter 2). A key factor is that different groups of MP speakers are likely to have different levels of exposure to the source language (English).

Also, due to the nature of the acquisition process for most MP speakers, who mostly learn English only in school, orthography may also play a role. Therefore, bilingualism and orthography are potential external factors which can play a role in MP loanword adaptation patterns and thus are discussed below.

3.4.1 Role of Bilingualism

Bilinguals are the agents of borrowing; they are the ones who use loanwords regularly and thus introduce them to the speech community (see e.g. Paradis and LaCharité, 1997, 2008, 2012). The phenomenon of bilingualism has therefore been widely argued to be involved in the process of sound adaptation. Haugen (1950) proposed that the degree to which loanwords go through sound adaptation depends on speakers' level of bilingualism. Haugen (1950) describes bilingualism as a continuum which can be split into three categories: he calls the first category the '*pre-bilingual*' period in which a very small proportion of the population is bilingual and thus there is a high degree of variability in loanword adaptation; the second category is called the '*adult bilingualism'* period in which the number of adult bilinguals increases and as a result more uniformity comes into the adapted forms of loanwords; the third and final category is called the *'childhood bilingualism'* period in which children grow up bilingually and learn the two languages (i.e. native and source language) simultaneously rather than learning the source language as an adult.

The classification of adaptation patterns in my loanword corpus data is inspired by Haugen's categories (see chapter 4 for further details). A number of researchers have examined variation in loanword adaptation patterns and proposed that bilingualism may influence the rate of sound adaptation at different levels. For example, Lev-Ari and Peperkamp (2014) suggest that individuals vary in their pronunciation of loanwords from one context to another, and that this variability is socially conditioned by factors such as the prestige that the donor language holds, speakers' level of bilingualism and the nature of interaction patterns between speakers. Similarly, the phonological stance (Paradis & LaCharité, 1997, 2001, Paradis & Thibeault 2004, LaCharité & Paradis 2002, 2005) is also built around the central notion that bilinguals are the agents of borrowing and leads to the claim that instead of monolinguals, bilinguals are the main borrowers who are also responsible to the adaptation, irrespective of the number of bilinguals in the speech community (Paradis & LaCharité,2008).Since bilingual speakers are considered the main originators of phonological innovations from the source language (Haugen1950, 1953; Mougeon et al., 1985), therefore, structural features on different linguistic levels (phonetics,

phonology, syntax etc) can be influenced by the source language (Thomason & Kaufman, 1988).

3.4.2 Role of Orthography

The role of orthography in loanword adaptation patterns is acknowledged to a limited extent by some authors (e.g. Lacharité and Paradis, 2005; Paradis and Prunet, 2000; Vendelin and Peperkamp, 2006, among others) but largely ignored in production models of loanword adaptation patterns (Taft, 2006). However, there is increasing evidence that orthography does play a role in adaptation.Orthographic influence can be found in Japanese loanword adaptations:Lovins (1975:48) explains the point that most learners/bilinguals are almost always exposed to the written form of the source word at the same time as hearing it,therefore, the written form of English loans into Japanese makes it difficult, if not impossible, to distinguish orthographic factors from phonetically-motivated variations.Schmidt (2008) agrees with Lovins and states that the type of the script selected to convey different loanwords in Japanese has an effect on the phonological realisation of the word.

Blair & Ingram (1998) also note that in cases where the spoken input is not available, borrowers depend on the written form, especially in the case of English because the majority of speakers of English in the world are infact non-native language speakers of English, who will have learned English in an educational setting rather than by immersion, so have no native speaker input. Similarly, Hamman and Colombo (2017) show the role of orthographic influence on loanword adaptation in Italian, a language with a relatively transparent grapheme-to-phoneme mapping. In the same vein, Mathieu (2012) argues that orthographic representation plays a role in shaping the phonological representation of the borrowed words. He presents the adaptation patterns in Romanian loanwords from French and Japanese loanwords from English, in which grapheme-phoneme mappings follow the spelling conventions of the recipient language (L1). Taft suggests that ‘the representation involved in generating sound output from an orthographic input is more abstract in nature than the phonemic form of the word’ (Taft, 2006:68). In other words, he suggests that the phonological representations of loanwords, or at least those involved in the processing of visually presented text, are moulded by orthographic considerations.

In the present study, I will show that the role of orthography can also manifest itself in a different way. I start from the premise that borrowers, being bilingual, have access to the phonological (or orthographic) representation of the source language, which is expected to affect the realisation of the English loanword in terms of pronunciation. In the case of

Pakistan, I know from experience of the educational system that working from grapheme-to-phoneme is a common way of learning English pronunciation. This may suggest that in Pakistan, some loanwords are learned via orthography.

In summary therefore, although I do not propose to argue that borrowers adapt loanwords solely depending on the written form of the word or on the speaker's level of bilingualism, the analysis will consider as these as potential factors which influenced the adaptation patterns in MP loanwords, and perhaps especially in cases of variation in the adaptation patterns.

3.5 Optimality Theory as a framework for analysis of English Loanwords in MP

Optimality Theory (OT hereafter: Prince and Smolensky,1993/2004) is an influential phonological theory used to study a number of areas in phonology, such as the phonetics-phonology- interface, historical linguistics, linguistic variation, dialectology and language acquisition (Martinez-Gil & Colina, 2007). Classical OT proposes a one-step mapping between underlying and surface forms, which are referred to as inputs and outputs, respectively (Kager, 1999). In OT, the rules and derivations of Generative Phonology are replaced by a set of interacting constraints. Although it is not a strict requirement of OT that constraints are innate (McCarthy, 2008), the core premise of OT is that constraints are universal and violable. For example, OT encodes the well-known asymmetry in the distribution of onsets and codas across languages by proposing an ONSET constraint, which penalises the presence of onsets, which interacts with a NOCODA constraint, which penalises the absence of codas (Prince & Smolensky, 1993). In this way, cross-linguistic universals or tendencies are hard-wired into the architecture of the theory.

The main tenet of OT is that the grammar of each language is a total ordering of a ranked set of constraints. Constraints fall into two categories: markedness and faithfulness. Every language is modelled using the same set of constraints, and languages differ only in the ranking of these constraints. For example, during the mapping operation between input and output, a set of hierarchically ranked constraints evaluate candidates based on the surface forms (outputs) in respect of the markedness conditions within a language and thus select an optimal output (forms) corresponding to the input (forms). The OT framework is particularly useful, therefore, for comparing grammars and handling language (or speaker) variation and is thus well-suited for the current work, which focuses on variation in the adaptation of loanwords.

3.5.1 The Basic OT Architecture

The basic architecture of OT is comprised of two components namely, GEN and EVAL, which are abbreviations of Generator and Evaluation respectively. GEN takes meaningful entities (e.g. words, syllables etc) as an input and returns a set of possible candidates that may satisfy or violate any of the constraints in the constraint hierarchy (CON). The principle that GEN offers an infinite and unconstrained list of candidates is called the Richness of the Base (Prince & Smolensky: 1993, 2004). It is the responsibility of EVAL to choose one of these candidates as the optimal candidate, being the output that violates the fewest most highly ranked constraints. The role of GEN, EVAL and CON are illustrated in (Fig.3.1) via an example from an English loanword into Mirpur Pahari.

Figure3.1 **Architecture of OT**

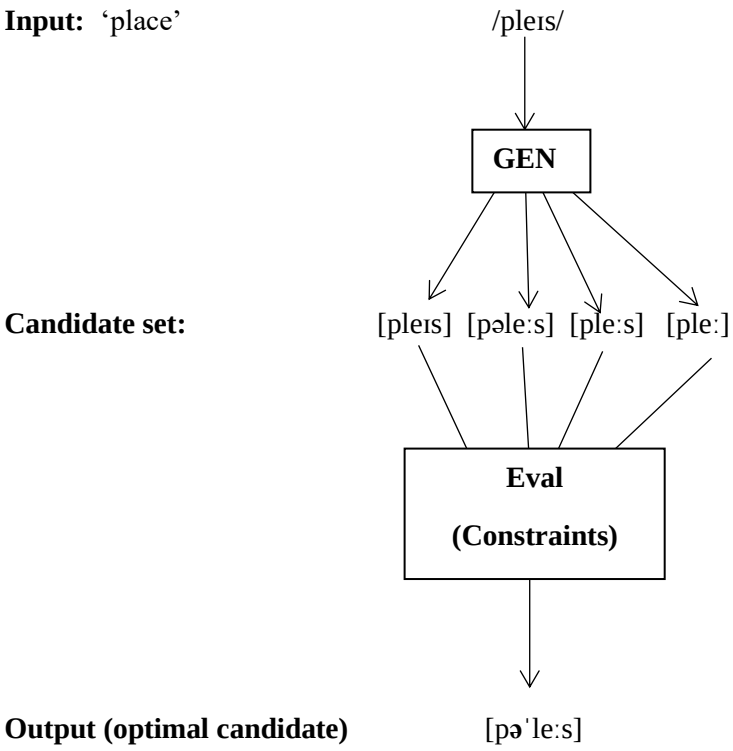


Figure 3.1 shows that a candidate as an input /pleɪs/ enters into GEN. Here, GEN creates many possible candidates: /pleɪs/, /pəleːs/, /pleːs/ and /peːs/. GEN is the stage where the mapping between input and output representations takes place. In the next stage, these candidates pass through a filter called EVAL which is responsible for finalising the choice of an optimal candidate from the set of possible candidates. EVAL contains universal constraints, i.e. markedness and faithfulness constraints. A markedness constraint enforces well-formedness conditions on the output itself whereas faithfulness constraints seek to ensure that the input and output resemble each other to the greatest extent possible. This

generates a conflict among the constraints (i.e. markedness versus faithfulness) and the result reflects the constraint ranking, which is language-specific. In this case, EVAL chooses the optimal candidate [pəleːs] as an output because if satisfies the high ranked constraints in the language under observation, i.e. Mirpur Pahari. In this specific example (as shown in Figure 3.1) a constraint against onset clusters is highly ranked, so an inserted vowel in the winning candidate [pəleːs] satisfies this high ranked markedness constraint. Thus, an optimal/final output may no longer be faithful to the input. This implies that a markedness constraint overrides a faithfulness constraint. Note that here (in figure 3.1) slanted brackets '/ /' are used to represent input forms whereas square brackets '[ ]' are used to enclose output forms.

3.5.2 The Tableaux

In standard OT, constraint ranking arguments are represented with tableaux. In the current study, for the analyses of MP and loanwords, I have used a format called 'combination tableaux', taken from McCarthy (2008), which allow clear illustration of ranking arguments. The standard tableau has one row for each candidate being compared and one column for each constraint involved in the comparison. The constraints which are involved in the ranking are shown in the first row from highest to lowest ranking order, from left to right. The top left cell shows the input and the list of possible candidates are listed in the leftmost column. The optimal candidate is the one that least violates the higher ranked constraints and is indicated by the symbol of an arrow '→' (or sometimes a pointing hand is used) and is often called the 'winning candidate' (Prince, 2002).

A comparative tableau additionally has 'W's and 'L's placed beside the violation marks in each cell of the tableau, which are shown with the symbol of an asterisk '*'; the W and L symbols are placed only on the rows of the tableau representing 'losing candidates'. Each W or L reports the result of comparing how that losing candidate is evaluated for a particular constraint, with how the winning candidate is evaluated. For example, f if a particular constraint favours the winner a 'W' is inserted in the cell, but if a constraint favours the losing candidate an 'L' is placed in the cell. The reason for adding the W/L labels is that it visualises the presence (or absence) of ranking arguments between constraints; if there is at least one 'W' to the left of every 'L' in a row this indicates that comparison of that losing candidate with the winning candidate yields a ranking argument for one or more constraints (Prince 2002; McCarthy, 2008). Consider the sample tableau in (2):

2) Ranking: *COMPLEX ^{ONSET} >>DEP

/pleɪs/	*COMPLEX ^{ONSET}	DEP
a. →[pəle:s]		*
b. [pleɪs]	*W	L

The tableau (2) shows that to be an optimal candidate in MP, candidate must obey *COMPLEX^{onset} by not allowing an onset cluster in word-initial position. We can see that [pəle:s] is the winning candidate because it obeys *COMPLEX^{onset} by not allowing onset consonant cluster, but the epenthesis that satisfies this requirement violates the competing DEP constraint. DEP is a faithfulness constraint which penalises insertion of material in the output, which is not present in the input. The candidates a. and b. are useful candidates to consider since they differ in precisely the ways that are relevant for the two constraints under consideration; one candidate satisfies *COMPLEX^{onset}but violates DEP, the other candidate violates *COMPLEX^{onset}but satisfies DEP. This direct conflict gives us a 'ranking argument' between the two constraints which shows that, in MP, *COMPLEX^{onset} dominates DEP. In this comparative tableau presentation, 'W' and 'L' annotations are added to the loser row and the configuration, with W to the left of L, provides a further visualisation of the ranking argument. Overall, the losing candidate (2b) shows that the winner favouring constraint labelled 'W' (i.e. *COMPLEX^{onset}) takes precedence over the loser-favouring constraint labelled 'L'(DEP). The solid vertical line is used to illustrate that constraints are ranked. A dashed vertical line between constraints will be used to show any constraints that are unranked.

3.5.3 How does OT handle variation?

All languages rank constraints according to the well-formedness conditions required in their respective grammars, with each ranking representing a different grammar/language. Thus, one constraint might be highly ranked in one language but lower ranked in another language. In OT therefore, systematic differences between the languages are due to the reranking of constraints, which allows modelling of typological variation. For example, MP does not allow onset clusters in word-initial position. Therefore, as we shall see, onset clusters in English loanwords are broken up by inserting an epenthetic vowel and violate the faithfulness constraint DEP; this give a constraint ranking *COMPLEX^{onset} >>DEP (as shown in tableau 2). In contrast with MP, onset consonant clusters are allowed in word-initial position in English. In terms of OT, this is modelled by saying that in English

*COMPLEX^{onset} is ranked lower than DEP and thus English reranks the relevant constraint set (i.e. DEP>>*COMPLEX^{onset}). (The full constraint ranking of syllable phonotactics in the adaptation patterns of MP loanwords is discussed in depth in chapters 6-8).

An advantage of using OT for the present study is that OT has the capability of handling phonological variation by partially ordering constraints instead of enforcing full constraint ordering. A range of work presents OT analyses of phonological variation (e.g. Anttila (1997), Anttila and Cho (1998), Boersma and Hayes (2001), Nagy and Reynolds (1997), Zubritskaya (1997) and many others). To analyse intra-speaker variation in MP loanwords, I will use the Partially Ordered Constraints (POC) model of variation, which is an elaborated version of OT proposed by Anttila (1997 et seq.). The POC model shows that variation arises when a given grammar allows the possibility of multiple total orders which produce different optimal candidates. Thus, each time the grammar is used to evaluate a candidate set, one of the total orders (constraint rankings) picks a candidate as optimal, but in a further iteration another order may pick a different candidate as optimal, and surface variation results. For example, in the grammar, if constraints B and C are not ranked with respect to each other, we can expect constraints A, B and C with the following ranking: A>>B, C. From this partial order, two total orders are possible: A ≫ B ≫ C and A ≫ C ≫ B. These total orders may choose different optimal candidates and thus capture the variation.

In summary, OT is able to capture variation *between* the languages by reranking of constraints and *within* a language by partial ordering of constraints. The MP English loanwords corpus provides data which is rich with phonological variation and acts as an interesting testing ground for Optimality Theory claims regarding the scope of language variation in general, using loanwords as a case study. After doing an OT analysis on paper (that is, using comparative tableaux), a constraint ranking can also be confirmed and checked in different ways. One of the methods is called Recursive Constraint Demotion (RCD) which is discussed below.

3.5.4 The Recursive Constraint Demotion algorithm (RCD)

Constraint ranking hierarchies (in our case, at the prosodic level in MP loanwords) can be checked using the Recursive Constraint Demotion algorithm (RCD). According to McCarthy (2008), in RCD, a loser-favouring constraint moves down the hierarchy, from some initial ranking, until all of its Ls are dominated by Ws, but not further; repetition of this task yields a final constraint hierarchy.

The examples used below to illustrate the RCD algorithm below are taken from the corpus to be analysed in the present thesis but are not the full representation of the corpus data of loanword adaptation patterns used in Mirpur Pahari (MP), but the final constraint

ranking from RCD is the full constraint hierarchy of syllable phonotactics of MP loanwords. The purpose at this point is only to illustrate how the RCD algorithm works. I start from a single table called 'the support' (as shown in tableau 3) which is a multi-input, unranked comparative tableau. The constraints are unranked as yet and are placed in random order.

Tableau 3 Support *for RCD*

Input	Winners	Losers	*COMPLEX^{ONSET}	MAX	DEP	IDENT$_{[PLACE]}$	*COMPLEX ^{CODA}
/pleɪs/	[pə.leːs]	[pleɪs]	*W		L		
		[pleː]	*W	*W	L		
		[bleːs]	*W	*W	L	*W	
/bænd/	[bænd]	[bænt]				*W	L
		[bæn]		*W	L		L
		[bæ.nər]			*W	*W	L

Note: The ordering of constraints shown here is not the final ranking needed to analyse MP loanwords. The purpose of this example is to represent how RCD works.

As a first step, all the constraints that favour no losers are identified by looking at their columns. If these constraints have no 'Ls' in their column, they are un-dominated or high ranked constraints. Three such constraints are visible, so they are promoted to the left-hand side in tableau 5 below: *COMPLEX^{onset}, MAX, IDENT $_{[Place]}$ .The remaining constraints (DEP, *COMPLEX^{coda}) are demoted as low ranked constraints and yields the interim constraint hierarchy in (4).

(4) *COMPLEX^{onset}, MAX, IDENT $_{[place]}$>>DEP, *COMPLEX ^{coda}

As a next step, in the support, the columns with high ranked constraints (i.e. *COMPLEX^{onset}, MAX, IDENT$_{[place]}$) are removed (see tableau 6), since there is nothing more to learn from them.

Tableau 5 Support *after first pass through RCD (shading)*

Input	Winners	Losers	*COMPLEX^{ONSET}	MAX	DEP	IDENT $_{[PLACE]}$	*COMPLEX $_{CODA}$
/pleɪs/	[pə.leːs]	[pleɪs]	*W		L		
		[pleː]	*W	*W	L		
		[bleːs]	*W	*W	L	*W	
/bænd/	[bænd]	[bænt]				*W	L
		[bæn]		*W	L		L
		[bæ.nər]			*W	*W	L

Tableau 6 ***Support after first pass through RCD (removal)***

Input	**Winners**	**Losers**	**DEP**	***COMPLEX** $^{\text{CODA}}$
/pleɪs/	[pə.leːs]	[pleɪs]	L	
		[pleː]	L	
		[bleːs]	L	
/bænd/	[bænd]	[bænt]		L
		[bæn]	L	L
		[bæ.nər]	*W	L

The process is recursive, in which the output of each stage is taken as input to the next. So, we need to look again for any constraint that favours no losers. Since in this example we do not have any constraint that favours losers, we move to the next step in which the support (as shown in tableau 7) will pass through the RCD (shading) in which all rows which have no W in them will be removed (deleted).

Tableau 7 Support ***after second pass through RCD (shading)***

Input	**Winners**	**Losers**	**DEP**	***COMPLEX** $^{\text{CODA}}$
/pleɪs/	[pə.leːs]	[pleɪs]	L	
		[pleː]	L	
		[bleːs]	L	
/bænd/	[bænd]	[bænt]		L
		[bæn]	L	L
		[bæ.nər]	*W	L

Tableau 8 ***Support after second pass through RCD (removal)***

Input	**Winners**	**Losers**	**DEP**	***COMPLEX** $^{\text{CODA}}$
/bænd/	[bænd]	[bæ.nər]	*W	L

Tableau (8) shows the result of constraint demotion, after the recursive process is repeated. After clearing out all the losers in the support, DEP is the only constraint that favours no losers. Now the only remaining constraint is *COMPLEX$^{\text{coda}}$ which has loser 'L' therefore, it is placed at the bottom of hierarchy, yielding (9).

9) Constraint hierarchy after final pass through RCD

*COMPLEX^{onset}, MAX, IDENT $_{[place]}$>>DEP>>*COMPLEX ^{coda}

3.5.5 OTSoft

An efficient method of checking a constraint ranking is by using OTSoft. It provides reliability in OT analysis by systematising various tasks that are performable by algorithm. It also calculates the factorial typology of a given set of constraints and candidates (output forms) that can be derived by varying the constraint ranking in all possible ways; it thus identifies the possible grammars predicted by a constraint ranking and allows the analyst to exclude impossible ones (Hayes, 2013). I will use OTSoft, version 2.5 (Hayes, 2017) as a way of evaluating the OT analysis presented in the thesis, in the discussion chapter. To my knowledge, this is the first study to use factorial typology to model the scope of variation in loanwords.

3.6 Chapter Summary

The two opposing approaches of loanword phonology are discussed. The first approach, which is the phonological one, argues that proficient bilinguals are the main originators of borrowing and thus that all the adaptation takes place on the phonological level; segment matching is based on phonological categories of *L1* and on the underlying forms (i.e. phonetic detail) of the source segments (*L2*). On the other hand, the central notion in the perception-only approach is that adaption takes place at the perception level, where the input segments of the source language (L2) are mapped onto the phonetic categories of *L1* segments of the native phonology. Nevertheless, loanwords are also influenced by external factors and potentially relevant factors in our case (MP loanwords) are the level of bilingualism and orthography. In this work, I explore the extent to which variation in loanword adaptation patterns can be explained within phonological theory. By using OT, phonological variation at both inter- and intra-speaker level in MP loanwords can be modelled via re-ranking and partial ordering of constraints respectively. OTSoft uses the RCD algorithm and takes inputs which consist of a support table like that shown in (3).

4 Corpus data of English Loanwords in Mirpur Pahari

4.1 Introduction

This chapter presents the procedures used to build the corpus of English loanwords in Mirpur Pahari. The status of loanwords is conferred on words which are widely used in the speech community and have achieved a certain level of recognition or acceptance (Mackey 1970; Poplack and Sankoff 1984). Since English is an official language in Pakistan and is taught as a compulsory subject up to the graduation level (i.e. 14 years of education in college), therefore, English loanwords are heavily used in Mirpur Pahari (MP hereafter) and thus are good candidates to attain the status of loanwords.

This chapter is divided into three subsections. Section *4.2* describes the procedure followed in building the MP loanword corpus reflecting MP as spoken in Pakistan. Section *4.3* shows the next phase of data collection with an early bilingual English-MP speaker living in the UK. Lastly, Section *4.4* concludes the main findings of the chapter and presents the rationale for the phonological analysis discussed in chapters five, six, seven and eight respectively.

4.2 The main loanword corpus

Fieldwork is commonly used for data collection, with the aim of gaining a sample of "real life language data" (Abbi 2001, 1). In the current research, the main corpus data was collected by following the norms of fieldwork that is by using informal elicitation methods, but without formal recording of production data. A corpus of 1219 English loanword in MP was built. The researcher recorded used her own intuitions as a native speaker of MP and grammaticality judgments with other native speakers (see also Nishimura, 2003; Kawahara, 2006; Morandini, 2007) to create the list of items included in the main MP loanword corpus. The items in the corpus were checked during informal elicitation sessions by phone (via WhatsApp) with family members (grandmother, mother, siblings, friends etc.) who live in Pakistan. This technique was used because the researcher had limited funds and was unable to travel to Pakistan for fieldwork. Despite having the limitation of not being physically present to elicit data, the researcher managed to collect grammaticality judgements giving a picture of the intuitions of MP speakers of different age groups, level of education and exposure to the donor language, i.e. English.

4.2.1 Building the Corpus

The loanword adaptation patterns in the corpus fall into two categories, roughly matching MP speakers' exposure to the source language (English) and their varying level of educational background. One group of loanword patterns produced was labelled as that of

monolinguals (i.e. *ML* hereafter). Typically, speakers who produce this pattern would have age ranges from 45-75 yrs old, little or no education and almost no exposure to the donor language (English). The second type of loanword patterns were labelled as those of speakers who have learned English as an additional language after acquiring MP as their first language, and thus described as Late-Bilinguals (*LB* hereafter). Speakers who produce this pattern would have a diverse educational background which ranges from 8-14 years of education and their age ranges would be between 17-45 yrs old. They are expected to be younger speakers who have more exposure to English than the *ML* do. These groups (*ML*, *LB*) are aligned with Haugen's (1950) groups and can be defined as:

ML: MP speakers who have almost no exposure to English.

LB: MP speakers who exposure to the non-native source language input (i.e. to Pakistani English).

A broad IPA transcription was used to indicate the most noticeable phonetic features of each item including stress assignment in both the source words (English) and MP words. For English words, the transcriptions were also verified with reference to a dictionary (Collins Cobuild Learners Dictionary, 1996) and with a native English speaker with a southern British accent (considered the standard British accent).

4.2.2 Refining the corpus

Poplack et al. (1988) describe established loanwords as words which are widely used in the community and are fully integrated from a linguistic point of view. As noted in chapter 2, there is potential for misconception about loanwords and codeswitches. Some scholars (e.g. Eastmann, 1992; Eliasson, 1989; Gardner-Chloros, 2009; Winford, 2003) consider loanwords and code switching to be closely related processes. These authors assume that loanwords (i.e. nonce borrowing) are first introduced as codeswitches then are gradually converted into (established) loanwords. In contrast, Poplack and her associates (Poplack and Meechan, 1998; Poplack et al., 1988; Poplack et al., 1989; Sankoff et al., 1990) make a clear distinction between borrowing and code-switching. For Poplack et al. (1988) conformity to the structure of the recipient language is a benchmark which can be used to make a distinction between borrowing and codeswitches.

The MP loanword corpus data fulfil the Poplack et al.'s diagnostic criterion. The adaptation patterns in the corpus of MP loanwords show the structure of native language (i.e. MP). Some patterns of syllable phonotactics and stress assignment (which are the focus of this study) in the *LB* corpus data show phonological variation and do not conform fully to the MP phonology. However, as we shall see, the same items in the *ML* portion of the corpus do conform to the recipient language. This suggests that the level of bilingualism intervenes

in the adaptation patterns; we thus treat both *ML* and *LB* variants as established loanwords, rather than assuming that the *LB* variants are code switches. Of the 1219 English loanwords in the full corpus a subset of 869 tokens were chosen for inclusion in the phonological analysis. These (869) items are accepted by both categories of MP speakers (i.e. *ML* and *LB*) which we take as evidence that they are established loanwords. Since *ML* do not use all the English loanwords identified (i.e. the other 350 items, to make the full 1219), we cannot necessarily assume that these other words are fully integrated into the general MP vocabulary as loanwords.

In the next section (4.2.3), I set out the specific selection criteria used to choose words from the corpus data of *ML* and *LB* for analysis of syllable phonotactics in the loanword adaptation patterns.

4.2.3 Target Structures for Syllable Phonotactics

One of the aims of this research is to analyse the syllable structure of English loanwords, focussing on consonant clusters in word/syllable-initial position (i.e. onset consonant clusters, hereafter) and word-final position (coda consonant clusters, hereafter) in the loanword corpus data. In total, 466 source words (in English) from the 869 established loanword items contained consonant clusters at syllable margins. The excluded loanwords had no consonant clusters at syllable margins, which is the selection criterion for this part of the analysis. The total number of items in each type of syllable structure (i.e. consonant clusters) in word-initial and -final position (as in Table 4.1 below) are counted according to the criteria which below in (a-c). I also thought of including word-medial clusters for analysis (e.g. /ˈæktrəs/ '*actress*') but there was no viable way to establish the syllabification in them. All the consonant clusters at syllable margins were analysed and grouped in the following way:

a. If the source word (i.e. English) contains an onset consonant cluster in word-initial position, it was included for this analysis. For example, a word /ˈflaʊə/ 'flower' contains an onset consonant cluster /fl/ at word-initially; therefore, it will be considered for the analysis of the syllable phonotactics.

b. If the source form contains a consonant cluster in word-final position (i.e. coda), it was considered for the analysis. For instance, the word /ˈkɒn.tækt/ 'contact' has a coda consonant cluster /kt/ in word-final position and thus counted in the corpus for this analysis.

c. If an English word contains a consonant cluster in both onset and coda position, it was also considered for this analysis. For example, the word /ˈstjuː.dənt/ 'student' contains the onset cluster /st/ and the coda cluster /nt/ and thus was eligible for this analysis.

Table 4.1 ***Syllable phonotactics in the corpus data of ML and LB***

Word-initial Onset cluster	269
Word-final Coda cluster	166
Word-initial onset cluster + word-final coda cluster	31
Total	**466**

The adaptation patterns of syllable phonotactics of English loanwords in *ML and LB* are analysed in detail in *Chapter 6* and *Chapter 7* respectively. This data is used to analyse the phonological similarities and/or differences at a prosodic level in loanwords produced by *ML* and *LB* respectively. In the next section, I show the selection criteria used to select items to analyse stress assignment in the adaptation patterns in MP loanwords.

4.2.4 Target Structure for Stress Patterns

The total number of source form items (i.e. in English) were counted in terms of stress by position and by weight. These source forms were investigated for the stress analysis by comparing their mapping to the position of stress in loanwords for *ML* and *LB* as reported in *chapter 6* and *chapter 7* respectively. Note that for the stress analysis, English loanwords with consonant clusters are also included. Therefore, all of the established loanwords (i.e. 869) are included in the analysis as shown in Table (4.2). To investigate stress assignment, the source forms (i.e. English) were grouped by considering the stress position (on final, penultimate or antepenultimate syllable) and syllable weight in the following way:

a. If the stress is on the final superheavy syllable (i.e. CVCC or CVVC) as in / rɪ.ˈfjuːz/ ‘refuse’, it was separated from final stressed syllables which are heavy (i.e. CVC, CVV, VCC, VC) as in /ʃamˈpuː/ ‘*shampoo*’.
b. Similarly, the stress positions (i.e. penult) of the source form were further grouped in terms of stress by weight. For instance, under the stress pattern, i.e. penult position, heavy syllable as /ˈkɒn.tækt/ ‘contact’ were separated from the penult light as /ˈpɒ.kɪt/ ‘*pocket*’ or penult superheavy syllables as in /ɪn.ˈgeɪdʒ.mənt/ ‘*engagement*’.
c. If the stress falls on heavy syllable at antepenult position as in /ˈprɪn.sɪ.pəl/ ‘*principal*’, it was separated from the light antepenult syllable as in /ˈkwɒ.lɪ.tɪ/ ‘*quality*’.

Table 4.2 ***Stress patterns in English source words***

Stress by position in English source words	**Stress by weight**			
	superheavy	**heavy**	**light**	**Total**
final syllable	175	57	24	256
penult syllables	95	325	13	433
antepenult	45	39	96	180
Overall				**869**

4.2.5 Interim Summary

The corpus data of MP loanwords was established based on the researcher's intuitions as a native speaker and checked through informal elicitation of grammaticality judgments with other native speakers with different levels of exposure to English. The subset of the corpus which reflects the two types of speaker groups, based on their exposure to the source language namely, *ML* and *LB,* are treated as established loanwords and included in the analysis. The loanword adaptation patterns in the corpus data of *ML* and *LB* will be analysed at prosodic level (i.e. syllable phonotactics and stress assignment) in *chapter 6* and *chapter* 7 respectively. The adaptation patterns will be modelled within the OT framework.

4.3 Data Collection with an Early-Bilingual (*EB*)

To explore whether MP speakers living in the UK speak the same variety of their native language (MP) as MP speakers in Pakistan, and whether they produce the loanwords like *ML* and *LB* or not, a further step was taken, and the researcher recorded and analysed roduction data from an early-bilingual English-MP speaker who lives in Bradford (UK).

4.3.1Why this data?

To complement the corpus data which represents the researcher's intuitions about the realisation of loanwords by *ML* and *LB*, data was also collected with an early-bilingual (*EB*) English-MP speaker in the UK. A large Pakistani heritage community living in Bradford are from the Mirpur region. They live in a very close-knit Asian community where they not only speak English but also MP, especially to communicate with people from older generation. This speech community represents a good opportunity to analyse how the level of bilingualism plays a role in the adaptation patterns of loanwords. Therefore, as a next step a set of production data was collected to analyse loanwords produced by MP speakers who are living in a native- L2 (English) setting, i.e. Bradford (UK). Another question which this data

can address is whether an MP speaker (here, *EB*) living in the UK speaks MP differently from MP speakers living in Mirpur (Pakistan), i.e. *ML* and *LB*.

4.3.2 Participant recruitment

Out of six potential participants, only one female speaker met the *EB* criteria. She was the only participant born and raised in the UK, whereas the other participants were born in Pakistan and lived there for a long time; they then came to the UK later with their parents or through marriage. The *EB* speaker was given the pseudonym 'PF-04' to make her identity anonymous. Here 'P' stands for the participant, 'F' shows the gender of the participant (i.e. female) and '04' reflects the order in which the data was recorded. The data was elicited using a picture naming task and a questionnaire. The data was recorded for later analysis because the researcher does not have intuitions about the realisations of loanwords by *EB* speakers in the UK.

4.3.3 Picture Naming Tasks

The *EB* speaker performed a series of production tasks, i.e. picture naming tasks in English and MP. The recordings were made in a quiet place at the participant's work place for her convenience. The researcher selected pictures of imageable nouns which were likely to be familiar to the participants. The participant's cultural and religious background was also taken into consideration in picture selection, and care was taken to select those words as stimuli which are also used by *ML* and *LB*, to facilitate comparison. Pictures were presented in a random order one by one on flashcards. The data collected in this way captures the adaptation patterns in loanwords produced by an *EB* speaker and shows to what extent loanword adaptation patterns show variation in all three MP speaker groups, i.e. *ML*, *LB* and *EB*.

4.3.4 Picture naming Tasks for MP

To check the knowledge of MP by *EB*, a *Language Background Questionnaire* (LBQ hereafter) was administered. The purpose of the LBQ was to verify whether she speaks MP dialect in the same way as it is spoken in Pakistan. One of the tasks in the LBQ was to translate twelve English lexical items into MP (as shown in *Table 4-3*) and write these words down in MP using the Roman alphabet.

Table 4.3 ***LBQ- translation of English lexical items into MP***

	English gloss	Expected MP word
1.	soap	[sə.buːn]
2.	mouth	[muː]
3.	son-in-law	[dʒə.maɪ]
4.	father-in-law	[soː. ra]
5.	children	[loːɽe-kuɽ.jãː]
6.	scarf	[tʃiː.la]
7.	curry	[saːlən]
8.	green	[saːva]
9.	red	[suː wa]
10.	door	[buːwa]
11.	sweetmeat	[mətʰaɪ]
12.	come here	[iː. d̪ər atʃʰ(o)]

To further check that the participant definitely speaks MP rather than another dialect /language (i.e. Punjabi or Urdu), the researcher also elicited a published list of lexical items (see *Table 4.4*) prepared by Stow & Pert (2006) with pictures on flashcards to show the participants.

Table 4.4 ***Published list of MP words (Stow &Pert, 2006)***

	Target word	Mirpuri	Punjabi	Urdu
1.	boy	mʊɾa	mʊnɖa	lɜɾka
2.	nose	næk	næk	nɑːkʰ
3.	water	paɳi	paɳi	paɳi
4.	flower	pʰʊl	pʰʊl	pʰul
5.	hat	ʈ̪əʊpi	ʈ̪əʊpi	ʈ̪əʊpi
6.	milk	ɖ̪uɖ̪	ɖ̪uɖ̪	ɖ̪uɖ̪
7.	ear	kæn	kæn	kan
8.	clothes	kʌpəɽ̥ẽɪ	kʌpəɽ̥ẽɪ	kʌpɽ̥ẽɪ
9.	banana	keɪlɑ	keɪlɑ	keɪlɑ
10.	chicken	kʊkəɽi	kʊkəɽi	mʊrgi
11.	soap	sɑbən	sɑbən	sɑbən
12.	clean	saːf	saːf	saːf
13.	lion	ʃɛər	ʃɛər	ʃɛər
14.	key	dʒabi	dʒabi	dʒabi
15.	dish/pot/meal	ʌɳɖi	hʌɳɖi	hʌɳɖi
16.	crying	ɽəʊna	ɽʊnɖ̪a	ɽʊ ɾəhɑ hɛə
17.	egg	ʌndɑ	ʌndɑ	ʌndɑ
18.	eye/eyes	æk/ækiɑ	ɑkʰ/ɑkɑ	ə̃ŋk/ə̃ŋke
19.	elephant	æʈ̪ʰi	æʈ̪ʰi	hæʈ̪ʰi
20.	flour	ɑɽɑ	ɑɽɑ	ɑɽɑ
21.	glasses	ẽnkɑ	ẽnkɑ	ẽnək

Another list of MP words (with pictures on flashcards) was also prepared by the researcher for second task. It was designed by considering all possible MP syllable types (as shown in *Table 4.5*). This task was designed to specifically check the syllable phonotactics and stress patterns realised by *EB* in MP words.

Table 4.5 ***List of MP words prepared by researcher***

	MP words	gloss
1.	[kə.ˈmiːʒ̊]	shirt
2.	[ɖər.ˈbaːr]	shrine
3.	[ˈʈəs.bi]	rosary
4.	[ˈlə̃ŋg.ri]	mortar
5.	[ɖə.ˈraː.χət]	tree
6.	[ˈɖər.zən]	seamstress
7.	[ˈʧɑː.vəl]	rice
8.	[pə.ˈrɑː.tʰa]	flat bread
9.	[kə.ˈreː.la]	bitter gourd
10.	[də.ˈr ɑː.ti]	sickle
11.	[gə.ˈlɑːb]	rose
12.	[səˈrɑː.na]	pillow
13.	[ˈtok.ri]	basket
14.	[ˈsoː.tɪ]	stick
15.	[ʧəp.ˈɽaː.sɪ]	peon
16.	[ˈkənɖ]	backbone
16.	[pə̃ndʒ]	five
17.	[rə̃ŋg]	colour
18.	[ˈləs.si]	yogurt drink

4.3.5 Picture naming Tasks for MP loanwords

The picture naming task in MP was followed by another picture naming task in English for loanwords which was designed by the researcher (see full list in Appendix II). This task had two purposes; first, to provide data for analysis of syllable phonotactics and stress assignment in English loanwords in MP produced by *EB*; second, to determine to what extent *EB* produces loanwords similarly to or differently from MP speakers who live in Pakistan (i.e. *ML* and *LB*). All the loanwords which were used in the picture naming task for *EB* were taken from the corpus of established loanword (i.e. 869). The reason to select the same words which are in the corpus data of *ML* and *LB* were to analyse the adaptation patterns at the prosodic level in a consistent way. This helps to answer the question whether *EB* has the same or a different phonology than that seen in corpus data of *ML* and *LB*.

Table 4.6 ***List of English loanwords for picture naming task***

	Input (English)	**gloss**
1.	/pleɪt/	plate
2.	/ˈprɪn.tə/	printer
3.	/ˈblɛn.də/	blender
4.	/ˈbreɪ.slət/	bracelet
5.	/ˈbrɒ.kə.li/	broccoli
6.	/ˈkrɪ.kɪt/	cricket
7.	/kriːm/	cream
8.	/slip/	slip
9.	/bliːtʃ/	bleach
10.	/ˈtrɒ.li/	trolley
11.	/ˈdraɪ.və/	driver
12.	/ˈkjuː.kʌm.bə/	cucumber
13.	/glɑːs/	glass
14.	/ˈskuː.tə/	scooter
15.	/spuːn/	spoon
16.	/spreɪ/	spray
17.	/ˈstjuː.dənt/	student
18.	/ˈsteɪ.dɪəm/	stadium
19.	/ˈæm.bjə.ləns/	ambulance
20.	/ɪn.tər.ˈdjuːs/	introduce
21.	/kəm.ˈpjuːtə/	computer
22.	/ʌm.ˈbrɛ.lə/	umbrella
23.	/ˈlaɪ.bri/	library
24.	/ˈpə.fjuːm/	perfume
25.	/ɪn.ˈspɛk.tə/	inspector
26.	/flɑsk/	flask
27.	/siŋk/	sink
28.	/hand/	hand
29.	/ɪnˈgeɪdʒ.mənt/	engagement
30.	/ˈɛ.lɪ.fənt/	elephant
31.	/ˈtɛ.rə.rɪst/	terrorist
32.	/bɒks/	box
33.	/gɪft/	gift

4.4 Chapter Summary

To recap, this chapter describes the procedure of how the corpus of MP loanwords as expected to be produced by *ML* and *LB* was built and then how the loanwords were elicited through a picture naming task from an English-MP *EB* speaker to capture the effect of advanced L2 (English) proficiency or bilingualism. The current research identifies the adaptation patterns in the corpus of MP loanwords at the prosodic level (syllable, stress) but also goes a step further by documenting the degree of variation in loanword adaptation patterns among *ML*, *LB* and *EB*, who have different levels of bilingualism. The following chapters explore the main research questions of the thesis (see chapter 3). Chapter 5 shows the syllable phonotactics and stress system of MP Phonology. This will enable us to later evaluate to what extent loanword adaptation patterns follow or violate the native MP phonology. Chapters 6, 7 and 8 outline the generalisations in the adaptation patterns of syllable phonotactics and stress system in *ML*, *LB* and *EB*, respectively. In addition, these generalisations will be analysed within the OT framework in each chapter (i.e.6, 7 and 8).

The following chapters thus seek to offer a unified analysis of the internal (phonological) and external (e.g. level of bilingualism) factors which affect the adaptation patterns of syllable phonotactics and position of stress in English loanwords into MP. This study establishes the syllable phonotactics and stress rules of MP phonology and explores the impact of bilingualism on MP loanwords for the first time. This research is also significant as it provides the first comparison of phonological patterns in in MP as spoken by a speaker settled in the UK with those found in the MP speaking community in Pakistan.

5 The Phonology of Mirpur Pahari

5.1 Introduction

In this chapter, I establish the syllable structure and stress patterns in Mirpur Pahari (MP hereafter). This chapter is particularly important as it is the first study of its kind. No previous study has described the syllable phonotactics and stress assignment in native MP phonology. Here, the focus will be on the status of consonant clusters in onset and coda positions and how stress in native MP phonology is dependent on syllable weight and position. The analysis at the prosodic level (i.e. syllable phonotactics and stress) is presented within the OT framework. For stress, I adopt metrical stress parameters (Hayes, 1995) within the framework of OT.

This chapter is organized as follows: Section *5.2* presents the generalizations related to syllable phonotactics then the generalisations for stress assignment in MP follow in section *5.3*. Section *5.4* shows the constraints involved in syllable phonotactics and presents the constraint ranking in MP in an OT analysis. In the same way, section *5.5* presents an OT analysis of the stress patterns of MP. Lastly, section *5.6* presents the chapter summary.

5.2 Syllable Phonotactics of MP

This section focuses on syllable phonotactics, starting with syllable templates in MP and discussing the status of allowed and restricted syllables in the native phonology. This is followed by discussion of consonantal phonotactics, giving an overview of the permissible onsets and codas in MP language. Overall this section sets up the generalisations which will be formalised within OT in section *5.4*.

5.2.1 Types of Syllable in MP

If we examine syllable types in word-initial, medial and final positions in polysyllabic words in MP, there are eight attested syllable types. Note that bold syllables highlighted in the *Table 5.1* show syllable types in one of the three positions and an asterisk '*' indicates the types of syllables which are not possible in these word positions.

Table 5.1 ***Permitted MP syllable types in word-initial, medial, and final position***

Type	Initial	gloss	Medial	gloss	Final	gloss
5.1a						
CV	[ʈə.reːl]	dew	*****		[ɖə.raː.tɪ]	sickle
CVV	[roː.lə]	noise	[ɖə. waː. nɪ]	penny	[ʈəl.laɪ]	mattress
CVC	[ʈər.paɪ]	stitching	[sə.təb.ra]	family	[soː.kən]	second wife
CVCC	[pãŋg.ɽa]	dance	******		[ʈə.rə̃nd]	flock
CVVC	[poːʈ.ri]	grand-daughter	******		[ɖər.baːr]	shrine
5.1b						
VV	[aː.kəɽ]	proud	******		******	
VVC	[oːʈ.lə]	surface	******		******	
VCC	[ə̃ŋg.raː]	to tease	******		******	

It can be seen in *Table 5.1* that not all types of syllables are attested in all (three) word positions in MP. The light syllable CV exists in word-initial and final positions. In the case of disyllabic words, if CV is in the initial position then a super heavy syllable (i.e. CVVC, CVCC) follows it as in [**ʈə**.reːl] '*dew*'. But, if it is the word-final position, it is preceded by a heavy syllable CVV or CVC (e.g. **[ro**ːlə] '*noise*'). Similarly, in trisyllabic words CV is found in initial and final positions and in each case, it is preceded and followed by a heavy syllable (CVV) as in [ɖə.**waː.**nɪ] '*penny*' or (CVC) as in [sə.**təb**.ra] '*whole family'*. Also note that in MP, the number of syllables can only go up to a maximum of three syllables in mono-morphemic words. However, monosyllabic words with all possible types of syllable template (except CV) as mentioned above in *Table 5.1* are possible in MP (as shown in *Table 5.2*).

Table 5.2 ***Types of monosyllabic word in MP***

syllable type	example	gloss	syllable type	example	gloss
CVC	[pəg]	turban	VV	[aː]	come
CVV	[boː]	smell	VC	[əl]	gourd
CVCC	[kənd]	backbone	VVC	[aːxʰ]	say
CVVC	[saːɣ]	green			

5.2.2 The Maximal Syllable Template in MP

A syllable template is an abstract tree structure onto which all syllables would have to fit to be recognized as acceptable syllables in a particular language (Hogg & McCully, 1987:41). There can be language-specific restrictions, which limit or expand the basic template(s) in a language, and this is observed in MP. The data in *Table 5.1* and *5.2* illustrate all the types of syllable in polysyllabic and monosyllabic words in MP. This data implies that the maximal syllable in MP can have four segments. We can represent the maximal syllable template in MP as CVXC, where 'X' can be a vowel appearing in a CVVC sequence, as in [pə.r**a**:t̪] '*big plate*' or a nasal [N] in a syllable of CVCC type, as in [kə**n**d] '*backbone*'.

Superheavy syllables (i.e. CVCC and CVVC) are only observed in word-initial and final position (e.g. [**dʒãŋg**.li]$_{MP}$ '*ill-mannered'*, [sə.**bu**:**n**]$_{MP}$ '*soap*') in MP. In terms of syllable distribution, my impression as a native MP speaker is that CVVC is more common than CVCC. The most common syllable types in all three positions are CVV or CVC syllables that contain three segments. These can be represented by CVX where 'X' can be a consonant or a vowel. Using the moraic concept (Hayes, 1995) of syllable weight (see *section 5.3*), CVV and CVC are heavy, and CV is a light syllable in MP. The next section will explore the syllable phonotactics in MP in relation to the internal structure of the syllable. It reports rules governing syllabification in onset and coda constituents due to which some sound patterns are allowed, and others are prohibited.

5.2.3 Simple Onset in MP

As described in *Chapter 2,* MP has a relatively large consonant inventory (i.e. 38 consonants). An onset position can contain any segment from the consonantal inventory (see *Chapter 2*) except the velar-nasal (sonorant) /ŋ/ which cannot occur in word-initial position. Khan (2012) also describes this restriction on the distribution of /ŋ/ in Poonch Pahari (PP hereafter), one of the other dialects of Pahari.

5.2.3.1 Complex Onset in MP

Tabassum (1996) reports the presence of onset consonant clusters in MP. Tabassum's paper is not about syllable phonotactics, but some examples he mentions, such as [kʰə.kɽi] '*melon*', [to.kri] '*basket*' imply the presence of onset clusters in MP. He still holds his position that MP exhibits onset clusters (personal communication, June 2016). However, I will argue here that MP does not contain complex onset clusters in any word position. This can be seen by comparison with Poonch Pahari (PP), in which cognate words are said to have onset clusters (Khan 2012). For example, [d̪əra:tɪ] '*sickle*' in MP is pronounced as

[ɖra:tɪ] in PP (as shown in table 5.3), with no epenthesis between the consonants /ɖ/ and /r/ in word-initial position.

Table 5.3 ***Onset phonotactics in word-initial position in PP and MP***

[PP]	**[MP]**	**gloss**
[pra:ʈ]	[pə.ra:ʈ]	'big plate'
[sla:ta]	[sə.la:.ta]	'grinding stone'
[plãŋg]	[pə.lãŋg]	'bed'
[trãnd]	[tə.rãnd]	'bunch of people'
[stə.bra]	[sə.təb.ra]	'whole family'

5.2.4 Simple Coda in MP

Any consonant can occur in the coda position i.e. word-finally, except /pʰ, ɦ, j/ in MP. This shows that MP behaves like PP in this respect.

5.2.4.1 Complex Coda Consonants in MP

Khan (2012) argues that in Poonch Pahari homorganic (i.e. place sharing) nasal-obstruent coda clusters are possible, provided both consonants are voiced. My data shows that this condition is also applicable to MP. However, there is a qualification to be made regarding voicing: MP only allows complex coda in the word-final position, and both coda consonants, in addition to being homorganic, must also be in a certain combination, i.e. voiced nasal and obstruent. This can be seen in Table *5.4* (below) where coda clusters are allowed only in word-final position with certain combinations where C1 of the (coda) cluster is a nasal (m, n, ŋ), and C2 is an obstruent (stop, fricative) except /b/.

Table5.4 ***Coda clusters in word-final position in MP***

[MP]	**gloss**
homorganic coda clusters in word-final position	
a. [ʧãmp]	a specific part of meat
b. [sũnd]	nutmeg
c. [kənd]	back bone
d. [pənd]	bundle
e. [pʰãnt]	stick

Also, note that many words in MP vocabulary originated from Urdu or Punjabi. These lexical items are not easy to separate from MP vocabulary because they have been part of MP for decades. For instance, the Urdu word /ɖərɖ/ '*pain*' is also a part of MP

vocabulary (that is, an established loanword). To be a part of MP vocabulary this word undergoes a process of nativization and is thus pronounced differently from its counterpart in Urdu. Since, the word /ɖərɖ/ '*pain*' contains an illicit coda cluster (i.e./rɖ/), therefore, it undergoes an adaptation process, i.e. an epenthetic vowel is inserted which makes it [ɖərəɖ] '*pain*' in MP.

The next section focuses on how the shapes of a word's final two syllables, in terms of syllable structures, constrain stress assignment.

5.3 Stress Assignment in MP

MP has a quantity-sensitive stress system. It has a three-way syllable weight distinction, i.e., light (CV), heavy (CVC, CVV) and superheavy (CVVC, CVCC) (also see section 5.2.1). Superheavy syllables are restricted to word-final position only. The position of stress is restricted to one of the two final syllables in the word, i.e. final and penult syllable, as shown in table 5.5 (below).

Table5.5 ***Stress Assignment in MP***

MP	**gloss**
5.5a Stress is assigned on final superheavy (i.e. CVCC, CVVC)	
[pəˈsə̃nd]	choice
[ˈə̃ŋg.raː]	tease
[səˈbuːn]	soap
[dəˈkaːn]	shop
[dərˈbaːr]	shrine
5.5b Stress on penult heavy syllable (i.e. CVC, CVV).	
[ˈɖər.zən]	seamstress
[ˈχʰəs.ra]	measles
[ˈʧaː.vəl]	rice
[ˈsoː.ti]	cane
[bəˈraɖ.rɪ]	caste
[ənˈɖər.rəs]	pillow case
5.5c lengthen short vowel in open stressed (penult) syllables.	
[ˈʧaː.vəl]	rice
[ˈsoː.ti]	cane
[ʧəpˈɽaː.si]	gofer
[ɖəˈraː.ti]	sickle
[ɖəˈkaːn]	shop

Based on the examples as shown in Table 5.5, the following are the generalisations for the MP stress system:

1) Generalisations for MP stress system

a. Assign stress to a final superheavy syllable.

b. In the absence of *1a* (i.e. superheavy final syllable), assign stress to a penult heavy syllable OR

c. Lengthen the short vowel in an open stressed (penult) syllable (e.g. /**so**.ti/→[ˈ**so**ː.ti] '*stick*') to conform with (*1b*).

The generalisations in (1a) and (1b) can be analysed in table *5.5a* and *5.5b* respectively. Examples in *5.5a* show that stress falls on an ultimate (final) superheavy syllable (CVVC, CVCC) in words such as [səˈbuːn] '*soap*'. Otherwise, stress falls on a heavy syllable. The examples in *5.5b* show that a penult heavy syllable (CVV, CVC) receives stress and that the position of stress never extends further leftward in the word than this limit, that is, from penult to antepenult syllable (e.g. [tʃəpˈɽaː.si] '*gofer*'. A stressed syllable must be long on the surface; a short vowel is lengthend to maintain the stress (e.g. [ˈsoː.ti] '*cane*') as shown in *5.5c*.

As noted earlier, in MP, the maximum number of syllables in monomorphemic words is up to three syllables only as in [bəˈraḍ.rɪ] '*caste*' as shown in *5.5a-5.5c.* However, in MP, there are some morphologically complex words (derivational and inflectional) in which the number of syllables can exceed three and go up to four as shown in table (*5.6).* For instance, a word [zə.miˈdar.ni] '*landlady*' is a compound word which consists of four syllables, i.e. noun [zəmi] '*land*'+ adjective [ˈdar] '*who belongs'* + gender-suffix [ni] '*female*'.

Table 5.6 ***Stress in tetra-syllabic MP words***

MP compound word	**Compounding**	**Number of syllables**	**gloss**
sə.wa.riː.jã	sə+wa+riː+jã	4 syllables	seats
loɽe-ˈkuːɽjañ	lo+ ɽe-ˈkuːɽ+jã	4syllables	kids

The generalisations for MP stress system (as mentioned in *1a-1c*) will be formalised through metrical parameters proposed by Hayes (1995) Metrical Stress Theory (MST hereafter) in the next section. These metrical parameters will later be couched in the OT framework for stress analysis (see section 5.5).

5.3.1 Metrical Parameters for MP Stress

Lexical word stress has been analysed within OT using concepts adopted from metrical phonology, e.g. feet and syllable weight (Frid, 2001). I will use Hayes' (1995) Metrical Stress Theory (MST) to understand the parameters involved in the stress system of MP (and MP loanwords). The central notion in MST is that stress is a relational property which can be represented in terms of a hierarchy (Hayes 1980, 1995). In MST, the role of constituents (such as moras, syllables, feet, and words) in showing the prominence relations (i.e. stress) has been described in terms of a prosodic hierarchy. In this hierarchy, the mora is the smallest unit of weight within a syllable.

The syllables which bear stress are organised into constituents called feet. As a constituent, a foot can be analysed in terms of syllables (or moras). This means that a foot can contain two syllables where one syllable (in a foot) is designated as a '*head*' and bears the main stress; the other syllable is a non-head and bears no main stress (it may bear secondary stress or no stress). Here the human perceptual bias underpinning the basic foot types is defined under the Iambic-Trochaic law (Hayes 1985, 1987) as in (*2)*:

(2) The Iambic-Trochic law:

a) Elements contrasting in intensity naturally form groupings with initial prominence, i.e. trochee.

b) Elements contrasting in duration naturally form groupings with final prominence, i.e. iambic.

Assuming MST, MP has moraic trochees (that is, left headed feet containing at least two moras). Feet are constructed from right-to-left. Moreover, degenerate feet are strictly prohibited, and this prevents open light syllables from bearing stress (cf. the Degenerate Foot Parameter (Hayes, 1995) or the Minimal Structure Parameter of Crowhurst, 1998). Following Hayes (1995), the following metrical parameters are used to account for MP stress assignment:

(3) Metrical parameters for MP Stress

a) Consonant Extrametricality:	C→ <C>__] word
b) Foot Construction:	Moraic trochees from right to left in non-iterative form.
	Degenerate feet are banned.
c) Word layer Construction:	End Rule Right.

In *3a*, consonant extrametricality is motivated by metrical theory whereby the weight of a syllable depends on whether it has a long bimoraic vowel or whether the coda of a closed syllable contributes a mora to the syllable. This suggests that the foot should be binary at the moraic level, which in case of MP equates to CVV or CVC (i.e. heavy syllable) only. However, in table *5.5a*, it is shown that in MP stress falls on a superheavy final syllable which is trimoraic, which appears to violate the foot condition (i.e., having more than two moras). This puzzle can be resolved, if we consider this as a case of consonant extrametricality, which reduces the superheavy syllable CVVC or CVCC to heavy CVV<C> or CVC<C> via consonant extrametricality which is shown with an angled bracket '< >' around the extrametrical consonant. Thus, MP constructs a foot which is maximally bimoraic, and stress is assigned tothe final syllable. This also shows that the foot is constructed from right-to-left direction. Stress falls on the initial syllable within the foot, therefore the foot type in MP is the moraic trochee. Also note that in *5.5c*, light syllables do not receive any stress showing that they are unable to construct feet in MP. Therefore, to assign stress, vowel lengthening takes place in light open syllables. However, unstressed light syllables remain unparsed in conjunction with Hayes (1995) observation that parsing does not need to be exhaustive.

The example in 4 (below) shows extrametricality in the MP word [ɖər.ˈbaːr] '*shrine*': in MP stress falls on a final superheavy syllable which can be derived by designating the final consonant of the superheavy syllable (here CVV**C**) as extrametrical and results in forming a binary, left-headed foot.

4) Example of foot construction in MP (under MST by Hayes, 1995)

	ɖər	(ˈ**baa)**	<r>
Word	(	**x**	)
Foot	(.	**x**	)
Syllable	σ	σ σ	< σ >

The example in (4) shows each level in the prosodic hierarchical structure following metrical parameters. The main stress of the word is on the final superheavy syllable, and there is an

unstressed syllable in initial position. In metrical phonology, it is important to note that a strong unit on one level must be supported by a strong unit in the same column on the level below. This principle is called the Continuous Column Constraint (Hayes, 1995). Later, in section 5.6, I will couch these metrical parameters within the OT framework to model the stress system for MP and also for MP loanwords (in chapters 6, 7 & 8).

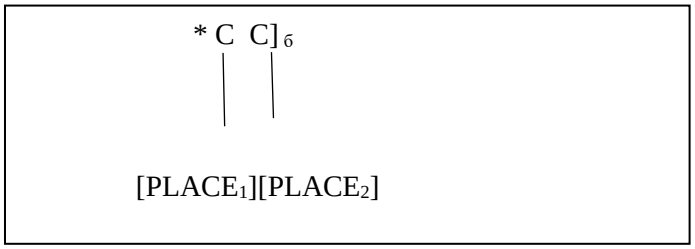
In the next section, before turning to a formal OT analysis of syllable phonotactics for MP, I shall suggest the set of constraints which I will use not only to analyse MP syllable phonotactics but also for MP loanwords (in *Chapters 6, 7 & 8*).

5.4 The Constraints involved in Syllable Phonotactics

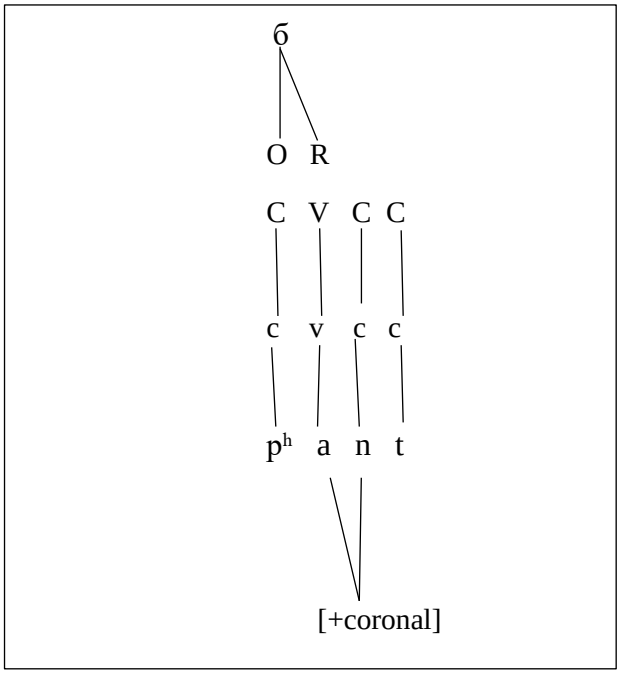
The generalisations for syllable phonotactics in the section above (see section 5.2) show the complete absence of surface CC clusters at onset position in MP. In OT terms, this suggests that the constraint *COMPLEX^{ONSET}, which requires that syllables must not have more than one segment in the onset (Prince & Smolensky 1993/2004), is a highly ranked markedness constraint in MP regardless of what the input is. On the other hand, we also know that consonant clusters can appear at coda position in MP under certain conditions as stated above (see table *5.4*). In terms of OT, the presence of (homorganic) coda clusters in word-final position in MP violates the markedness constraint *COMPLEX^{CODA}. This constraint states that syllables must not have more than one segment in the coda (Prince & Smolensky 1993/2004). However, we also know from the above generalizations (as shown in table 5.4) that only homorganic coda clusters are allowed in word-final position. Therefore, we need a constraint which supports this generalisation about the coda condition in MP. Here, I will propose a new constraint, i.e. *COMPLEX $_{[PLACE]}$ (as shown in 5). It allows a consonant cluster if it links to a single place feature at syllable margins, i.e. onset and coda position as illustrated in *Figure 5.3*.

5) *COMPLEX $_{[PLACE]}$: This constraint requires that consonants appearing in a cluster must be linked to a single place feature.

***Figure5.1* proposed constraint: *COMPLEX $_{[PLACE]}$**



6) Example: homorganic coda cluster in word- final position: [pʰã**nt**] ‘*stick*’



In the above example (6), the consonant cluster /nt/ appears in coda position with two independent nodes under the rhyme on the skeletal tier. However, on the melodic level, the linking constraint applies because of the coda condition (i.e. consonant cluster /nt/ is homorganic). As a result, only one place node is shown at the segment level which shows the place sharing node for both coronal consonants.

The application of this proposed constraint (in 5) is then extended to account for consonant clusters at any word position (onset or coda) provided that both consonants share the same place of articulation.Therefore,for its wider application it can be split into *COMPLEX [PLACE-ONS] and *COMPLEX [PLACE-CODA] as described in (7) and (8) respectively:

7a) *COMPLEX [PLACE-ONS]: This constraint requires that onset consonant clusters appearing in the word-initial position should be place-linked.

7b) Implementation: Assign one violation mark for every non-homorganic cluster at the onset position.

8a) *COMPLEX [PLACE-CODA]: This constraint requires that coda consonant clusters appearing in the word-final position should be place-linked.

8b) Implementation: Assign one violation mark for every non-homorganic cluster at the coda position.

The proposed constraint (i.e.*COMPLEX $_{[PLACE]}$) allows coda clusters with the same place of articulation (i.e. homorganic) which violate*COMPLEX^{CODA}. This creates the environment for harmonic bounding[6]. Consequently, we cannot rank *COMPLEX^{CODA} and *COMPLEX $_{[PLACE\text{-}CODA]}$ with respect to each other under any constraint ranking.

9) Harmonic Bounding: the violations of *COMPLEX $_{[place]}$ will always be a proper subset of the violations of *COMPLEX (McCarthy, 2008).

In (9), *COMPLEX $_{[PLACE]}$ is a cover term for both *COMPLEX^{ONSET} and *COMPLEX^{CODA}. There are also three types of faithfulness constraints involved in accounting for MP syllable phonotactics which are shown in (*10-12*).

10a) DEP: It prohibits epenthesis (McCarthy &Prince 1995, 1999).

10b) Implementation: Assign one violation mark for every insertion of a segment in the output.

11a) MAX: It prohibits deletion (McCarthy & Prince1995, 1999).

11b) Implementation: Assign one violation mark for every deletion of a segment in the output.

12a) IDENT $_{[PLACE]}$ I/O: This is a family of constraints, one for each distinctive feature, which prohibits changing feature values (McCarthy Prince1995, 1999).

12b) Implementation: Assign one violation mark if corresponding segments in input and output forms are not identical in feature composition.

5.4.1 Syllable Phonotactics: OT analysis in MP

Before moving on to how syllable phonotactics are treated in OT, we repeat the generalisations for syllable phonotactics set out in section 5.2, in *13* (below):

13) Generalisations for syllable phonotactics

a. Onset clusters are not allowed in word-initial position

b. Coda clusters are not allowed in word-final position except the homorganic clusters with certain combination (i.e. nasal+ obstruent)

As mentioned (in 13a), onset consonant clusters are not allowed in word-initial position in MP. In OT terms, the winning candidate (14a) in tableau (14) satisfies the *COMPLEX^{ONSET}, *COMPLEX $_{[PLACE\text{-}ONS]}$ and MAX constraints but violates the

[6]According to McCarthy (2008:80) harmonic bounding is a situation where losers (non-optimal candidates) cannot win no matter how the constraints are ranked. These losers are said to be harmonically bounded.

faithfulness constraint DEP due to epenthesis, which yields the following ranking as shown in 14.

(14) *COMPLEX ^{ONSET}, *COMPLEX $_{[PLACE\text{-}ONS]}$, MAX>>DEP

/ɖraːti/	*COMPLEX ^{ONSET}	*COMPLEX$_{[PLACE\text{-}ONS]}$	MAX	DEP
a.→[ɖə.raː.ti]				*
b. [ɖraː.ti]	*W	*W		L
c. [raː.ti]			*W	L

In tableau (14), the losing candidate *14b* is eliminated due to violation of *COMPLEX ^{onset} and *COMPLEX $_{[PLACE\text{-}ONS]}$ because it contains an onset cluster. Candidate *14c* is ruled out due to violation of MAX because it deletes the first consonant of the complex onset in the word-initial position. Note that we have assumed that there is an onset cluster in the input because we know that Poonch Pahari (PP) displays onset clusters in onset position, including in this lexical item (see section 5.2.3.1). The output [ɖə.raː.ti] is the optimal realisation of input /ɖraː.ti/ in MP because it does not contain onset consonant cluster.

In another context, if there is a consonant sequence in both word-initial and word-medial position in the input, we obtain further ranking arguments as shown in tableau 15:

(15) *COMPLEX^{ONSET},*COMPLEX $_{[PLACE\text{-}ONS]}$, MAX, IDENT $_{[PLACE]}$>>DEP

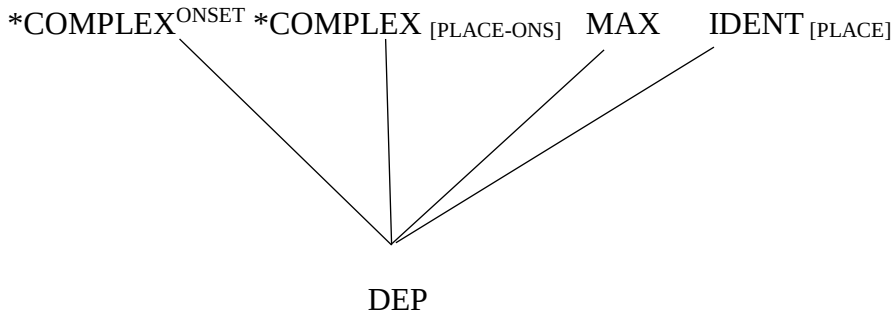
/braɖrɪ/	*COMPLEX ^{ONSET}	*COMPLEX $_{[PLACE\text{-}ONS]}$	MAX	IDENT$_{[PLACE]}$	DEP
a.→[bə.raɖ.rɪ]					*
b. [bra.ɖrɪ]	**W	**W			L
c. [bə.ra.drɪ]	*			*	*
d. [ba.ɖrɪ]	*W	*W	*W		L
e. [ba.drɪ]	*W		*W	*W	L

In tableau (15), the winning candidate *15a* violates low ranked constraints i.e. DEP. Following the analysis in (14), I assume that onset clusters are also not allowed in word-medial position. Thus, /ḍ/ in the word-medial consonant sequence /ḍr/ is syllabified in the coda position of the preceding syllable. In this tableau, the losing candidate *15b* violates the high-ranked constraint, i.e. *COMPLEX^{ONSET}, *COMPLEX $_{[PLACE-ONS]}$ but satisfies DEP. Similarly, the losing candidate *15c* violates *COMPLEX^{ONSET} and IDENT $_{[PLACE]}$.

Note that here the losing candidate (*15c*) satisfies *COMPLEX $_{[PLACE-ONS]}$ (since alveolar /d/ shares the same place of articulation with /r/ in an onset cluster) but it violates at the same time other high ranked constraints, i.e.*COMPLEX^{ONSET} and IDENT $_{[PLACE]}$ so *15c* is not the optimal candidate. The candidate *15d* also meets low ranked constraint DEP, yet it fails to satisfy the high ranked constraints i.e.*COMPLEX^{ONSET}, *COMPLEX$_{[PLACE-ONS]}$ and MAX, which results in elimination of *15d* also. Similarly, the candidate *15e* violates *COMPLEX^{ONSET}, MAX and IDENT $_{[PLACE]}$ despite satisfying the low ranked constraint DEP. Note that the presence of consonant /d/ in candidates (*15c* &*15e*) is not unexpected, since we know that in the Pahari consonantal inventory both /d/ and /ḍ/ are possible consonants (see section 2.8.1).

Overall the tableaux (*14-15*) give us a constraint ranking of onset phonotactics in MP which can be shown in the Hasse diagram in *16* (below).

16**)** Hasse diagram of onset phonotactics in MP:



Now, turning to coda phonotactics (see also *Table 5.4),* MP allows a consonant cluster in word-final position, but only if the two consonants are homorganic and are of a certain combination (i.e. nasal + obstruent). A surface homorganic coda cluster will involve a violation of COMPLEX^{CODA} as shown below in tableau (17), but not of *COMPLEX $_{[PLACE-CODA]}$.

(17) {MAX, IDENT $_{[PLACE]}$, *COMPLEX $_{[PLACE\text{-}CODA]}$}>> {DEP, *COMPLEX^{CODA}}

/pə̃nd/	MAX	IDENT$_{[PLACE]}$	*COMPLEX $_{[PLACE\text{-}CODA]}$	DEP	*COMPLEX^{CODA}
a.→[pə̃nd]					*
b. [pə̃nd̪]		*	*		*
c. [pə̃d̪]	*W	*W			L

In tableau (*17*), the winning candidate *17a* violates the low-ranked constraint *COMPLEX^{CODA} by allowing a homorganic coda cluster in word-final position. The losing candidate *17b* is harmonically bounded by the winning candidate *17a* under the constraint *COMPLEX^{CODA}. Therefore, no constraint is favouring the loser over the winner, and thus no ranking can be formulated here. The winning candidate *19a* has one violation (i.e. *COMPLEX^{CODA}) whereas the losing candidate *17b* has the same violation plus also a violation of *COMPLEX $_{[PLACE\text{-}CODA]}$. The violations of *COMPLEX $_{[PLACE\text{-}CODA]}$ for *17b* are a subset of the violations of *COMPLEX^{CODA} and thus no ordering of the constraints can be proven; the losing candidate *17b* can never win over the winner *17a* under any constraint ranking (McCarthy, 2008). The losing candidate *17c* violates MAX, IDENT $_{[PLACE]}$ to satisfy low-ranked constraint *COMPLEX^{CODA}. The constraint ranking between DEP and *COMPLEX $_{[PLACE\text{-}CODA]}$ is not yet clear from this example. Therefore, we will consider another context where a word has a non-homorganic coda consonant cluster in the input. It shows the following ranking as shown below in *18*.

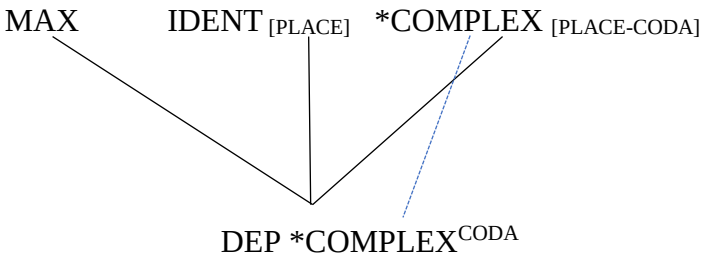
(18){MAX, IDENT [PLACE],*COMPLEX [PLACE-CODA]}>> {DEP,*COMPLEX^{CODA}}

/d̪ərd̪/	MAX	IDENT [PLACE]	*COMPLEX [PLACE- CODA]	DEP	*COMPLEX^{CODA}
a.→[d̪ə.rəd̪]				*	
b. [d̪ərd̪]			*W	L	*
c. [d̪ər]	*W			L	
d. [d̪ə̃d]	*W	*W		L	
e. [də̃]	**W	*W		L	

In tableau (18), the winning candidate *18a* violates DEP constraint but satisfies the higher ranked constraints *COMPLEX [PLACE-CODA], MAX and IDENT [PLACE]. The losing candidate *18b* satisfies DEP but at the cost of violating high ranked constraint *COMPLEX [PLACE-CODA] which shows that *COMPLEX [PLACE-CODA] ranks higher than DEP. The losing candidates *18c* and *18d* obey DEP but at the cost of high-ranked constraints MAX (in candidates *18c*, *18d*) and IDENT [PLACE] (in candidate *18d* only). Finally, the losing candidate *18e* obeys DEP but at the expense of high ranked constraints MAX and IDENT [PLACE].

The overall ranking of coda phonotactics in MP can be shown in a Hasse diagram as in *19*below:

19) Hasse diagram of coda phonotactics in MP:



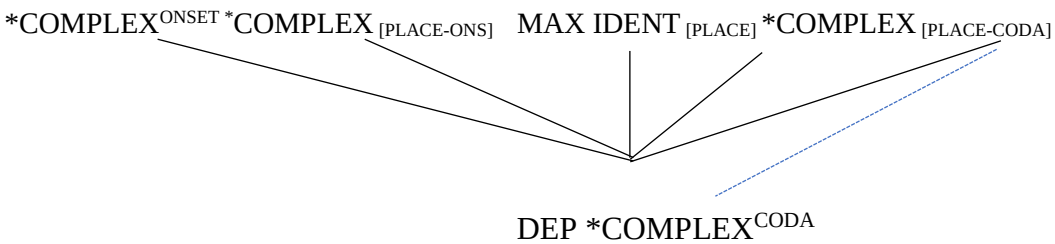
The blue dotted line in the above diagram (19) shows harmonic bounding. Now, an overall ranking of syllable phonotactics can be seen in tableau (20) below.

(20) {*COMPLEX^{ONSET}, *COMPLEX [PLACE-ONS], MAX, IDENT [PLACE], *COMPLEX [PLACE-CODA]}>> {DEP, *COMPLEX^{CODA}}

/t̪rə̃nd/	*COMPLEX ^{ONSET}	*COMPLEX $_{[PLACE-ONS]}$	MAX	IDENT$_{[PLACE]}$	*COMPLEX$_{[PLACE- CODA]}$	DEP	*COMPLEX^{CODA}
a.→[t̪ə.rə̃nd]						*	*
b. [t̪rə̃nd]	*W	*W				L	*
c. [t̪ə.rə̃n]			*W			*	L
d. [t̪rə̃nd̪]	*W	*W		*W	*W	L	*
e. [t̪rə̃n]	*W	*W	*W			L	L
f. [t̪rə̃.nə]	*W	*W	*W			*	L
g. [trə̃.nə]	*W		*W	*W		*	L
h. [t̪ə.rə̃.nə]			*W			**	L
i. [trə̃]	*W		**W	*W		L	L
j. [t̪ə̃nd̪]			*W	*W	*W	L	*

In the tableau (20), the winning candidate *20a* shows that *COMPLEX^{ONSET}, *COMPLEX $_{[PLACE-ONS]}$, MAX, IDENT $_{[PLACE]}$,*COMPLEX $_{[PLACE-CODA]}$ are higher ranked constraints whereas DEP and *COMPLEX^{CODA} are lower ranked constraints. The constraint ranking in tableau 20 conforms to the generalisations of MP syllable phonotactics as shown in (*13)*; no consonant clusters are allowed except homorganic coda clusters. To avoid illicit consonant clusters at syllable margins (i.e. onset and coda position), an epenthetic vowel is inserted to break up any consonant clusters in the input, and this violates DEP. Similarly, the presence of homorganic coda clusters in word-final position violates COMPLEX^{CODA} which is however a lower ranked constraint. The ranking in tableau (*20*) accounts for the above rankings regarding onset and coda phonotactics (as shown previously in each Hasse diagram respectively). We can show an overall ranking of syllable phonotactics in MP in a Hasse diagram in (21).

(21) Hasse diagram of syllable phonotactics in MP:



After this discussion of syllable phonotactics in MP in section (5.4), in the next section (*5.5*), I will present the constraints involved in analysis of stress assignment in native MP phonology within the framework of OT.

5.5 Stress Constraints in MP: OT Analysis

In this subsection, I will introduce the OT constraints which are used to analyse stress patterns in MP. The same constraints will be used to analyse English loanwords into MP in chapters *6*, *7* and *8*. Regarding stress assignment, I will repeat the relevant generalisations (as shown in table 5.5) in (22) below:

(22) Generalisations regarding stress assignment in MP:

a) Stress a final superheavy syllable (i.e. CCVCC or CVVC).

b) In the absence of (24a), the primary stress falls on a penultimate heavy syllables (penult) as an elsewhere condition. (We know that heavy penult syllable in MP are CVV, CVC, and VC.)

c) No stress on open light (penult) syllable.

The generalisation in *22c* is that in MP stress never falls on an open/light CV syllable. We ascribe this to a markedness constraint based on the Stress-to-Weight principle (SWP) as shown in (23a). This constraint forces all stressed syllables in MP to be heavy.

23a) Stress-to-Weight (SWP): If stressed, then heavy (Crosswhite, 1998).

23b) Implementation: Assign one violation mark to any stressed light syllable in the output.

There does not appear to be any secondary stress in MP, and light syllables never receive any stress. As a result, we assume that only a single metrical foot is built in monomorphemic words which in some cases (disyllables or trisyllabic words) may result in violation of the markedness constraint Parse-σ in MP (as shown in 24a):

24a) Parse-σ: All σ must be parsed by feet. (Kager, 1999).

24b) Implementation: Award one violation mark to any un-footed syllable.

We also know that in MP the foot is a bimoraic trochee which is built from right to left, as main stress falls on a superheavy final syllable in the word if present (see also section 5.3.1).

Thus, a single metrical foot is aligned under the markedness constraint Align R in MP as shown below in *25a*.

25a) Align R (WORD, HEAD FOOT): The right-edge of the word must match the right edge of the head foot (McCarthy and Prince, 1993).

25b) Implementation: Assign one violation mark to any foot which is not right aligned in the word.

However, we also know that the foot in MP is bimoraic because stress falls on heavy syllables which contain two moras. In other words, stress is assigned to the leftmost mora in a foot of two morae under the foot condition, i.e. Foot Binarity as described in *26a*:

26a) Ft-Bin: Feet are binary under moraic analysis (McCarthy & Prince 1995; Prince, 1983)

26b) Implementation: Assign one violation mark to a foot that does not contain two moras.

We know that stress is only ever realised on heavy syllables in MP. We allow in the analysis for the possibility that, to maintain stress on the penult, an input vowel may be lengthened (see table *5.5c*) in violation of the constraint, i.e. IDENT $_{[long\text{-}v]}$ (as shown in 27 below).

27a) IDENT $_{[long\text{-}V]}$: an input vowel and its output correspondent have the same value for [long] (Prince, & Smolensky, 1993, 2004).

27b) Implementation: Assign one violation mark for every vowel in the output which has a different length from its corresponding vowel in the input.

The data on stress in MP illustrated in table *5.5a* includes examples which appear to violate the Ft-Bin constraint by allowing stress to fall on superheavy syllable types CVCC as in [ʈə.ˈrə̃nd] '*group*' or CVVC as in [sə.ˈbuːn] '*soap*', both of which are trimoraic syllables by weight. However, this issue can be resolved by including a Non-Finality constraint proposed by Hyde (2003, 2007, 2011, and 2012) in the current stress analysis (as shown in *28*). This constraint is used here to analyse consonant extrametricality in MP.

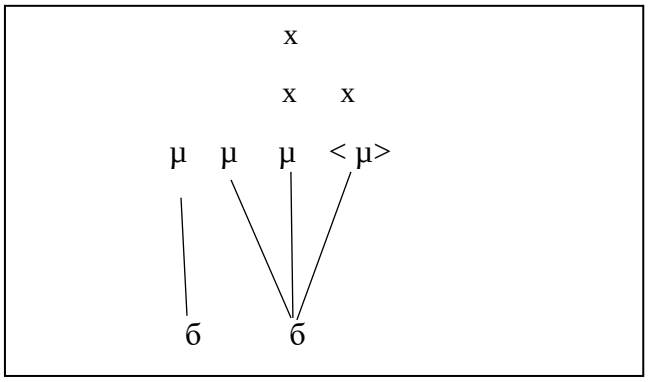
28a) Non-Finality$_{[C, w]}$: No mora-level grid mark occurs over the final consonant of a prosodic word (Hyde, 2003, 2007, 2011, 2012).

28b) Implementation: Assign one violation mark to any word-final foot that includes a word-final consonant.

In the light of constraint *28a* (i.e. Non-Finality $_{[C, w]}$), an extrametrical consonant in MP can be illustrated as in (29 a & b):

29) Extrametrical consonant in MP

a) CVCC or CVVC syllables in MP



b) Examples in MP: [t̪ə.ˈrə̃nd] '*group*' and [sə.ˈbuːn] '*soap*'

foot	x	x
syllables	x x	x x
moras	μ μ μ	μ μ μ
	sə ˈbu u <n>	t̪ə ˈrə̃ n <d>

Here in *29b* each grid mark (x) is used to show the metrical representation of stress at the different prosodic levels such as mora, syllable foot etc in the prosodic word. The Non-Finality $_{[C, w]}$ constraint prohibits a grid mark on the mora associated with the final constituent (coda consonant) in the foot.

In the next subsection I offer a formal analysis of MP stress system within OT framework. Note that in the stress analysis that follows, foot structure is marked with parentheses '( )' and extrametricality is shown with angled brackets '< >'.

5.5.1 Stress Assignment in MP: OT analysis

In this section arguments for various sub-rankings are made to show an overall constraint ranking operating in MP. To start, the following tableau (30 & 31) will show only the stress related constraint ranking in MP.

(30) {Ft Bin, SWP, NonFin$_C$}>> {AlignR, IDENT $_{[long-v]}$, Parse-σ}

/soti/	FtBin	SWP	NonFin$_C$	AlignR	IDENT $_{[long-v]}$	Parse-σ
a.→(ˈsoː).ti				*	*	*
b. (so).(ˈti)	**W	*W		L	L	L
c. (ˈsoː).(ti)	*W	*W		*	*	L
d. (ˈsot)			*W	L	L	L

In tableau (30), the winning candidate *30a* shows that FtBin, SWP and NonFin$_C$ dominate the low-ranked AlignR, IDENT $_{[long-v]}$ and Parse-σ. The losing candidate *30b* obeys AlignR, IDENT $_{[long-v]}$ and Parse-σ but at the expense of high ranked constraints (FtBin, SWP). Similarly, losing candidates *30c* and *30d* violate high ranked constraints, i.e. FtBin, SWP (in *30c*), and the NonFin$_C$ constraint (only in *30d*) but obey low ranked constraints, i.e. AlignR, IDENT $_{[long-v]}$ and Parse-σ in *30(c&d)* respectively.

Now, the tableau (31) shows the overall stress related constraint ranking in MP. Here the ranking argument among AlignR, IDENT $_{[long-v]}$ and Parse-σ is already shown, although it is not yet shown in the above tableau (30).

(31) {FtBin, SWP, NonFin$_C$}>> {AlignR, IDENT $_{[long-v]}$, Parse-σ}

/ʧaː.vəl/	FtBin	SWP	NonFin$_C$	AlignR	IDENT$_{[long-v]}$	Parse-σ
a.→ (ˈʧaː).vəl				*		*
b. (ʧaː).(ˈvəl)			*W	L		L
c. (ʧaː).(ˈvə)	*W	*W		L		L
d. (ʧaː).(ˈvaːl)	*W		*W	L	*	L

In tableau (31), the winning candidate *33a* violates Align R and Parse-σ. The losing candidate *31b* and *31c* obey the low-ranked constraint Align R and Parse-σ but at the expense of high-ranked constraint NonFin$_C$ (in *31b* only) and FtBin, SWP (in *31c* only) respectively. Candidate *31d* demonstrates the ranking of FtBin and NonFin$_C$ over Align R and Parse-σ. The non-grammaticality of candidate *31c* indicates that only one foot is formed in MP.

However, this tableau still does not tell us a ranking argument for IDENT $_{[long\text{-}v],}$ so we need one more tableau to show the final constraint ranking.

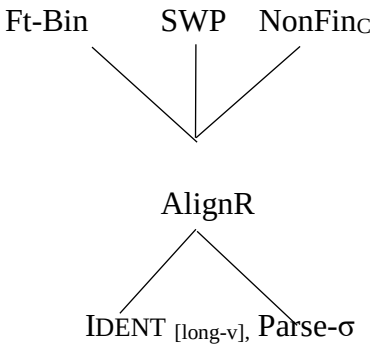
(32) {FtBin, SWP, NonFin$_C$}>> AlignR>> {IDENT $_{[long\text{-}v],}$ Parse-σ}

/d̪ʊ.kan/	FtBin	SWP	NonFin$_C$	AlignR	IDENT$_{[long\text{-}v]}$	Parse-σ
a.→ d̪ə.(ˈkaː)<n>					*	*
b.(ˈd̪ə).(kaː)<n>	*W	*W		*W	L	L
c. (d̪ə).(ˈkan)	*W		*W		L	L

In tableau (32), the winning candidate *32a* violates IDENT $_{[long\text{-}v]}$ and Parse-σ. The losing candidate *32b* obeys the low-ranked constraint IDENT $_{[long\text{-}v]}$ and Parse-σ but at the expense of high-ranked constraint FtBin, SWP and AlignR. Similarly, candidate *32c* obey low ranked constraints (IDENT $_{[long\text{-}v]}$, Parse-σ) but violates the high ranked constraints FtBin and NonFin$_C$. The tableau (32) shows that Align R>> IDENT $_{[long\text{-}v]}$, Parse-σ.

We can now show the full constraint ranking for stress assignment in MP words in a Hasse diagram in (*33).*

(33) Hasse diagram: Stress constraints in MP



The Hasse diagram in (33) illustrates that there is no constraint interaction among FtBin, SWP, NonFin$_C$, thus these constraints are equally ranked with respect to each other, but all outrank AlignR, IDENT $_{[long\text{-}v]}$ and Parse-σ. Likewise, Align R ranks higher than IDENT $_{[long\text{-}v]}$ and Parse-σ.

5.6 Chapter Summary

Table 5.7 ***Summary: description of MP phonology***

Syllable Phonotactics	**MP**
a. Onset cluster	not allowed
b. Coda Cluster	only-homorganic (i.e. nasal obstruent)
Stress Assignment	MP
d. Stress the final superheavy syllable otherwise, stress the penult heavy syllable	allowed
e. stress the light penult syllable	not allowed
f. vowel lengthening to the short vowel in open stressed syllable	allowed

The aim of this chapter was to describe the suprasegmental features (i.e. syllable phonotactics, stress) of MP. OT is used as a framework to analyse the generalizations for both syllable phonotactics and stress assignment. Table (5.7) shows that in syllable phonotactics, MP does not allow consonant clusters at syllable margins except homorganic coda clusters (i.e. combination of nasal+ obstruent). This is formalised in the OT analysis through the constraint ranking in (34).

(34) Constraint ranking: Syllable Phonotactics in MP

{*COMPLEX^{ONSET},*COMPLEX$_{[PLACE\text{-}ONES]}$,MAX,IDENT$_{[PLACE]}$,*COMPLEX$_{[PLACE\text{-}CODA]}$} >> {DEP,*COMPLEX^{CODA}}

In stress assignment, stress falls on final superheavy or penult heavy syllables in MP. A short vowel in an open stressed syllable in the input is lengthened to meet the stress rule in MP. This is seen in MP words which have cognates in Urdu which contain a short vowel (e.g./ɖʊ.kan/ URDU →[ɖə.ˈkaː n] MP ‘shop’). In terms of OT analysis, MP stress can be analysed through the constraint ranking in (35).

(35) Constraint ranking: Stress Assignment in MP

{FtBin, SWP, $NonFin_C$} >> AlignR>> {$IDENT_{[long\text{-}v]}$, Parse-σ}

After establishing the grammar of MP native phonology in terms of constraint ranking, in the next chapter I present the generalisations and OT analysis for English loanwords into MP at the prosodic level (i.e. syllable phonotactics and stress) for monolinguals (*ML*). This will show whether *ML* conform to the native MP phonology in the adaptation of syllable phonotactics and stress assignment in MP loanwords or whether they conform to the source language phonology.

6 Loanword Adaptation in MP-Monolinguals

6.1 Introduction

This chapter accounts for adaptation patterns of syllable structure and stress system in MP loanwords spoken by monolingual speakers (‘*ML’* hereafter). In addition, the loanword adaptation patterns at prosodic level (i.e. syllable and stress) are analysed within the OT framework. The current chapter will explore whether the adaptation patterns of syllable phonotactics and stress system conform to the native (MP) phonology or whether we need another grammar to account for these adaptation patterns in *ML*. This chapter is particularly important as it is the first study of its kind. No previous study has focused on the adaptation patterns at prosodic level in MP loanwords from the perspective of *ML*.

The chapter is organized as follows: Section 6.2 briefly reviews the background of syllable phonotactics and stress assignment cross-linguistically, including the phonemic inventory and syllable structure of the target/source language, i.e. English, with a focus on complex onsets and codas in syllable margins. Section 6.3 describes the syllable phonotactics of the source language (*English*) to better understand the adaption patterns in MP loanwords produced by *ML*. Section *6.4* focuses on syllable phonotactics of English loanwords in MP and presents generalisations related to consonant clusters at their syllable margins (i.e. onset and coda position). Section 6.5 provides generalisations regarding loanword adaptation patterns for stress assignment in *ML*. Section 6.6 and 6.7 present an OT analysis of loanword adaptation patterns for syllable phonotactics and the stress system in *ML* respectively. Lastly, section 6.8 wraps up the analysis of loanwords at prosodic level for *ML* and attempts to answer the questions posed earlier in this section.

6.2 Cross-linguistic Syllable phonotactics and Stress system in loanwords

Languages may vary in their syllable phonotactics. Therefore, when a recipient language borrows lexical items from a donor language, the word in the recipient language may undergo certain segmental adjustments through different processes. These processes include epenthesis, deletion, substitution, etc. For instance, English loanwords are heavily borrowed into other languages. English allows onset segments (which can go up to three consecutive consonants as in *<u>str</u>eet*), vowels (short, long) and coda segments (sometimes three and even up to four consecutive consonants as in *pro<u>mpts</u>*, *atte<u>mpts</u>*. According to Beel and Fedler (2013), when English loanwords with an onset cluster are borrowed into Turkish, the onset cluster is broken up by inserting an epenthetic vowel between the consonants to conform to the native Turkish phonology (e.g. /treɪn/ → [t**i**rɛn] ‘*train*’). Similarly, Kenstowicz (2007) observes that Fijian has a syllable structure which permits a single onset

segment followed by a single vowel i.e. CV but can never have a coda segment. Thus, when Fijian borrows English words with syllable type CVC such as *'bus'*, it avoids a coda consonant by word-final epenthesis as in [bas**i],** to make the word conform to the native phonology.

Similarly, in adaptation patterns of stress system, Kang (2010) argues that stress languages are stricter in the maintenance of their native stress rules than the tone languages. The repair strategies which are used to make an input permissible on their native phonology can be at the segmental level, via deletion, alteration or vowel lengthening. For example, when a Spanish loanword enters the basilect of Huave (cf. Davidson & Noyer, 1997; Broselow, 2009), stress is maintained on the same syllable as in the input by deletion of segments, for instance, /garaˈbato/$_{Spanish}$ '*hook*' changes into [garaˈbat] $_{Huave}$; this is needed because in Huave stress is related to syllable weight which is dependent on the presence or absence of a coda consonant rather than vowel length. Kang (2010) also explains that if loanwords in the borrowing language (native) show faithful preservation of the stress position of the source language (SL) without any segmental alteration or importation, it may be because the input language (native) has more direct contact with the SL (see Kubozono, 2006 for English into Japanese; Kubozono, 2007 and Lee, 2005 for English into South Kyungsang Korean).

In this chapter, I will discuss the adaptation patterns for syllable phonotactics and stress assignment in MP loanwords used by *ML*. I will analyse whether the adaptation patterns at prosodic level (i.e. syllable phonotactics and stress assignment) conform to the native MP grammar or whether a separate grammar is needed to account for the loanword adaptation patterns. As a background to the discussion of English loanwords in MP, it is important to first know about the phonemic inventory and syllable phonotactics of English. The following subsections will show the consonantal inventory of English, as well as the syllable phonotactics of English.

6.2.1 Consonantal Inventory of English

In English, there are twenty-four consonants which are grouped into five categories based on manner of articulation namely: plosives, which include /p, b, t, d, k, ɡ/, nasals /m, n, ŋ/, fricatives /f, v, θ, ð, s, z, ʃ, ʒ, h/, affricates /tʃ, dʒ/ and approximants (also known as semivowels) /l, r, j, w/. The chart below (Table 6.1*)* represents consonants in Received Pronunciation (RP) as reported by Roach (2004:240).

Table 6.1 ***Consonants in British English (RP), Roach (2004:240)***

	Bilabial	Labio-dental	Dental	Alveolar	Post-alveolar	Palatal	Velar	Glottal
Plosives	p b			t d			k g	
Affricate					tʃ dʒ			
Nasal	m			n			ŋ	
Fricative		f	v θ ð	s z	ʃ ʒ			h
Approximant			w	ɹ		j		
Lateral				l				

The consonantal chart shows that in English, place and manner help to distinguish different consonants. Furthermore, there is only a two-way contrastive distribution of phonemes (consonants) i.e. voiced or voiceless phonemes. There are also unaspirated phonemes, which are allophonic rather than phonemic, for example [p^h], as in [p^hɪl] '*pill*' and [p] as in [spɪl] '*spill*' are the allophones of phoneme /p/.

6.3 Syllable Phonotactics of English

English syllable structures can be classified as simple and complex depending on the number of consonants before and after a vowel.

6.3.1 Onset Phonotactics in English

According to McCully (2009) in English, no onset position can be filled with the voiced post-alveolar /ʒ/ and alveolar-nasal /ŋ/.

6.3.1.1 Complex Onset Clusters in English

Complex onset clusters are permitted in English. According to McCully (2009), consonants are divided into classes[7] based on the degree of openness of the vocal tract, and the sequences permitted in complex onset clusters depend on the degree of openness of the vocal tract. The less open consonants occur at the left margin as the first consonant (C1) of the sequence cluster and the more open consonants occur as the second consonant (C2) of the sequence cluster. In English, complex onset consonant clusters (both segments) belong to non-identical classes. The second consonant (C2) of the sequence cluster belongs to a class which is at least one class higher than the first consonant (C1) of the sequence in

[7]McCully (2009) has constructed the classes of the consonants based on the places and manners of articulation and labelled them numerically, where Class1= plosives, Class 2=Affricates, Class 3=Fricatives, Class 4= nasal stops and Class 5=approximants.

sonority, except /s/ which behaves irregularly in terms of phonotactics. For example, /pleɪt/ '*plate*' where /p/ belongs to class-1 and /l/ belongs to class-5 respectively. Both consonants in the cluster sequence belong to non-identical classes.

Moreover, there are some exceptions in the sequence of complex onset clusters. In C1 of the consonant cluster any obstruent except /v, ð, z, ʒ/ can be present, while the second consonant (C2) must not be a voiced obstruent. However, it can be a liquid or a glide, for example, /flɒp/ '*flop*', /kriːm/ '*cream*' and /mjuːzɪk/ '*music*'. There are further specifications in which /t, d, θ/ combined with /l/ are non-permissible onset clusters. Occurrence of an affricate is also prohibited in a complex onset cluster. A three-consonant cluster obligatorily begins with the sound /s/ which is shown below in Table 6.2.

Table 6.2 ***Examples of s(C) r patterns in English***

	s(C)r cluster	**example**	**gloss**
a	/s/ + /t/ + /ɹ/	/strɒŋ/	strong
b	/s/ + /t/ + /j/	/stjuːdənt/	student
c	/s/ + /p/ + /j, l, r/	/dɪspjuːt/, /splæʃ/, /sprɪŋ/	splash
d	/s/ + /k/ + /j, ɹ, w/	/skjuː/, /skruː/, /skwiːz/	skew, screw, squeeze

6.3.2 Coda Phonotactics in English

McCully (2009) describes that in English any consonant can appear in coda position except /j, w, h/.

6.3.2.1 Complex Coda in English

Complex codas are permissible in English with certain limitations. In the case of a complex coda, the second consonant must not be /ŋ/, /ʒ/, or /ð/. Likewise, /lg / is also not a permissible coda cluster type in English. In case of a nasal consonant which is part of the complex coda, non-nasal consonants must be homorganic with the following segment. For example, in word 'paint', both the consonants /n/ and /t/ in the coda position are homorganic, i.e. alveolar. English also allows /m, n, l, r/ as syllabic consonants which appear in coda position. Among these syllabic consonants, the most common are /n/, /l/ and /r/ (syllabic /r/ only features in rhotic dialects). In certain phonological conditions, syllabic consonants may fill a vowel gap in its absence in a syllable. In other words, a consonant can form a syllable on its own without any help of vowel, for example, bottle /bɑːt**l̩**/, button /bʌt**n̩**/, where bold and underlined /l/ and /n/ behave as a vowel to fill the vowel slot or gap.

6.3.3 Syllable Templates in English

McMahon (2002) reports that in English two or three consonants (and sometimes, in limited cases, up to four consonants) are allowed as a cluster in both onset and coda positions. The number of syllables in a word is typically one, two or three, as in 'go', 'poster',

'vaseline', but can (in principle though rarely) go up to twelve syllables, as in 'antidisestablishmentarianism'. Overall, there can be up to three consonants in the onset (e.g. [spriŋz] '*springs*') and up to four in coda (e.g. [siksθs] '*sixths*'). Onset and coda consonants are largely independent of each other.

In the next section, I present the generalisations regarding the loanword adaptation patterns for syllable phonotactics in *ML* which will later be formalised within OT in section 6.6.

6.4 Syllable phonotactics of English loanwords in *ML*

The pronunciation of English loanwords depends on amount of exposure to the source language (English) for an MP speaker. In this chapter I will investigate how syllable phonotactics of MP operate in English loanwords produced by MP speakers who are classified as monolinguals (*ML), i.e.* who have little or no exposure to English. In the data set of MP loanwords, syllable structures that are permissible in the source language (English) but are illicit in MP may undergo phonotactic adjustments to conform to the syllable phonotactics of native phonology (MP). The focus of analysis here is on consonant clusters in word-initial and final position in MP loanwords. It is also important to mention that only adaptation at the phonotactic (syllable) level is focused here rather than the segmental alterations.

6.4.1 Generalisations on Onset Phonotactics in *ML*

Table 6.3 ***Onset consonant cluster in ML***

Input(English)	***ML***	**gloss**
6.3a Onset consonant clusters in word-initial position with an epenthetic vowel /ɪ/. (07/269)		
/tjuːb/	[tuːb]	tube
/mjuː.zɪk/	[mɪ.juː.zək]	music
/bluː/	[bɪl.juː]	blue
6.3b Onset consonant clusters in word-initial position with an epenthetic vowel /ə/.(262/269)		
/plɒt/	[pə.laːt]	plot
/blɒk/	[bə.laːk]	block
/brænd/	[bə.rand]	brand
/krɪs.təl/	[kə.rɪs.təl]	question
/krɒ.kri/	[kə.rak.ri]	crockery
/glɑːs/	[gə.laːs]	glass
/flaɪt/	[fə.læːt]	flight
/θrəʊt	[t̪ʰə.raːt]	threat

/skʊəl/	[əs. kuːl]	school
/smal/	[əs.maːl]	smell
/spreɪ/	[səp.reː]	spray
/steɪ.ʃən/	[əs.teː.ʃən]	station
/spaɪ.si/	[əs. pæː.si]	spicy
/træk.tər/	[tə.ræk.tər]	tractor
/trɒ.li/	[tə.raː.li]	trolley
/draɪvər/	[də.ræː.vər]	driver

As discussed earlier, the source language (English) allows onset consonant clusters in word-initial position (see section *6.3.1.1).* In contrast, in MP, consonant clusters are not tolerated in word-initial position. Therefore, when an English word (mono-morphemic) with an onset consonant cluster in a word-initial position is introduced in MP, the cluster is not maintained in *ML* (as shown in *6.3a &6.3b*). The onset phonotactics in *ML* can be generalised as follows:

1a) Onset consonant cluster are prohibited in word-initial position. This requirement is met via the process of epenthesis.

There are two types of epenthetic vowels used by *ML*, one is context-dependent, and the other is a context-free, default vowel. There are 7 out of 269 items in word-initial position in *ML* where /ɪ/ is used as an epenthetic vowel (see *6.3a*) to break up an obstruent or nasal /m, n/ + glide /j/ consonant cluster. Elsewhere, there are 262 out of 269 items where the schwa /ə/ is used as a default vowel as shown in *6.3b*. An epenthetic vowel breaks up the onset cluster as in [d**ə**.ræː.vər]$_{ML}$ ‘*driver*’, [t**ə**.raː.li]$_{ML}$ ‘*trolley*’ in order to conform to the native MP phonology in *ML*.

6.4.2 Coda Phonotactics of MP Loanwords in *ML*

Table 6.4 ***Coda clusters in word-final position in ML***

Input (English)	***ML***	**gloss**
6.4a homorganic coda cluster: nasal+ obstruent		
/kæmp/	[kæmp]	camp
/peɪnt/	[pẽːnt]	paint
/paʊnd/	[põnd]	pound
/bentʃ/	[bæ̃ntʃ]	bench
/tʃeɪndʒ/	[tʃæ̃ndʒ]	change
/bæŋk/	[bæ̃ŋk]	bank
/trʌst/	[tə.raː.sət]	trust
/prɪnt/	[pə.rɪnt]	print
6.4b /s/or lateral+ obstruent		
/ɹəʊst/	[roː.sət]	roast
/fəʊld/	[foː. ləd]	fold
6.4c Non-homorganic coda clusters with an epenthetic vowel		
/help/	[hæː.ləp]	help
/mɪlk/	[miː.lək]	milk
/sɪlk /	[siː.lək]	silk
/self/	[sæː.ləf]	self
/gʌlf/	[gəːləf]	gulf
/sɒlv/	[saːləv]	solve
/steɪˌʃən/	[səˈteːʃən]	station
/fɪlm/	[fiː.ləm]	film
/mɑːsk/	[mɑː.sək]	mask
/sɪ.lekt/	[sə.læː.kət]	select
/bɒks/	[bak.sə]	box
/ʃɪft/	[ʃɪː.fət]	shift
/gɪft/	[giː.fət]	gift
/bəlb/	[bə.ləb]	bulb

Recall the coda phonotactics generalisations in MP in which only a homorganic coda cluster with the combination of 'nasal+obstruent' is legitimate (see section 5.2.4). Now, if we analyse the loanword data in *ML*, we see that the examples shown in *6.4a* typically respect the MP coda phonotactics, so far. The data in *6.4b* indicates that even if a source word consonant cluster partially respects the core principle of coda phonotactics operative in MP, that is, to be homorganic, yet there is a difference in the coda cluster combination

(not a nasal + obstruent); therefore, *ML* break up the coda cluster with an epenthetic vowel as in [roː.səʊt] '*roast*'. Similarly, *ML* do not tolerate a non-homorganic coda cluster which is also broken up by an epenthetic vowel [mɑː.sək] '*mask*' (as shown in 6.4c). Based on these observations of coda phonotactics drawn in Table 6.4, the following generalisation can be made:

> *1b) ML* do not allow non-homorganic coda clusters in word-final position. This requirement is enforced by the insertion of an epenthetic vowel /ə/ as in [miː.lək] '*milk*' [siː.lək] '*silk*' or [mɑː.sək] '*mask*'.

So far then, there is an influence of the native (MP) syllable phonotactics on loanwords produced by *ML*. In the next section, I will present the generalisations for stress system in *ML* which will be later analysed in OT analysis in section 6.6.

6.4.3 Stress Assignment: MP loanwords in *ML*

The data presented in table (6.5) is based on the corpus data for ML.

Table 6.5 ***Stress Assignment in MP loanwords in ML***

	Input (English)	***ML***	**gloss**
6.5a There is no conflict in the output between the native (MP) stress rules and source word.			
	/rɪ.ˈfjuːz/	[rəf.ˈjuːz]	refuse
	/ˈpʌb.lɪk/	[ˈpəb.lək]	public
Pattern 'A'	/ˈkrɒ.kri/	[kə.ˈrɑk.ri]	crockery
	/ə.ˈpɛn.dɪks/	[ˈpæn.dəs]	appendix
	/dɪ.ˈsɪ.ʒən/	[də.ˈsiː.ʒən]	decision
	/ˈlɛ.tɪs/	[ˈlæː.təs]	lettuce
	/ˈtrɒ.li/	[tə.ˈraː.li]	trolley
	/ˈpɛ.pə/	[ˈpeː.pər]	pepper
6.5b. *ML* ignore the stress patterns of the source word(English)			
Pattern'B'	/rɪ.ˈplaɪ/	[ˈrəp.laɪ]	reply
	/ˈsteɪ.dɪəm/	[sə.teː.ˈdɪəm]	stadium
	/ˈæm.bju.ləns/	[əm.bo.ˈlæns]	ambulance
	/ˈgluːkəʊs/	[gəl.ˈkoːz]	glucose
	/ˈvæk.siːn/	[vək.ˈsiːn]	vaccine
	/ˈhɒs.pɪ.təl/	[həs.pə.ˈt̪aːl]	hospital
	/ʃæm.ˈpuː/	[ˈʃæm.pu]	shampoo
	/ˈsɪ.lɪn.də/	[sə.ˈlæ̃n.dər]	cylinder

Note. A, B shown in *ML* stand for the following:

‘A’ there is no conflict between source stress position and in loanwords. Stress position in source word conforms to the native MP phonology; ‘B’ source stress position is ignored to conform to the native MP stress rules

Table 6.5 shows that there are two types of stress patterns (i.e. 6.5a-b) in the loanword data of *ML*. The first stress pattern ‘A’ shows that there is no conflict between where the stress falls in the source input (i.e. English) and where the stress falls in the output in the MP loanword, because stress position in the source word already meets the rules of native MP phonology. However, the second stress pattern ‘B’ in the loanwords works opposite to the pattern ‘A’. In pattern ‘B’ stress falls on the syllable in the output which conforms to the native MP phonology but as a result moves the stress away from the position it held in the source form (English).

Based on the data in pattern A and B in table 6.5, the stress patterns for MP loanwords in *ML* can be summarise as in (2):

2) Generalisations on stress assignment in *ML*

a) Stress the super-heavy final syllable.

b) In the absence of 2a, stress the penult heavy syllable

c) Stress is not assigned on open penult syllable (CV).

The generalisations outlined in *2a-2c* are reflected in both Pattern ‘A’ and ‘B’. The Pattern ‘A’ does not violate the native MP phonology (as repeated in table 6.6).

Table 6.6 ***Stress assignment: Pattern ‘A’ in ML***

	Input(English)	***ML***	**gloss**
a.	L (ˈ**S**)	H(ˈ**S**)	
	rɪ.ˈfjuːz	rəf.ˈjuːz	refuse
b.	H **(S)**	H L (**S**)	
	ən.ˈkluːd	ən.kə.ˈluːd	include
c.	(ˈ**H**) H	(ˈ**H**) H	
	ˈpʌb.lɪk	ˈpəb.lək	public
d.	L (ˈ**H**) S	**(**ˈ**H)** H	
	ə.ˈpɛn.dɪks	ˈpæn.dəs	appendix
e.	L (ˈ**L**) H	L (ˈ**H)** H	
	dɪ.ˈsɪ.ʒən	də.ˈsiː.ʒən	decision
f.	(ˈ**L**)H	(ˈ**H**)H	
	ˈlɛ.tɪs	læː.təs	lettuce

Note. The symbol ‘L’ shows light syllable, ‘H’ is used for heavy syllable and ‘S’ for superheavy syllables hereafter.

The examples in table 6.6 show that the position of stress in the input (English) has already met the stress rules of native MP phonology. However, in some cases there are some segmental or phonotactic adjustments have been taken place in the output to avoid conflict with the native (MP) phonology. For example, the vowel of the penult syllable may be

lengthened to make a heavy penult syllable, as in [ˈlæː.təs] '*lettuce*'. As a result, stress in the resultant output matches the position of stress in the source form (i.e. English) and it also does not violate the native MP stress rules (i.e. stress on a light syllable is avoided). In comparison with pattern 'A', pattern 'B' describes adaptation patterns which ignore the position of stress in the source words (i.e. English). It means that *ML* do not retain stress in the position held in the source word but strictly follow the stress patterns which conform to the native MP phonology.

Table 6.7 ***Stress assignment: Pattern 'B' in ML***

	Input(English)	***ML***	**gloss**
a.	**(ˈH)**S	H **(ˈS)**	
	ˈgluː.kəʊz	gəl.ˈkoːz	glucose
b.	**(ˈL)**HL	L **(ˈH)** H	
	ˈsɪ.lɪn.də	sə.ˈlɛ̃n.dər	cylinder
c.	**(ˈH)** S	H **(ˈS)**	
	ˈvæk.siːn	væk.ˈsiːn	vaccine

Table *6.7* shows stress pattern 'B' where the stress is assigned to conform to the native MP phonology by placing the stress on a final superheavy syllable as in [gəl.ˈkoːz]$_{ML}$ '*glucose*' or on a penult heavy syllable as in [sə.ˈlɛ̃n.dər]$_{ML}$ '*cylinder*'. Overall in *ML*, the stress patterns 'A' and 'B' in loanwords do not violate the native MP stress rules.

6.4.4 Interim Summary

The data illustrated above (sections 6.4.2 and 6.4.3) suggest that in English loanwords in MP, consonant clusters are not allowed in word-initial and -final position except for homorganic coda clusters. Similarly, stress surfaces only on final superheavy syllables or on penult heavy syllables in *ML*. *ML* thus follow the native MP phonology in the adaptation patterns of MP loanwords; they prohibit any illicit consonant cluster by the process of epenthesis in syllable phonotactics, and stress is assigned by shifting the stress (where necessary) to either a final superheavy or penult syllable. In the next section, I will provide an OT analysis of the generalisations set out above for syllable phonotactics (see section 6.4.1 & 6.4.2). The OT analysis for stress assignment (see section 6.4.3) will follow in section 6.6.

6.5 Syllable Phonotactics of MP loanwords in *ML*: OT Analysis

This subsection analyses the adaptation patterns related to syllable structure in MP loanwords produced by *ML* within the OT framework. The OT analysis will show the extent to which loanwords produced by *ML* conform to the phonotactic constraints of the borrowing language (MP) and thus to the native MP phonology. Note that for the OT analysis of ML loanwords, I use the same constraints as for MP (see section 5.3.2).

6.5.1 Syllable Phonotactics in ML: OT analysis

The generalisations for MP loanwords drawn from the *ML* data set are reproduced here in (*3*) for convenience:

3) Generalisations for syllable phonotactics in *ML*

Input	***ML***	**gloss**
3a. Onset clusters are not allowed in word-initial position		
/ trɒ.li/	[tə.rɑː.li]	trolley
/glɑːs/	[gə.laːs]	glass
/ krɒ.kri/	[kə.rɑk.ri]	crockery
3b. homorganic coda clusters are allowed in word-final position in *ML*		
/kæmp/	[kæmp]	camp
/prɪnt/	[pə.rɪnt]	print
3c. non-homorganic coda clusters are banned in the word-final position via epenthesis		
/mɪlk/	[miː.l**ə**k]	milk
/sɪlk /	[siː.lək]	silk
/mɑːsk/	[mɑː.s**ə**k]	mask

The generalisation in (3a) shows a ban on onset consonant clusters in word-initial position. This is achieved by inserting an epenthetic vowel between the consonants forming the cluster in the source word. Note that here the input assumed for *ML* is the native-like pronunciation of the source word (i.e. English). According to 'Richness of the base' (ROTB) principle, different inputs should not affect the ability of the algorithm to demonstrate the overall ranking of the language (Prince & Smolensky, 1993; 2004). ROTB posits that systematic differences between in languages arise solely from different constraint rankings, not from different inputs. In principle therefore, this entails that whether an input is native-like (e.g. English pronunciation) or non-native-like (e.g. Pakistani English), it does not affect the ability to show an overall ranking and supporting arguments for the language.

In OT terms, the ban on the onset clusters which do not share the place of articulation in word-initial position suggests the dominance of the markedness constraints *COMPLEX $_{[PLACE\text{-}ONS]}$ and COMPLEX ^{ONSET} over the faithfulness constraint DEP in *ML*. Since no deletion occurs to avoid an onset cluster, no ranking argument can be shown among *COMPLEX $_{[PLACE\text{-}ONS]}$, COMPLEX ^{ONSET} and MAX. In addition, in this example no violation of IDENT $_{[PLACE]}$ occurs in the optimal candidate. The ranking argument in this context can be seen below in tableau (4).

(4) COMPLEX ^{ONSET}, *COMPLEX $_{[PLACE-ONS]}$, MAX, IDENT $_{[PLACE]}$>>DEP

/ trɒ.li/	*COMPLEX ^{ONSET}	*COMPLEX $_{[PLACE-ONS]}$	MAX	IDENT $_{[PLACE]}$	DEP
a.→ [tə.rɑː.li]					*
b. [t̪rɑː.li]	*W	*W		*W	L
c. [trɑː.li]	*W				L
d. [rɑː.li]			*W		L

The tableau (*4*) shows that the winning candidate *4a* violates a low ranked constraint DEP. The losing candidate *4b* satisfies DEP but it violates high ranked constraints COMPLEX ^{ONSET}, *COMPLEX $_{[PLACE-ONSET]}$ and IDENT $_{[PLACE]}$. The losing candidate *4c* obeys DEP but at the cost of violating the high ranked constraint *COMPLEX^{ONSET}. Note that the losing candidate *4*c complies with the constraint *COMPLEX $_{[PLACE-ONSET]}$. The losing constraint *4d* violates MAX to obey a DEP constraint. Since we know that onset clusters are not allowed in word-initial position (see in *3a* above), I assume that the same generalisation applies in word-medial position. Thus, if a potential onset cluster appears in word-medial position, the first consonant of the cluster will in fact be syllabified in the coda position of the preceding syllable and the second consonant of the sequence will be syllabied in the onset position of the following syllable (e.g. /krɒ.kri/$_{Eng}$ →[kə.rɑk.ri] $_{ML}$ '*crockery*'). The constraint ranking for this word is shown below in tableau (5).

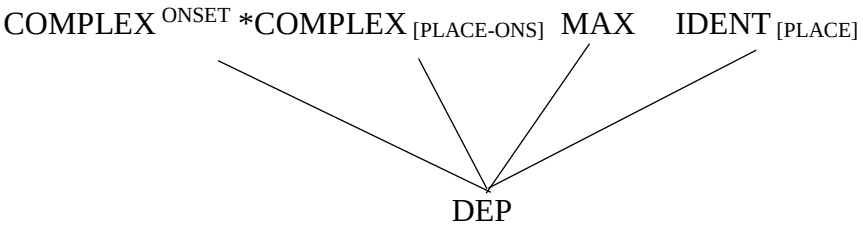
(5) COMPLEX ^{ONSET}, *COMPLEX $_{[PLACE-ONS]}$, MAX, IDENT $_{[PLACE]}$>>DEP

/krɒ.kri /	*COMPLEX ^{ONSET}	*COMPLEX $_{[PLACE-ONS]}$	MAX	IDENT $_{[PLACE]}$	DEP
a.→[kə.rɑk.ri]					*
b. [krɑ.kri]	**W	**W			L
c. [kɑ.kɽi]	*W	*W	*W	*W	L
d. [kɑ.kri]	*W	*W	*W		L

The tableau (5) shows that the winning candidate 5*a* violates the low ranked constraint DEP. A losing candidate *5b* obeys DEP but at the cost of high ranked constraints COMPLEX ^{ONSET} and *COMPLEX $_{[PLACE-ONS]}$. Similarly, losing candidates 5*c* and 5*d* obey low ranked constraint, i.e. DEP but they violate COMPLEX ^{ONSET}, *COMPLEX $_{[PLACE-ONS]}$, MAX (in *5c*&*5d*) and IDENT $_{[PLACE]}$ (in *5*c only).

Based on the ranking arguments shown above in tableaux (4 & 5), it can be safely generalized that *ML* do not allow onset consonant clusters in word-initial and medial positions. This indicates that in loanwords *ML* conform to the native MP phonology by adhering to the same constraint ranking for onset phonotactics as in MP which is shown below in the Hasse diagram in (6).

(6) Hasse diagram: onset phonotactics in *ML*:



The above diagram (6) shows the same constraint ranking which prevails in the native MP phonology regarding onset phonotactics. In terms of coda phonotactics, *ML* allow only homorganic coda clusters as shown above in (3b). For instance, in the word [kæmp] '*camp*', the coda cluster is allowed because both consonants /m/ and /p/ are bilabial and share the same place of articulation. Thus, in terms of OT, the winning candidate *7a* (in below)

obeys *COMPLEX [PLACE-CODA] by violating *COMPLEX CODA. Therefore, in this context (i.e. presence of homorganic coda cluster), a harmonic bounding effect is expected in the OT analysis. A constraint ranking of homorganic coda clusters in the word-final position is shown below in tableau (7).

7) {MAX, IDENT [PLACE], *COMPLEX [PLACE-CODA]}>> {DEP, *COMPLEX CODA}

/kæmp/	MAX	IDENT[PLACE]	*COMPLEX[PLACE-CODA]	DEP	*COMPLEX CODA
a. →[kæmp]					*
b. [kæ.məs]		*W		*	L
c. [kæm]	*W				L
d. [kæ.mə]	*W			*	L
e. [kæ.sə]	*W	*W		*	L
f. [kæms]		*	*		*

In tableau (7), candidate 7*a* is the winner; it violates *COMPLEX CODA yet maintains a homorganic coda cluster in word-final position. The losing candidate *7b* is faithful to *COMPLEX CODA but at the expense of changing the place feature of the final coda consonant from bilabial /p/ to alveolar /s/ and by inserting an epenthetic vowel, thus, causing a violation of DEP and IDENT[PLACE]. Similarly, the losing candidate *7c* obeys *COMPLEX CODA but at the cost of deletion and violates a high ranked constraint MAX. The losing candidate *7d* violates the high ranked constraints MAX and IDENT [PLACE] to satisfy a low ranked constraint, i.e. *COMPLEX CODA. Likewise, the losing candidate *7*e obeys *COMPLEX CODA at the cost of high ranked constraints MAX, IDENT [PLACE]. It also violates DEP. Lastly, the losing candidate *7f* shows no constraint ranking because of harmonic bounding by the more general constraint, i.e. *COMPLEX CODA of the more specific constraint, i.e. *COMPLEX [PLACE-CODA]. Since *COMPLEX [PLACE-CODA] is not violated in the winning candidate *7a*, this suggests that it is a high ranked constraint. Note that tableau (7) does not yet provide a ranking argument between *COMPLEX [PLACE-CODA] and DEP; this will be shown in the next tableau (8). If a non-homorganic coda cluster

appears in the source form in word-final position, then an epenthetic vowel /ə/ is inserted to break up the coda cluster (as shown in3c). For instance, in the words [miː.l**ə̲**k] $_{ML}$ '*milk*' or [siː.l**ə̲**k] $_{ML}$ '*silk*' the consonants /l/ and /k/ are non-homorganic (i.e. alveolar and velar), therefore, an epenthetic vowel is inserted to break up the potential coda cluster. The constraint ranking in this context is shown below in tableau (8).

(8) {MAX, IDENT $_{[PLACE]}$, *COMPLEX $_{[PLACE-CODA]}$} >> {DEP, *COMPLEX ^{CODA}}

/mɪlk/	MAX	IDENT$_{[PLACE]}$	*COMPLEX$_{[PLACE-CODA]}$	DEP	*COMPLEX^{CODA}
a. →[miː. lək]				**	
b. [mɪlk]			*W	L	*
c. [mɪl]	*W			L	
d. [nɪl]	*W	*W		L	

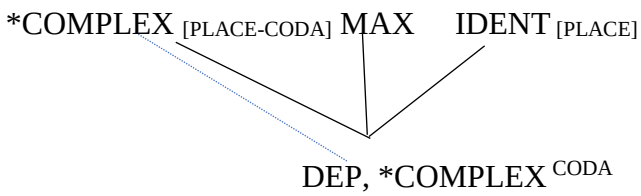
The tableau (8) shows that the winning candidate *8a* violates the DEP constraint. T losing candidate *8b* is faithful to the DEP constraint but at the cost of allowing a non-homorganic coda cluster in word-final position and thus violates *COMPLEX $_{[PLACE-CODA]}$, as well as *COMPLEX^{CODA}. The losing candidate *8c* obeys DEP at the cost of deletion of the coda consonant and thus violates the MAX constraint which is a high ranked constraint. The losing candidate *8d* is faithful to DEP but at the cost of high ranked constraints MAX and IDENT $_{[PLACE]}$.

In another word, such as 'roast' (see *6.4b*), the coda cluster is homorganic, because /s/ and /t/ both belong to the same place of articulation i.e. alveolar, but is still broken up by *ML*. In native MP phonology, we do not have any evidence for this type of combination, which is homorganic but does not match the preferred native MP combination of nasal+obstruent. This shows us a case where the native phonological rules as applied to loanwords allow us to clarify the specifics of the native phonology. That is, why, despite [st] being homorganic does *ML* break this cluster with an epenthetic vowel (e.g. /ɹəʊst/→[roː.səʊt]). In chapter 5 (section *5.2.4.1)* it was shown that MP allows coda clusters with certain conditions: first, only homorganic coda clusters are allowed, and second, the coda cluster must appear in a certain combination of consonant types, i.e. nasal + obstruent.

Therefore, in order to conform to the native MP phonology, *ML* do not allow a coda cluster [st] in the word 'roast' thus, insertion of an epenthetic vowel i.e. [ro:.sə̲t]$_{ML}$ '*roast*' takes place. Since /st/ partially fulfils the native MP coda condition, i.e. to be homorganic but it violates the certain combination, i.e. nasal + obstruent. In terms of OT, the production of word [roast] violates the high ranked markedness constraint *COMPLEX $_{[PLACE\text{-}CODA]}$, therefore, it is not considered as an optimal candidate in *ML*. The 'roast' example shows that the correct definition and implementation of *COMPLEX $_{[PLACE\text{-}CODA]}$ is that it allows maximum one Place feature in the coda (rather than allowing more than one Place feature so long as it is the same place of articulation). This in turn implies that in MP nasal consonants don't have a separate place feature of their own and can thus appear in a coda with another consonant and not violate *COMPLEX $_{[PLACE\text{-}CODA]}$.

Together tableaux 7-8 capture the generalisations related to coda phonotactics (as shown in 3b-3c) in *ML* and can be shown in a Hasse diagram as in (9):

(9) Hasse diagram: coda phonotactics of MP loanwords in *ML*:



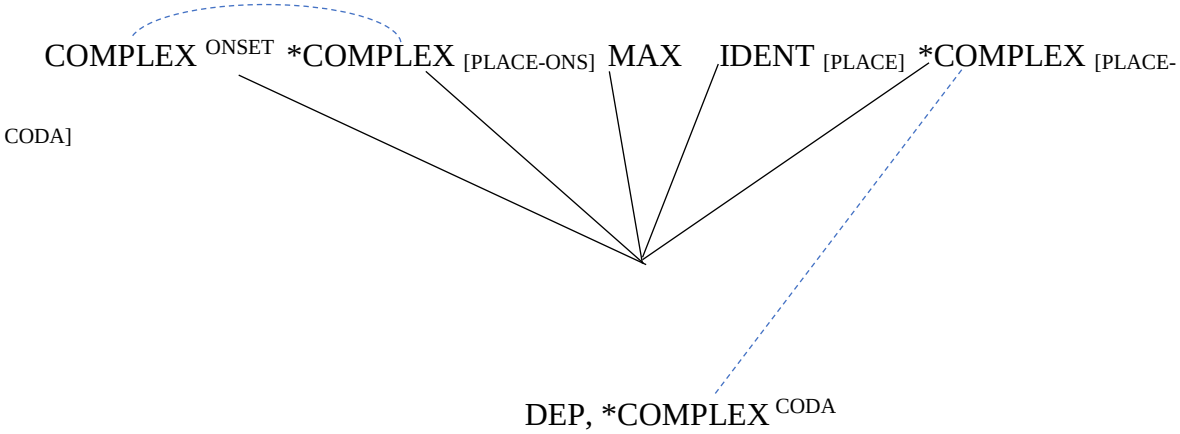
The above Hasse diagram (9) matches the constraint ranking for the coda phonotactics of native MP phonology. The tableau (10) below presents an overall constraint ranking of syllable phonotactics of MP loanwords in *ML*.

(10)*COMPLEX^{ONSET},*COMPLEX $_{[PLACE\text{-}ONS]}$, MAX, IDENT $_{[PLACE]}$,*COMPLEX $_{[PLACE\text{-}CODA]}$ >> {DEP, *COMPLEX ^{CODA}}

/prɪnt/	*COMPLEX ^{ONSET}	*COMPLEX $_{[PLACE\text{-}ONS]}$	MAX	IDENT$_{[PLACE]}$	*COMPLEX $_{[PLACE\text{-}CODA]}$	DEP	*COMPLEX^{CODA}
a.→[pə.rɪnt]						*	*
b. [prɪnt]	*W	*W				L	*
c. [prɪn̪t̪]	*W	*W		*W	*W	L	*
d. [prɪ.nət]	*W	*W				*	L
e. [prɪt̪]	*W	*W	*W	*W		L	L
f. [brɪ]	*W	*W	**W	*W		L	L
g. [bə.rɪ.nə]			*W	*W		**	L
h. [pə.rɪnt̪]				*	*	*	*

The tableau (10) shows that the winning candidate [pə.rɪnt] (i.e. *10a*) violates the low ranked constraints *COMPLEX ^{CODA} and DEP. The constraint ranking in 10 formalises the fact that *ML* do not allow any type of onset cluster in word-initial position. Likewise, *ML* do not allow any non-homorganic coda clusters in word-final position. These requirements are met via epenthesis, rather than by deletion or by changing the features of the segments in the optimal outputs. This shows that *COMPLEX^{ONSET},*COMPLEX $_{[PLACE\text{-}ONS]}$, MAX, IDENT $_{[PLACE]}$ are all high ranked constraints in *ML*. Also note that the winning candidate (*10a*) allows homorganic coda clusters in word-final position and thus conforms to the native MP syllable rules. Therefore, *COMPLEX $_{[PLACE\text{-}CODA]}$ is high ranked constraint in the ranking (in tableau 10). Since the winning candidate *10a* allows homorganic coda cluster, it also violates *COMPLEX ^{CODA} The overall constraint ranking for the syllable phonotactics in *ML* (as illustrated in tableau *10*) can be drawn in a Hasse diagram as in (11).

(11) Hasse diagram of loanwords by *ML*:



The Hasse diagram (11) in above gives us an overall constraint ranking of syllable phonotactics for the loanword patterns shown in the corpus data for *ML*. This constraint ranking exactly matches the ranking for native MP syllable phonotactics as shown above (also see section 5.4.1). This suggests *ML* conform strictly to the native MP Phonology. The constraint ranking shown in the Hasse diagram in (11) was re-checked through OTSoft (version 2.5: Hayes, 2017). This method confirmed that the proposed ranking is correct for the *ML* data set for syllable phonotactics (see Appendix XII), and thus that the proposed ranking for MP native phonology is correct also.

6.6 Stress Assignment of English loanwords in ML: OT analysis

In the section 6.4.3, it was shown that there are two stress patterns 'A' & 'B' observed in *ML*. These stress patterns show that *ML* remain faithful to the native MP stress rules and do not show any variation in stress assignment in loanwords. This suggests that the stress assignment patterns of the native grammar are displayed in MP loanwords produced by *ML*. In terms of OT analysis, I will show the constraint ranking for stress patterns in *ML* in section 6.6.1.

6.6.1 Stress Pattern A&B: OT Analysis

The stress adaptation patterns 'A' & 'B' (as shown in Table *6.5*) can be analysed using the native MP constraint ranking, as shown below in tableaux (12-13). Pattern 'A' is where stress in the input (in English) is already on the final superheavy or penult heavy syllables (see 6.5a), therefore, it does not violate the native (MP) stress rules and remains in the same position in the word in the output in *ML*. Pattern 'A' is shown through tableau (12).

(12) FtBin, SWP, NonFin$_C$, IDENT $_{[long]}$ >>AlignR, IDENT $_{[long-v]}$, Parse-σ

/ˈlɛ.tɪs/	FtBin	SWP	NonFin$_C$	AlignR	IDENT$_{[long-v]}$	Parse-σ
a. → (ˈlæː).təs				*	*	*
b. (ˈlɛ.tɪ)<s>		*W		L	L	L
c. (lɛ.ˈtɪs)	*W		*W	L	L	L
d. (læː).(ˈtə)<s>	*W	*W		L	L	L

In tableau (12), the observed surface form in the corpus is the candidate (*12a*). To maintain stress on the penult, the vowel is lengthened and thus the winning candidate *12a* violates the constraints AlignR, IDENT $_{[long-v]}$ and Parse-σ. Conversely, the losing candidates *12* (*c* &*d)* demonstrate the ranking of FtBin, SWP , NonFin$_C$ (in *12c* only) over AlignR, IDENT $_{[long-v]}$ and Parse-σ in loanwords, as was also found in native MP words; the losing candidate (*12b*) demonstrates the ranking of SWP over Align R, IDENT $_{[long-v]}$ and Parse-σ only. The tableau (12) does not yet provide a ranking argument among Align R, IDENT $_{[long-v]}$ and Parse-σ, therefore, we need another tableau (13) which will show the ranking among them.

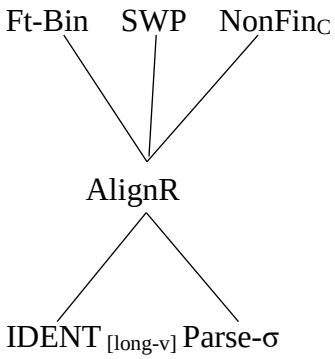
(13) FtBin, SWP, NonFin$_C$ >> AlignR>> {IDENT $_{[long-v]}$, Parse-σ}

/ˈgluː.kəʊz/	FtBin	SWP	NonFin$_C$	AlignR	IDENT$_{[long-v]}$	Parse-σ
a.→gəl.(ˈkoː)<z>					*	*
b. (ˈgəl).(koːz)	*W			*W	L	L
c. (gəl).(ˈkoːz)			*W		*	L
d. (ˈgə).(koːz)	**W	*W		*W	L	L
e. (gə).(ˈkoː)<z>	*W	*W			*	L

The tableau (13) shows that the optimal candidate *13a* satisfies all the high ranked constraints and violates the low ranked constraint IDENT $_{[long-v]}$ and Parse-σ. The losing candidate *13b* obeys the low ranked constraints, i.e. IDENT $_{[long-v]}$ and Parse-σ but it violates FtBin and Align R. We have already learned from tableau (12) that Align R is lower in

ranking than FtBin, SWP, $NonFin_C$. However, the losing candidate *13b* shows us that Align R is higher in constraint hierarchy than $IDENT_{[long\text{-}v]}$ and Parse-σ. The losing candidates *13c* and *13d* obey $IDENT_{[long\text{-}v]}$ (only *13d*) and Parse-σ but at the cost of high ranked markedness constraints $NonFin_C$ (in candidate *13c only*), FtBin, SWP and Align R in *13d*. Likewise, candidate *13e* satisfies Parse-σ but at the expense of high ranked constraints, i.e. FtBin and SWP. The constraint ranking in tableau 13 is an example of stress pattern 'B'. This shows that *ML* resists keeping stress in the position that it holds in the input (English) and thus strictly obeys the MP native stress grammar by placing stress on superheavy final syllable and thus does not match the stress position of source word (English). Together tableaux 12-13 show that stress patterns 'A' and 'B' reflect the constraint ranking of native MP phonology in *ML* (i.e. {FtBin, SWP, $NonFin_C$}>>AlignR>>{ $IDENT_{[long]}$,Parse-σ}). This can be reflected in a Hasse diagram as in (14) below.

14) Hasse diagram of stress patterns '*A*' and '*B*' in *ML*



The constraint ranking as shown in the Hasse diagram in (14) was re-checked through OTSoft (version 2.5: Hayes, 2017). This method confirmed that the proposed ranking is correct for the *ML* data set of stress system (see Appendix XI), and thus that the proposed ranking for MP native phonology is correct also.

6.7 Chapter Summary

This chapter closely examines the syllable phonotactics and stress assignment of English loanwords in the MP and offers a comprehensive analysis of syllable phonotactics and stress assignment within the theoretical framework of OT. The loanword adaptation patterns at the prosodic level (i.e. syllable phonotactics and stress) show that *ML* do not violate the native MP phonology. The constraint rankings in syllable phonotactics and stress assignment (as shown in Hasse diagram 11 and 14) in *ML* show strict adherence to the constraint hierarchy of native MP phonology, which is repeated here in *15* and *16* respectively.

15) Syllable phonotactics: MP = *ML*

*COMPLEX ^{ONSET},*COMPLEX $_{[PLACE-ONS]}$, MAX, IDENT $_{[PLACE]}$,*COMPLEX $_{[PLACE-CODA]}$>> {DEP, *COMPLEX ^{CODA}}

16) Stress Assignment: MP = *ML*

{FtBin, SWP, NonFin$_C$} >> AlignR>> {IDENT $_{[long-v]}$, Parse-σ}

By using the same constraints and the same ranking in their adaptation patterns (as illustrated in 15 &16), *ML* show complete integration of loanwords into the native MP phonological structure. In the next chapter (7), I will analyse to what extent MP-English late-bilingual speakers (*LB*) show similarity and/or differences in the adaptation patterns of syllable phonotactics and stress assignment in MP loanwords. The subsequent OT analysis will provide an answer to the question whether *LB* behave like *ML* in their loanword adaptation patterns at the prosodic level or display a separate grammar, which is different from the native MP grammar.

7 Loanword Adaptations in MP-English Late Bilinguals

7.1 Introduction

This chapter presents the adaptation patterns at the prosodic level (i.e. syllable phonotactics and stress assignment) in MP loanwords as used by Late Bilinguals *(LB hereafter).* The question posed in this chapter is whether the constraint ranking (in OT analysis) in *LB* loanword adaptation patterns (at the prosodic level) conforms to the native grammar or has a different grammar special to the loanword adaptation patterns. This chapter is organised as follows. Section *7.2* presents the data and the generalisations found in loanword adaptation patterns of syllable phonotactics and stress assignment in *LB.* This is followed by section *7.3* in which the OT analysis of the adaptation patterns of syllable phonotactics is presented. Similarly, section *7.4* presents the OT analysis of the adaptation patterns of stress assignment in *LB*. Section *7.5* concludes the overall discussion of the chapter.

7.2 Loanword Adaptation Patterns at prosodic level in *LB*

This section presents the generalisations about syllable phonotactics and stress assignment of MP loanwords in *LB*. These generalisations will be later formalised within OT framework in section *7.3* &*7.4* respectively.

7.2.1 Loanword Adaptation patterns of onset phonotactics in *LB*

The following MP loanwords show how onset clusters in word-initial position undergo adaptation in *LB*.

Table 7.1 ***Onset consonant cluster in the word-initial position in LB***

Input (English)	***LB***	**gloss**
7.1a Onset consonant clusters with an epenthetic vowel /ɪ/ (7/269)		
/tjuːb/	[tɪ.juːb]	tube
/mjuː.zɪk/	[mɪ.juː.zək]	music
/bluː/	[bɪl.juː]	blue
7.1b onset clusters with an epenthetic vowel /ə/ (241/269)		
/plɒt/	[pə.laːt]	plot
/blɒk/	[bə.laːk]	block
/krɪstəl/	[kə.rɪs.təl]	question
/krɒ.kri/	[kə.rak.ri]	crockery
/glɑːs/	[gə.laːs]	glass
/θrəʊt /	[t̪ʰə.raːt]	throat

/smal/	[əs.maːl]	smell
/steɪʃən/	[əs.teː.ʃən]	station
/spaɪ.si/	[sə.paɪ.si]	spicy
/skʊəl/	[sə.kuːl]	school

7.1c Onset consonant clusters /tr/, /dr/without an epenthetic vowel in word-initial position (21/269)		
/trʌk/	[trək]	truck
/træktər/	[træk.tər]	tractor
/trɒli/	[traː.li]	trolley
/draɪvə/	[draɪ.vər]	driver
/dɹɒp/	[draːp]	drop

Table *7-1* shows the following generalisations in relation to onset phonotactics:

1a) Onset consonant clusters are not allowed (as shown in 7.1 a & b) except the specific onset cluster /tr/ and /dr/ (as shown in 7.c)

The source language (English) allows onset consonant clusters in word-initial position, however, the outputs in *LB* suggest that onset consonant clusters (except /tr, dr/) must undergo adaptation. This requirement is met via the process of epenthesis. There are two types of epenthetic vowels used in adaptation patterns of syllable phonotactics in *LB;* one is context-dependent and the other is a context-free, default vowel. There are 7 out of 269 tokens in word-initial position in *LB* where /ɪ/ is inserted as an epenthetic vowel (see *7.1a*) to break up an obstruent or nasal /m, n/ + glide /j/ consonant cluster. Elsewhere, there are 241 out of 269 tokens where a schwa /ə/ is used as a default vowel, as shown in *7.1b*. However, there are 21 out of 269 tokens in the corpus where a complex onset /tr/ and /dr/ has been maintained in word-initial position in *LB* as shown in *7.1c*. In contrast with *LB*, recall that all onset clusters including /tr, dr/ undergo adaptation in *ML* (see section 6.4.1) with an epenthetic vowel inserted to break up the consonant cluster to conform to the native (MP) phonology (e.g. [t**ə.**raː.li] $_{ML}$ '*trolley*').

7.2.2 Coda Phonotactics in *LB*

The following data show the loanword adaptation patterns of coda clusters in word-final position in *LB.*

Table 7.2 ***Coda clusters in word-final position in LB***

Input (English)	***LB***	**gloss**
7.2a homorganic coda cluster: nasal+ obstruent		
/kæmp/	[kæmp]	camp
/peɪnt/	[pɛ̃ːnt]	paint
/paʊnd/	[põnd]	pound
/dɑːns/	[dãns]	dance
/bentʃ/	[bæ̃ntʃ]	bench
/tʃeɪndʒ/	[tʃæ̃ndʒ	change
/bæŋk/	[bæ̃ŋk]	bank
7.2b homorganic coda clusters: obstruent + obstruent		
/ɹəʊst/	[rost]	roast
/ɪnsʌlt/	[ən.səlt]	insult
/fəʊld/	[fold]	fold
7.2c Non-homorganic coda clusters with an epenthetic vowel		
/help/	[hæː.ləp]	help
/mɪlk/	[miː.lək]	milk
/self/	[sæː.ləf]	self
/sɒlv/	[saː.ləv]	solve
/fɪlm/	[fiː.ləm]	film
/sɒft/	[saː.fət]	soft
/lɪft/	[liːfət]	lift
7.2d Non-homorganic coda clusters without an epenthetic vowel		
/mɑːsk/	[mask]	mask
/sɪ.lekt/	[sə.lækt]	select
/bɒks/	[baks]	box
/ʃɪft/	[ʃɪft]	shift
/gɪft/	[ɡɪft]	gift
/bəlb/	[bəlb]	bulb
/sɪlk/	[sɪlk]	silk
/gʌlf/	[gəlf]	gulf

The data in Table 7.2 show the following generalisation in connection with coda phonotactics in *LB*:

1b) All types of homorganic coda clusters are allowed but there is variable adaptation of source word containing non-homorganic coda clusters in word-final position.

The examples in *7.2a* (in table 7.2) reflect native (MP) coda phonotactics as we have seen so far (i.e. homorganic clusters allowed in a certain combination, i.e. nasal + obstruent). In contrast, the data in *7.2b* indicate that *LB* allow other types of coda clusters in word-final position. Alongside consonant clusters which hold to the core principle of coda phonotactics operative in MP, to be homorganic, the difference comes in other types of coda cluster combination (i.e. obstruent + obstruent as in [ro**st**] *LB* '*roast*') which is disallowed in MP.

The data in *7.2c* appear to show that a consonant cluster with a non-homorganic combination in coda position is not tolerated in *LB*. In these cases, an epenthetic vowel /ə/ is used to resolve an illicit (non-homorganic) coda cluster combination as in [miː.l**ə**k] *LB* '*milk*' and thus conform to the native MP phonology. The examples in *7.2c* therefore still show an influence of the native (MP) phonotactics in adaptation patterns of coda phonotactics in *LB*. However, we see that in *7.2d*, *LB* retain the non-homorganic coda cluster from the source word which is an illicit combination in MP as [sɪ**lk**] *LB* '*silk*'. The adaptation patterns in *7.2c* and *7.2d* have essentially the same structure (i.e. same coda cluster types e.g. /lk/) but have different surface representations as an output in *LB*, e.g. [miː.l**ə**k] *LB* '*milk*'~[sɪ**lk**]*LB* 'silk' or [sæː.ləf] 'self' ~[gəlf] '*gulf*''.

There are two possible scenarios which might explain this variation in coda phonotactics. The first is related to the particular properties of individual lexical items, such as frequency or some phonological property, due to which e.g. [sæː.ləf] '*self*'' may be pronounced in this way by all *LB*, *MP* speakers. Alternatively, the variation may be due to a speaker's individual linguistic characteristic to retain illicit coda cluster and thus pronounce e.g. [gəlf] '*gulf*'. We cannot fully diagnose the source of this variation in the adaptation patterns within coda phonotactics from this corpus data. For the purposes of the present study, I am going to treat these adaptation patterns of syllable phonotactics as pockets of intra-speaker variation (that is, following the second scenario), in order to explore whether a phonological approach to loanword phonology, specifically couched in OT, can account for this type of variation.

Note also that I do not have an independent evidence for the syllabification of onset clusters in word-medial position. For instance, the word '*actress*' can be syllabified as [æ**kt.**rə**s**] ~ [æk.**trə**s]. As a native MP speaker my intuition is that the syllabification is [æk.**trə**s]. This follows from the phonological facts also, since /kt/ as a coda cluster in word-final position is not permitted, whereas /tr/ is an acceptable onset cluster in *LB*, therefore, it

can be retained as an onset cluster in word-medial position. Similarly, the word ‘crockery’ can be syllabified as [kə.rak.ri] ~[kə.ra.kri] but we know that /kr/ is illicit onset cluster in MP, therefore, /kr/ is banned in word-medial position. I will thus apply the same native MP rule in the word ‘crockery’ and will syllabify it as [kə.rak.ri].

7.2.3 Stress Assignment in English loanwords by *LB*

In this section I investigate whether stress patterns in *LB* conform to the MP stress rules or retain stress in the position that it holds on the source word (English) and thus violates the native (MP) phonology.

Table 7.3 ***stress patterns of English loanwords in LB***

	Input (English)	***LB***	**gloss**
7.3a	**Pattern A:** There is no conflict between source stress(English) and output in *LB*		
	/rɪ.ˈfjuːz/	[rəf.ˈjuːz]	refuse
	/ˈpʌb.lɪk/	[ˈpəb.lək]	public
	/ˈkrɒ.kri/	[kə.ˈrak.ri]	crockery
	/ɪnˈkluːd/	[ən.kə.ˈluːd]	include
	/əˈpɛn.dɪks/	[ˈpæn.dəs]	appendix
	/dɪ.ˈsɪ.ʒən/	[də.ˈsiː.ʒən]	decision
	/ˈlɛ.tɪs/	[ˈlæː.təs]	lettuce
	/ˈtrɒ.li/	[ˈtraː.li]	trolley
	/ˈpɛ.pə/	[ˈpeː.pər]	pepper
7.3b	**Pattern B:** *LB* ignores the stress patterns of the source input (i.e. English)		
	/ˈgluː.kəʊz/	[gəl.ˈkoːz]	glucose
	/ʃæm.ˈpuː/	[ˈʃæm.po]	shampoo
	/ɪm.ˈprɛs/	[ˈəmp.ræs]	impress
	/ˈsɪ.lɪn.də/	[sə.ˈlæ̃n.dər]	cylinder
7.3c	**Pattern C:** *LB* follow the stress pattern of the source language (English)		
	/rɪ.ˈplaɪ/	[rəp.ˈlaɪ]	reply
	/ˈsteɪ.dɪəm/	[əs.ˈteː.dɪəm]	stadium
	/ˈæm.bju.ləns/	[ˈæm.buː.læns]	ambulance
	/ˈvæk.siːn/	[ˈvæk.siːn]	vaccine
	/ˈhɒs.pɪ.təl/	[ˈhəs.pə.ɬaːl]	hospital
	/ɪksˈpɛl/	[əks.ˈpæl]	expel

LB show three types of adaptation patterns of stress which are labelled as A, B & C in Table 7.3 (a-c). The first stress pattern 'A' are cases where there is no conflict in the position of stress assignment in the source input and the output in *LB*. The stress falls on a syllable in the source word which already meets the rules of native MP phonology, with stress on a superheavy final syllable or penult heavy syllable. There are some items in which the stressed vowel is lengthened (e.g. /ˈlɛ.tɪs/ →[ˈ**læ**ː.təs] *LB* '*lettuce*') in pattern 'A' to conform to the MP phonology.

The other two patterns 'B' and 'C' are opposite to each other in terms of stress assignment in the adaptation patterns. In pattern 'B' stress falls on the syllable in the output to conform to the native MP stress rules and thus it (pattern 'B') and in so doing does not match the position of stress in the source form (English) by shifting the stress to another syllable, i.e. superheavy or penult (e.g. /ˈgluː.kəʊz/→[gəl.ˈ**koːz**] *LB* '*glucose*'). However, the last pattern, i.e. pattern 'C', shows a violation of native MP stress rules by allowing stress on a light syllable or on the antepenult syllable to match the position of stress in the source word, i.e. English (e.g. /ˈvæk.siːn/→[ˈ**væk**.siːn]*LB* '*vaccine*').

Stress patterns A & B in *LB* are like *ML*. Both patterns (A & B) do not violate the native MP stress rules. However, the additional stress pattern 'C' in *LB* violates the native stress rules. Since we know that *ML* strictly follow the native MP stress rules (see section 6.4.3), therefore, *ML* do not show any item with stress pattern '*C*' which violates native MP phonology. This can be seen in Table *7.4*.

Table 7.4 ***Stress assignment: Pattern 'C' LB items with ML equivalents for comparison***

	SL(English)	***LB***	***ML***	**gloss**
	(ˈ**H)**S	L (ˈ**H)** S	L H **(S)**	
a.	ˈsteɪ.dɪəm	sə.ˈteː.dɪəm	əs.teː.ˈdɪəm	stadium
	(ˈ**H)**S	(ˈ**H)** S	(H) **(S)**	
b.	ˈvæk.siːn	ˈvæk.siːn	vək.ˈsiːn	vaccine
	(H) L H	**(H)** L S	H L **(S)**	
c.	ˈhɒs.pɪ.təl	ˈhəs.pə.ʈaːl	həs.pə.ˈʈaːl	hospital

The pattern 'C' in examples (a-c) in table *7.4* show that *LB* violate native MP stress rules by ignoring the MP treatment of syllable weight and stress position. For example, in the word [ˈhas.pə.ʈaːl] *LB* '*hospital*' stress falls on the antepenult syllable, ignoring the final superheavy syllable, and thus violates the native MP stress rule. In comparison with *LB*, *ML*

follow the native MP stress rules and stress falls on the final superheavy syllable, i.e. [həs.pə.ˈt̪aːl] *ML*. The presence of stress pattern 'C' in *LB* and absence in *ML* show a difference between *LB* and *ML*. In *LB*, the presence of stress pattern 'B' & 'C' in examples [gəl.ˈ**koːz**] *LB* 'glucose'~ [ˈ**væk**.siːn] *LB* 'vaccine' echoes the variation in adaptation patterns of coda phonotactics (as shown above in 7.2.2) where we have structurally identical patterns which have two different surface representations as an output, e.g. [sæː.ləf] *LB* '*self*' ~[gəlf] *LB* '*gulf*''. Again, this variation in the treatment of structurally parallel words could be due to a property of the words, such as their frequency. My intuition as a native speaker suggests that it is a speaker dependent characteristic however, and – in line with the approach taken to variation in phonotactics - I am going to treat these cases (stress pattern B~C) as a pocket of intra-speaker variation.

7.2.4 Interim Summary

Having presented the analysis of the data, I can summarise the findings by stating first that *LB* do not allow onset consonant clusters in word-initial position except /tr/, /dr/. Nevertheless, in coda phonotactics, *LB* show variation in adaptation patterns by allowing non-homorganic coda clusters (e.g. [miː.lək] *LB* '*milk*' ~ [sɪ**lk]** *LB* *'silk*'). This contrasts with *ML* (see chapter 6) who hold to the native (MP) phonotactics throughout the adaptation patterns by not allowing any onset consonant clusters (including /tr/, /dr/) as in [də.ræː.vər]*ML* '*driver*', [tə.raː.li] *ML* '*trolley*'; the same is the case with non-homorganic coda clusters which are rescued by an insertion of an epenthetic vowel /ə/ (e.g. [miː.l**ə**k] *ML* '*milk*' and [siː.l**ə**k] *ML* '*silk*'). In summary, the presence of onset clusters (i.e. /tr/, /dr/) and non-homorganic coda clusters in *LB* and the absence of these adaptation patterns in *ML* shows difference between *LB* and *ML*. Regarding stress assignment in MP loanwords, the presence of stress patterns A & B in *LB* shows that *LB* conform to the native stress rules. However, the presence of pattern 'C' in *LB* indicate a violation of the native MP stress rules and in this way, *LB* behave differently from *ML*. The presence of stress patterns 'B' and 'C' simultaneously (e.g. [gəl.ˈkoːz]*LB* *'glucose'* ~ [ˈvæk.siːn]*LB* *'vaccine')* is further evidence of variation in adaptation patterns within *LB.* Based on all these generalisations shown in the adaptation patterns in *LB,* in the next sections, I will show the OT analysis of syllable phonotactics and stress assignment.

7.3 Syllable Phonotactics in *LB*: OT analysis

In this section, I will analyse the data within the OT framework. The data are divided into onset and coda phonotactics. This ultimately leads us to determine how *LB* adaptation

patterns in MP loanwords can be modelled. In addition, it shows whether *LB* use same grammar as *ML* or have a different grammar from *ML*.

7.3.1 Onset Clusters in *LB*: OT analysis

I will repeat the generalisation related to onset clusters present in word-initial position in *LB* (from section *7.2).*

2) Onset clusters are not allowed in word-initial position except /tr, dr/.

***Input* (English)**	***LB***	***gloss***
/trɒ.li/	[traː.li]	trolley
/draɪvə/	[draɪ.vər]	driver

The generalisation in (2) shows that *LB* allow some onset clusters containing /tr/ and/ dr/ in word-initial position. Theconsonants in the onset clusters /tr/ and /dr/ share the same place of articulation (i.e. alveolar). In terms of OT, this means that COMPLEX $_{[PLACE-ONS]}$ continues to rank high in this context. Since these onset clusters are retained in word-initial position, there is no violation of DEP. However, these onset clusters (i.e. /tr, dr/) violate another constraint *COMPLEX ^{ONSET}. This is shown in tableau 3(in below).

(3) {*COMPLEX $_{[PLACE-ONS]}$, MAX, IDENT $_{[PLACE]}$, DEP}>>*COMPLEX ^{ONSET}

/trɒ.li/	*COMPLEX $_{[PLACE-ONS]}$	MAX	IDENT$_{[PLACE]}$	DEP	*COMPLEX ^{ONSET}
a.→ [trɑː.li]					*
b. [t̪rɑː.li]	*		*		*
c. [rɑː.li]		*W			L
d. [tə. rɑː.li]				*W	L

In tableau (3), the winning candidate *3a* violates *COMPLEX ^{ONSET} by allowing onset cluster /tr/ in word-initial position. The losing candidate *3b* violates *COMPLEX $_{[PLACE-ONS]}$ and IDENT $_{[PLACE]}$ by changing /t/ →[t̪] due to which the two consonants in the

onset cluster [t̪r] do not share the same place features[8]. Candidate *3b* has also a violation of the constraints *COMPLEX ^{ONSET}. The next losing candidate *3c* deletes /r/ from onset cluster /tr/ to obey *COMPLEX ^{ONSET} and it violates a high ranked constraint MAX. The losing candidate *3d* satisfies *COMPLEX ^{ONSET} by inserting an epenthetic vowel between onset cluster and thus violates a high ranked constraint DEP.

We also know from the above generalisation in (2) that *LB* do not allow any other onset clusters (except /tr, dr/) and this requirement is met via an epenthetic process. In this way *LB* conform to the native MP phonology and behave like *ML*. This translates into the tableau 4 (below).

(4) *COMPLEX $_{[PLACE-ONS]}$ MAX, IDENT $_{[place]}$>>DEP>>*COMPLEX^{ONSET}

/krɒ.kri/	*COMPLEX $_{[PLACE-ONS]}$	MAX	IDENT $_{[PLACE]}$	DEP	*COMPLEX^{ONSET}
a.→[kə.rɑk.ri]				*	
b. [krɑ.kri]	**W			L	**
c. [kɑ.kɻi]	*W	*W	*W	L	*
d. [kɑ.kri]	*W	*W		L	*

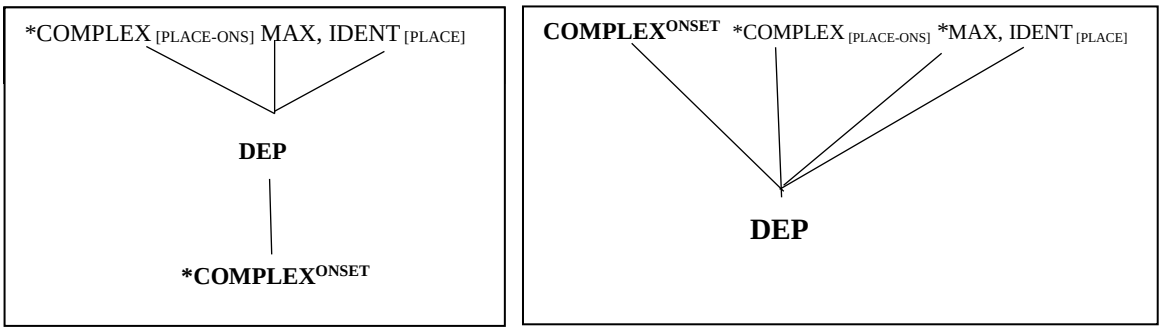
In tableau (4), the winning candidate *4a* violates DEP to avoid a non-homorganic onset cluster in word-initial position. Candidate 4*b* is ruled out because it violates *COMPLEX $_{[PLACE-ONS]}$ and it also violates *COMPLEX^{ONSET} by allowing a non-homorganic onset cluster. However, from the tableau (3) we already know that DEP>>*COMPLEX^{ONSET}. The losing candidate *4c* obeys DEP but at the cost of high ranked constraint MAX. Similarly, the losing candidate in *4d* satisfies DEP and violates another high ranked constraint IDENT $_{[PLACE]}$. Now the question arises, how is it that *LB* have a different grammar than *ML* in onset phonotactics? Recall that *ML* are more restrictive in not permitting any onset clusters including /tr/, dr/ in word-initial position (see section 6.4.1, tableau 4). In contrast, *LB* permit the onset cluster /tr, dr/in word-initial position and so

[8] Note that the definition of *COMPLEX [PLACE] adopted here entails assuming that /tr/ is linked to a single place feature.

behave differently than *ML*. In terms of OT, *COMPLEX^{ONSET} and DEP are re-ranked (see above in tableau 3&4).

Together tableaux *3 & 4* show that in onset phonotactics, *LB* show a different grammar from *ML* by reranking of the constraints COMPLEX^{ONSET} and DEP. This is shown in an example via Hasse diagram in 5a & 5b respectively.

5a) *LB:*/trɒ.li/→[trɑː.li] '*trolley*' **5b) *ML :*/trɒ.li /→[tə.rɑː.li] '*trolley*'**



Note that the placement of DEP differs in 5a and 5b in relation to COMPLEX^{ONSET} whereas*COMPLEX [PLACE-ONS], continues to rank higher in both ranking orders (i.e.5a&b). *LB* and *ML* differ in relative placement of DEP in relation with *COMPLEX ^{ONSET}. This reranking of the relevant constraints (i.e. DEP, *COMPLEX ^{ONSET}) show that the *LB* loanword grammar for onset clusters is different than that of *ML*.

7.3.2 Coda Clusters in *LB*: OT analysis

I will repeat the generalisation on coda phonotactic in *LB* (see also section 7.2.2). The data will be analysed within OT to show the full constraint ranking in *LB.*

6) Homorganic coda clusters are allowed but there is variable adaptation of source word containing non-homorganic coda clusters in word-final position.

	Input	***LB***	**gloss**
6a.	/kæmp/	[kæmp]	camp
	/lænd/	[lænd]	land
6b.	/mɪlk/	[miːlək]	milk
	/self/	[sæː.ləf]	self
	/fɪlm/	[fiː.ləm]	film
6c.	/mɑsk/	[mɑsk]	mask
	/sɪlk/	[sɪlk]	silk
	/gʌlf/	[gəlf]	gulf
	/bəlb/	[bəlb]	bulb

The data in 6a show that *LB* allow homorganic coda clusters (e.g. [kæ**<u>mp</u>**] $_{LB}$ '*camp*') and shows a constraint ranking in tableau (7).

(7) *COMPLEX $_{[PLACE\text{-}CODA]}$, MAX, IDENT $_{[PLACE]}$>> DEP,*COMPLEX ^{CODA}

/kæmp/	*COMPLEX $_{[PLACE\text{-}CODA]}$	MAX	IDENT$_{[PLACE]}$	DEP	*COMPLEX ^{CODA}
a. →[kæmp]					*
b. [kæ.məs]			*W	*W	L
c. [kæm]		*W			L
d. [kæ. mə]		*W		*W	L
e. [kæ.sə]		*W	*W	*W	L
f. [kæms]	*		*		*

In tableau (7), the winning candidate*7a* shows that *COMPLEX $_{[PLACE\text{-}CODA]}$ is high ranked constraints than *COMPLEX^{CODA}. Now turning to the data in 6b, non-homorganic coda clusters are also not permitted in *LB* and thus these (non-homorganic) coda clusters are repaired by inserting an epenthetic vowel /ə/ between the coda consonant clusters. In terms

of OT, it means that DEP ranked below *COMPLEX $_{[PLACE-CODA]}$. This is shown in tableau (8).

8) *COMPLEX $_{[PLACE-CODA]}$, MAX, IDENT $_{[PLACE]}$>>DEP, *COMPLEX ^{CODA}

/mɪlk /	*COMPLEX $_{[PLACE-CODA]}$	MAX	IDENT $_{[PLACE]}$	DEP	*COMPLEX ^{CODA}
a. → [miː.lək]				**	
b. [mɪlk]	*			L	*
c. [ni.lə]		*W	*W	L	L

In comparison with *ML*, *LB* permit some non-homorganic coda clusters in word-final position and in these cases thus violate the native MP phonology (as shown above in 6c). The presence of the two adaptation patterns 6b and 6c shows variation within the adaptation patterns of coda phonotactics in *LB* for structurally parallel words (e.g. [miː.**<u>lək</u>**] $_{LB}$ '*milk*' ~ [sɪ**<u>lk</u>**]$_{LB}$ '*silk*'). The cases involving violation of native MP coda rules require a different constraint ranking which is shown in (9).

9) MAX, IDENT $_{[PLACE]}$, DEP>>*COMPLEX $_{[PLACE-CODA,}$*COMPLEX ^{CODA}

/sɪlk/	MAX	IDENT $_{[PLACE]}$	DEP	*COMPLEX $_{[PLACE-CODA]}$	*COMPLEX ^{CODA}
a. →[sɪlk]				*	*
b. [siː.lək]			*W	L	L
c. [sɪl]	*W			L	L
d. [iː.lət]	*W	*W	**W	L	L

The tableau (*9)* shows that the winning candidate *9a* violates *COMPLEX $_{[PLACE-CODA]}$ and *COMPLEX ^{CODA} to be faithful to the input. Candidate *9b* is ruled out because it violates DEP. The losing candidate *9c* obeys the constraint *COMPLEX $_{[PLACE\ CODA]}$ and *COMPLEX^{CODA} by deleting the final consonant /k/ of the coda cluster and thus violates MAX. The losing candidate *9d* satisfies *COMPLEX $_{[PLACE\ CODA]}$ and *COMPLEX^{CODA} but at the cost of high ranked constraint MAX. Similarly, the losing candidate *9d* obeys the low ranked constraints*COMPLEX $_{[PLACE\ CODA]}$ and *COMPLEX ^{CODA} but it violates all high ranked faithfulness constraints MAX, IDENT $_{[PLACE]}$ and DEP.

Together tableaux 8 & 9 show partial ordering of constraint set DEP and *COMPLEX^{CODA} in *LB* which I will repeat here in 10 (a&b).

10) Partial ordering of the constraints (DEP, *COMPLEX^{CODA}) in *LB*:

10a) LB1: /mɪlk / →[miː.lək]$_{LB}$ '*milk*'

*COMPLEX $_{[PLACE-CODA]}$ MAX IDENT $_{[PLACE]}$

DEP, *COMPLEX ^{CODA}

10b) LB2: /sɪlk/ →[sɪlk]$_{LB}$ '*silk*'

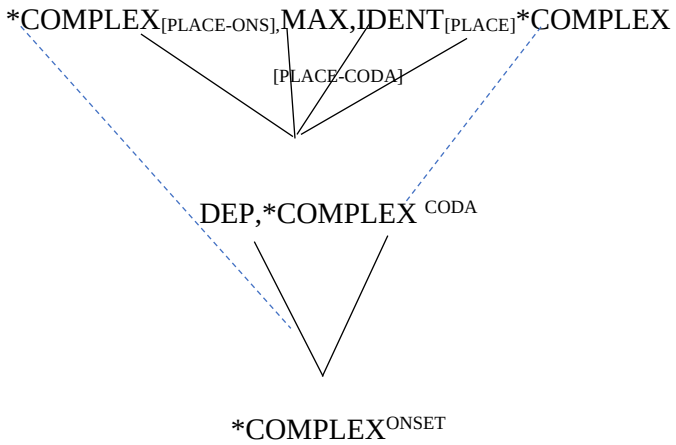
MAX IDENT $_{[PLACE]}$ **DEP**

*COMPLEX $_{[PLACE-CODA]}$,***COMPLEX ^{CODA}**

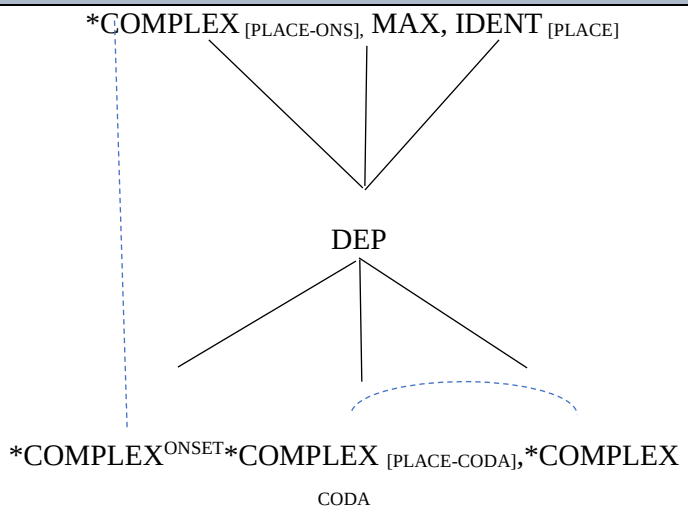
The partial constraint ranking orders (as shown in tableau 10a &10b) show that in coda phonotactics, *LB* has a variable grammar. This variation in the coda phonotactics in *LB* could be because some speakers in *LB* are in an earlier stage of the bilingual language continuum. They do not (yet) permit non-homorganic coda clusters (e.g. mɪlk / →[miː.lək]$_{LB}$ '*milk*') and can be labelled as *LB1*. However, some other speakers in *LB* who are more advanced in their exposure to the source language (English) and further along the bilingual continuum, permit non-homorganic coda clusters. They are labelled as *LB2*. Now, I will summarise an overall variation in syllable phonotactics in *LB1* and *LB2* in Table 12.

Table 7.5 ***Full constraint ranking of syllable phonotactics in LB1 and LB2***

7.5a) *LB1*: syllable phonotactics			
Input	**gloss**	**Output**	**Constraint ranking**
/trɒ.li/	trolley	[traː.li]	
/krɒ.kri/	crockery	[kə.rɑk.ri]	
/kæmp/	camp	[kæmp]	
/mɪlk/	milk	[miː.lək]	
/sɪlk/	silk	[siː.lək]	



7.5b) *LB2:* syllable phonotactics			
/trɒ.li/	trolley	[traː.li]	
/krɒ.kri/	crockery	[kə.rɑk.ri]	
/kæmp/	camp	[kæmp]	
/mɪlk/	milk	[mɪlk]	
/sɪlk/	silk	[sɪlk]	



The constraint rankings as shown in the Hasse diagrams in (11 a&b) were re-checked through OTSoft (version 2.5: Hayes, 2017). This method confirmed that the proposed ranking is correct for the data set for syllable phonotactics in *LB* (see Appendix VII). In the next subsection, I investigate for stress patterns whether the constraint ranking conforms to native MP phonology or displays a different grammar for *LB*.

7.4 Stress assignment in MP loanwords in *LB*: OT analysis

The generalisations for stress assignment in adaptation of MP loanwords in *LB* are the following:

11a) **Pattern A:** There is no conflict between the source and native stress assignment. Stress falls on the final superheavy syllable or in the absence of a superheavy syllable on a penult heavy syllable (with vowel lengthening if needed).		
Input (English)	LB	gloss
/rɪ.ˈfjuːz/	[rəf.ˈjuːz]	refuse
/dɪ.ˈsɪ.ʒən/	[də.ˈsiː.ʒən]	decision
/ˈlɛ.tɪs/	[ˈlæː.təs]	lettuce
11b) **Pattern B:** *LB* ignores the stress patterns of the source input (i.e. English) to conform to the native stress rules		
/ˈɡluː. kəʊz/	[ɡəl.ˈkoːz]	glucose
/ʃæm.ˈpuː/	[ˈʃæm.po]	shampoo
/ˈsɪ.lɪn.də/	[sə.ˈlæ̃n.dər]	cylinder
11c) **Pattern C:** *LB* follow the stress pattern of the source language (English) and ignores the native stress rules.		
/ˈsteɪ.dɪəm/	[əs.ˈteː.dɪəm]	stadium
/ˈvæk. siːn/	[ˈvæk. siːn]	vaccine
/ˈhɒs.pɪ. təl/	[ˈhəs.pə. ʈaːl]	hospital

The generalisations in *11a* and *11b* show that *LB* follow the native MP stress rules by permitting stress on a final superheavy or otherwise on penult syllables. However, it is also noted that *LB* display the stress pattern '*C*'. In pattern 'C', *LB* violate the native (MP) stress rules and maintain stress in the output to be faithful to the surface representation of the source word (English). This pattern (i.e. C) is absent in native MP and consequently in *ML*.

In terms of OT analysis, I will analyse the stress patterns A and B in section *7.4.1*. In these patterns (i.e. A &B), there is no conflict in the phonology of *LB* with the native MP phonology. After that in another section *7.4.2*, I will show the constraint ranking in Pattern 'C'. The presence of pattern B~C shows variation in the stress patterns within *LB*. Also note that the pattern 'C' is the only stress pattern which is absent in *ML* and it shows the difference between *ML* and *LB*.

7.4.1 Stress Pattern A & B in *LB*: OT analysis

The stress adaptation patterns A & B (shown in *11a & 11b*) in *LB* reflect the same productions as *ML*. These stress patterns (i.e. A & B) can be analysed within the native MP grammar (i.e. constraints) as shown in the tableaux (*12-13*) below. As mentioned in *11a* in '*Pattern A*', the source position of stress remains the same in the loanwords in *LB*, though in the case of a penult light syllable, the vowel is lengthened to conform to the native MP stress phonology; this is reflected in tableau (12).

12) FtBin, SWP, $NonFin_C$ >>AlignR, $IDENT_{[long\text{-}v]}$, Parse-σ

/ˈlɛ.tɪs/	FtBin	SWP	$NonFin_C$	AlignR	$IDENT_{[long\text{-}v]}$	Parse-σ
a. →(ˈlæː).təs				*	*	*
b. (ˈlɛ.tɪ)<s>	*W	*W		L	L	L
c. (ˈlæː).(tə)<s>	*W			*	L	L
d. (læː).(ˈtə)<s>	*W	*W		L	L	L
e. (lɛ).(ˈtɪs)	*W		*W	L	L	L

In tableau (12), the observed surface form in the corpus is the candidate (*12a*). The losing candidates 12 (c & d) demonstrate the violation of high ranking of FtBin (in *12c* and *12d*) and SWP (in *12d* only) over AlignR (in *12d* only) $IDENT_{[long\text{-}v]}$ and Parse-σ(*12c* and*12d*) in loanwords, as in native MP words; however, the losing candidate (*12b*) demonstrates the ranking of FtBin, SWP over Align R, $IDENT_{[long\text{-}v]}$ and Parse-σ. Lastly, the losing candidate *12e* obeys Align R, $IDENT_{[long\text{-}v]}$ and Parse-σ but at the cost of FtBin and $NonFin_C$.

Similarly, the stress patterns which are shown under pattern 'B' strictly obey native (MP) stress grammar by placing stress on superheavy final syllable otherwise on penult and thus violate the stress position of source word (English). The constraint ranking for Pattern 'B' is shown in tableau (13)

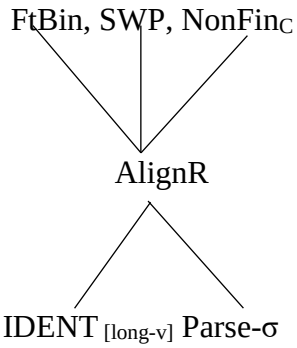
(13) {FtBin, SWP, NonFin$_C$}>>AlignR>> {IDENT $_{[long\text{-}v]}$,Parse-σ}

/ˈgluː.kəʊz/	FtBin	SWP	NonFin$_C$	AlignR	IDENT $_{[long\text{-}v]}$	Parse-σ
a.→ gəl.(ˈkoː)<z>					*	*
b. (gəl).(ˈkoː)<z>	*W			*W	L	L
c. (ˈgəl).(koː)<z>	*W				*	L
d. (ˈgə).(koː)<z>	**W	*W		*W	L	L

The tableau (13) shows that the optimal candidate *13a* satisfies all the high ranked constraints and violates low ranked constraint IDENT $_{[long\text{-}v]}$ and Parse-σ. The losing candidate *13b* obeys IDENT $_{[long\text{-}v]}$ and Parse-σ but at the cost of high ranked markedness constraint FtBin and AlignR. The losing candidate *13b* shows AlignR>> IDENT $_{[long\text{-}v]}$, Parse-σ. Similarly, losing candidates *13c* and *13d* obey IDENT $_{[long\text{-}v]}$ (in *13d* only) and Parse- σ (in *13c* and *13d*) but at the cost of high ranked markedness constraints FtBin (in *13c and 13d*) and SWP, Align R in *13d*.

Together tableaux 12& 13show that stress patterns ‘A’ & ‘B’ reflect the constraint ranking of native MP phonology in *LB*. This can be reflected in a Hasse diagram as in 14.

14) Hasse diagram of stress patterns ‘A’ and ‘B’ in *LB*



The constraint ranking as shown in the Hasse diagram in (14) was re-checked through OTSoft (version 2.5: Hayes, 2017). This method confirmed that the proposed ranking is correct for the MP loanword data set of stress patterns (A & B) in *LB* (see Appendix IX).

7.4.2 Stress Pattern 'C' in LB: OT analysis

Now, recall the Pattern 'C' which is observed in the productions of some loanwords in MP by *LB.* These examples can be analysed by introducing a loanword phonology specific constraint, MATCH Stress (Davidson and Noyer, 1997) as shown below:

15a) MATCH Stress: Stress falls on the same vowel in the source word as in the loanword.

15b) Implementation: Assign one violation mark, if the stress falls on another vowel in the loanword than it does in the source word.

The example in (16) demonstrates that in pattern 'C' MATCH Stress is highly ranked.

(16) Stress Pattern 'C' in *LB* only

/ˈvæk.siːn/	MATCH	FtBin	SWP	$NonFin_C$	AlignR	$IDENT_{[long\text{-}v]}$	Parse-σ
a.→(ˈvæk).(siː)<n>					*		
b. (væk).(ˈsiː)<n>	*W				L		
c. (væk).(ˈsiː)<n>	*W				L		

In tableau (16) the winning candidate (*16a*) satisfies all high ranked constraints (i.e. MATCH, FtBin, SWP, $NonFin_{C)}$ and thus violates the low ranked constraints Align R. However, the losing candidate *16b* satisfies a low ranked constraint Align R but at the expense of ignoring the source stress. This is a violation of the high ranked markedness constraint MATCH.

Recall that *LB* show variation within the MP loanword data where structurally parallel cases produce different outputs: [gəl.ˈ**ko**ː**z**]$_{LB}$ '*glucose*'~[ˈvæk.**si**ː**n**] $_{LB}$ '*vaccine*'. Therefore, it is not possible to derive stress patterns 'B' + 'C' within the same grammar. Pattern 'C' requires a grammar in which MATCH outranks AlignR (as shown in *16a*) to keep the source form intact, but pattern 'B' requires a grammar in which AlignR outranks MATCH to conform to the native MP phonology. I will use the same constraint ranking as shown in Hasse diagram (14) but I will add the MATCH constraint to show the variation between pattern B and C (as shown in *17a* below).

(*17*) Stress Pattern ‘B’ (including MATCH Stress)

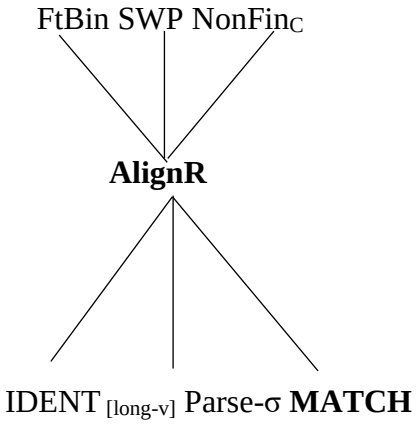
/ˈvæk.siːn/	FtBin	SWP	$NonFin_C$	AlignR	$IDENT_{[long-v]}$	Parse-σ	MATCH
a.→(væk).(ˈsiː)<n>							*
b.(ˈvæk).(siː)<n>				*W			L
c.(væk).(ˈsiː)<n>				*W			L

In tableau (*17*) the optimal candidate *18a* violates MATCH constraints. Note that in contrast to pattern ‘C’ where MATCH is high ranked (see tableau 17), MATCH is low in ranking in pattern ‘B’. The losing candidate *17b* obeys low ranked constraint MATCH by shifting stress to conform to the source form. This violates Align R in this case. Likewise, the losing candidate *17c* obey MATCH, but at the cost of high ranked constraint Align R. In the tableaux (16& 17) Align R changes place with respect to MATCH constraint.

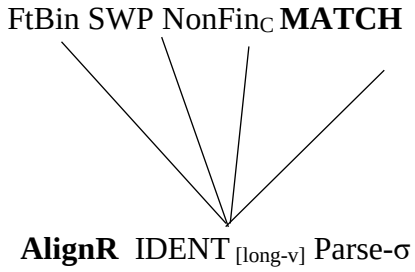
In summary, it is possible to explain the adaptation patterns (i.e. A & B) of stress in MP loanwords in *LB* through the native MP grammar and constraint ranking, FtBin, SWP, NonFinC >>AlignR>> $IDENT_{[long-v]}$, Parse-σ. However, the difference between *ML* and *LB* can be seen via tableaux (16 &17) in which there is re-ranking of constraints (i.e. MATCH and Align R) for some words. In tableau *16* for pattern ‘C’, MATCH is higher in ranking than Align R and we get MATCH>>Align R. However, in tableau 17 for Pattern ‘B’, Align R is higher in ranking than MATCH. Therefore, the constraints rank as Align R>> MATCH, which conforms to the native MP phonology. Overall, there is variation in the stress patterns (e.g. Pattern B~ Pattern C). I will split *LB* into LB1 and LB2 which show pattern B and pattern C respectively (as shown in 18) and are checked in OTSoft (see Appendix IX).

18) Variation in stress patterns

LB1=Pattern A& B



LB2=Pattern C



7.5 Chapter Summary

This chapter shows the adaptation patterns of established MP loanwords observed in the *LB* portion of the corpus. The data analysis at prosodic level (syllable phonotactics and stress) shows that *LB* have a different grammar in loanwords than native MP, and thus also different to the grammar of *ML*. For instance, in the adaptation patterns of syllable phonotactics in *LB* show an influence of foreign input, i.e. English. For example, in onset phonotactics, *LB* allow onset cluster /tr, dr/. In term of OTs, in MP *COMPLEX $_{[PLACE-ONS]}$ is a high ranked constraint. Since *LB* allow place-sharing onset clusters in word-initial position, therefore, COMPLEX ^{onset} is demoted in the *LB* grammar and DEP promoted above *COMPLEX^{ONSET} which is shown below in 19:

19) Constraint reranking for onset /tr, dr/ to show the difference between *LB* and *ML*

{*COMPLEX$_{[PLACE-ONS]}$,~~***COMPLEX^{ONSET}**~~**,...**}>>{**DEP**,…} >>***COMPLEX^{ONSET}**

The presence vs prohibition of non-homorganic coda clusters in word-final position (i.e. [sæ:.ləf]$_{LB}$ ~ [gəlf]$_{LB}$ '*gulf*') shows variation within the adaptation patterns in *LB* and divides *LB* into *LB1* and *LB2*. In terms of OT, this suggest that *LB* have two partial ranking orders as mentioned earlier (see Table 7.5**)** and I will repeat them here in (*20* a & b)

20a) *LB1:* /mɪlk / →[miː.lək]$_{LB}$ '*milk*': *COMPLEX $_{[PLACE\text{-}CODA]}$>>**DEP ,*COMPLEX^{CODA}**

20b) *LB2:* /sɪlk/ →[sɪlk]$_{LB}$ '*silk*': **DEP**>>*COMPLEX $_{[PLACE\text{-}CODA],}$ ***COMPLEX** ^{CODA}

This partial ordering of the relevant constraints only {*COMPLEX ^{CODA}, DEP} (in 20 a & b) can be used to model the fact that *LB* display a variable grammar in the adaptation patterns of syllable phonotactics in MP loanwords.

Likewise, in *LB* the stress patterns A and B show the same constraint ranking as *ML* and this constraint ranking also conforms to the native MP phonology (i.e. stress the super heavy syllables, otherwise stress falls on the penult heavy syllable). Thus, there is no conflict in stress assignment between *SL* (English) and *TL* (MP) in the patterns A and B, in *ML* and *LB.* However, variation occurs due to the presence of pattern 'C' in the stress assignment in *LB* which results from a conflict between the position of stress placement in *SL* (English) and the requirements of MP native phonology. In terms of OT, a new constraint MATCH Stress is needed to account for the adaptation pattern 'C' in MP loanwords produced by *LB.* In other words, pattern 'C' cannot be modelled within the native MP grammar (i.e. FtBin, SWP, NonFin$_C$>>AlignR>> IDENT $_{[long\text{-}v]}$, Parse-σ). Pattern '*C*' needs a new constraint MATCH. This new constraint shows that *LB* display some influence of the source language (English) in adaptation patterns (for some words) and thus MATCH>>AlignR in Pattern C cases. Consequently, *LB* violate the native MP stress rules (i.e. AlignR >>MATCH) for some words and show a different grammar than *ML* in the adaptation of stress patterns in loanwords in some cases.

In chapter 8, we investigate data from an early bilingual speaker to see whether this speaker uses the same (native) phonology or needs a different grammar to account for native MP words and loanword adaptation patterns at prosodic level.

8 Loanword Adaptations in MP: A Case Study of Early-Bilingual speaker

8.1 Introduction

This chapter investigates the loanword adaptation patterns of syllable phonotactics and stress assignment for an early-bilingual MP-English speaker (*EB* hereafter). The *EB* speaker who is presented here as a case study is a speaker who is born and raised in the UK. Therefore, her exposure and level of *L2* (English) proficiency is far higher than any another MP speaker category of *LB*. I show here that variation in the adaptation patterns between *LB* and *EB* is due to re-ranking of constraints.

This chapter is organised as follows: section *8.2* presents the patterns of syllable phonotactics and stress assignment of native MP phonology spoken by *EB*. Since *EB* was born and raised in the UK, this work is needed as a preliminary, to confirm whether the grammar of as MP spoken in the UK is the same as that of MP spoken in Pakistan. Therefore, section (*8.2*) addresses this issue. The next section *8.3* presents the generalisations for adaptation patterns of syllable phonotactics and stress assignment in loanwords produced by *EB*. Section 8.4 provides an OT analysis of the adaptation patterns of syllable phonotactics and stress assignment in *EB*. Lastly, section *8.5* shows an overview of the adaptation patterns (at prosodic level) in *EB* and then an overview of the variation in adaptation patterns present at prosodic level in the full range of MP speaker groups investigated in the current research, i.e. *ML*, *LB* and *EB*.

8.2 Data Analysis: Does *EB* (PF-04) speak MP?

In Bradford, young people of Pakistani origin speak a range of different Pakistani regional languages (or dialects) at the same time as English. Therefore, it is important to check whether *EB* definitely speaks MP, and whether her MP grammar is similar or different to that of MP as spoken in Pakistan. In the following section, I will investigate the syllable phonotactics and stress patterns of native (MP) words produced by *EB* to understand whether *EB* conforms to MP or not. This will also help to understand the phonology of loanword adaptation patterns in *EB*.

8.2.1 Syllable Phonotactics in MP as spoken by *EB*

In terms of syllable phonotactics, *EB* conforms to the native MP phonology by allowing only homorganic coda clusters in word-final position, and no word-initial onset clusters, as shown in the table (*8.1*).

Table 8.1 ***Syllable phonotactics of MP words produced by EB***

EB	**gloss**
8.1a absence of consonant clusters in word-initial position	
[pəˈrãn.tʰa]	fried bread
[bəˈraːt̪]	wedding reception
[kəˈleː.dʒi]	liver
[gəˈlaːb]	rose
[səˈraː.nə]	pillow
[zəˈlaː.bã]	socks(plural)
8.1b only homorganic coda clusters are allowed in word -final position	
[ˈpənd]	bundle
[ˈpə̃ndʒ]	five
[ˈrə̃ŋg]	colour

Recall from chapter *5* that in MP phonology as spoken in Pakistan onset consonant clusters are not allowed in word-initial position. Also, only coda consonant clusters which share the same place of articulation (i.e. homorganic) with certain combination (i.e. nasal + obstruent) are allowed. In Table *8.1*, *EB* reflects the native MP phonology by not allowing onset consonant cluster in word-initial position (as shown in *8.1a*).She only allows homorganic coda clusters in word-final position (as shown in *8.1b*). This indicate that in her MP *EB* conforms to the same grammar of syllable phonotactics as MP spoken in Pakistan. The next section shows stress assignment in MP as spoken by *EB*.

8.2.2 Stress assignment in MP: Data analysis of *EB*

We know from the previous discussion (see *chapter5*) that in MP, stress is sensitive to syllable weight, i.e. superheavy or heavy syllables, and is restricted to final two syllables of the word, thus blocking stress placement farther to the left in the word. *EB* also shows the same set of possible native (MP) stress patterns, as transcribed below.

Table 8.2 ***Stress assignment in EB***

8.2a stress the super-heavy final syllable.	
EB	**gloss**
[bə.ˈraːt̪̚]	wedding reception
[d̪ər.ˈbaːr]	shrine
[kə.ˈmiːz̪̚]	shirt
[ɡə.ˈlaːb]	rose
[sə.ˈbuːn]	soap
8.2b in the absence of (8.2a), stress falls on the penult heavy syllable otherwise	
[ˈt̪əs.bi]	rosary
[ˈən.da]	egg
[pə.ˈrãn.tʰa]	fried bread
8.2c vowels in open penult syllables are long	
[ˈsoː ti]	stick
[sə.ˈraː.nə]	pillow
[ˈʧaː.vəl]	rice

In table *8.2*, *EB* assigns stress on a final superheavy syllable (e.g. [d̪ər.ˈbaːr]$_{EB}$ '*shrine*') or penult heavy syllable (e.g. [ˈt̪əs.bi]$_{EB}$ '*rosary*'). She does not assign stress on any light syllable. She displays only long vowels in open penult syllables and does not place stress in antepenult position (e.g. [sə.ˈraː.nə]$_{EB}$ '*pillow*'). Together *8.2a - 8.2c* show that *EB* conforms to the same grammar for stress patterns as that seen in native MP phonology as spoken in Pakistan.

8.2.3 Interim Summary: MP lexical words in *EB*

Table 8.3 ***Summary: syllable phonotactics and stress patterns in MP produced by EB***

MP lexical Words	***EB***	**MP phonology (✓MP/ ×MP)**
8.3a **Syllable Phonotactics**		
Onset clusters		
word- initial position	not permitted	✓
Coda clusters		
word-final position	only homorganic clusters permitted	✓
8.3b **Stress Assignment**		

final super-heavy syllable	always stressed if present	✓
penult heavy syllable	stressed if no final super-heavy	✓
penult light syllable	never bear stress	✓

In table *8.3a*, it is shown that *EB* follows the syllable phonotactics of native MP as spoken in Pakistan by not allowing onset consonant clusters in word-initial position. She only allows coda consonant clusters which share the same place of articulation. Similarly, *8.3b* shows that *EB* assigns stress only on a superheavy final syllable. However, in the absence of superheavy final syllable, stress falls on next heavy syllable from the right end, i.e. penult heavy syllable to conform to the native MP phonology. The table 8.3 confirms that *EB* speaks MP with the same grammar as that for MP speakers in Pakistan, with respect to syllable phonotactics and stress assignment.

8.3 Loanword Adaptation patterns in *EB*

The following sections (8.3.1 & 8.3.2) will investigate loanword adaptation patterns and present the generalisations for syllable phonotactics and stress patterns produced by *EB*. Since we know that *EB* is born and raised in the UK, she has access to the native input forms of the source language (i.e. British English) for loanwords. The loanword adaptation patterns will show whether she conforms to native (MP) phonology or shows influence of the source language. The analysis of adaptation patterns will also indicate that to what extent *EB* behaves similarly or differently to *ML* and *LB* in loanword adaptation patterns, who only have access to non-native source input forms (i.e. Pakistani English).

8.3.1 Adaptation patterns of syllable phonotactics in *EB*

I will investigate whether some or all of the adaptation patterns of syllable phonotactics undergo phonotactic adjustments to conform to the native MP phonology for *EB*. This section sets up the *EB* generalisations related to syllable phonotactics of MP loanwords which will be analysed in OT in the section *8.4.1*.

8.3.1.1 Onset phonotactics in MP loanwords produced by EB

Table 8.4 ***Onset consonant clusters in MP loanwords produced by EB***

Input	***EB***	**gloss**
8.4a Onset consonant clusters are epenthesised in word-initial position (8/18)		
/pleɪt/	[pʰə.ˈleɪt]	plate
/ˈprɪn.tə/	[pə.ˈrɪn.tər]	printer
/ˈblɛn.də/	[bə.ˈlæn.dər]	blender
/ˈbreɪ.slət/	[bə.ˈrɛs.ləʔ]	bracelet
/ˈbrɒ.kə.li/	[bə.ˈrok.li]	broccoli
/ˈkrɪ.kɪt/	[ˈkir.kət]	cricket
/kriːm/	[kə.ˈriːm]	cream
/slip/	[sə.ˈlip]	slip
8.4b Onset consonant clusters are maintained in word initial position (10/18)		
/bliːtʃ/	[ˈbliːʧ]	bleach
/ˈtrɒ.li/	[ˈtrɒ.li]	trolley
/ˈdraɪ.və/	[ˈdraɪ.və]	driver
/ˈkjuː.kʌm.bə/	[ˈkjuː.kəm.bər]	cucumber
/glɑːs/	[ˈglɑːs]	glass
/ˈskuː.tə/	[ˈskuː.tər]	scooter
/spuːn/	[ˈspuːn]	spoon
/spreɪ/	[ˈspreɪ]	spray
/ˈsteɪ.dɪəm/	[ˈsteː.dɪəm]	stadium
/flɑsk/	[ˈflɑsk]	flask

Table *8.4a* shows that there are *8* out of *18* tokens where onset cluster is not maintained by *EB*. This requirement is enforced by the process of epenthesis and the vowel /ə/ is inserted between the two consonants as in [b**ə**.ˈrok.li]$_{EB}$ '*broccoli*'. One explanation for not maintaining the source onset cluster would be that onset consonant clusters are not allowed in the native language (MP) of the speaker. However, the examples in *8.4b* contradict this. There are *10* out of *18* tokens where onset consonant clusters in word-initial position are allowed, as in [ˈglɑːs]$_{EB}$ '*glass*'.

8.3.1.2 Coda phonotactics in MP loanwords produced by EB

The dataset (in table 8.5) show the generalisations for coda phonotactics in *EB.*

Table 8.5 ***Coda clusters in word-final position produced by EB***

Input	***EB***	**gloss**
8.5a homorganic coda clusters are maintained in word-final position		
/siŋk/	[siŋk]	sink
/hand/	[hand]	hand
/ɪnˈgeɪdʒ.mənt/	[əŋ.ˈgedʒ.mɪnt]	engagement
/ˈstjuː.dənt	[ˈstuː.dənt‾]	student
/ˈɛ.lɪ.fənt/	[ˈæ.li.fænt‾]	elephant
/ˈtɛ.rə.rɪst/	[ˈtæ.ra.rɪst]	terrorist
8.5b non-homorganic coda clusters are also maintained in word-final position		
/ʧiks/	[ʧiks]	cheeks
/mask/	[mask]	mask
/bɒks/	[bɒks]	box
/gɪft/	[gɪft]	gift

The pattern in *8.5a* shows that *EB* allows coda clusters which share the same place of articulation (i.e. homorganic). Recall that in native MP phonology only homorganic coda consonant clusters with certain combination (i.e. nasal +obstruent) are allowed in word- final position. *EB* does not permit only certain combinations of coda cluster, however. For example, in [ˈtæ.ra.rɪ**st**] *EB* '*terrorist*' coda cluster /st/ share the same place of articulation, i.e. alveolar, bBut, both consonants are obstruent which violate the native coda combination rule (i.e. nasal+ obstruent). Indeed, *8.5b* shows that *EB* also allows non-homorganic coda clusters and thus violates native MP phonology in loanwords more generally. The next section investigates whether MP syllable structure restrictions govern the placement of stress in loanwords produced by *EB*.

8.3.2 Stress Assignment in loanword adaptation patterns in *EB*

In this section, I will set out the generalisations of stress assignment in adaptation patterns which will be analysed within the OT framework in section *8.4.2*.

8.3.2.1 Data analysis of stress assignment in EB

There is a set of 40 English loanwords in which stress placement is analysed. The stress patterns are labelled in the same way as for *ML* and *LB*, i.e. using patterns A, B, and C. The stress pattern 'A' denotes that there is no conflict in the stress assignment between the native MP phonology and source language (English). The stress in the source form falls in a position that happens to already meet the native MP (i.e. stress on the superheavy syllable or in the absence of a superheavy syllable the penult is stressed). Pattern 'B' also

meets the native MP stress rules by ignoring the position of stress in the source form of the word (English). Lastly, Pattern 'C' shows that stress falls on the same syllable which is stressed in the input form (English), but it breaks the native MP stress rules.

Table 8.6 ***Stress assignment in MPL produced by EB***

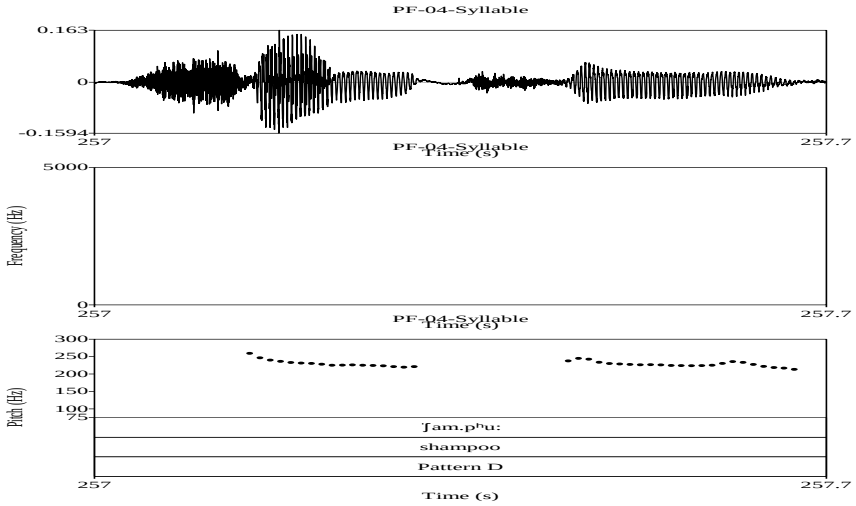
	Input	***EB***	**gloss**
8.6a	**Pattern 'A'** (25/40): stress in SL (English) already follows MP phonology		
	/bəˈluːn/	[bəˈluːn]	balloon
	/ˈbɑː.skɪt/	[ˈbas.ki]	basket
	/ˈpaɪ.lət/	[ˈpaɪ.lə]	pilot
	/dʒɪˈrɑːf/	[dʒəˈraːf]	giraffe
	/ˈdɒk.tə/	[ˈdak.tər]	doctor
	/ˈdraɪ.və/	[ˈdraɪ.və]	driver
	/ˈskuː.tə/	[ˈskuː.tər]	scooter
	/ˈlaɪ.brɪ/	[ˈlaɪ.brɪ]	library
	/ˈbrɒ.kə.li/	[bəˈrɒk.li]	broccoli
	/ˈblɛn.də/	[bəˈlæn.də]	blender
	/ˈkrɪ.kɪt/	[ˈkir.kət]	cricket
8.6b	**Pattern 'C'** (14/40): SL stress wins by ignoring native (MP) stress rules		
	/ˈbeɪ.bi	[ˈbe.bi]	baby
	/ˈle. tɪs/	[ˈlæ.təs]	lettuce
	/ˈtɛ.rə.rɪst/	[ˈtæ.ra.rɪst]	terrorist
	/ˈæm.bjə.ləns/	[ˈam.bu.ləns]	ambulance
	/ˈsɪ.lɪn.də/	[ˈsə.lɪn.dər]	cylinder
	/ˈhɒs.pɪ.təl/	[ˈhəs.pə.ɾaːl]	hospital
	/ˈsteɪ.dɪəm/	[ˈsteː dɪəm]	stadium

The examples in *8.6a* (above) show that there are *25* out of *40* tokens where stress is realised as Pattern 'A'. Here *EB* satisfies both native MP phonology and also the position of stress in the source form (English). For example, in the *SL* (English), stress is assigned already either on the superheavy final syllable as in [bəˈluːn]$_{EB}$ '*balloon*' or on the penult heavy syllable as in [ˈbas.ki] $_{EB}$ '*basket*'. However, in some cases *EB* does some structural adjustments in a syllable to conform to the native phonotactics. For instance, an epenthetic vowel breaks up the potential onset cluster in [bəˈrɒk.li] $_{EB}$ '*broccoli*' in word-initial position, and the /k/ is syllabified in the coda position of preceding syllable, which serves two purposes: this makes the penult syllable heavy, so it can bear stress, and it avoids

creation of an onset consonant cluster, to meet the native syllable phonotactics. As a result, *EB* assigns stress to the same syllable as in the input (English) but no violation of native MP phonology occurs either.

There was one token in the data where *EB* realises a word according to pattern '*B*', i.e. [ˈʃam.pʰuː] '*shampoo*'. In this one token *EB* ignores the stress pattern of the source form and instead conforms to the native MP phonology.

Figure 8.1 **Spectrogram and pitch trace of the one *EB* token of pattern 'B'**



The token [ˈʃam.pʰuː] '*shampoo*' can be seen in *Figure 8.1* which shows the pitch trace and spectrogram. Finding phonological variation in only one token can be considered as potentially due to frequent usage of this particular word in native MP used by *EB.* At the same time, having only one example in the whole data set suggests Pattern B should not be generalised as a stress pattern that EB uses (i.e. it is not a productive pattern).

On the other hand, there are 14 out of 40 tokens where *EB* realises stress Pattern '*C*', ignoring the native MP phonology with respect to syllable weight and position. For instance, in the token [ˈtæ.ra.rɪst]$_{EB}$ '*terrorist*' stress falls on the light antepenult syllable to conform to the stress assignment of English source form and thus violates the native MP stress rule.

8.3.3 Interim Summary: Syllable Phonotactics in *EB*

An overview of syllable phonotactics shows that *EB* varies from *LB* by allowing more types of onset clusters and all types of non-homorganic coda clusters at syllable margins (i.e. word-initial and final position). In this sense *EB* behaves in a more English-like manner than *LB.* It also differs from *ML* who strictly conforms to the native MP

phonology by not allowing any type of onset clusters and illicit coda clusters in word-initial and final position respectively. In the stress assignment, we know from the previous discussions (see chapter 6 & 7) that *ML* conforms to the native MP phonology by allowing the stress patterns '*A*+*B*'. In contrast, *LB* allows an additional stress pattern 'C' which violates the native stress rules, and thus LB have '*A*+*B*+*C*'. Contrary to both *ML* and *LB*, *EB* has only the stress patterns *'A+C'* which means that *EB* is faithful at all times to the source form and thus violates the native (MP) stress rules, when necessary. This is further evidence that *EB* behaves in a more English-like manner than *LB.*

8.4 Syllable Phonotactics in EB: OT analysis

In the following section, I will analyse the generalisations of syllable phonotactics within OT framework. The OT analysis will model the grammar of *EB* and will show whether *EB* needs a native MP phonology or another grammar to account for the loanword adaptation patterns.

8.4.1 OT analysis of EB Onset phonotactics

Based on the generalisations from the data set (as shown in table 8.4) *EB* shows variation in the adaptation patterns of onset phonotactics. There are some tokens where *EB* breaks up onset clusters by inserting an epenthetic vowel into the cluster to conform to the native (MP) grammar. This can be seen in tableau 1 (below).

1) {*COMPLEX $_{[PLACE-ONS]}$, *COMPLEX ^{ONSET}, MAX, IDENT $_{[PLACE]}$}>> DEP

/ˈbrɒ.kə.li/	*COMPLEXONSET	*COMPLEX[PLACE-ONS]	MAX	IDENT[PLACE]	DEP
a.→[bə.ˈrok.li]					*
b. [ˈbro.kə.li]	*W	*W			L
c. [ˈro. kə.li]	*W	*W	*W		L
d. [ˈbro. tə.li]	*W	*W	*W	*W	L

EB permits homorganic onset clusters /tr, dr/ in word-initial position and thus behaves like *LB* which is shown in tableau 2.

2) {MAX, IDENT $_{[PLACE]}$, DEP}>>*COMPLEX ^{ONSET}, *COMPLEX $_{[PLACE-ONS]}$

/bliːtʃ/	MAX	IDENT$_{[PLACE]}$	DEP	*COMPLEX ^{ONSET}	*COMPLEX $_{[PLACE-ONS]}$
a.→ [bliːtʃ]				*	*
b. [bə.liːtʃ]			*W	*	*
c. [piːtʃ]	*W	*W		L	L

Tableau 2 shows that *EB* allows homorganic onset cluster (i.e. /tr/), therefore, there is no insertion of an epenthetic vowel takes place to break the onset cluster.

There is a partial ordering of the relevant constraints (i.e.*COMPLEX^{ONSET}, DEP) and we get DEP as a high ranked constraint and *COMPLEX^{onset} is demoted as a low ranked constraint (i.e. DEP>>*COMPLEX^{ONSET}).

Together tableau 1 & 2 show the partial ordering of the mutually unranked constraint set, i.e. {*COMPLEX^{ONSET}, DEP} and we get two partially ranked constraint orders which I will repeat here again in 3a&b:

3) *EB*=: Onset phonotactics

a) /ˈbrɒ.kə.li/→[bə.ˈrok.li]$_{EB}$:

{***COMPLEX ^{ONSET}**,*COMPLEX $_{[PLACE-ONS]}$, MAX, IDENT $_{[PLACE]}$}>>

DEP

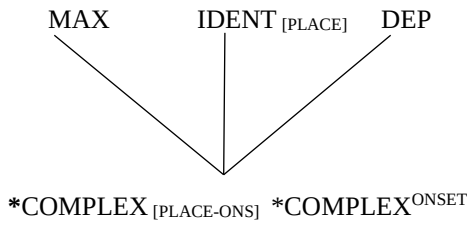
b) //bliːtʃ/→[bliːtʃ]$_{EB}$:

{MAX, IDENT $_{[PLACE]}$, **DEP}**>>***COMPLEX ^{ONSET},***COMPLEX $_{[PLACE-ONS]}$

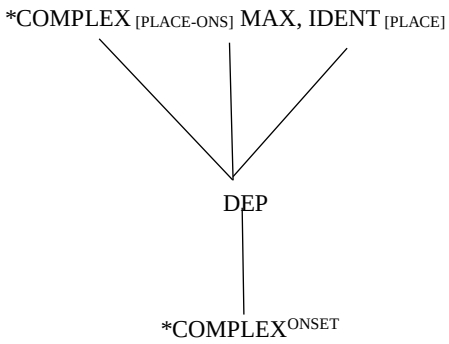
The constraint rankings in 3 (a & b) show that *EB* behaves for onsets like *LB* does for codas, in displaying a variable grammar which varies between native MP phonology and the source language (English) which is shown in the Hasse diagrams in 4a and 4b respectively:

4) Onset Phonotactics in *EB*

4a) onset phonotactics in *EB*



4b) onset phonotactics in *EB*



8.4.2 Coda phonotactics in *EB*: OT analysis

Contrary to *LB*, *EB* does not show any variation in coda phonotactics but allows all types of coda clusters including non-homorganic coda clusters. She violates the native MP phonology by maintaining non-homorganic clusters in word-final position (as shown in table

8.5b). In comparison with *LB* and *ML*, she has a different grammar which is shown in tableau 5:

(5) Coda phonotactics in *EB:*

{MAX, IDENT $_{[PLACE]}$, DEP}>> {*COMPLEX $_{[PLACE-CODA]}$, *COMPLEX ^{CODA}}

/sılk/	MAX	IDENT$_{[PLACE]}$	DEP	*COMPLEX $_{[PLACE-CODA]}$	*COMPLEX ^{CODA}
a. →[sılk]				*	*
b. [siː.lək]			*W	L	L
c. [sıl]	*W			L	L
d. [iː.lət]	*W	*W	**W	L	L

The winning candidate 5a shows that in *EB* there is a re-ranking of constraints; the faithfulness constraints are promoted to be higher ranked than the markedness constraints. This shift in constraint ranking between markedness and faithfulness suggest that *EB* conforms to the phonotactics of the source form and thus violates the native MP phonology. Now, in tableau 6, I will show the full constraint ranking of syllable phonotactics in *EB*.

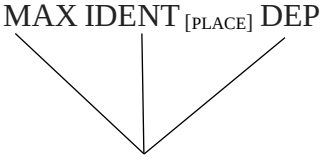
6) Overall ranking argument of syllable phonotactics in *EB*:

{MAX, IDENT $_{[PLACE]}$, DEP}>> {*COMPLEX $_{[PLACE-ONS]}$, *COMPLEX^{ONSET}, *COMPLEX $_{[PLACE-CODA]}$, *COMPLEX ^{CODA}}

/flɑsk/	MAX	IDENT$_{[PLACE]}$	DEP	COMPLEX$_{[PLACE-ONS]}$	*COMPLEX^{ONSET}	*COMPLEX$_{[PLACE-CODA]}$	*COMPLEX^{CODA}
a.→[flɑsk]				*	*	*	*
b. [fə.lɑsk]			*W	L	L	*	*
c. [fə.lɑː.sək]			**W	L	L	L	L
d. [fə.lɑːs]	*W		*W	L	L	L	L
e. [fə.lɑːz]	*W	*W	*W	L	L	L	L

The tableau (6) shows that the winning candidate *6a* obeys all high ranked constraints MAX, DEP and IDENT $_{[PLACE]}$ but at the cost of allowing non-homorganic consonant clusters at the syllable margins. This is a violation of *COMPLEX $_{[PLACE-ONS]}$, *COMPLEX^{ONSET}, *COMPLEX $_{[PLACE-CODA]}$ and *COMPLEX^{CODA} constraints. This tableau (6) shows the overall ranking for syllable phonotactics in *EB* where faithfulness constraints are promoted as high ranked constraints and markedness constraints are demoted as low ranked constraints. The demotion of markedness constraints shows an influence of source language in *EB* which I will show in a Hasse diagram as in (7) below:

7) Hasse diagram Constraint ranking of syllable phonotactics in *EB*



*COMPLEX $_{[PLACE-ONS]}$ *COMPLEX^{ONSET} *COMPLEX $_{[PLACE-CODA]}$ *COMPLEX ^{CODA}

Now recall the adaptation patterns of syllable phonotactics in *LB* where there is a partial ordering of constraints which I will repeat here in (8).

8) Constraint ranking of syllable phonotactics in *LB*

*COMPLEX $_{[PLACE\text{-}ONS]}$, MAX, IDENT $_{[PLACE]}$>>DEP>>*COMPLEX^{ONSET}, *COMPLEX $_{[PLACE\text{-}CODA]}$, *COMPLEX^{CODA}

By comparing (7) with (8), in *EB*, the adaptation patterns of syllable phonotactics are more faithful to the source language which is shown by an extensive reranking of the constraints. Thus, *EB* display a different grammar in loanwords which shows more an English-like pronunciation than *LB*. The proposed ranking for syllable phonotactics in *EB* (as shown in tableau 6) was verified through OTSoft (version2.5: Hayes, 2017) and this method confirms the proposed ranking of syllable phonotactics for MP loanwords in *EB* (see Appendix VII). Now in the following subsection, I will investigate the adaptation patterns of stress assignment based on the generalisations drawn above (see section 8.3.2.1). The OT analysis will show whether the adaptation patterns can be explained using the native MP grammar or whether they also need a different grammar in *EB*.

8.4.3 Stress Assignment in *EB*: OT analysis

As we know from section (8.3.2.1) *EB* violates the native stress rules by allowing stress pattern 'C'. *EB* varies from *ML* and *LB* in a sense that it does not display stress pattern 'B' (except for one token which we set aside). Note that pattern 'B' stands for the stress rules which obey the native (MP) stress rules. We know that in MP, stress is sensitive to syllable weight, i.e. stress the superheavy or heavy syllables and it is restricted to the final two syllables of the word thus blocking stress placement farther to the left in the word. The presence of Pattern C violates the native MP stress rules. In terms of OT, it shows that in *EB* a loanword specific constraint, MATCH Stress, is a high ranked constraint which is shown in tableau 9.

9) {MATCH, FtBin, NonFin$_{C,}$ IDENT $_{[long\text{-}v]}$} >> **{**SWP, Align R, Parse-ϭ}

/ˈhʊs.pɪ.təl/	MATCH	FtBin	NonFinC	IDENT [long-v]	SWP	Align R	Parse-ϭ
a. →(ˈhəs).pə. t̪aːl						*	**
b. həs.pə.(ˈt̪aː)<l>	*W			*W		L	**
c.(həs).(pə).(ˈt̪aːl)	*W	**W	*W	*W		L	L

In tableau (9), the optimal candidate *9a* satisfies all high ranked constraints, i.e. MATCH, FtBin, NonFin$_C$, IDENT $_{[long\text{-}v]}$ and violates low ranked constraints, i.e. Align R and Parse-ϭ. However, the losing candidates *9b* and 9c obey low ranked constraints Align R (in *9b* and *9c*) and Parse-ϭ (in *9c* only) but at the cost of high ranked constraint MATCH (in 9b,9c), FtBin (in *9c* only) and IDENT$_{[long\text{-}v]}$ (in *9b* and *9c*). Similarly, we know that *EB* violates the native MP stress rule by ignoring the SWP constraint, therefore we need another tableau (10) to show the full constraint ranking.

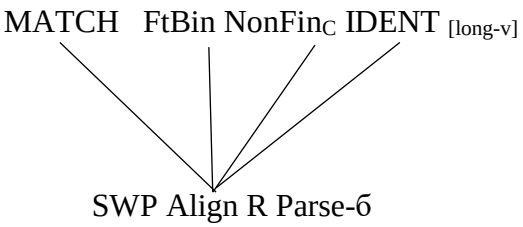
10) {MATCH, FtBin, NonFin$_{C,}$ IDENT $_{[long\text{-}v]}$} >> **{**SWP, Align R, Parse-ϭ}

/ˈlɛ.tɪs/	MATCH	FtBin	NonFin$_C$	IDENT$_{[long\text{-}v]}$	SWP	AlignR	Parse-σ
a. →(ˈlɛ.tɪ)<s>					*		
b. (lɛ).(ˈtɪs)	*W	*W	*W		L		
c. (ˈlæː).(tə)<s>		*W		*W	L	*	
d. (ˈlæː).təs				*W	L	*	*

The winning candidate *10a* shows that MATCH, FtBin, NonFin$_C$ and IDENT $_{[long\text{-}v]}$ are high ranked constraints over SWP. The losing candidate *10b* obeys SWP but at the expense of high ranked constraints MATCH, FtBin and NonFin$_C$. Similarly, the losing candidates *10c* and *10d* obey SWP but violate high ranked constraints FtBin (in *10c* only) and IDENT $_{[long\text{-}v]}$ (in *10c* and *10d*).

The overall picture of stress adaption of English loanwords in MP is shown in a Hasse diagram as in 11:

11) Hasse diagram of stress system in *EB*



As we know that *EB* realises only two stress patterns, i.e. *A, C*. It means that *EB* displays a different grammar to be faithful to the source (English) than *LB* and *ML*. The proposed ranking for stress assignment in *EB* (as shown in Hasse diagram 11) was verified through OTSoft (version2.5: Hayes, 2017) which confirms the proposed ranking of stress system for MP loanwords in *EB* (see Appendix IX).

8.5 Chapter Summary: Loanword adaptation patterns in *EB*

The following table *8.7* shows the loanword adaptation patterns of syllable phonotactics and stress patterns and present the comparison among *ML, LB, and EB.*

Table 8.7 ***Syllable phonotactics and stress assignment in MP loanwords produced by EB***

Adaptation patterns	***ML***	***LB***	***EB***
Onset phonotactics	*MP*	*MP (except /tr,dr/)*	*MP~SL*
Coda phonotactics	*MP*	*MP~SL*	*SL*
Stress patterns	A+B	A+B+ **C**	A+ **C**

Table *8.7* shows that there are differences in the adaptation patterns of syllable phonotactics and stress assignment among *ML*, *LB*, and *EB*. The first column in Table (8.7) shows that *ML* strictly follow the native MP phonology in the adaptation patterns of syllable phonotactics and stress patterns in MP loanwords. Next appears the *LB* who have greater exposure to the source language (English) than *ML*. *LB* also do not allow onset clusters except /tr,dr/. However, they (*LB)* show variation in the adaptation patterns of coda phonotactics by permitting some non-homorganic coda clusters but not others. In the same vein, they (*LB*) permit an illicit stress pattern 'C' in some loanwords, but not others, and thus

display a different grammar from *ML*. Since *LB* do not always violate the native MP phonology, they therefore show a variable grammar which is modelled via partial ordering of constraints.

Lastly, *EB* behaves differently than *LB*. In syllable phonotactics, *EB* allows more types of onset clusters in word-initial position. Similarly, all non-homorganic coda clusters are permitted in word-final position. In onset phonotactics, unlike *LB* (which allows homorganic onset clusters, i.e. /tr, dr/ only), there is an inconsistency in adaptation patterns in onset clusters by *EB*. For example, [pʰ**ə**.ˈleɪt]$_{EB}$ '*plate*' ~ [ˈ**bl**iːtʃ]$_{EB}$ '*bleach*' contain the same syllable shape (i.e. CCVVC) in the source word but the onset cluster is broken up in the first instance (i.e. [pʰ**ə**.ˈleɪt]$_{EB}$) whereas it is maintained in the latter ([ˈ**bl**iːtʃ]$_{EB}$). In terms of OT, there is a reranking of constraints in syllable phonotactics which shows *EB* has a different overall grammar than *LB*, and also displays a variable grammar for onsets which is again modelled via partial ordering of constraints.

In the next chapter, I will summarize the main findings of all the chapters and discuss what we learn from the overall patterns of adaptation patterns across different speaker groups and reflect on the modelling of this variation in OT with some theoretical discussion.

9 Discussion

9.1 Introduction

This chapter summarizes the main findings of the thesis. The aim of this thesis is to account for the phonological adaptation of English loanwords in Mirpur Pahari to better understand Mirpur Pahari phonology and contribute to phonological theory. The phonological variations in the adaptation patterns of MP loanwords at prosodic level are modelled within OT. The central tenet of the thesis is that phonological variation at intraspeaker level can be modelled within the phonologically informed production model using the OT framework. In this chapter we revisit the role of orthographic influence in the loanword adaptation patterns is as a potential factor to explain restrictions on the range of observed grammars in comparison to the full set of possible grammars predicted in a factorial analysis of MP loanword adaption patterns for syllable phonotactics and stress assignment.

This chapter is organised as follows. Section 9.2 presents a summary of the main findings of the study, and section 9.3 reports the results of a factorial typology analysis of the OT constraints used in the current work to capture the scope of variation observed in MP loanwords. The orthographic influence in loanword phonology is mentioned as a potential limiting factor in the adaptation patterns. Section 9.4 draws the main conclusions by setting out the main contributions, significance and also the limitations of the study.

9.2 Summary of basic findings: Effect of bilingualism

In MP phonology, consonant clusters are not allowed at onset or coda position except for homorganic coda clusters in a certain combination, i.e. nasal + obstruent in word-final position (e.g. [kənd] $_{MP}$ '*backbone*', [bəŋg] $_{MP}$ '*bangle*'). In loanword adaptation patterns of syllable phonotactics (see chapter 6, 7 & 8), *ML* (monolinguals) do not allow onset clusters in word-initial position (e.g. [tə̲.raː.li] $_{ML}$ '*trolley*'). Only homorganic coda clusters are allowed in word-final position in *ML* (e.g. [kæmp] '*camp*') and non-homorganic coda clusters in word-final position are not allowed (e.g. [miː.lək]$_{ML}$ '*milk*' [siː.lək]$_{ML}$ '*silk*'). Consonant clusters at both syllable margins (onset and coda) are banned and repaired via the process of epenthesis. Thus, the adaptation patterns in the corpus of *ML* are restricted throughout by the constraints of native (MP) phonology.

In contrast, *LB (*late bilinguals*)* do not allow most onset clusters but permit /tr, dr/ in word-initial position (e.g. [**tr**aː.li]$_{LB}$ '*trolley*'). In terms of coda phonotactics, there is some variable adaptation of structurally parallel coda clusters within *LB* (e.g. [miː.lək]$_{LB}$ '*milk*', [sɪlk]$_{LB}$ '*silk*'). In comparison with *LB, EB* (the early bilingual) maintains even more types of onset clusters in word-initial position on the surface representation (e.g. [**tr**ɒ.li] $_{EB}$

'*trolley*', [**bl**iːtʃ]$_{EB}$ '*bleach*', [**gl**ɑːs]$_{EB}$ '*glass*'), though some structurally parallel onset clusters are broken up in loanwords (e.g. [pʰə.ˈleɪt]$_{EB}$ '*plate*'). Note that there do not seem to be specific types of onset clusters in *EB* which are banned or accepted, rather it seems to be free variation. For codas, *EB* goes farther away from MP and allows all types of coda clusters permitted in English and thus violates the native MP phonology (e.g. [mɪlk]$_{EB}$ '*milk*' [sɪlk]$_{EB}$ '*silk*', [ʃɪft] $_{EB}$ '*shift*').

The presence of non-native onset clusters and variable adaptation of coda clusters in *LB.* and the presence of all types of coda clusters in *EB* are clearly related to the key external factor of level of bilingualism, since both speaker categories (*LB* and *EB*) have more exposure to the source language (English) than *ML* do.

Overall, however, we observe a restriction on the adaptation of syllable phonotactics, namely that MP speakers show an onset-coda asymmetry. Although the rate of modification of clusters varies across all three speaker categories (*ML*, *LB* and *EB*), within each speaker group onset clusters are always modified more (i.e. are more restricted and less English like) than coda clusters.

Table 9.1 ***the adaptation patterns of syllable phonotactics in MP loanwords***

Onset clusters		**Coda Clusters**
MP	Very restricted (i.e. none)	Partially allowed (homorganic)
ML	Very restricted (i.e. none)	Partially allowed (homorganic)
LB	Partially allowed (only homorganic /tr,dr/)	Partially allowed (variable adaptation)
EB	Partially allowed (variable adaptation)	Unrestricted (English-like)

Table (9.1) shows that in MP loanwords, the extent of modification of onset clusters is always more than in coda clusters. The corpus data of adaptation patterns of all categories of speakers (*ML*, *LB* and *EB*) show that (almost) all onset clusters are repaired at least some of the time through the process of epenthesis whereas coda clusters are less modified (*LB*) or even not modified at all (*EB*) in the surface representation (output). Thus, the repair process (epenthesis) which is used to modify illicit clusters at syllable margins always affects one edge (onset) more than the other (coda) and thus shows consistent onset-coda asymmetry at syllable margins in MP loanwords.

This onset-coda cluster asymmetry is reminiscent of the presence of phonological universals of syllable markedness and appears to constrain the effect of bilingualism on variation in the adaptation patterns in MP loanwords. The goal of this thesis is to model loanword phonology in OT; the final step is thus to check whether OT captures this onset-coda asymmetry across observed grammars. In the next section, I discuss how a factorial

typology analysis in OT predicts all possible and impossible grammars using the proposed constraint set and argue that it captures the onset-coda asymmetry by conforming to the grammars predicted by the OT analysis of syllable phonotactics in MP loanwords.

9.3 Factorial Typology of MP loanwords

According to Prince & Smolensky (1993/2004), constraints (CON) are universal and constraint rankings (permutations) make one language different from other. A factorial typology is therefore an important feature of OT because it shows every permutation of CON, each of which is a possible grammar predicted by some constraint set. In the current study, the purpose of performing a factorial typology of constraint sets is to develop predictions about all the possible and impossible grammars of MP loanword adaptation and compare these grammars to the rankings (or grammars) which I have shown in the MP loanwords in the previous chapters (see chapter 6, 7 & 8). For the factorial typology, I have used the output of OT Soft, produced as a by-product of checking the constraint ranking of each grammar of MP loanwords mentioned in the previous chapters (see chapter 6, 7 & 8). OTSoft computes the factorial typology over the relevant constraint set and reports all possible input-output mappings for the MP loanwords predicted by the analysis.

9.3.1 Factorial Typology for syllable phonotactics

In the investigation of factorial typology of syllable phonotactics of MP loanwords, I ran OTSoft over the set of seven constraints which are used in the previous chapters 6, 7, 8 (i.e.*COMPLEX^{ONSET}, *COMPLEX $_{[PLACE\text{-}ONSET],}$ MAX, IDENT $_{[PLACE],}$ DEP, *COMPLEX^{CODA}, *COMPLEX $_{[PLACE\text{-}CODA]}$).With 7 constraints, there are 7! =5040 logically possible rankings. OTSoft finds 27 possible grammars in the output sets (grammars) shown in table (9.2). Note that in Table (9.2), I have only mentioned how the input words are produced as an output; the constraint rankings for each output set/grammar can be seen in Appendix (XII).

Table 9.2 ***Factorial typology of MP loanwords in OT software***

Inputs	/kæmp/ ‘*camp*’	/mɪlk/ ‘*milk*’	/krɒ.kri/ ‘*crockery*’	/trɒ.li/ ‘*trolley*’	/sɪlk/ ‘*silk*’	*Possible grammars in MPL*
Output sets						
a.	[kæmp]	[miː.lək]	[kə.rak.ri]	[tə.raː.li]	[siː.lək]	*=ML*
b.	[kæmp]	[miː.lək]	[kə.rak.ri]	[traː.li]	[siː.lək]	*=LB*
c.	[kæmp]	[miː.lək]	[kə.rak.ri]	[traː.li]	[sɪl]	
d.	[kæmp]	[miː.lək]	[kə.rak.ri]	[raː.li]	[sɪl]	
e.	[kæmp]	[miː.lək]	[kra.kri]	[traː.li]	[siː.lək]	
f.	[kæmp]	[miː.lək]	[kra.kri]	[traː.li]	[sɪl]	
g.	[kæmp]	[miː.lək]	[kra.kri]	[raː.li]	[sɪl]	
h.	[kæmp]	[mɪlk]	[kə.rak.ri]	[tə.raː.li]	[sɪlk]	
i.	[kæmp]	[mɪlk]	[kə.rak.ri]	[traː.li]	[sɪlk]	*=LB*
j.	[kæmp]	[mɪlk]	[kə.rak.ri]	[traː.li]	[sɪl]	
k.	[kæmp]	[mɪlk]	[kə.rak.ri]	[raː.li]	[sɪlk]	
l.	[kæmp]	[mɪlk]	[kə.rak.ri]	[raː.li]	[sɪl]	
m.	[kæmp]	[mɪlk]	[kra.kri]	[traː.li]	[sɪlk]	*=EB*
n.	[kæmp]	[mɪlk]	[kra.kri]	[traː.li]	[sɪl]	
o.	[kæmp]	[mɪlk]	[kra.kri]	[raː.li]	[sɪlk]	
p.	[kæmp]	[mɪlk]	[kra.kri]	[raː.li]	[sɪl]	
q.	[kæm]	[miː.lək]	[kə.rak.ri]	[tə.raː.li]	[siː.lək]	
r.	[kæm]	[miː.lək]	[kə.rak.ri]	[traː.li]	[siː.lək]	
s.	[kæm]	[miː.lək]	[kə.rak.ri]	[traː.li]	[sɪl]	
t.	[kæm]	[miː.lək]	[kə.rak.ri]	[raː.li]	[sɪl]	
u.	[kæm]	[miː.lək]	[kra.kri]	[traː.li]	[siː.lək]	
v.	[kæm]	[miː.lək]	[kra.kri]	[traː.li]	[sɪl]	
w.	[kæm]	[miː.lək]	[kra.kri]	[raː.li]	[sɪl]	
x.	[kæm]	[mɪlk]	[kə.rak.ri]	[traː.li]	[sɪl]	
y.	[kæm]	[mɪlk]	[kə.rak.ri]	[raː.li]	[sɪl]	
z.	[kæm]	[mɪlk]	[kra.kri]	[traː.li]	[sɪl]	
zz.	[kæm]	[mɪlk]	[kra.kri]	[raː.li]	[sɪl]	

Note. *Red shading indicates an excluded output set involving deletion of segments at syllable margins (i.e. onset and coda). Grey shading shows remaining grammars which are not observed in MP loanword corpus*

Table 9.2 shows 27 re-rankings which are predicted to yield possible grammars or output sets. When we look at the output sets closely, we find that four grammars are the ones observed in MP loanwords in the thesis, as shown in the output sets in (a), (b), (i) and (m).These output sets confirm the same grammars as shown in previous chapters (6, 7 & 8) for syllable phonotactics. For example, the output set (a) has the same patterns which are shown in *ML*: onset and non-homorganic coda clusters are banned in word-initial and -final position respectively. The output sets (b) and (i) modify the marked structures in onset position by banning onset clusters (except homorganic onset cluster /tr/) like *LB* and show the variation in the adaptation patterns of coda clusters in word-final position between *LB1* and *LB2*. According to my intuitions, as represented in the corpus after grammaticality judgement checks with other native speakers, *LB* speakers do show variation in coda phonotactics and display the variable grammar which is predicted in the grammars in (b) and (i). The output set (m) maintains all the marked structures (onset and coda clusters) and shows the constraint ranking which was predicted for *EB* (see chapter 8). These four grammars (a, b, i, m) predict the same grammars which are shown in the thesis data.

Now, we turn to the other *23* rankings which are shown in table (9.2). We can see that out of these 23 output sets, there are *21* output sets which show deletion of some segments either in onset or coda position, which are not observed in the MP loanword data. The corpus data is based on my intuitions and what I hear, and I have not heard MP speakers deleting segments in loanwords (i.e. to repair consonant clusters at syllable margins). When I did grammaticality judgement checking, no one said to me that they would rather delete segments. Similarly, in the data collection with *EB*, *EB* never deleted any segments at syllable margins. There were a few cases of single coda deletion (e.g. /breɪ.slət/→ [breɪ.slə]$_{EB}$ '*bracelet*'), but no cases of cluster simplification at syllable margins were found in the *EB* data.

Why deletion is completely ruled out in the 21 rankings in MP loanwords? It could be that some kind of faithfulness constraint is missing, which is universally highly ranked. The point of the OTSoft approach is that phonology cannot rule out segment deletion as a loanword repair strategy, because if it is part of phonology, it will be reranked (assuming the proposed constraint set). Therefore, it must be an external factor which is not part of the OT analysis or the phonology which rules out deletion in MP loanwords. The MP loanwords analysed are real words, not nonsense words, and I suggest that it is probably the orthography which is playing a role in the adaptation patterns. That is, MP speakers heavily rely on Urdu orthography while learning English in schools. They have seen MP loanwords either in Urdu

or English; therefore, they prefer to be faithful to the orthography. For example, a word such as '*driver*' is written in Urdu script as ڈرائیور (transliterated as <draivar>) in which each grapheme is represented as shown below

(1) /driver/→ ڈرائیور
<d> →ڈ
<r> →ر
<ai> →اءي (alif+ya)
<v> →و
<r> →ر

This example shows that an MP speaker who wants to make sure each of the letters in the target word is phonetically represented or pronounced is likely to preserve both /d/ and /r/ in word-initial position. Thus, I suggest that these *21* rankings are ruled out in MP loanwords due to an external factor (orthography) which does not favour the deletion of segments.

This leaves two output sets (e) & (h) which OT predicts as possible grammars, but which are not observed in the thesis data; these are repeated in table 9.3 (below).

Table 9.3 ***possible grammars in LB but not observed in LB corpus data***

Inputs	/kæmp/ '*camp*'	/mɪlk/ '*milk*'	/krɒ.kri/ '*crockery*'	/trɒ.li/ '*trolley*'	/sɪlk/ '*silk*'	Onset-coda asymmetry
Output sets						
e.	[kæmp]	[miː.lək]	[kra.kri]	[traː.li]	[siː.lək]	×
h.	[kæmp]	[mɪlk]	[kə.rak.ri]	[tə.raː.li]	[sɪlk]	✓

OT predicts one grammar in the rankings where the onset-coda asymmetry is violated. Output set (e) contradicts the onset-coda asymmetry in that it maintains all onset clusters but only homorganic codas. The output set (h) allows all coda clusters but breaks all onset clusters by vowel insertion.

The output (h) is consistent with the onset-coda asymmetry and plausibly falls in the continuum of *LB* speech. My intuitions are that *LB* speakers could manage this output set (h), which did not occur to me before, but it is arguably a part of a continuum of variation in which they are managing non-homorganic coda clusters but not (yet) the onset clusters; we could label it as LB_0. Thus, the output set (h) which is predicted by OT is plausibly possible and could be related to the speaker's competence or level of exposure to the target language. In contrast, my intuition is that the output set (e) is not plausible. It sounds unnatural in MP

loanwords to retain onset clusters while breaking up coda clusters; the more likely possibility would be the other way around, i.e. *LB* speakers might manage non-homorganic coda clusters, but not maintain the onset clusters.

The coda-onset asymmetry is modelled in OT by the fact that there is a constraint ONSET which penalises the presence of onsets and its corresponding coda constraint is the reverse of it, i.e. NOCODA which penalises the absence of codas; the asymmetry is hardwired into OT (Prince & Smolensky, 1993/2004). Thus, OT models this language universal within its constraint set and it is shown in the definition of these constraints (ONSET, NOCODA). Therefore, I reran the OTSoft analysis by adding the basic onset and coda constraints in to the existing constraints set of the syllable phonotactic constraints.

With 9 constraints, there are 9! =362880 logically possible rankings. In these rankings, there are 35 different unique output sets which are the different predicted possible grammars as shown in table (9.4). Here in the table, I only mention the possible words produced as an output; the constraint rankings can be seen in appendix XIII.

Table 9.4 ***Factorial typology of MP loanwords with 9constraints***

Inputs	/kæmp/ ‘*camp*’	/mɪlk/ ‘*milk*’	/krɒ.kri/ ‘*crockery*’	/trɒ.li/ ‘*trolley*’	/sɪlk/ ‘*silk*’	***Possible grammars in MP loanwords***
Output sets						
	[kæmp]	[miː.lək]	[kə.rak.ri]	[traː.li]	[siː.lək]	=LB_1
	[kæmp]	[miː.lək]	[kə.rak.ri]	[tə.raː.li]	[siː.lək]	=*ML*
	[kæmp]	[miː.lək]	[kra.kri]	[traː.li]	[siː.lək]	
	[kæmp]	[miː.lək]	[kra.kri]	[tə.raː.li]	[siː.lək]	
	[kæmp]	[mɪlk]	[kə.rak.ri]	[traː.li]	[sɪlk]	=LB_2
	[kæmp]	[mɪlk]	[kə.rak.ri]	[tə.raː.li]	[sɪlk]	
	[kæmp]	[mɪlk]	[kə.rak.ri]	[raː.li]	[sɪlk]	
	[kæmp]	[mɪlk]	[kra.kri]	[traː.li]	[sɪlk]	=*EB*
	[kæmp]	[mɪlk]	[kra.kri]	[tə.raː.li]	[sɪlk]	
	[kæmp]	[mɪlk]	[kra.kri]	[raː.li]	[sɪlk]	
	[kæmp]	[mɪl]	[kə.rak.ri]	[traː.li]	[sɪl]	
	[kæmp]	[mɪl]	[kə.rak.ri]	[raː.li]	[sɪl]	
	[kæmp]	[mɪl]	[kra.kri]	[traː.li]	[sɪl]	
	[kæmp]	[mɪl]	[kra.kri]	[raː.li]	[sɪl]	
	[kæ.məs]	[miː.lək]	[kə.rak.ri]	[traː.li]	[siː.lək]	
	[kæ.məs]	[miː.lək]	[kə.rak.ri]	[tə.raː.li]	[siː.lək]	

	[kæ.məs]	[miː.lək]	[kra.kri]	[traː.li]	[siː.lək]
	[kæ.məs]	[miː.lək]	[kra.kri]	[tə.raː.li]	[siː.lək]
	[kæm]	[miː.lək]	[kə.rak.ri]	[traː.li]	[siː.lək]
	[kæm]	[miː.lək]	[kə.rak.ri]	[tə.raː.li]	[siː.lək]
	[kæm]	[miː.lək]	[kra.kri]	[traː.li]	[siː.lək]
	[kæm]	[mɪl]	[kə.rak.ri]	[traː.li]	[sɪl]
	[kæm]	[mɪl]	[kə.rak.ri]	[raː.li]	[sɪl]
	[kæm]	[mɪl]	[kra.kri]	[tə.raː.li]	[sɪl]
	[kæm]	[mɪl]	[kra.kri]	[raː.li]	[sɪl]
	[kæ.mə]	[miː.lək]	[kə.rak.ri]	[traː.li]	[siː.lək]
	[kæ.mə]	[miː.lək]	[kə.rak.ri]	[tə.raː.li]	[siː.lək]
	[kæ.mə]	[miː.lək]	[kra.kri]	[traː.li]	[siː.lək]
	[kæ.mə]	[miː.lək]	[kra.kri]	[tə.raː.li]	[siː.lək]
	[kæ.mə]	[miː.lə]	[kə.rak.ri]	[traː.li]	[siː.lə]
	[kæ.mə]	[miː.lə]	[kə.rak.ri]	[tə.raː.li]	[siː.lə]
	[kæ.mə]	[miː.lə]	[kə.rak.ri]	[raː.li]	[siː.lə]
	[kæ.mə]	[miː.lə]	[kra.kri]	[traː.li]	[siː.lə]
	[kæ.mə]	[miː.lə]	[kra.kri]	[tə.raː.li]	[siː.lə]
	[kæ.mə]	[miː.lə]	[kra.kri]	[raː.li]	[siː.lə]

Note. *Red shading indicates deletion of segments and orange shading indicates a change of place features of segments (consonants) at syllable margins. Grey shading shows the remaining grammars which are not observed in the MP loanword corpus*

Table 9.4 shows 35 possible rankings in which four output sets (1, 2, 5, 8) reflect the same grammars which are displayed in the chapters (6, 7, 8). In the output sets (1) & (5), OT predicts the onset-coda asymmetry which are the equivalent of the *LB1* and *LB2* grammars (see chapter 7). Similarly, the output sets (2) and (8) show the grammars seen in *ML* and *EB* respectively (see chapters 6 & 8). However, the OT factorial typology also predicts other grammars, which are not captured in the corpus data. Setting aside all output sets which allow for segment deletion or substitution, which could plausibly be dispreferred due to effects of orthography (as before), we are still left with four grammars (shaded in grey), some of which violate onset-coda asymmetry (namely, 3 and 4).

Although in my data there is a strong onset-coda asymmetry in patterns of variation in adaptation of MP loanwords, a factorial typology run on the constraints used in the OT analysis does not predict this asymmetry, and instead predicts more variation along the *LB* continuum. It is beyond the scope of this study to analyse loanword adaptation patterns in terms of developmental language acquisition, but we may hypothesisethat these output sets

show the different types of learners along the continuum of *L2* acquisition among *LB* speakers.

The factorial typology predicts grammars in which there is reranking of some constraints (MAX and IDENT$_{[PLACE]}$); but in our thesis data, we know that deletion of segments or changing the place features of segments were not considered favourable repair strategies, therefore, MAX and IDENT$_{[PLACE]}$ remain high ranked constraints in MP loanwords (see chapters 7 & 8). This suggests the influence of orthography in adaptation patterns because MP speakers learn English via Urdu or English orthography depending on the level of the learner, as discussed above. Thus, in the above table (9.4), the remaining 27 output sets violate MAX and IDENT $_{[PLACE]}$, therefore, these rankings in the outputs are set aside and considered as impossible grammars in MP loanwords. According to my data, onset clusters are more restricted than coda clusters in the adaptation patterns in MP loanwords. However, it also looks like the factorial typology in OT predicts at least one grammar which violates the onset-coda asymmetry, contrary to what I have observed in my corpus.

One factor which may explain the variation (in terms of onset-coda asymmetry) in adaptation patterns is the variation in the mode of input, and specifically, when one input is a spoken borrowing while the other is a written borrowing (Smith 2006). In the realm of loanword phonology, some scholars argue that the L2 experience of the listener could affect interpretation of the written versus spoken input to loanwords and cause variation in the outputs (e.g. Bundgaard-Nielsen et al. 2011; Kwon 2017; Nomura and Ishikawa 2018; Kang & Schertz, 2017). Another point of view is that the perceptual strategies could affect the input to spoken borrowings only, not written ones (Smith 2006).

9.3.2 Factorial Typology for stress assignment

Now we turn to probe the factorial typology of stress assignment in the adaptation patterns of MP loanwords. There are seven constraints related to the stress system (i.e. FtBin, SWP, NonFin$_C$, AlignR, IDENT $_{[long-v]}$, Parse-б, MATCH) which were run in OTSoft. We have received 7! =5040 logically possible permutations in which 21 are possible output sets (grammars) as shown in Table 9.4.

Table 9.5 ***Factorial typology of MP loanwords with 7 constraints***

Inputs	/ˈgluː.kəʊz/ ‘*glucose*’	/ˈvæk.siːn/ ‘*vaccine*’	/ˈpʌb.lɪk/ ‘*public*’	/ˈlɛ.tɪs/ ‘*lettuce*’	Possible grammars in MPL
Output sets					
	gəl.(ˈko:)<z>	(væk). (ˈsiː)<n>	(ˈpəb).lək	(ˈlæː).təs	*ML*
	gəl.(ˈko:)<z>	(væk). (ˈsiː)<n>	(ˈpəb).lək	(ˈlɛ.tɪ)<s>	*LB1*
	gəl.(ˈko:)<z>	(væk). (ˈsiː)<n>	(ˈpəb).(lə)<k>	(lɛ).(ˈtɪs)	
	gəl.(ˈko:)<z>	(væk). (ˈsiː)<n>	(ˈpəb).(lə)<k>	(lɛ).(ˈtɪs)	
	gəl.(ˈko:)<z>	(væk). (ˈsiː)<n>	(ˈpəb).(lə)<k>	(ˈlæː).(tə)<s>	
	gəl.(ˈko:)<z>	(væk). (ˈsiː)<n>	(ˈpəb).(lə)<k>	(ˈlɛ.tɪ)<s>	
	gəl.(ˈko:)<z>	(ˈvæk).(siː)<n>	(pəb).(ˈlə)<k>	(lɛ).(ˈtɪs)	
	(ˈgəl).(ko:)<z>	(ˈvæk).(siː)<n>	(ˈpəb).lək	(ˈlæː).təs	*LB2*
	(ˈgəl).(ko:)<z>	(ˈvæk).(siː)<n>	(ˈpəb).lək	(ˈlɛ.tɪ)<s>	*EB*
	(ˈgəl).(ko:)<z>	(ˈvæk). (siː)<n>	(ˈpəb).lək	(lɛ).(ˈtɪs)	
	(ˈgəl).(ko:)<z>	(ˈvæk). (siː)<n>	(ˈpəb).(lə)<k>	(ˈlɛ.tɪ)<s>	
	(ˈgəl).(ko:)<z>	(ˈvæk). (siː)<n>	(ˈpəb).(lə)<k>	(lɛ).(ˈtɪs)	
	(ˈgəl).(ko:)<z>	(ˈvæk). (siː)<n>	(ˈpəb).(lə)<k>	(ˈlæː).(tə)<s>	
	(ˈgəl).(ko:)<z>	(væk). (ˈsiː)<n>	(ˈpəb). lək	(ˈlæː).təs	
	(ˈgəl).(ko:)<z>	(væk). (ˈsiː)<n>	(ˈpəb). lək	(ˈlɛ.tɪ)<s>	
	(ˈgəl).(ko:)<z>	(væk). (ˈsiː)<n>	(ˈpəb). lək	(lɛ).(ˈtɪs)	
	(ˈgəl).(ko:)<z>	(væk). (ˈsiː)<n>	(ˈpəb).(lə)<k>	(ˈlɛ.tɪ)<s>	
	(ˈgəl).(ko:)<z>	(væk). (ˈsiː)<n>	(ˈpəb).(lə)<k>	(lɛ).(ˈtɪs)	
	(ˈgəl).(ko:)<z>	(væk). (ˈsiː)<n>	(ˈpəb).(lə)<k>	(ˈlæː).(tə)<s>	
	(ˈgəl).(ko:)<z>	(væk). (ˈsiː)<n>	(pəb).(ˈlə)<k>	(ˈlɛ.tɪ)<s>	
	(ˈgəl).(ko:)<z>	(væk). (ˈsiː)<n>	(pəb).(ˈlə)<k>	(lɛ).(ˈtɪs)	

Note. *Red shading shows stress patterns which are not acceptable in MP. Grey colour shows the remaining grammars which are not observed in the MP loanword corpus.*

Table 9.5 shows the possibility of *21* grammars. The possible output patterns in (a, b, h, i) show the same grammars which are predicted in the previous chapters 6, 7 & 8. *ML* are reflected in output set ‘a’ which conform to the native MP stress rules by restricting the stress to the final superheavy or penult heavy syllables. Since there is variation in the adaptation patterns of *LB*, therefore, *LB1* shows the output set ‘b’ which is more influenced by native stress rules and have stress Pattern ‘A’ and ‘B’. Whereas, *LB2* is shown by an output set ‘h’ which is more influenced by the source form and shows the stress pattern ‘A’ and ‘C’. Similarly, the output set ‘i’ displays patterns which conform to the phonology of

the source language, in other words, which show stress pattern 'C'. Apart from these four grammars, there are also other eight predicted output sets (i.e. e, f, k, m, n, o, q, s) which can be possible grammars but are not observed in the corpus data of *LB*. These eight output sets are in my view plausible depending on the learners' level in *LB* speech continuum. The remaining eight output sets are in my view not possible grammars. These output sets (c, d, g, j, l, p, r, t, u) violate NonfinalityC in some words but not in others predicting variable implementation of consonant extrametricality. Finally, some output sets (t, u) violate the language specific stress rules by assigning the stress to the final light (CV) syllable.

Although, it is beyond the scope of this study to test the predictions made here, I propose that the variation in stress assignment in possible output sets (grammars) may also be due to orthographic influence. Many studies (e.g. Arciuli & Cupples, 2006; 2002; Repetti, 1993; Davis and Kelly, 1997; Kemp et al. 2009; Buffington, 2013) reported the orthographic influence on stress assignment. In the context of MP loanwords, as already noted, in the public sector of the educational system in Mirpur, English is taught via the Urdu writing system, which is different from the English alphabetic system. Therefore, MP learners who have less exposure to the source language, tend to learn loanwords more via a grapheme-to-phoneme correspondence strategy than adaptations under oral conditions and this is a common behaviour reported in loanword adaptation processing (see also Vendelin and Peperkamp, 2006). The *LB1* speakers who are in an initial stage of their *LB* speech continuum are less familiar with the grapheme regulations of the source language and may rely on its written form, along their knowledge of native MP stress rules, and thus assign stress on final syllable. In the example in Table 9.6 below, a vowel symbol intervenes between /v/and /k/ in 'vaccine', but not between /g/ and /l/ in 'glucose'. To support this, I have noticed that speakers who are advanced learners of English (*LB2*, *EB*) and who do have some knowledge of the source language and are familiar with standardisation that regulates how graphemes in the source language are to be pronounced (e.g. vowels), do follow the standard rules of the stress system of source language and ignore the native stress rules, once they encounter the source form for loans (as shown in table 9.6).

Table 9.6 ***Orthographic representation of MP loanwords***

	Input	**outputs**		**Vowel representation**	**Urdu Orthographic representation**
		LB1	***LB2, EB***		
a.	/ˈvæk.siːn/ ‘*vaccine*’	[væk.ˈsiːn]	[ˈvæk.siːn]	<ي >→/æ/	< ویکسین >
b.	/ˈgluː.kəʊz/ ‘*glucose*’	[gəl.ˈkoːz]	[ˈgəl.koːz]	<و >→/uː/	< گلوکوز >

In the loanword literature, many scholars argue that orthography plays a role in shaping phonological representation. Indeed, Taft (2006:75) argues that the orthographic influence would only make sense for alphabetically scripted languages. It is possible that bilinguals whose native orthographic system is not purely alphabetic (e.g. Persian-Arabic script used in MP) may phonologically process the words of an alphabetically scripted language in a non-optimal manner. We can suggest that OT Soft predicts more possible grammars than observed in the previous chapters can be due to an impact of an orthographic information during pronunciation. Since, this study is not designed in a way to capture the orthographic influence on the loanword adaptation patterns, nevertheless I suggest that orthography plays a crucial role in MP loanword adaptation patterns, especially in placing restrictions on the outputs which are not observed in the thesis data but are captured in the factorial typology at the prosodic level (i.e. syllable phonotactics and stress system), and this can be explored in the future research.

9.4 Conclusions

A number of conclusions can be drawn from the current work. First, phonological variation in loanword adaptation patterns both within and between speaker groups can be modelled within a phonologically informed OT framework. However, typological variation in terms of language universals in syllable phonotactics (e.g. onset-coda asymmetry) cannot be fully modelled within a phonological model. Nevertheless, exploration of this variation strongly suggests that orthography influences the phonological variation at the prosodic level in MP loanwords. Overall, the thesis supports the notion that modelling of phonological variation in loanword adaptation patterns within an OT framework is effective in generating hypotheses for further empirical research.

9.4.1 Limitations of the Study

There are number of key limitations in this study which I will describe below:

∞ It does not investigate loanword adaptation at the segmental level which could help us to identify the role of phonetic details and expand the theoretical scope further.

∞ Data could have been collected in more controlled way by systematically varying some of the external factors mentioned in this study (i.e. level of bilingualism and orthography).

∞ Ideally, it would have been possible to collect production data to investigate the pronunciation of the loanwords and or to use loanwords extracted from natural conversations from each category of MP speakers mentioned in corpus data (i.e. *ML, LB & EB*).

However, the thesis was successful in identifying an overriding research question for future research, which would be to test whether or not adaptation patterns in production data do or do not violate the onset-coda asymmetry pattern seen in the corpus data used here, based on speaker intuitions.

10. Appendices

Appendix I : Information Sheet

UNIVERSITY of York
DEPARTMENT OF
LANGUAGE AND
LINGUISTIC SCIENCE
Heslington, York, YO10 5DD, UK
Email:ss1681@york.ac.uk

INFORMATION SHEET

PLEASE KEEP THIS INFORMATION SHEET AND A SIGNED COPY OF THE CONSENT FORM FOR YOUR RECORDS

You are invited to take part in a research study. Before you decide whether to participate it is important for you to understand why the research is being done and what it will involve. Please take the time to read the following information carefully. If there is anything you do not understand, or if you want more information, please ask the researcher.

Title of study: A Phonological Analysis of English loanwords in Mirpur Pahari: In the framework of Optimality Theory.

Researcher: Sehrish Shafi

What is the research about?

Mirpuri Pahari is a dialect of Western Punjabi, spoken in Mirpur, Pakistan. A large proportion of the Pakistani heritage community in the UK are originally from this region, having moved to the UK from the 1960s onwards. The Mirpuri language has thus been in contact with English for many years, and many Mirpuri speakers in Pakistan speak or learn English. This research is about the sound structures of Mirpur Pahari and about the effects of contact between English and Mirpur Pahari.

Who is carrying out the research?

Sehrish Shafi, under the supervision of Dr Sam Hellmuth, at the University of York.

Who can participate?

All participants must be fluent native speakers of Mirpuri Pahari with no hearing or speaking difficulties. Please do not participate if you are not a fluent native speaker of Mirpuri Pahari or if you have hearing or speaking difficulties.

What does the study involve?

After filling in a written questionnaire to provide some background information about yourself, you will be asked to do three tasks in Mirpuri: a picture naming task, a picture description task and a reading task. We will record your voice as you are speaking, using a

microphone which you wear on your head. There will be no video recording. After that we will ask you to take a vocabulary quiz, written in English. The whole session will take approximately 30-45 minutes to complete.

Do I have to take part?

You do not have to take part in the study. If you do decide to take part you will be given this information sheet to keep and will be asked to sign two copies of the consent form (one copy is for you to keep). If you decide to take part you will still be free to withdraw without giving a reason, even during the session itself. If you withdraw from the study, we will destroy your data and will not use it in any way.

What are the possible risks of taking part?

There is no risk involved while carrying out this study.

Are there any benefits to participating?

You will be participating in linguistic research that will help linguists better understand the Mirpuri language, as it is spoken in the UK.

What will happen to the data I provide?

The data you provide will be used alongside the data of other participants to build up a picture of how English words are pronounced in Mirpuri. Your data will be stored securely in the University of York, Department of Language and Linguistic Science.

What about confidentiality?

Your identity will be kept strictly confidential. No real names will be used in any presentations or publications or in my dissertation.

Will I know the results? Individual results will not be given but if you are interested in the group results, you can contact to the researcher (see below).

Contact Information:

Sehrish Shafi
Department of Language & Linguistic Science, University of York
Email:ss1681@york.ac.uk
Supervisor:
Dr Sam Hellmuth
Department of Language & Linguistic Science, University of York
Email: sam.hellmuth@york.ac.uk

Appendix II: Consent Form

Phonological Analysis of English loanwords in Mirpur Pahari: In the framework of Optimality Theory

Lead researcher: Sehrish Shafi

Consent form

This form is for you to state whether or not you agree to take part in the study. Please read and answer every question. If there is anything you do not understand, or if you want more information, please ask the researcher.

Have you read and understood the information leaflet about the study?	Yes ❒ No ❒
Have you had an opportunity to ask questions about the study and have these been answered satisfactorily?	Yes ❒ No ❒
Do you understand that the information you provide will be held in confidence by the research team, and your name or identifying information about you will not be mentioned in any publication?	Yes ❒ No ❒
Do you understand that you may withdraw from the study at any time before the end of the data collection session without giving any reason, and that in such a case all your data will be destroyed?	Yes ❒ No ❒
Do you understand that the information you provide may be kept after the duration of the current project, to be used in future research on language?	Yes ❒ No ❒
Do you agree to take part in the study?	Yes ❒ No ❒
Do you agree to excerpts from your audio recordings being used in presentations or in teaching by the researchers, without disclosing your real name? *(You may take part in the study without agreeing to this).*	Yes ❒ No ❒
Do you agree to the researcher's keeping your contact details after the end of the current project, in order that s/he may contact you in the future about possible participation in other studies? *(You may take part in the study without agreeing to this).*	Yes ❒ No ❒

Your name (in BLOCK letters): _____
Your signature: _____
Researcher's name: _____
Date: _____

Appendix III: Language Background Questionnaire

University of York
Department of Language and Linguistic Science

Research Leader: Sehrish Shafi
Research Supervisor: Dr Sam Hellmuth
Project Title: A Phonological Analysis of Mirpur Pahari

Language Background Questionnaire

Personal Information

Year of Birth: _____

Gender: _____

Place of Birth: _____

Nationality: _____

Language Background Information

1. Please indicate which countries you have lived in (including the *UK*).

Country	**From (Age)**	**To (Age)**

2. In Mirpur (Pakistan), what is the name of your *village /city* in *Mirpur*?

Mirpur:		**Name of *city/village(Mirpur)***
City	**Village**	

3. What is the name of the *village/town*, where your relatives live?

Mirpur:		**Name of *city/village(Mirpur*)**
City	**Village**	

4. Have you got an education? If yes then please tell us at what level of education you have reached and where you studied?

Education		**Country(where you obtained your education)**
Yes /No	**If yes, please tell us your highest qualification)**	**e.g. Pakistan ,UK**

5. Please indicate all the languages that you regularly speak and your fluency on the scale from 1-3 level where level 1 is for Beginners and level 3 is for native or near native fluency.

Language	Fluency		
	1.(beginner)	2.Intermediate level	3.(native or near-native)

6. What is your first language? Tick the boxes below (as many as needed) for the language(s) you speak while communicating with your family at home.

Language(s)	Tick here
Mirpuri	
Punjabi	
Urdu	
English	
Other	

7. How long have you been living in your current place/address, and what groups of people (that is, from which ethnicity, such as British, Asian-British or other) are settled around you in your borough/ current location?

Current area of residence	Duration of living at current address	Ethnicity of People living in your area.(Tick under the relevant boxes)		
		British	British- Asian	others

8. How many hours do you work and what language(s) do you speak most at your work place?

Nature of job	Working hour (per day/week)	Language(s) spoken at work place

9. How many close friends of yours belong to a different ethnicity from yours?

Number of friends(close)	Ethnicity (friends)

10. How often do you visit Pakistan (more specifically to Mirpur)and how long do you stay there and for what purpose?

Frequency of visit	Duration of stay	Purpose		
		To attend functions (wedding/other)	To visit relatives	Just for holiday/business/shopping

11. On your visit to Mirpur (Pakistan), in which language do you communicate with your relatives /people there?

12. Which TV programs (Pakistani & British) do you watch on a regular basis in your free time?

Pakistani TV-Programs	**British TV-Programs**

13. Which music do you listen while driving or in your leisure time?

English Music	**Bollywood Music**	**Punjabi/regional-Folk Music(Pakistani)**	**Other(music)**

14. What do you call these English words (given below) in your first language?

No.s	**Questions**	**Answers**
1.	What word do you use for soap in your language?	
2.	What word do you use for mouth in your language?	
3.	What word do you use for son-in law (daughters husband) in your language?	
4.	What word do you use for father in law (husbands father) in your language?	
5.	What word do you use for children in your language?	
6.	What word do you use for shawl/scarf in your language?	
7.	What word do you use for curry in your language?	
8.	What word do you use for green and red colour in your language?	
9.	What word do you use for door in your language?	
10.	What word do you use for sweetmeat given on happy occasions like wedding or childbirth?	
11.	What word do you use for ‘come here’ in your language?	

Appendix IV: Published list of MP words (Pert & Stow, 2006)

	Target word	Mirpuri	Punjabi	Urdu
1.	boy	mʊɾa	mʊnɖa	lɜɾka
2.	nose	næk	næk	nɑːkʰ
3.	water	paɳi	paɳi	paɳi
4.	flower	pʰʊl	pʰʊl	pʰul
5.	hat	ʈəʊpi	ʈəʊpi	ʈəʊpi
6.	milk	ɖuɖ	ɖuɖ	ɖuɖ
7.	ear	kæn	kæn	kan
8.	clothes	kʌpəɽẽɪ	kʌpəɽẽɪ	kʌpɽẽɪ
9.	banana	keɪlɑ	keɪlɑ	keɪlɑ
10.	chicken	kʊkəɽi	kʊkəɽi	mʊrgi
11.	soap	sɑbən	sɑbən	sɑbən
12.	clean	saːf	saːf	saːf
13.	lion	ʃɛər	ʃɛər	ʃɛər
14.	key	dʒabi	dʒabi	dʒabi
15.	dish/pot/meal	ʌɳɖi	hʌɳɖi	hʌɳɖi
16.	crying	ɽəʊna	ɽʊnɖa	ɽʊ ɾəhɑ hɛə
17.	egg	ʌndɑ	ʌndɑ	ʌndɑ
18.	eye/eyes	æk/ækiɑ	ɑkʰ/ɑkɑ	ə̃ŋk/ə̃ŋke
19.	elephant	æʈʰi	æʈʰi	hæʈʰi
20.	flour	ɑɽɑ	ɑɽɑ	ɑɽɑ
21.	glasses	ẽnkɑ	ẽnkɑ	ẽnək

Appendix V: List of MP words

	MP words	gloss
1.	[pə.ˈrɑ̃n.tʰa]	fried bread
2.	[bə.ˈraːt̪̊]	wedding reception
3.	[kə.ˈleː.dʒi]	liver
4.	[gə.ˈlaːb]	rose
5.	[sə.ˈraː.nə]	pillow
6.	[zə.ˈlaː.bɑ̃]	socks(plural)
7.	[ˈtuk.ri]	basket
8.	[gə.ˈlaːb]	rose
9.	[d̪ər.ˈbaːr]	shrine
10.	[kə.ˈmiːz̪̊]	shirt
11.	[sə.ˈbuːn]	soap
12.	[ˈʧaː.vəl]	rice
13.	[ˈt̪əs.bi]	rosary
14.	[ˈən.da]	egg
15.	[ˈlɑ̃ŋg.ri]	mortar
16.	[ˈd̪ənd̪]	tooth
17.	[ˈpɑ̃ndʒ]	five
18.	[ˈrɑ̃ŋg]	colour

Appendix VI: List of English loanwords in MP

	target	gloss		target	gloss
1.	/pleɪt/	plate	24.	/ˈpə.fjuːm/	perfume
2.	/ˈprɪn.tə/	printer	25.	/ɪn.ˈspɛk.tə/	inspector
3.	/ˈblɛn.də/	blender	26.	/siŋk/	sink
4.	/ˈbreɪ.slət/	bracelet	27.	/hand/	hand
5.	/ˈbrɒ.kə.li/	broccoli	28.	/ɪnˈgeɪdʒ.mənt/	engagement
6.	/ˈkrɪ.kɪt/	cricket	29.	/ˈɛ.lɪ.fənt/	elephant
7.	/kriːm/	cream	30.	/ˈtɛ.rə.rɪst/	terrorist
8.	/slip/	slip	31.	/tʃiks/	cheeks
9.	/bliːtʃ/	bleach	32.	/mask/	mask
10.	/ˈtrɒ.li/	trolley	33.	/bɒks/	box
11.	/ˈdraɪ.və/	driver	34.	/gɪft/	gift
12.	/ˈkjuː.kʌm.bə/	cucumber	35.	/ əˈlɑːm/	alarm
13.	/glɑːs/	glass	36.	/bəˈluːn/	balloon
14.	/ˈskuː.tə/	scooter	37.	/ˈbɑː.skɪt/	basket
15.	/spuːn/	spoon	38.	/ˈpaɪ.lət/	pilot
16.	/spreɪ/	spray	39.	/dʒɪ.ˈrɑːf/	giraffe
17.	/ˈstjuː.dənt	student	40.	/ˈdɒk.tə/	doctor
18.	/ˈsteɪ.dɪəm/	stadium	41.	/ˈbeɪ.bi	baby
19.	/ˈæm.bjə.ləns/	ambulance	42.	/ˈtɛ.rə.rɪst/	terrorist
20.	/ɪn.təˈdjuːs/	introduce	43.	/ˈsɪ.lɪn.də/	cylinder
21.	/kəm.ˈpjuː.tə/	computer	44.	/ˈhɒs.pɪ.təl/	hospital
22.	/ʌm.ˈbrɛ.lə/	umbrella	45.	/ʃamˈpuː/	shampoo
23.	/ˈlaɪ.bri/	library	46.	/ˈlɛ.tɪs/	lettuce

Appendix-VII

Factorial Typology: Syllable Phonotactics

1. Constraints

Full Name	Abbr.
1. COMPLEX ^{ONSET}	COMP ^{ONSET}
2. *COMP$_{[PLACE-ONS]}$	*COMP$_{[PLACE-ONS]}$
3. MAX	MAX
4. IDENT $_{[PLACE]}$	IDENT $_{[PLACE-CODA]}$
5. DEP	DEP
6. *COMPLEX $_{[PLACE-CODA]}$	*COMP$_{[PLACE-CODA]}$
7. *COMPLEX^{CODA}	*COMP ^{CODA}

All rankings were considered.
Immediately below are reports on individual patterns generated.

2. Summary Information

With 7 constraints, the number of logically possible grammars is 5040.
There were 27 different output patterns.
Forms marked as winners in the input file are marked with >.

	Output #1	**Output #2**	**Output #3**	**Output #4**
//kæmp//	>[kæmp]	>[kæmp]	>[kæmp]	>[kæmp]
//mɪlk/ /	>[mi: .lək]	>[mi: .lək]	>[mi: .lək]	>[mi: .lək]
//krɒ.kri//	>[kə.rak.ri]	>[kə.rak.ri]	>[kə.rak.ri]	>[kə.rak.ri]
//trɒ.li//	>[tə.ra:.li]	[tra:.li]	[tra:.li]	[ra:.li]
//sɪlk//	>[si: .lək]	>[si: .lək]	[sɪl]	[sɪl]
	Output #5	**Output #6**	**Output #7**	**Output #8**
//kæmp//	>[kæmp]	>[kæmp]	>[kæmp]	>[kæmp]
//mɪlk/ /	>[mi: .lək]	>[mi: .lək]	>[mi: .lək]	[milk]
//krɒ.kri//	[kra.kri]	[kra.kri]	[kra.kri]	>[kə.rak.ri]
//trɒ.li//	[tra:.li]	[tra:.li]	[ra:.li]	>[tə.ra:.li]
//sɪlk//	>[si: .lək]	[sɪl]	[sɪl]	[sɪlk]
	Output #9	**Output #10**	**Output #11**	**Outpu#12**
//kæmp//	>[kæmp]	>[kæmp]	>[kæmp]	>[kæmp]
//mɪlk/ /	[mɪlk]	[mɪlk]	[mɪlk]	[mɪlk]
//krɒ.kri//	>[kə.rak.ri]	>[kə.rak.ri]	>[kə.rak.ri]	>[kə.rak.ri]
//trɒ.li//	[tra:.li]	[tra:.li]	[ra:.li]	[ra:.li]
//sɪlk//	[sɪlk]	[sɪl]	[sɪlk]	[sɪl]
	Outpu#13	**Outpu#14**	**Outpu#15**	**Outpu#16**
//kæmp//	>[kæmp]	>[kæmp]	>[kæmp]	>[kæmp]
//mɪlk/ /	[mɪlk]	[mɪlk]	[mɪlk]	[mɪlk]
//krɒ.kri//	[kra.kri]	[kra.kri]	[kra.kri]	[kra.kri]
//trɒ.li//	[tra:.li]	[tra:.li]	[ra:.li]	[ra:.li]
//sɪlk//	[sɪlk]	[sɪl]	[sɪlk]	[sɪl]
	Outpu#17	**Outpu#18**	**Outpu#19**	**Outpu#20**
//kæmp//	[kæm]	[kæm]	[kæm]	[kæm]
//mɪlk/ /	>[mi: .lək]	>[mi: .lək]	>[mi: .lək]	>[mi: .lək]

//krɒ.kri//	>[kə.rak.ri]	>[kə.rak.ri]	>[kə.rak.ri]	>[kə.rak.ri]
//trɒ.li//	>[tə.ra:.li]	[tra:.li]	[tra:.li]	[ra:.li]
//sılk//	>[si: .lək]	>[si: .lək]	[sıl]	[sıl]
	Outpu#21	**Outpu#22**	**Outpu#23**	**Outpu#24**
//kæmp//	[kæm]	[kæm]	[kæm]	[kæm]
//mılk/ /	>[mi: .lək]	>[mi: .lək]	>[mi: .lək]	[mılk]
//krɒ.kri//	[kra.kri]	[kra.kri]	[kra.kri]	>[kə.rak.ri]
//trɒ.li//	[tra:.li]	[tra:.li]	[ra:.li]	[tra:.li]
//sılk//	>[si: .lək]	[sıl]	[sıl]	[sıl]
	[kra.kri]	**Outpu#26**	**Outpu#27**	
//kæmp//	[kæm]	[kæm]	[kæm]	
//mılk/ /	[mılk]	[mılk]	[mılk]	
//krɒ.kri//	>[kə.rak.ri]	[kra.kri]	[kra.kri]	
//trɒ.li//	[ra:.li]	[tra:.li]	[ra:.li]	
//sılk//	[sıl]			

3. List of Winners

The following specifies for each candidate whether there is at least one ranking that derives it:

// kæmp//:		//trɒ.li//:	
[[kæmp]]	yes	[[tə.raː.li]]	yes
[[kæm]]	yes	[[traː.li]]	yes
[[kæms]]	no	[[ra:.li]]:	yes
		[[t̪raː.li]]	no
//mılk//:		//sılk//:	
[[miː.lək]]	yes	[[siː.lək]]	yes
[[mılk]]	yes	[[sılk]]	yes
[[nɪ.lə]]	no	[[sıl]]	yes
		[[iː.lət]]	no
//krɒ.kri//:			
[[kə.rak.ri]]	yes		
[[kra.kri]]	yes		
[[ka.kɾi]]	no		
[[kra.ki]]	no		

4. T-orders

The t-order is the set of implications in a factorial typology.

If this input has this output, then this input has this output

//trɒ.li//	[[tə.raː.li]]	// kra.kri//	[[kə.rak.ri]]
//sılk//	[[siː.lək]]	//mılk/ /	[[miː.lək]]
//sılk//	[[sılk]]	// kæmp//	[[kæmp]]
//sılk//	[[sılk]]	//mılk/ /	[[mılk]]

Nothing is implicated by these input-output pairs:

/ kæmp/ →[kæmp] / krɒ.kri/ → [kra.ki]
/ kæmp/ →[kæm] /trɒ.li/ → [tra:.li]
/kæmp/ → [kæms] /trɒ.li/ →[ra:.li]
/mɪlk/ → [mi:.lək] /trɒ.li/ → [t̪ra:.li]
/mɪlk/ → [mɪlk] /mɪlk/ → [ni.lə]
/sɪlk/ → [sɪl] /sɪlk/ → [i:.lət]

Input Candidate

/kæmp/ [kæmp] /krɒ.kri/ [kə.rak.ri]
/kæmp/ [kæm] /krɒ.kri/ [kra.kri]
/kæmp/ [kæms] /krɒ.kri/ [ka.kɻi]
/mɪlk/ [mi:.lək] /krɒ.kri/ [kra.ki]
/mɪlk/ [mɪlk] /trɒ.li/ [tra:.li]
/mɪlk/ [ni.lə] /trɒ.li/ [ra:.li]
/sɪlk/ [sɪl] /trɒ.li/ [t̪ra:.li]
/sɪlk/ [i:.lət]

5. Complete Listing of Output Patterns

OUTPUT SET #1:

These are the winning outputs. → specifies outputs marked as winning candidates in all the input file.

// kæmp// →[kæmp]
//mɪlk// →[mi:.lək]
// krɒ.kri// →[kə.rak.ri]
// trɒ.li // →[tə.ra:.li]
//sɪlk// →[si:.lək]

Grammar:

Stratum #1		
	COMPLEX onset	[= COMP onset]
	*COMP [place-ons]	[= *COMP[place-ons]]
	MAX	[= MAX]
	IDENT [place]	[= IDENT [place]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
Stratum #2		
	DEP	[= DEP]
	*COMPLEX coda	[= *COMPcoda]

OUTPUT SET #2:

//kæmp// → [kæmp]
//mɪlk// → [mi:.lək]
//krɒ.kri// → [kə.rak.ri]
//trɒ.li// → [tra:.li]
//sɪlk// → [si:.lək]

Grammar:

Stratum #1		
	*COMP$_{[PLACE-ONS]}$	[= *COMP[PLACE-ONS]]
	MAX	[= MAX]

	IDENT $_{[PLACE]}$	[= IDENT $_{[PLACE]}$]
	*COMPLEX $_{[PLACE-CODA]}$	[= *COMP$_{[PLACE-CODA]}$]
Stratum #2		
	DEP	[= DEP]
	*COMPLEX ^{CODA}	[= *COMP ^{CODA}]
Stratum #3		
	COMPLEX ^{ONSET}	[= COMP ^{ONSET}]

OUTPUT SET #3:

// kæmp// → [kæmp]

//mɪlk// → [miː.lək]
// krɒ.kri// → [kə.rak.ri]
//trɒ.li// → [traː.li]
//sɪlk/ / → [sɪl]

Grammar:

Stratum #1		
	*COMPLEX$_{[PLACE-ONS]}$	[= *COMP$_{[PLACE-ONS]}$]
	IDENT$_{[PLACE]}$	[= IDENT $_{[PLACE]}$]
	*COMPLEX $_{[PLACE-CODA]}$	[= *COMP$_{[PLACE-CODA]}$]
Stratum #2		
	DEP	[= DEP]
Stratum #3		
	MAX	[= MAX]
Stratum #4		
	*COMPLEX ^{ONSET}	[= *COMP ^{ONSET}]
	*COMPLEX ^{CODA}	[= *COMP ^{CODA}]

OUTPUT SET #4:

//kæmp// → [kæmp]
//mɪlk/ / → [miː.lək]
// krɒ.kri// → [kə.rak.ri]
//trɒ.li// → [raː.li]
//sɪlk/ →[sɪl]

Grammar:

Stratum #1		
	*COMPLEX onset	[= *COMP onset]
	*COMP[place-ons]	[= *COMP[place-ons]]
	IDENT [place]	[= IDENT [place]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
Stratum #2		
	DEP	[= DEP]
Stratum #3		
	MAX	[= MAX]
Stratum #4		
	*COMPLEX coda	[= *COMP coda]

OUTPUT SET #5:

//kæmp// → [kæmp]

//mɪlk// → [miː.lək]
//krɒ.kri// →[kra.kri]
//trɒ.li// →[traː.li]
//sɪlk/ / → [siː.lək]

Grammar:

Stratum #1		
	MAX	[= MAX]
	IDENT[place]	[= IDENT [place]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
Stratum #2		
	DEP	[= DEP]
	*COMPLEX coda	[= *COMPcoda]
Stratum #3		
	COMPLEX onset	[= *COMP onset]
	*COMP[place-ons]	[= *COMP[place-ons]]

OUTPUT SET #6:

// kæmp// → [kæmp]
//mɪlk/ / → [miː.lək]
// krɒ.kri// → [kra.kri]
//trɒ.li// → [traː.li]
//sɪlk/ / → [sɪl]

Grammar:

Stratum #1		
	IDENT [place]	[= IDENT [place]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
Stratum #2		
	DEP	[= DEP]
Stratum #3		
	*COMP[place-ons]	[= *COMP[place-ons]]
	MAX	[= MAX]
Stratum #4		
	COMPLEX onset	[=*COMP onset]
	*COMPLEX coda	[= *COMP coda]

OUTPUT SET #7:

// kæmp// → [kæmp]
//mɪlk// → [miː.lək]
// krɒ.kri// → [kra.kri]
//trɒ.li// → [raː.li]
//sɪlk// → [sɪl]

Grammar:

Stratum #1		
	IDENT [place]	[= IDENT[place]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
Stratum #2		
	DEP	[= DEP]
Stratum #3		
	COMPLEX onset	[= COMPonset]
	*COMP[place-ons]	[= *COMP[place-ons]]
Stratum #4		
	MAX	[= MAX]
Stratum #5		
	*COMPLEX coda	[= *COMPcoda]

OUTPUT SET #8:

// kæmp// → [kæmp]
//mɪlk// → [mɪlk]
// krɒ.kri// → [kə.rak.ri]
//trɒ.li// → [tə.raː.li]
//sɪlk// → [sɪlk]

Grammar:

Stratum #1		
	*COMPLEX onset	[= *COMP onset]
	*COMP[place-ons]	[= *COMP[place-ons]]
	MAX	[= MAX]
	IDENT [place]	[= IDENT[place]]
Stratum #2		
	DEP	[= DEP]
Stratum #3		
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]

OUTPUT SET #9:

// kæmp// →[kæmp]
//mɪlk/ / →[mɪlk]
// krɒ.kri// →[kə.rak.ri]
//trɒ.li// →[traː.li]
//sɪlk/ / →[sɪlk]

Grammar:

Stratum #1		
	*COMP[place-ons]	[= *COMP[place-ons]]
	MAX	[= MAX]
	IDENT [place]	[= IDENT [place]]
Stratum #2		
	DEP	[= DEP]
Stratum #3		
	*COMPLEX onset	[= COMP onset]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]

OUTPUT SET #10:

// kæmp// → [kæmp]
//mɪlk// → [mɪlk]
// krɒ.kri// → [kə.rak.ri]
//trɒ.li// → [traː.li]
//sɪlk// → [sɪl]

Grammar:

Stratum #1		
	*COMP$_{[place-ons]}$	[= *COMP$_{[place-ons]}$]
	IDENT$_{[place]}$	[= IDENT$_{[place]}$]
Stratum #2		
	DEP	[= DEP]
Stratum #3		
	*COMPLEX $_{[place-coda]}$	[= *COMP$_{[place-coda]}$]
Stratum #4		
	MAX	[= MAX]
Stratum #5		
	*COMPLEX ^{onset}	[= *COMP^{onset}]

	*COMPLEX ^{coda}	[= *COMP ^{coda}]

OUTPUT SET #11:

//kæmp// → [kæmp]
//mɪlk// → [mɪlk]
// krɒ.kri// → [kə.rak.ri]
//trɒ.li// → [raː.li]
//sɪlk// →[sɪlk]

Grammar:

Stratum #1		
	*COMPLEX ^{onset}	[=*COMP ^{onset}]
	*COMP$_{[place\text{-}ons]}$	[= *COMP$_{[place\text{-}ons]}$]
	IDENT$_{[place]}$	[= IDENT$_{[place]}$]
Stratum #2		
	DEP	[= DEP]
Stratum #3		
	MAX	[= MAX]
Stratum #4		
	*COMPLEX $_{[place\text{-}coda]}$	[= *COMP$_{[place\text{-}coda]}$]
	*COMPLEX ^{coda}	[= *COMP ^{coda}]

OUTPUT SET #12:

// kæmp// → [kæmp]
//mɪlk/ / → [mɪlk]
// krɒ.kri// → [kə.rak.ri]
//trɒ.li// → [raː.li]
//sɪlk/ / → [sɪl]

Grammar:

Stratum #1		
	*COMPLEX ^{onset}	[= *COMP ^{onset}]
	*COMP$_{[place\text{-}ons]}$	[= *COMP$_{[place\text{-}ons]}$]
	IDENT$_{[place]}$	[= IDENT$_{[place]}$]
Stratum #2		
	DEP	[= DEP]
Stratum #3		
	*COMPLEX $_{[place\text{-}coda]}$	[= *COMP$_{[place\text{-}coda]}$]
Stratum #4	MAX	[= MAX]
Stratum #5		
	*COMPLEX ^{coda}	[= *COMP ^{coda}]

OUTPUT SET #13:

//kæmp// → [kæmp]
//mɪlk// → [mɪlk]
//krɒ.kri// → [kra.kri]
//trɒ.li// →[tra:.li]
//sɪlk// → [sɪlk]

Grammar:

Stratum #1		
	MAX	[= MAX]
	$IDENT_{[place]}$	[= $IDENT_{[place]}$]
	DEP	[= DEP]
Stratum #2		
	$COMPLEX^{onset}$	[= $*COMP^{onset}$]
	$*COMP_{[place-ons]}$	[= $*COMP_{[place-ons]}$]
	$*COMPLEX_{[place-coda]}$	[= $*COMP_{[place-coda]}$]
	$*COMPLEX^{coda}$	[= $*COMP^{coda}$]

OUTPUT SET #14:

// kæmp// → [kæmp]
//mɪlk/ / → [mɪlk]
// krɒ.kri// → [kra.kri]
//trɒ.li// → [tra:.li]
//sɪlk/ / → [sɪl]

Grammar:

Stratum #1		
	$IDENT_{[place]}$	[= $IDENT_{[place]}$]
	DEP	[= DEP]
Stratum #2	$*COMP_{[place-ons]}$	[= $*COMP_{[place-ons]}$]
	$*COMPLEX_{[place-coda]}$	[= $*COMP_{[place-coda]}$]
Stratum #3		
	MAX	[= MAX]
Stratum #4		
	$COMPLEX^{onset}$	[= $COMP^{onset}$]
	$*COMPLEX^{coda}$	[= $*COMP^{coda}$]

OUTPUT SET #15:

//kæmp// → [kæmp]
//mɪlk// → [mɪlk]
//krɒ.kri// → [kra.kri]
//trɒ.li// → [ra:.li]
//sɪlk// → [sɪlk]

Grammar:

Stratum #1		
	$IDENT_{[place]}$	[= $IDENT_{[place]}$]
	DEP	[= DEP]
Stratum #2		
	$*COMPLEX^{onset}$	[= $*COMP^{onset}$]
	$*COMP_{[place-ons]}$	[= $*COMP_{[place-ons]}$]
Stratum #3		
	MAX	[= MAX]
Stratum #4		
	$*COMPLEX_{[place-coda]}$	[= $*COMP_{[place-coda]}$]
	$*COMPLEX^{coda}$	[= $*COMP^{coda}$]

OUTPUT SET #16:

// kæmp// → [kæmp]
//mɪlk// → [mɪlk]
// krɒ.kri// → [kra.kri]
//trɒ.li// → [ra:.li]
//sɪlk// → [sɪl]

Grammar:

Stratum #1		
	$IDENT_{[place]}$	[= $IDENT_{[place]}$]
	DEP	[= DEP]
Stratum #2		
	*COMPLEX ^{onset}	[= *COMP ^{onset}]
	$*COMP_{[place-ons]}$	[= $*COMP_{[place-ons]}$]
	*COMPLEX $_{[place-coda]}$	[= $*COMP_{[place-coda]}$]
Stratum #3		
	MAX	[= MAX]
Stratum #4	*COMPLEX ^{coda}	[= *COMP ^{coda}]

OUTPUT SET #17:

//kæmp// → [kæm]
//mɪlk/ / → [mi:.lək]
// krɒ.kri// → [kə.rak.ri]
//trɒ.li// → [tə.ra:.li]
//sɪlk// →[si:.lək]

Grammar:

Stratum #1		
	*COMPLEX onset	[= *COMP onset]
	*COMP[place-ons]	[= *COMP[place-ons]]
	IDENT [place]	[= IDENT [place]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]
Stratum #2		
	MAX	[= MAX]
Stratum #3		
	DEP	[= DEP]

OUTPUT SET #18:

// kæmp// →[kæm]
//mɪlk// →[mi:.lək]
// krɒ.kri// →[kə.rak.ri]
//trɒ.li// →[tra:.li]
//sɪlk// →[si:.lək]

Grammar:

Stratum #1	*COMP[place-ons]	[= *COMP[place-ons]]
	IDENT [place]	[= IDENT [place]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]
Stratum #2		
	MAX	[= MAX]
Stratum #3		
	DEP	[= DEP]

Stratum #4		
	*COMPLEX onset	[= *COMPonset]

OUTPUT SET #19:

// kæmp// →[kæm]
//mɪlk// →[mi:.lək]
// krɒ.kri// →[kə.rak.ri]
//trɒ.li// →[tra:.li]
//sɪlk// →[sɪl]

Grammar:

Stratum #1		
	*COMP[place-ons]	[= *COMP[place-ons]]
	IDENT [place]	[= IDENT [place]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]
Stratum #2		
	DEP	[= DEP]
Stratum #3		
	MAX	[= MAX]
Stratum #4	*COMPLEX onset	[= *COMP onset]

OUTPUT SET #20:

// kæmp// →[kæm]
//mɪlk// →[mi: .lək]
// krɒ.kri// →[kə.rak.ri]
//trɒ.li// →[ra:.li]
//sɪlk// →[sɪl]

Grammar:

Stratum #1		
	*COMPLEX onset	[=*COMP onset]
	*COMP[place-ons]	[= *COMP[place-ons]]
	IDENT [place]	[= IDENT [place]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]
Stratum #2		
	DEP	[= DEP]
Stratum #3		
	MAX	[= MAX]

OUTPUT SET #21:

// kæmp// →[kæm]
//mɪlk// →[mi:.lək]
// krɒ.kri// →[kra.kri]
//trɒ.li// →[tra:.li]
//sɪlk// →[si:.lək]

Grammar:

Stratum #1		
	IDENT [place]	[= IDENT [place]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]

Stratum #2		
	MAX	[= MAX]
Stratum #3		
	DEP	[= DEP]
Stratum #4		
	*COMPLEX onset	[= *COMP onset]
	*COMP[place-ons]	[= *COMP[place-ons]]

OUTPUT SET #22:

// kæmp// →[kæm]
//mɪlk// →[mi:.lək]
// krɒ.kri// →[kra.kri]
//trɒ.li// →[tra:.li]
//sɪlk// →[sɪl]

Grammar:

Stratum #1		
	IDENT [place]	[= IDENT [place]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]
Stratum #2		
	DEP	[= DEP]
Stratum #3		
	*COMP[place-ons]	[= *COMP[place-ons]]
	MAX	[= MAX]
Stratum #4		
	*COMPLEX onset	[=*COMP onset]

OUTPUT SET #23:

//kæmp// →[kæm]
//mɪlk// →[mi:.lək]
// krɒ.kri// →[kra.kri]
//trɒ.li// →[ra:.li]
//sɪlk// →[sɪl]

Grammar:

Stratum #1		
	IDENT [place]	[= IDENT [place]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]
Stratum #2		
	DEP	[= DEP]
Stratum #3		
	*COMPLEX onset	[=*COMP onset]
	*COMP[place-ons]	[= *COMP[place-ons]]
Stratum #4	MAX	[= MAX]

OUTPUT SET #24:

//kæmp// →[kæm]
//mɪlk// →[mɪlk]
//krɒ.kri// →[kə.rak.ri]

//trɒ.li// →[tra:.li]
//sılk// →[sıl]

Grammar:

Stratum #1		
	*COMP[place-ons]	[= *COMP[place-ons]]
	IDENT [place]	[= IDENT [place]]
Stratum #2		
	DEP	[= DEP]
Stratum #3		
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]
Stratum #4		
	MAX	[= MAX]
Stratum #5		
	*COMPLEX onset	[=*COMP onset]

OUTPUT SET #25:

//kæmp// →[kæm]
//mılk// →[mılk]
//krɒ.kri// →[kə.rak.ri]
//trɒ.li// →[ra:.li]
//sılk// →[sıl]

Grammar:

Stratum #1		
	*COMPLEX onset	[=*COMP onset]
	*COMP[place-ons]	[= *COMP[place-ons]]
	IDENT [place]	[= IDENT [place]]
Stratum #2		
	DEP	[= DEP]
Stratum #3		
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]
Stratum #4		
	MAX	[= MAX]

OUTPUT SET #26:

//kæmp// →[kæm]
//mɪlk// →[mɪlk]
//krɒ.kri// →[kra.kri]
//trɒ.li// →[tra:.li]
//sɪlk// →[sɪl]

Grammar:

Stratum #1		
	IDENT [place]	[= IDENT [place]]
	DEP	[= DEP]
Stratum #2		
	*COMP[place-ons]	[= *COMP[place-ons]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]
Stratum #3		
	MAX	[= MAX]
Stratum #4		
	*COMPLEX onset	[=*COMP onset]

OUTPUT SET #27:

//kæmp// →[kæm]
//mɪlk// →[mɪlk]
//krɒ.kri// →[kra.kri]
//trɒ.li// →[ra:.li]
//sɪlk// →[sɪl]

Grammar:

Stratum #1		
	IDENT [place]	[= IDENT [place]]
	DEP	[= DEP]
Stratum #2		
	*COMPLEX onset	[=*COMP onset]
	*COMP[place-ons]	[= *COMP[place-ons]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]
Stratum #3		
	MAX	[= MAX]

Appendix-VIII

Factorial Typology-Syllable Phonotactics with Onset-Coda Constraints

1. Constraints

	Full Name	Abbr.
1.	COMPLEX $^{\text{ONSET}}$	COMP $^{\text{ONSET}}$
2.	*COMPLEX$_{\text{[PLACE-ONS]}}$	*COMP$_{\text{[PLACE-ONS]}}$
3.	MAX	MAX
4.	IDENT $_{\text{[PLACE]}}$	IDENT $_{\text{[PLACE]}}$
5.	DEP	DEP
6.	*COMPLEX $_{\text{[PLACE-CODA]}}$	*COMP$_{\text{[PLACE-CODA]}}$
7.	*COMPLEX $^{\text{CODA}}$	*COMP $^{\text{CODA}}$
8.	ONSET	ONS
9.	NOCODA	NOCODA

All rankings were considered. Summary results appear at end of file.
Immediately below are reports on individual patterns generated.

2. Summary Information

With 9 constraints, the number of logically possible grammars is 362880.
There were 35 different output patterns.
Forms marked as winners in the input file are marked with >.

	Output #1	**Output #2**	**Output #3**	**Output #4**
// kæmp//	>[kæmp]	>[kæmp]	>[kæmp]	>[kæmp]
//mɪlk/ /	>[mi: .lək]	>[mi: .lək]	>[mi: .lək]	>[mi: .lək]
// krɒ.kri//	>[kə.rak.ri]	>[kə.rak.ri]	[kra.kri]	[kra.kri]
//trɒ.li//	>[tra:.li]	[tə.ra:.li]	>[tra:.li]	[tə.ra:.li]
//sɪlk/ /	>[si: .lək]	>[si: .lək]	>[si: .lək]	>[si: .lək]
	Output #5	**Output #6**	**Output #7**	**Output #8**
// kæmp//	>[kæmp]	>[kæmp]	>[kæmp]	>[kæmp]
//mɪlk/ /	[mɪlk]	[mɪlk]	[mɪlk]	[mɪlk]
// krɒ.kri//	>[kə.rak.ri]	>[kə.rak.ri]	>[kə.rak.ri]	[kra.kri]
//trɒ.li//	>[tra:.li]	[tə.ra:.li]	[ra:.li]	>[tra:.li]
//sɪlk/ /	[sɪlk]	[sɪlk]	[sɪlk]	[sɪlk]
	Output #9	**Output #10**	**Output #11**	**Output #12**
// kæmp//	>[kæmp]	>[kæmp]	>[kæmp]	>[kæmp]
//mɪlk/ /	[mɪlk]	[mɪlk]	[mɪl]	[mɪl]
// krɒ.kri//	[kra.kri]	[kra.kri]	>[kə.rak.ri]	>[kə.rak.ri]
//trɒ.li//	[tə.ra:.li]	[ra:.li]	>[tra:.li]	[ra:.li]
//sɪlk/ /	[sɪlk]	[sɪlk]	[sɪl]	[sɪl]
	Output #13	**Output #14**	**Output #15**	**Output #16**
// kæmp//	>[kæmp]	>[kæmp]	[kæ.məs]	[kæ.məs]
//mɪlk/ /	[mɪl]	[mɪl]	>[mi: .lək]	>[mi: .lək]
// krɒ.kri//	[kra.kri]	[kra.kri]	>[kə.rak.ri]	>[kə.rak.ri]
//trɒ.li//	>[tra:.li]	[ra:.li]	>[tra:.li]	[tə.ra:.li]
//sɪlk/ /	[sɪl]	[sɪl]	>[si: .lək]	>[si: .lək]
	Output #17	**Output #18**	**Output #19**	**Output #20**
// kæmp//	[kæ.məs]	[kæ.məs]	[kæm]	[kæm]
//mɪlk/ /	>[mi: .lək]	>[mi: .lək]	>[mi: .lək]	>[mi: .lək]
// krɒ.kri//	[kra.kri]	[kra.kri]	>[kə.rak.ri]	>[kə.rak.ri]
//trɒ.li//	>[tra:.li]	[tə.ra:.li]	>[tra:.li]	[tə.ra:.li]
//sɪlk/ /	>[si: .lək]	>[si: .lək]	>[si: .lək]	>[si: .lək]

	Output #21	Output #22	Output #23	Output #24
// kæmp//	[kæm]	[kæm]	[kæm]	[kæm]
//mɪlk/ /	>[mi: .lək]	[mɪl]	[mɪl]	[mɪl]
// krɒ.kri//	[kra.kri]	>[kə.rak.ri]	>[kə.rak.ri]	[kra.kri]
//trɒ.li//	>[tra:.li]	>[tra:.li]	[ra:.li]	>[tra:.li]
//sɪlk/ /	>[si: .lək]	[sɪl]	[sɪl]	[sɪl]
	Output #25	**Output #26**	**Output #27**	**Output #28**
// kæmp//	[kæm]	[kæ.mə]	[kæ.mə]	[kæ.mə]
//mɪlk/ /	[mɪl]	>[mi: .lək]	>[mi: .lək]	>[mi: .lək]
// krɒ.kri//	[kra.kri]	>[kə.rak.ri]	>[kə.rak.ri]	[kra.kri]
//trɒ.li//	[ra:.li]	>[tra:.li]	[tə.ra:.li]	>[tra:.li]
//sɪlk/ /	[sɪl]	>[si: .lək]	>[si: .lək]	>[si: .lək]
	Output #29	**Output #30**	**Output #31**	**Output #32**
// kæmp//	[kæ.mə]	[kæ.mə]	[kæ.mə]	[kæ.mə]
//mɪlk/ /	>[mi: .lək]	[mi: .lə]	[mi: .lə]	[mi: .lə]
// krɒ.kri//	[kra.kri]	>[kə.rak.ri]	>[kə.rak.ri]	>[kə.rak.ri]
//trɒ.li//	[tə.ra:.li]	>[tra:.li]	[tə.ra:.li]	[ra:.li]
//sɪlk/ /	>[si: .lək]	[si: .lə]	[si: .lə]	[si: .lə]
	Output #33	**Output #34**	**Output #35**	
// kæmp//	[kæ.mə]	[kæ.mə]	[kæ.mə]	
//mɪlk/ /	[mi: .lə]	[mi: .lə]	[mi: .lə]	
// krɒ.kri//	[kra.kri	[kra.kri	[kra.kri	
//trɒ.li//	>[tra:.li]	[tə.ra:.li]	[ra:.li]	
//sɪlk/ /	[si: .lə]	[si: .lə]	[si: .lə]	

3. List of Winners

The following specifies for each candidate whether there is at least one ranking that derives it:

// kæmp//		//krɒ.kri//		//sɪlk//	
[[kæmp]]	yes	[[kə.rak.ri]]	yes	[[si:.lək]]	yes
[[kæ.məs]]	yes	[[kra.kri]]	yes	[[sɪlk]]	yes
[[kæm]]	yes	[[ka.kɾi]]	no	[[sɪl]]	yes
[[kæ.mə]]	yes	[[kra.ki]]	no	[[si:.lə]]	yes
[[kæ.sə]]	no			[[i:.lət]]	no
[[kæms]]	no				
//mɪlk//		//trɒ.li//			
[[mi: .lək]]	yes	[[tra:.li]]	yes		
[[mɪlk]]	yes	[[tə.ra:.li]]	yes		
[[mɪl]]	yes	[[ra:.li]]	yes		
[[mi: .lə]]	yes	[[ɽra:.li]]	no		
[[ni.lə]]	no				

4. T-orders

The t-order is the set of implications in a factorial typology.

If this input has this output, then this input has this output

// kæmp// [[kæ.məs]] //mɪlk// [[mi:.lək]]

// kæmp// [[kæ.məs]] //sɪlk// [[si:.lək]]

//mɪlk/ / [[mi:.lək]] //sɪlk// [[si:.lək]]

//mɪlk/ / [[milk]] //kæmp// [[kæmp]]

//mɪlk/ / [[milk]] //sɪlk// [[sɪlk]]

//mɪlk/ / [[mil]] //sɪlk// [[sɪl]]

//mɪlk/ / [[mi:.lə]] //kæmp// [[kæ.mə]]
//mɪlk/ / [[mi:.lə]] //sɪlk/ / [[si:.lə]]
//sɪlk/ / [[si:.lək]] //mɪlk/ / [[mi:.lək]]
//sɪlk/ / [[silk]] //kæmp// [[kæmp]]
//sɪlk/ / [[silk]] //mɪlk/ / [[mɪlk]]
//sɪlk/ / [[sɪl]] //mɪlk/ / [[mɪl]]
//sɪlk/ / [[si:.lə]] //kæmp// [[kæ.mə]]
//sɪlk/ / [[si:.lə]] //mɪlk/ / [[mi:.lə]]

Nothing is implicated by these input-output pairs:

/kæmp/ → [kæmp] / krɒ.kri/ → [kə.rak.ri]
/kæmp/ → [kæm] / krɒ.kri/ → [kra.kri]
/kæmp/ → [kæ.mə] / krɒ.kri/ →[ka.kɽi]
/kæmp/ → [kæ.sə] / krɒ.kri/ → [kra.ki]
/kæmp/ → [kæms] /mɪlk/ → [ni.lə]
/trɒ.li/ → [tra:.li] /sɪlk/ → [i:.lət]
/trɒ.li/ →[tə.ra:.li]
/trɒ.li/ →[ra:.li]
/trɒ.li/ → [t̪ra:.li]

Input Candidate

/kæmp/ [kæmp] / krɒ.kri/ [kə.rak.ri]
/kæmp/ [kæm] / krɒ.kri/ [kra.kri]
/kæmp/ [kæ.mə] / krɒ.kri/ [ka.kɽi]
/kæmp/ [kæ.sə] / krɒ.kri/ [kra.ki]
/kæmp/ [kæms] /mɪlk/ [ni.lə]
/trɒ.li/ [tra:.li] /sɪlk/ [i:.lət]
/trɒ.li/ [tə.ra:.li]
/trɒ.li/ [ra:.li]
/trɒ.li/ [t̪ra:.li]

5. Complete Listing of Output Patterns

OUTPUT SET #1:

// kæmp// →[kæmp]
//mɪlk/ / →[mi:.lək]
// krɒ.kri// →[kə.rak.ri]
//trɒli// →[tra:.li]
//sɪlk/ / →[si:.lək]

Grammar:

Stratum #1		
	*COMP[place-ons]	[= *COMP[place-ons]]
	MAX	[= MAX]
	IDENT [place]	[= IDENT [place]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	ONSET	[= ONS]
Stratum #2		
	DEP	[= DEP]
	*COMPLEX coda	[= *COMP coda]
	NOCODA	[= NOCODA]
Stratum #3		
	*COMPLEX onset	[=*COMP onset]

OUTPUT SET #2:

// kæmp// →[kæmp]
//mɪlk// →[mi:.lək]
//krɒ.kri// →[kə.rak.ri]
//trɒ.li// →[tə.ra:.li]
//sɪlk// →[si:.lək]

Grammar:

Stratum #1		
	*COMPLEX onset	[=*COMP onset]
	*COMP[place-ons]	[= *COMP[place-ons]]
	MAX	[= MAX]
	IDENT [place]	[= IDENT [place]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	ONSET	[= ONS]
Stratum #2		
	DEP	[= DEP]
	*COMPLEX coda	[= *COMP coda]
	NOCODA	[= NOCODA]

OUTPUT SET #3:

// kæmp// →[kæmp]
//mɪlk// →[mi:.lək]
// krɒ.kri// →[kra.kri]
//trɒ.li// →[tra:.li]
//sɪlk// →[si:.lək]

Grammar:

Stratum #1		
	MAX	[= MAX]
	IDENT [place]	[= IDENT [place]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	ONSET	[= ONS]
Stratum #2		
	DEP	[= DEP]
	*COMPLEX coda	[= *COMP coda]
	NOCODA	[= NOCODA]
Stratum #3		
	*COMPLEX onset	[=*COMP onset]

	*COMP[place-ons]	[= *COMP[place-ons]]

OUTPUT SET #4:

//kæmp// →[kæmp]
//mɪlk// →[mi:.lək]
// krɒ.kri// →[kra.kri]
//trɒ.li// →[tə.ra:.li]
//sɪlk/ / →[si:.lək]

Grammar:

Stratum #1		
	MAX	[= MAX]
	IDENT [place]	[= IDENT [place]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	ONSET	[= ONS]
Stratum #2		
	*COMPLEX coda	[= *COMP coda]
	NOCODA	[= NOCODA]
Stratum #3		
	*COMPLEX onset	[=*COMP onset]
	*COMP[place-ons]	[= *COMP[place-ons]]
Stratum #4	DEP	[= DEP]

OUTPUT SET #5:

//kæmp// →[kæmp]
//mɪlk// →[mɪlk]
//krɒ.kri// →[kə.rak.ri]
//trɒ.li// →[tra:.li]
//sɪlk// →[sɪlk]

Grammar:

Stratum #1		
	*COMP[place-ons]	[= *COMP[place-ons]]
	MAX	[= MAX]
	IDENT [place]	[= IDENT [place]]
	ONSET	[= ONS]
Stratum #2		
	DEP	[= DEP]
	NOCODA	[= NOCODA]
Stratum #3		
	*COMPLEX onset	[= *COMP onset]
	*COMPLEX [place-coda]	[= *COMP[place-coda]
	*COMPLEX coda	[= *COMP coda]

OUTPUT SET #6:

//kæmp// →[kæmp]
//mɪlk// →[mɪlk]
// krɒ.kri// →[kə.rak.ri]
//trɒ.li// →[tə.ra:.li]
//sɪlk// →[sɪlk]

Grammar:

Stratum #1		
	*COMPLEX onset	[=*COMP onset]
	*COMP[place-ons]	[= *COMP[place-ons]]

	MAX	[= MAX]
	IDENT [place]	[= IDENT [place]]
	ONSET	[= ONS]
Stratum #2		
	DEP	[= DEP]
	NOCODA	[= NOCODA]
Stratum #3		
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]

OUTPUT SET #7:

//kæmp// →[kæmp]
//mɪlk// →[mɪlk]
// krɒ.kri// →[kə.rak.ri]
//trɒ.li// →[ra:.li]
//sɪlk// →[sɪlk]

Grammar:

Stratum #1		
	*COMPLEX onset	[=*COMP onset]
	*COMP[place-ons]	[= *COMP[place-ons]]
	IDENT [place]	[= IDENT [place]]
	ONSET	[= ONS]
Stratum #2		
	DEP	[= DEP]
Stratum #3		
	MAX	[= MAX]
	NOCODA	[= NOCODA]
Stratum #4		
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]

OUTPUT SET #8:

// kæmp// →[kæmp]
//mɪlk/ / →[mɪlk]
// krɒ.kri// →[kra.kri]
//trɒ.li// →[tra:.li]
//sɪlk// →[sɪlk]

Grammar

Stratum #1		
	MAX	[= MAX]
	IDENT [place]	[= IDENT [place]]
	DEP	[= DEP]
	ONSET	[= ONS]
Stratum #2		
	*COMPLEX onset	[=*COMP onset]
	*COMP[place-ons]	[= *COMP[place-ons]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]
	NOCODA	[= NOCODA]

OUTPUT SET #9:

// kæmp// →[kæmp]
//mɪlk/ / →[mɪlk]
// krɒ.kri// →[kra.kri]
//trɒ.li// →[tə.ra:.li]
//sɪlk// →[sɪlk]

Grammar:

Stratum #1		
	MAX	[= MAX]
Stratum #2		
	NOCODA	[= NOCODA]
	*COMPLEX onset	[= *COMP onset]
	*COMP[place-ons]	[= *COMP[place-ons]]
Stratum #4		
	DEP	[= DEP]
Stratum #5		
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]

OUTPUT SET #10:

// kæmp// →[kæmp]
//mɪlk/ / →[mɪlk]
// krɒ.kri// →[kra.kri]
//trɒ.li// →[ra:.li]
//sɪlk// →[sɪlk]

Grammar:

Stratum #1		
	IDENT [place]	[= IDENT [place]]
	DEP	[= DEP]
	ONSET	[= ONS]
Stratum #2		
	*COMPLEX onset	[= *COMP onset]
	*COMP[place-ons]	[= *COMP[place-ons]]
	NOCODA	[= NOCODA]
Stratum #3		
	MAX	[= MAX]
Stratum #4	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]

OUTPUT SET #11:

// kæmp// →[kæmp]
//mɪlk/ / →[mɪl]
// krɒ.kri// →[kə.rak.ri]
//trɒ.li// →[tra:.li]
//sɪlk/ / →[sɪl]

Grammar:

Stratum #1		
	*COMP[place-ons]	[= *COMP[place-ons]]
	IDENT [place]	[= IDENT [place]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	ONSET	[= ONS]
Stratum #2		

	DEP	[= DEP]
Stratum #3		
	MAX	[= MAX]
	NOCODA	[=NOCODA]
Stratum #4		
	COMPLEX onset	[= COMP onset]
	*COMPLEX coda	[= *COMP coda]

OUTPUT SET #12:

// kæmp// →[kæmp]
//mɪlk/ / →[mɪl]
// krɒ.kri// →[kə.rak.ri]
//trɒ.li// →[ra:.li]
//sɪlk/ / →[sɪl]

Grammar:

Stratum #1		
	*COMPLEX onset	[= *COMP onset]
	*COMP[place-ons]	[= *COMP[place-ons]]
	IDENT [place]	[= IDENT [place]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	ONSET	[= ONS]
Stratum #2	DEP	[= DEP]
Stratum #3	MAX	[= MAX]
	NOCODA	[= NOCODA]
Stratum #4	*COMPLEX coda	[= *COMP coda]

OUTPUT SET #13:

// kæmp// →[kæmp]
//mɪlk/ / →[mɪl]
// krɒ.kri// →[kra.kri]
//trɒ.li// →[tra:.li]
//sɪlk/ / →[sɪl]

Grammar:

Stratum #1		
	IDENT [place]	[= IDENT [place]]
	DEP	[= DEP]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	ONSET	[= ONS]
Stratum #2		
	*COMP[place-ons]	[= *COMP[place-ons]]
	MAX	[= MAX]
	NOCODA	[= NOCODA]
Stratum #3		
	COMPLEX onset	[= COMP onset]
	*COMPLEX coda	[= *COMP coda]

OUTPUT SET #14:

// kæmp// →[kæmp]
//mɪlk/ / →[mɪl]
// krɒ.kri// →[kra.kri]
//trɒ.li// →[ra:.li]
//sɪlk/ / →[sɪl]

Grammar:

Stratum #1		

	IDENT [place]	[= IDENT [place]]
	DEP	[= DEP]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	ONSET	[= ONS]
Stratum #2		
	COMPLEX onset	[= COMP onset]
	*COMP[place-ons]	[= *COMP[place-ons]]
	NOCODA	[= NOCODA]
Stratum #3		
	MAX	[= MAX]
Stratum #4		
	*COMPLEX coda	[= *COMP coda]

OUTPUT SET #15:

// kæmp// →[kæ.məs]
//mɪlk/ / →[mi:.lək]
// krɒ.kri// →[kə.rak.ri]
//trɒ.li// →[tra:.li]
//sɪlk/ / →[si:.lək]

Grammar:

Stratum #1		
	*COMP[place-ons]	[= *COMP[place-ons]]
	MAX	[= MAX]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]
	ONSET	[= ONS]
Stratum #2	IDENT [place]	[= IDENT [place]]
	DEP	[= DEP]
	NOCODA	[= NOCODA]
Stratum #3	*COMPLEX onset	[=*COMP onset]

OUTPUT SET #16:

// kæmp// →[kæ.məs]
//mɪlk/ / →[mi: .lək]
// krɒ.kri// →[kə.rak.ri]
//trɒ.li// →[tə.ra:.li]
//sɪlk/ / →[si: .lək]

Grammar:

Stratum #1		
	COMPLEX onset	[= COMP onset]
	*COMP[place-ons]	[= *COMP[place-ons]]
	MAX	[= MAX]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]
	ONSET	[= ONS]
Stratum #2	IDENT [place]	[= IDENT [place]]
	DEP	[= DEP]
	NOCODA	[= NOCODA]

OUTPUT SET #17:

// kæmp// →[kæ.məs]
//mɪlk/ / →[mi: .lək]
// krɒ.kri// →[kra.kri]
//trɒ.li// →[tra:.li]
//sɪlk/ / →[si:.lək]

Grammar:

Stratum #1		
	MAX	[= MAX]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]
	ONSET	[= ONS]
Stratum #2		
	IDENT [place]	[= IDENT [place]]
	DEP	[= DEP]
	NOCODA	[= NOCODA]
Stratum #3	COMPLEX onset	[= COMP onset]
	*COMP[place-ons]	[= *COMP[place-ons]]

OUTPUT SET #18:

// kæmp// →[kæ.məs]
//mɪlk/ / →[mi: .lək]
// krɒ.kri// →[kra.kri]
//trɒ.li// →[tə.ra:.li]
//sɪlk/ / →[si: .lək]

Grammar:

Stratum #1		
	MAX	[= MAX]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]
	ONSET	[= ONS]
Stratum #2		
	IDENT [place]	[= IDENT [place]]
	NOCODA	[= NOCODA]
Stratum #3		
	COMPLEX onset	[= COMP onset]
	*COMP[place-ons]	[= *COMP[place-ons]]
Stratum #4	DEP	[= DEP]

OUTPUT SET #19:

// kæmp// →[kæm]
//mɪlk/ / →[mi: .lək]
// krɒ.kri// →[kə.rak.ri]
//trɒ.li// →[tra:.li]
//sɪlk/ / →[si: .lək]

Grammar:

Stratum #1		
	*COMP[place-ons]	[= *COMP[place-ons]]
	IDENT [place]	[= IDENT [place]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]
	ONSET	[= ONS]
Stratum #2	MAX	[= MAX]
Stratum #3	DEP	[= DEP]
Stratum #4	COMPLEX onset	[= COMP onset]
	NOCODA	[= NOCODA]

OUTPUT SET #20:

// kæmp// →[kæm]
//mɪlk/ / →[mi: .lək]
// krɒ.kri// →[kə.rak.ri]
//trɒ.li// →[tə.ra:.li]
//sɪlk/ / → [si:.lək]

Grammar:

Stratum #1		
	COMPLEX onset	[= COMP onset]
	*COMP[place-ons]	[= *COMP[place-ons]]
	IDENT [place]	[= IDENT [place]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]
	ONSET	[= ONS]
Stratum #2	MAX	[= MAX]
Stratum #3	DEP	[= DEP]
Stratum #4	NOCODA	[= NOCODA]

OUTPUT SET #21:

// kæmp// →[kæm]
//mɪlk// →[mi: .lək]
// krɒ.kri// →[kra.kri]
//trɒ.li// →[tra:.li]
//sɪlk// →[si: .lək]

Grammar:

Stratum #1		
	IDENT [place]	[= IDENT [place]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]
	ONSET	[= ONS]
Stratum #2	MAX	[= MAX]
Stratum #3	DEP	[= DEP]
Stratum #4	COMPLEX onset	[= COMP onset]
	*COMP[place-ons]	[= *COMP[place-ons]]
	NOCODA	[=NOCODA]

OUTPUT SET #22:

// kæmp// →[kæm]
//mɪlk/ / →[mɪl]
// krɒ.kri// →[kə.rak.ri]
//trɒ.li// →[tra:.li]
//sɪlk/ / →[sɪl]

Grammar:

Stratum #1		
	*COMP[place-ons]	[= *COMP[place-ons]]
	IDENT [place]	[= IDENT [place]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]
	ONSET	[= ONS]
Stratum #2	DEP	[= DEP]
Stratum #3	MAX	[= MAX]
	NOCODA	[= NOCODA]
Stratum #4	COMPLEX onset	[= COMP onset]

OUTPUT SET #23:

// kæmp// →[kæm]
//mɪlk/ / →[mɪl]
// krɒ.kri// →[kə.rak.ri]
//trɒ.li// → [ra:.li]
//sɪlk/ / →[sɪl]

Grammar:

Stratum #1		
	COMPLEX onset	[= COMP onset]
	*COMP[place-ons]	[= *COMP[place-ons]]
	IDENT [place]	[= IDENT [place]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]
	ONSET	[= ONS]
Stratum #2	DEP	[= DEP]
Stratum #3	MAX	[= MAX]
	NOCODA	[= NOCODA]

OUTPUT SET #24:

// kæmp// →[kæm]
//mɪlk/ / →[mɪl]
// krɒ.kri// →[kra.kri]
//trɒ.li// →[tra:.li]
//sɪlk/ / →[sɪl]

Grammar:

Stratum #1		
	IDENT [place]	[= IDENT [place]]
	DEP	[= DEP]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]
	ONSET	[= ONS]
Stratum #2	*COMP[place-ons]	[= *COMP[place-ons]]
	MAX	[= MAX]
	NOCODA	[= NOCODA]
Stratum #3	COMPLEX onset	[= COMP onset]

OUTPUT SET #25:

// kæmp// →[kæm]
//mɪlk/ / →[mɪl]
// krɒ.kri// →[kra.kri]
//trɒ.li// → [ra:.li]
//sɪlk/ / →[sɪl]

Grammar:

Stratum #1		
	IDENT [place]	[= IDENT [place]]
	DEP	[= DEP]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]
	ONSET	[= ONS]
Stratum #2	COMPLEX onset	[= COMP onset]
	*COMP[place-ons]	[= *COMP[place-ons]]
	NOCODA	[= NOCODA]
Stratum #3	MAX	[= MAX]

OUTPUT SET #26:

// kæmp// →[kæ.mə]
//mɪlk/ / →[mi:.lək]
// krɒ.kri// →[kə.rak.ri]
//trɒ.li// →[tra:.li]
//sɪlk// →[si:.lək]

Grammar:

Stratum #1		
	*COMP[place-ons]	[= *COMP[place-ons]]
	IDENT [place]	[= IDENT [place]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]
	ONSET	[= ONS]
Stratum #2	MAX	[=MAX]
Stratum #3	NOCODA	[= NOCODA]
Stratum #4	DEP	[= DEP]
Stratum #5	COMPLEX onset	[= COMP onset]

OUTPUT SET #27:

// kæmp// →[kæ.mə]
//mɪlk/ / →[mi:.lək]
// krɒ.kri// →[kə.rak.ri]
//trɒ.li// →[tə.ra:.li]
//sɪlk/ / →[si:.lək]

Grammar:

Stratum #1		
	COMPLEX onset	[= COMP onset]
	*COMP[place-ons]	[= *COMP[place-ons]]
	IDENT [place]	[= IDENT [place]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]
	ONSET	[= ONS]
Stratum #2	MAX	[= MAX]
Stratum #3	NOCODA	[= NOCODA]
Stratum #4	DEP	[= DEP]

OUTPUT SET #28:

// kæmp// →[kæ.mə]
//mɪlk/ / →[mi:.lək]
// krɒ.kri// →[kra.kri]
//trɒ.li// →[tra:.li]
//sɪlk/ / →[si:.lək]

Grammar:

Stratum #1		
	IDENT [place]	[= IDENT [place]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]
	ONSET	[= ONS]
Stratum #2	MAX	[= MAX]
Stratum #3	NOCODA	[= NOCODA]

Stratum #4	*COMP[place-ons]	[= *COMP[place-ons]]
	DEP	[= DEP]
Stratum #5	COMPLEX onset	[= COMP onset]

OUTPUT SET #29:

// kæmp// →[kæ.mə]
//mɪlk/ / →[mi:.lək]
// krɒ.kri// →[kra.kri]
//trɒ.li// →[tə.ra:.li]
//sɪlk/ / →[si:.lək]

Grammar:

Stratum #1		
	IDENT [place]	[= IDENT [place]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]
	ONSET	[= ONS]
Stratum #2	MAX	[= MAX]
Stratum #3	NOCODA	[= NOCODA]
Stratum #4	COMPLEX onset	[= COMP onset]
	*COMP[place-ons]	[= *COMP[place-ons]]
Stratum #5	DEP	[= DEP]

OUTPUT SET #30:

// kæmp// →[kæ.mə]
//mɪlk/ / →[mi:.lə]
// krɒ.kri// →[kə.rak.ri]
//trɒ.li// →[tra:.li]
//sɪlk// →[si:.lə]

Grammar:

Stratum #1		
	*COMP[place-ons]	[= *COMP[place-ons]]
	IDENT [place]	[= IDENT [place]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]
	ONSET	[= ONS]
Stratum #2	NOCODA	[= NOCODA]
Stratum #3	MAX	[= MAX]
	DEP	[= DEP]
Stratum #4	COMPLEX onset	[= COMP onset]

OUTPUT SET #31:

// kæmp// →[kæ.mə]
//mɪlk// →[mi:.lə]
// krɒ.kri// →[kə.rak.ri]
//trɒ.li// →[tə.ra:.li]
//sɪlk/ / →[si:.lə]

Grammar:

Stratum #1		
	COMPLEX onset	[= COMP onset]
	*COMP[place-ons]	[= *COMP[place-ons]]
	IDENT [place]	[=IDENT [place]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]

	*COMPLEX coda	[= *COMP coda]
	ONSET	[= ONS]
Stratum #2	NOCODA	[= NOCODA]
Stratum #3	MAX	[= MAX]
Stratum #4	DEP	[= DEP]

OUTPUT SET #32:

// kæmp// →[kæ.mə]
//mɪlk/ / →[mi:.lə]
// krɒ.kri// →[kə.rak.ri]
//trɒ.li// →[ra:.li]
//sɪlk// →[si: .lə]

Grammar:

Stratum #1		
	COMPLEX onset	[= COMP onset]
	*COMP[place-ons]	[= *COMP[place-ons]]
	IDENT [place]	[= IDENT [place]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]
	ONSET	[= ONS]
Stratum #2	NOCODA	[= NOCODA]
Stratum #3	DEP	[= DEP]
Stratum #4	MAX	[= MAX]

OUTPUT SET #33:

// kæmp// →[kæ.mə]
//mɪlk/ / →[mi: .lə]
// krɒ.kri// →[kra.kri]
//trɒ.li// →[tra:.li]
//sɪlk/ / →[si: .lə]

Grammar:

Stratum #1		
	IDENT [place]	[= IDENT [place]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]
	ONSET	[= ONS]
	NOCODA	[= NOCODA]
Stratum #2	*COMP[place-ons]	[= *COMP[place-ons]]
	MAX	[= MAX]
	DEP	[= DEP]
Stratum #3	COMPLEX onset	[= COMP onset]

OUTPUT SET #34:

// kæmp// →[kæ.mə]
//mɪlk/ / →[mi: .lə]
// krɒ.kri// →[kra.kri]
//trɒ.li// →[tə.ra:.li]
//sɪlk/ / →[si: .lə]

Grammar:

Stratum #1		
	IDENT [place]	[= IDENT [place]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]
	ONSET	[= ONS]

	NOCODA	[= NOCODA]
Stratum #2	COMPLEX onset	[= COMP onset]
	*COMP[place-ons]	[= *COMP[place-ons]]
	MAX	[= MAX]
Stratum #3	DEP	[= DEP]

OUTPUT SET #35:

// kæmp// →[kæ.mə]
//mɪlk/ / → [mi: .lə]
// krɒ.kri// →[kra.kri]
//trɒ.li// →[ra:.li]
//sɪlk/ / →[si: .lə]

Grammar:

Stratum #1		
	IDENT [place]	[= IDENT [place]]
	*COMPLEX [place-coda]	[= *COMP[place-coda]]
	*COMPLEX coda	[= *COMP coda]
	ONSET	[= ONS]
	NOCODA	[= NOCODA]
Stratum #2	COMPLEX onset	[= COMP onset]
	*COMP[place-ons]	[= *COMP[place-ons]]
	DEP	[= DEP]
Stratum #3	MAX	[= MAX]

Appendix IX

Factorial Typology : Stress System

1. Constraints

Full Name	**Abbr.**
1. FtBin	FtBin
2. SWP	SWP
3. NonFin_{C}	NonFin_{C}
4. Align R	Align R
5. $\text{IDENT}_{[long\text{-}v]}$	$\text{ID}_{[long\text{-}v]}$
6. Parse-syllable	Parse-syll
7. MATCH	MATCH

All rankings were considered.
Summary results appear at end of file.
Immediately below are reports on individual patterns generated.

2. Summary Information
With 7 constraints, the number of logically possible grammars is 5040.
There were 21 different output patterns.
Forms marked as winners in the input file are marked with >.

	Output #1	**Output #2**	**Output #3**	**Output #4**
//ˈgluː.kəʊz//	>gəl.('ko:)<z>	>gəl.('ko:)<z>	>gəl.('ko:)<z>	>gəl.('ko:)<z>
//'væk.si:n//	(væk).('si:)<n>	(væk).('si:)<n>	(væk).('si:)<n>	(væk).('si:)<n>

//'pəb.lək//	>('pəb).lək	>('pəb).lək	>('pəb).lək	('pəb).(lə)<k>
//'lɛ.tɪs//	>('læ:).təs	('lɛ.t?)<s>	(lɛ).('tɪs)	(lɛ).('tɪs)
	Output #5	**Output #6**	**Output #7**	**Output #8**
//'glu: .kəʊz//	>gəl.('ko:)<z>	>gəl.('ko:)<z>	>gəl.('ko:)<z>	('gəl).(ko:)<z>
//'væk.si:n//	(væk).('si:)<n>	(væk).('si:)<n>	(væk).('si:)<n>	>('væk).(si:)<n>
//'pəb.lək//	('pəb).(lə)<k>	(pəb).('lə)<k>	(pəb).('lə)<k>	>('pəb).lək
//'lɛ.tɪs//	('læ:).(tə)<s>	('lɛ.tɪ)<s>	(lɛ).('tɪs)	>('læ:).tɪs
	Output #9	**Output #10**	**Output #11**	**Output #12**
//'glu: .kəʊz//	('gəl).(ko:)<z>	('gəl).(ko:)<z>	('gəl).(ko:)<z>	('gəl).(ko:)<z>
//'væk.si:n//	>('væk).(si:)<n>	>('væk).(si:)<n>	>('væk).(si:)<n>	>('væk).(si:)<n>
//'pəb.lək//	>('pəb).lək	>('pəb).lək	('pəb).(lə)<k>	('pəb).(lə)<k>
//'lɛ.tɪs//	('lɛ.tɪ)<s>	(lɛ).('tɪs)	('lɛ.tɪ)<s>	(lɛ).('tɪs)
	Output #13	**Output #14**	**Output #15**	**Output #16**
//'glu: .kəʊz//	('gəl).(ko:)<z>	('gəl).(ko:)<z>	'g?l).(ko:)<z>	(('g?l).(ko:)<z>
//'væk.si:n//	>('væk).(si:)<n>	(væk).(?si:)<n>	(væk).('si:)<n>	(væk).('si:)<n>
//'pəb.lək//	('pəb).(l?)<k>	>('pəb).lək	>('pəb).lək	>('pəb).lək
//'lɛ.tɪs//	('læ:).(tə)<s>	>('læ:).təs	('lɛ.tɪ)<s>	(lɛ).('tɪs)
	Output #17	**Output #18**	**Output #19**	**Output #20**
//'glu: .kəʊz//	('gəl).(ko:)<z>	('gəl).(ko:)<z>	('gəl).(ko:)<z>	('gəl).(ko:)<z>
//'væk.si:n//	(væk). ('si:)<n>	(væk).('si:)<n>	(væk). ('si:)<n>	(væk).('si:)<n>
//'pəb.lək//	('pəb).(lə)<k>	('pəb).(lə)<k>	('pəb).(lə)<k>	(pəb).('lə)<k>
//'lɛ.tɪs//	('lɛ.tɪ)<s>	(lɛ).('tɪs)	('læ:).(tə)<s>	('lɛ.tɪ)<s>
	Output #21			
//'glu: .kəʊz//	('gəl).(ko:)<z>			
//'væk.si:n//	(væk).('si:)<n>			
//'pəb.lək//	(pəb).('lə)<k>			
//'lɛ.tɪs//	(lɛ).('tɪs)			

3. List of Winners

The following specifies for each candidate whether there is at least one ranking that derives it:

//'glu:kəʊz//		//'pəb.lək//	
[gəl.('ko:)<z>]	yes	[('pəb).lək]	yes
[('gəl).(ko:)<z>]	yes	[('pəb).(lə)<k>]	yes
[('gə).(ko:)<z>]	no	[(pəb).('lə)<k>]	yes
//'væk.si:n//		//'lɛ.tɪs//	
[('væk).(si:)<n>]:	yes	[('læ:).təs]	yes
[(væk).('si:)<n>]	yes	[('lɛ.tɪ)<s>]	yes
[væk. ('si:)<n>]	no	[(lɛ).('tɪs)]	yes
		[('læ:).(tə)<s>]	yes
		[(lɛ).('tɪ)<s>]	no

4. T-orders

The t-order is the set of implications in a factorial typology.

If this input has this output, then this input has this output

//'glu: .kəʊz// [gəl.('ko:)<z>] //'væk.si:n// [(væk). ('si:)<n>]
//'væk.si:n// [('væk).(si:)<n>] //'glu: .kəʊz// [('gəl).(ko:)<z>]
//'pəb.lək// [(pəb).('lə)<k>] //'væk.si:n// [(væk).('si:)<n>]
//'lɛ.tɪs// [('læ:).təs] //'pəb.lək// [('pəb).lək]

//'lɛ.tɪs// [('læ:).(tə)<s>] //'pəb.lək// [('pəb).(lə)<k>]

Nothing is implicated by these input-output pairs:

/'glu: .kəʊz/ --> ('gəl).(ko:)<z> /'pəb.lək/ --> ('pəb).lək
/'glu: .kəʊz/ --> ('gə).(ko:)<z> /'pəb.lək/ --> ('pəb).(lə)<k>
/'væk.si:n/ --> (væk).('si:)<n>
/'væk.si:n/ --> væk.('si:)<n>
/'lɛ.tɪs / --> ('lɛ.tɪ)<s>
/'lɛ.tɪs / --> (lɛ).('tɪs)
/'lɛ.tɪs/ --> (lɛ).('tɪ)<s>

Input Candidate

/'glu: .kəʊz/ ('gəl).(ko:)<z> /'pəb.lək/ ('pəb).lək
/'glu: .kəʊz/ ('gə).(ko:)<z> /'pəb.lək/ ('pəb).(lə)<k>
/'væk.si:n/ (væk).('si:)<n>
/'væk.si:n/ væk.('si:)<n>
/'lɛ.tɪs/ ('lɛ.tɪ)<s>
/'lɛ.tɪs/ (lɛ).('tɪs)
/'lɛ.tɪs/ (lɛ).('tɪ)<s>

5. Complete Listing of Output Patterns

OUTPUT SET #1:

//ˈglu:.kəʊz// → gəl.('ko:)<z>
//'væk.si:n// →(væk).('si:)<n>
//'pəb.lək// →('pəb).lək
//'lɛ.tɪs// →('læ:).təs

Grammar:

Stratum #1		
	FtBin	[= FtBin]
	SWP	[= SWP]
	NonFinC	[= NonFinC]
Stratum #2	Align R	[= Align R]
Stratum #3	IDENT[long-v]	[= ID[long-v]]
	Parse-syllable	[= Parse-syll]
	MATCH	[= MATCH]

OUTPUT SET #2:

//ˈglu:.kəʊz// →gəl.('ko:)<z>
//'væk.si:n// →(væk).('si:)<n>
//'pəb.lək// →('pəb).lək
//'lɛ.tɪs// →('lɛ.tɪ)<s>

Grammar:

Stratum #1		
	FtBin	[= FtBin]
	NonFinC	[= NonFinC]
Stratum #2	Align R	[= Align R]
Stratum #3	SWP	[= SWP]
	IDENT[long-v]	[= ID[long-v]]
	Parse-syllable	[= Parse-syll]
	MATCH	[= MATCH]

OUTPUT SET #3:

//ˈgluː.kəʊz// → gəl.('ko:)<z>
//'væk.si:n// →(væk).('si?)<n>
//'pəb.lək// →('pəb).lək
//'lɛ.tɪs// →(lɛ).('tɪs)

Grammar:

Stratum #1	SWP	[= SWP]
Stratum #2	Align R	[= Align R]
Stratum #3	FtBin	[= FtBin]
	NonFinC	[= NonFinC]
	IDENT[long-v]	[= ID[long-v]]
	MATCH	[= MATCH]
Stratum #4	Parse-syllable	[= Parse-syll]

OUTPUT SET #4:

//ˈgluː.kəʊz// →gəl.('ko:)<z>
//'væk.si:n// →(væk).('si:)<n>
//'pəb.lək// →('pəb).(lə)<k>
//'lɛ.tɪs// →(lɛ).('tɪs)

Grammar:

Stratum #1	SWP	[= SWP]
Stratum #2	Align R	[= Align R]
Stratum #3	NonFinC	[= NonFinC]
	IDENT[long-v]	[= ID[long-v]]
	Parse-syllable	[= Parse-syll]
	MATCH	[= MATCH]
Stratum #4	FtBin	[= FtBin]

OUTPUT SET #5:

//ˈgluː.kəʊz// →gəl.('ko:)<z>
//'væk.si:n// →(væk).('si:)<n>
//'pəb.lək// →('pəb).(lə)<k>
//'lɛ.tɪs// →('læ:).(tə)<s>

Grammar:

Stratum #1		
	SWP	[= SWP]
	NonFinC	[= NonFinC]
Stratum #2	Align R	[= Align R]
Stratum #3	IDENT[long-v]	[= ID[long-v]]
	Parse-syllable	[= Parse-syll]
	MATCH	[= MATCH]
Stratum #4	FtBin	[= FtBin]

OUTPUT SET #6:

//ˈgluː.kəʊz// →gəl.('ko:)<z>
//'væk.si:n// →(væk).('si:)<n>
//'pəb.lək// →(pəb).('lə)<k>
//'lɛ.tɪs// → ('lɛ.tɪ)<s>

Grammar:

Stratum #1		
	NonFinC	[= NonFinC]
	Align R	[= Align R]
Stratum #2	FtBin	[= FtBin]
	SWP	[= SWP]
	IDENT[long-v]	[= ID[long-v]]
	Parse-syllable	[= Parse-syll]
	MATCH	[= MATCH]

OUTPUT SET #7:

//ˈgluː.kəʊz// →gəl.('koː)<z>
//'væk.siːn// →(væk). ('siʔ)<n>
//'pəb.lək// →(pəb).('lə)<k>
//'lɛ.tɪs// →(lɛ).('tɪs)

Grammar:

Stratum #1	Align R	[= Align R]
Stratum #2	SWP	[= SWP]
	IDENT[long-v]	[= ID[long-v]]
	Parse-syllable	[= Parse-syll]
Stratum #3	FtBin	[= FtBin]
	NonFinC	[= NonFinC]
	MATCH	[= MATCH]

OUTPUT SET #8:

//ˈgluː.kəʊz// →('gəl).(koː)<z>
//'væk.siːn// →('væk).(siː)<n>
//'pəb.lək// →('pəb).lək
//'lɛ.tɪs// →('læː).təs

Grammar:

Stratum #1	FtBin	[= FtBin]
	SWP	[= SWP]
	NonFinC	[= NonFinC]
	MATCH	[= MATCH]
Stratum #2	Align R	[= Align R]
	IDENT[long-v]	[= ID[long-v]]
	Parse-syllable	[= Parse-syll]

OUTPUT SET #9:

//ˈgluː.kəʊz// →('gəl).(koː)<z>
//'væk.siːn// →('væk).(siː)<n>
//'pəb.lək// →('pəb).lək
//'lɛ.tɪs// →('lɛ.tɪ)<s>

Grammar:

Stratum #1	FtBin	[= FtBin]
	NonFinC	[= NonFinC]
	IDENT[long-v]	[= ID[long-v]]
	MATCH	[= MATCH]
Stratum #2	SWP	[= SWP]
	Align R	[= Align R]
	Parse-syllable	[= Parse-syll]

OUTPUT SET #10:

//ˈgluː.kəʊz// →('gəl).(ko:)<z>
//'væk.si:n// →('væk).(si:)<n>
//'pəb.lək// →('pəb).lək
//'lɛ.tɪs// →(lɛ).('tɪs)

Grammar:

Stratum #1	SWP	[= SWP]
	IDENT[long-v]	[= ID[long-v]]
Stratum #2	FtBin	[= FtBin]
	NonFinC	[= NonFinC]
	MATCH	[= MATCH]
Stratum #3	Align R	[= Align R]
	Parse-syllable	[= Parse-syll]

OUTPUT SET #11:

//ˈgluː.kəʊz// →('gəl).(ko:)<z>
//'væk.si:n// →('væk).(si:)<n>
//'pəb.lək// →('pəb).(lə)<k>
//'lɛ.tɪs// →('lɛ.tɪ)<s>

Grammar:

Stratum #1		
	NonFinC	[= NonFinC]
	IDENT[long-v]	[= ID[long-v]]
	Parse-syllable	[= Parse-syll]
	MATCH	[= MATCH]
Stratum #2	FtBin	[= FtBin]
	SWP	[= SWP]
	Align R	[= Align R]

OUTPUT SET #12:

//ˈgluː.kəʊz// →('gəl).(ko:)<z>
//'væk.si:n// →('væk).(si:)<n>
//'pəb.lək// →('pəb).(lə)<k>
//'lɛ.tɪs// →(lɛ).('tɪs)

Grammar:

Stratum #1		
	SWP	[= SWP]
	IDENT[long-v]	[= ID[long-v]]
	Parse-syllable	[= Parse-syll]
Stratum #2	FtBin	[= FtBin]
	NonFinC	[= NonFinC]
	MATCH	[= MATCH]
Stratum #3	Align R	[= Align R]

OUTPUT SET #13:

//ˈgluː.kəʊz// →('gəl).(ko:)<z>
//'væk.si:n// →('væk).(si:)<n>
//'pəb.lək// →('pəb).(lə)<k>
//'lɛ.tɪs// →('læ?).(tə)<s>

Grammar:

Stratum #1		
	SWP	[= SWP]
	NonFinC	[= NonFinC]
	Parse-syllable	[= Parse-syll]
	MATCH	[= MATCH]
Stratum #2		
	FtBin	[= FtBin]
	Align R	[= Align R]
	IDENT[long-v]	[= ID[long-v]]

OUTPUT SET #14:

//ˈgluː.kəʊz// →('gəl).(koː)<z>
//'væk.siːn// →(væk).('siː)<n>
//'pəb.lək// →('pəb).lək
//'lɛ.tɪs// →('læː).təs

Grammar:

Stratum #1		
	FtBin	[= FtBin]
	SWP	[= SWP]
	NonFinC	[= NonFinC]
Stratum #2	IDENT[long-v]	[= ID[long-v]]
	Parse-syllable	[= Parse-syll]
Stratum #3	Align R	[= Align R]
Stratum #4	MATCH	[= MATCH]

OUTPUT SET #15:

//ˈgluː.kəʊz// →('gəl).(koː)<z>
//'væk.siːn// →(væk).('siː)<n>
//'pəb.lək// →('pəb).lək
//'lɛ.tɪs// →('lɛ.tɪ)<s>

Grammar:

Stratum #1		
	FtBin	[= FtBin]
	NonFinC	[= NonFinC]
	IDENT[long-v]	[= ID[long-v]]
Stratum #2	SWP	[= SWP]
	Align R	[= Align R]
	Parse-syllable	[= Parse-syll]
Stratum #3	MATCH	[= MATCH]

OUTPUT SET #16:

//ˈgluː.kəʊz// →('gəl).(koː)<z>
//'væk.siːn// →(væk).('siː)<n>
//'pəb.lək// →('pəb).lək
//'lɛ.tɪs// →(lɛ).('tɪs)

Grammar:

Stratum #1		
	SWP	[= SWP]
	IDENT[long-v]	[= ID[long-v]]
Stratum #2		
	FtBin	[= FtBin]

	NonFinC	[= NonFinC]
	Align R	[= Align R]
Stratum #3		
	Parse-syllable	[= Parse-syll]
	MATCH	[= MATCH]

OUTPUT SET #17:

//ˈgluː.kəʊz// →('gəl).(koː)<z>
//'væk.siː.n// →(væk).('siː)<n>
//'pəb.lək// →('pəb).(lə)<k>
//'lɛ.tɪs// →('lɛ.tɪ)<s>

Grammar:

Stratum #1		
	NonFinC	[= NonFinC]
	IDENT[long-v]	[= ID[long-v]]
	Parse-syllable	[= Parse-syll]
Stratum #2	FtBin	[= FtBin]
	SWP	[= SWP]
Stratum #3	Align R	[= Align R]
Stratum #4	MATCH	[= MATCH]

OUTPUT SET #18:

//ˈgluː.kəʊz// →('gəl).(koː)<z>
//'væk.siː.n// →(væk). ('siʔ)<n>
//'pəb.lək// →('pəb).(lə)<k>
//'lɛ.tɪs// →(lɛ).('tɪs)

Grammar:

Stratum #1		
	SWP	[= SWP]
	IDENT[long-v]	[= ID[long-v]]
	Parse-syllable	[= Parse-syll]
Stratum #2	FtBin	[= FtBin]
	NonFinC	[= NonFinC]
	Align R	[= Align R]
Stratum #3	MATCH	[= MATCH]

OUTPUT SET #19:

//ˈgluː.kəʊz// →('gəl).(koː)<z>
//'væk.siː.n// →(væk).('siː)<n>
//'pəb.lək// →('pəb).(lə)<k>
//'lɛ.tɪs// →('læː).(tʔ)<s>

Grammar:

Stratum #1		
	SWP	[= SWP]
	NonFinC	[= NonFinC]
	Parse-syllable	[= Parse-syll]
Stratum #	FtBin	[= FtBin]
	Align R	[= Align R]
	IDENT[long-v]	[= ID[long-v]]
Stratum #3	MATCH	[= MATCH]

OUTPUT SET #20:

//ˈgluː.kəʊz// →('gəl).(koː)<z>
//'væk.siːn// →(væk).('siː)<n>
//'pəb.lək// →(pəb).('lə)<k> (actual)
//'lɛ.tɪs// →('lɛ.tɪ)<s>

Grammar:

Stratum #1		
	NonFinC	[= NonFinC]
	IDENT[long-v]	[= ID[long-v]]
	Parse-syllable	[= Parse-syll]
Stratum #2	FtBin	[= FtBin]
	Align R	[= Align R]
Stratum #3	SWP	[= SWP]
	MATCH	[= MATCH]

OUTPUT SET #21:

//ˈgluː.kəʊz// →('gəl).(koː)<z>
//'væk.siːn// →(væk). ('siː)<n>
//'pəb.lək// →(pəb).('lə)<k> (actual)
//'lɛ.tɪs// →(lɛ).('tɪs

Grammar:

Stratm #1		
	IDENT[long-v]	[= ID[long-v]]
	Parse-syllable	[= Parse-syll]
Stratum #2	Align R	[= Align R]
Stratum #3	SWP	[= SWP]
Stratum #4	FtBin	[= FtBin]
	NonFinC	[= NonFinC]
	MATCH	[= MATCH]

Appendix 10
Corpus: English Loanwords into Mirpur Pahari (MP)

Gloss	Input(English)	Monolinguals(*ML*)	Late Bilinguals (*LB*)
1. abortion	/əˈbɔːˌʃən/	[ˈbaːr.ʃən]	[ˈbaːr.ʃən]
2. abroad	/əˈbrɔːd/	[bəˈraːd]	[əbˈraːd]
3. abstract	/ˈæb.strækt/		[əb.səˈtrækt]
4. academy	/əˈkæ.də.mi/	[ˈkæd.mi]	[əˈkæd.mi]
5. access	/ˈæk.ses/		[ˈək.sæs]
6. accommodation	/ə.kɒm.əˈdeɪˌʃən/		[ka.moˈdeːˌʃən]
7. account	/əˈkaʊnt/	[ˈkõnt]	[əˈkaʊnt]
8. accurate	/ˈæk.jə.rət/		[æ.ˈkoː.ret]
9. achievement	/əˈtʃiːv.mənt/	[ˈtʃiːv.mɪt]	[əˈtʃiːv.mɪt]
10. action	/ˈæk.ʃən/	[ˈæk.ʃən]	[ˈæk.ʃən]
11. active	/ˈæk.tɪv/	[ˈæk.təv]	[ˈæk.tɪv]
12. actress	/ˈæk.trəs/	[ˈæt.rəs]	[ˈæk.trəs]
13. address	/əˈdrɛs/	[ˈæd.rəs]	[ˈæd.rəs]
14. adjust	/əˈdʒʌst/	[ədˈdʒʌst]	[ədˈdʒʌst]
15. admin	/ˈæd.mɪn/		[ˈæd.mən]
16. admission	/ædˈmɪˌʃən/	[ədˈmɪːˌʃən]	[ædˈmɪːˌʃən]
17. adopt	/əˈdɒpt/	[ˈdapt]	[əˈdapt]
18. advantage	/ədˈvɑːn.tɪdʒ/		[ədˈvãːn.tədʒ]
19. advertisement	/ədˈvɜː.tɪs.mənt/		[æd.vərˈtɪz.mɪt]
20. advise	/ədˈvaɪz/		[ədˈvaɪs]
21. aeroplane	/ˈeə.rə.pleɪn/		[æ.ro.pəˈleːn]
22. affair	/əˈfɛə/	[ˈfeər]	[əˈfeːr]
23. afford	/əˈfɔːd/	[ˈfoːt]	[əˈfoːd]
24. aged	/eɪdʒd/		[ˈeː.dʒəd]
25. agency	/ˈeɪ.dʒən.si/	[ˈdʒæn.si]	[əˈdʒən.si]
26. agent	/ˈeɪ.dʒənt/	[ˈdʒə̃nt]	[ˈeː.dʒə̃nt]
27. aggressive	/əˈgre.sɪv/		[ˈəg.re.sɪv]
28. agreement	/əˈgriː.mənt/		[ægˈriː.mɪnt]
29. aid	/eɪd/		[eːd]
30. alarm	/əˈlɑːm/	[ˈlaː.rəm]	[əˈlaː.rəm]
31. allergy	/ˈæ.lə.dʒi/	[ˈlər.zi]	[əˈlər.dʒi]
32. allowance	/əˈlaʊəns/	[ˈlõns]	[əˈlaõs]
33. almond	/ˈɑː.mənd/		[ˈal.mənd]
34. alternative	/ɒlˈtɜː.nə.tɪv/		[ələˈtər.ne.tɪv]
35. ambulance	/ˈæm.bjə.ləns/	[əm.boˈlə̃ns]	[ˈæm.bo.ləns]
36. america	/əˈme.rɪ.kə/	[əmˈrɪː.kə]	[əˈmær.kə]
37. ankle	/ˈæŋ.kəl/		[ˈæŋ.kəl]
38. answer	/ˈɑːn.sə/	[ˈən.sər]	[ˈan.sər]
39. ant	/ænt/		[añt]
40. antique	/ænˈtiːk/	[ənˈtiːk]	[ənˈtiːk]
41. anxiety	/æŋˈzaɪ.ɪt.i/		[ənˈzaɪ.ti]

42. apartment	/əˈpɑːt.mənt/	[ˈpaːt.mɪt]	[əˈpɑːt.mĩnt]
43. appeal	/əˈpiːl/	[ˈpiːl]	[əˈpiːl]
44. appendix	ə.ˈpɛn.dɪks	[ˈpæn.dəs]	[ˈpæn.dəs]
45. apple	/ˈæ.pəl/		[ˈeː.pəl]
46. application	/æp.lɪˈkeɪ.ʃən/	[əp.lɪˈkeː.ʃən]	[æp.lɪˈkeː.ʃən]
47. apply	/ə.ˈplaɪ/	[ˈap.laɪ]	[əp.ˈlaɪ]
48. appointment	/əˈpɔɪnt.mənt/	[puːˈwænt.mɪt]	[əpˈwaĩt.mɪt]
49. apparatus	/æ.pəˈreɪ.təs/		[əp.ˈreː.təs]
50. approach	/ə.ˈprəʊtʃ/	[əp.ˈroːtʃ]	[əp.ˈroːtʃ]
51. april	/ˈeɪ.prɪl/	[ˈəp.ræl]	[ˈæp.rəl]
52. argue	/ˈɑːg.juː/		[ˈar.guː]
53. army	/ˈɑː.mi/	[ˈar.mi]	[ˈar.mi]
54. arrest	/əˈrest/	[ˈræː.sət]	[əˈræst]
55. artist	/ˈɑː.tɪst/	[ˈar.təs]	[ˈar.tɪst]
56. assignment	/əˈsaɪn.mənt/	[ˈsæn.mɪt]	[əˈsaɪn.mɪt]
57. assistant	/əˈsɪs.tənt/		[əˈsɪs.tənt]
58. associate	/əˈsəʊ.si.eɪt/		[əˈsuː.si.eːt]
59. asthma	/ˈæs.mə/		[ˈəs.t̪ʰə.mə]
60. attitude	/ˈæ.tɪ.tʃuːd/	[ə.tɪ.ˈtuːd]	[ˈæ.tɪ.tuːd]
61. attention	/əˈten.ʃən/	[ˈten.ʃən]	[əˈten.ʃən]
62. attraction	/əˈtræk.ʃən/	[tə.ˈræk.ʃən]	[əˈtræk.ʃən]
63. aunt	/ɑːnt/		[ant]
64. authentic	/ɔːˈθen.tɪk/	[ˈt̪ʰæn.tək]	[ə.ˈt̪ʰæn.tɪk]
65. authority	/ɔː.ˈθɒ.rɪ.ti/	[ˈt̪ʰaː.ti]	[ə.ˈt̪ʰar.ti]
66. automatic	/ɔː.tə.ˈmæ.tɪk/	[ə.to.ˈmæt.tək]	[aː.to.ˈmæ.tɪk]
67. average	/ˈæ.və.rɪdʒ/		[ˈæv.rədʒ]
68. award	/əˈwɔːd/	ˈwaːd]	əˈwaːd]
69. baby	/ˈbeɪ.bi	[ˈbeː.bi]	[ˈbeː.bi]
70. back	/bæk/		[bæːk]
71. bag	/bæg/	[bæːg]	[bæːg]
72. bakery	/ˈbeɪ.kə.ri/	[ˈbek.ri]	[ˈbek.ri]
73. balance	/ˈbæ.ləns/	[ˈbæː.ləs]	[ˈbæ.ləns]
74. ball	/bɔːl/	[baːl]	[baːl]
75. balloon	/bə. ˈluːn/	[bə.ˈluːn]	[bə.ˈluːn]
76. banana	/bəˈnɑː.nə/	[bəˈnaː.nə]	[bəˈnaː.nə]
77. band	/bænd/	[bænd]	[bænd]
78. bandage	/ˈbæn.dɪdʒ/	[ˈbæn.dədʒ]	[ˈbæn.dədʒ]
79. bangle	/ˈbæŋ.gəl/	[ˈbæŋ.gəl]	[ˈbæŋ.gəl]
80. bank	/bæŋk/	[bæ̃ŋk]	[bæ̃ŋk]
81. barrister	/ˈbæ.rɪs.tə/	[bə.ˈriːs.tər]	[ˈbæ.rɪs.tər]
82. base	/beɪs/	[beːs]	[beːs]
83. basket	/ˈbɑːs.kɪt/	[ˈbaːs.kət]	[ˈbaːs.kət]
84. battery	/ˈbæ.tə.ri/	[ˈbæt.ri]	[ˈbæt.ri]
85. battle	/ˈbæ.təl/		[ˈbæ.təl]
86. beard	/bɪəd/		[bɪər]
87. beauty	/ˈbjuː.ti/	[ˈbuː.ti]	[bɪ.ˈjuː.ti]

88. bed	/bed/	[bæːd]	[bæd]
89. behaviour	/bɪˈheɪ.vjə/	[ˈbæv.jər]	[bəˈhev.jər]
90. belief	/bɪˈliːf/		[bəˈliːf]
91. bench	/bentʃ/	[bæntʃ]	[bæntʃ]
92. bike	/baɪk/	[bæːk]	[baɪk]
93. bill	/bɪl/	[biːl]	[bil]
94. bin	/bɪn/	[biːn]	[bin]
95. biology	/baɪˈɒ.lə.dʒi/		[bə.jaˈloː.dʒi]
96. bird	/bɜːd/		[bərd]
97. birmingam	/ˈbɜː.mɪŋ.əm/	[bər.mɪˈgaːm]	[bər.mɪˈgaːm]
98. birth	/bɜːθ/	[ˈbər.rə̪tʰ]	[bərt̪ʰ]
99. biscuit	/ˈbɪs.kɪt/	[bɪsˈkuːt]	[ˈbɪs.kət]
100. bite	/baɪt/		[baɪt]
101. black	/blæk/	[bəˈlæːk]	[bəˈlæːk]
102. blade	/bleɪd/	[bəˈleːt]	[bəˈleːd]
103. blame	/bleɪm/	[bəˈlæːm]	[bəˈleːm]
104. blank	/blæŋk/	[bəˈlæ̃ŋk]	[bəˈlæ̃ŋk]
105. blanket	/ˈblæŋ.kɪt/		[bəˈlæŋ.kət]
106. blast	/blɑːst/	[bəˈlaːs]	[bəˈlast]
107. bleach	/bliːtʃ/	[bəˈliːtʃ]	[bəˈliːtʃ]
108. blend	/blend/	[bəˈlæ̃nd]	[bəˈlæ̃nd]
109. blender	/ˈblɛn.də/	[bəˈlæn.dər]	[bəˈlæn.dər]
110. blind	/blaɪnd/	[bəˈlæ̃nd]	[bəˈlaɪnd]
111. block	/blɒk/	[bəˈlaːk]	[bəˈlaːk]
112. blood	/blʌd/	[bəˈlaːt]	[bəˈlaːd]
113. blue	/bluː/	[ˈbɪl.juː]	[ˈbɪl.juː]
114. blush	/blʌʃ/	[bəˈlaːʃ]	[bəˈlaːʃ]
115. board	/bɔːd/	[boːt]	[boːd]
116. boat	/bəʊt/	[boːt]	[boːt]
117. body	/ˈbɒ.di/	[ˈbaː.di]	[ˈbaː.di]
118. boil	/bɔɪl/	[ˈbuː.wæl]	[ˈbuː.waɪl]
119. bold	/bəʊld/	[boː.ləd]	[bold]
120. bomb	/bɒm/	[bəm]	[bomb]
121. bond	/bɒnd/	[bə̃nd]	[bə̃nd]
122. bonus	/ˈbəʊ.nəs/	[ˈboː.nəs]	[ˈboː.nəs]
123. book	/bʊk/	[buːk]	[buːk]
124. border	/ˈbɔː.də/	[ˈbaː.dər]	[ˈbaː.dər]
125. boss	/bɒs/	[baːs]	[baːs]
126. botany	/ˈbɒ.tə.ni/		[ˈbaːt.ni]
127. bottle	/ˈbɒ.təl/	[ˈboː.t̪əl]	[ˈbaː.təl]
128. bottom	/ˈbɒ.təm/		[ˈbaː.təm]
129. bowl	/bəʊl/		[baʊl]
130. box	/bɒks/	[ˈbək.sə]	[baks]
131. boy	/bɔɪ/		[ˈbuː.waɪ]
132. boycott	/ˈbɔɪ.kɒt/	[ˈbaɪ.kat]	[ˈbaɪ.kat]
133. bracelet	/ˈbreɪ.slət/	[bəˈræs.lət]	[bəˈræs.lət]

134.	bracket	/ˈbræ.kɪt/	[bəˈræk.kət]	[bəˈræ.kət]
135.	brain	/breɪn/	[bəˈræːn]	[bəˈreːn]
136.	branch	/brɑːntʃ/	[bəˈrãntʃ]	[bəˈrãntʃ]
137.	brave	/breɪv/		[bəˈreːv]
138.	bread	/brɛd/	[bəˈræːd]	[bəˈræːd]
139.	break	/breɪk/	[bəˈreːk]	[bəˈreːk]
140.	breast	/brest/	[bəˈræːˌsət]	[bəˈræst]
141.	brick	/brɪk/	[bəˈriːk]	[bəˈriːk]
142.	bridal	/ˈbraɪ.dəl/	[bəˈræːˌdəl]	[bəˈraɪ.dəl]
143.	bride	/braɪd/	[bəˈræːt]	[bəˈraɪd]
144.	bridge	/brɪdʒ/	[bəˈriːdʒ]	[bəˈriːdʒ]
145.	bright	/braɪt/	[bəˈræːt]	[bəˈraɪt]
146.	brilliant	/ˈbrɪl.jənt/		[bəˈrɪl.jənt]
147.	british	/ˈbrɪ.tɪʃ/	[bəˈriːˌtəʃ]	[bəˈriːˌtəʃ]
148.	broach	/brəʊtʃ/	[bəˈroːtʃ]	[bəˈroːtʃ]
149.	broad	/brɔːd/	[bəˈraːt]	[bəˈraːd]
150.	broccli	/ˈbrɒ.kə.li/	[ˈbə.rok.li]	[ˈbə.rok.li]
151.	brother	/ˈbrʌ.ðə/	[bəˈrəd̪.d̪ər]	[bəˈrəd̪.d̪ər]
152.	brown	/braʊn/	[bəˈroːn]	[bəˈroːn]
153.	brush	/bɹəʃ/	[ˈbuːˌrəʃ]	[ˈbuːˌrəʃ]
154.	brutal	/ˈbruːˌtəl/		[bəˈruːˌtəl]
155.	bubble	/ˈbʌ.bəl/	[ˈbəb.bəl]	[ˈbaːˌbəl]
156.	budget	/ˈbʌ.dʒɪt/	[ˈbaːˌtʃət]	[ˈbə.dʒət]
157.	builder	/ˈbɪl.də/		[ˈbɪl.dər]
158.	bulb	/bəlb/	[ˈbəl.ləb]	[bəlb]
159.	bun	/bən/	[bənd̪]	[bənd̪]
160.	bundle	/ˈbʌn.dəl/	[ˈbən.dəl]	[ˈbən.dəl]
161.	bunglow	/ˈbʌŋ.gəl.əʊ/	[ˈbãŋg.laːˌ]	[ˈbãŋg.laːˌ]
162.	bunk	/bʌŋk/		[bãŋk]
163.	burger	/ˈbɜːˌgə/	[ˈbər.gər]	[ˈbər.gər]
164.	bus	/bʌs/	[bəs]	[bəs]
165.	business	/ˈbɪz.nɪs/	[ˈbɪz.nəs]	[ˈbɪz.nəs]
166.	busy	/ˈbɪ.zi/	[ˈbiːˌzi]	[ˈbiːˌzi]
167.	butter	/ˈbʌ.tə/	[ˈbət.tər]	[ˈbət.tər]
168.	cabbage	/ˈkæ.bɪdʒ/		[ˈkæːˌbədʒ]
169.	cake	/keɪk/	[keːk]	[keːk]
170.	calculator	/ˈkæl.kjə.leɪ.tə/	[kə.kuˈleːˌtər]	[ˈkæl.kuːˌle.tər]
171.	calendar	/ˈkæ.lɪn.də/	[kəˈlæn.dər]	[kəˈlæn.dər]
172.	camel	/ˈkæ.məl/		[ˈkæm.məl]
173.	camera	/ˈkæm.rə/	[ˈkæm.rə]	[ˈkæm.rə]
174.	camp	/kæmp/	[kæ̃mp]	[kæ̃mp]
175.	cancer	/ˈkæn.sə/	[ˈkæn.sər]	[ˈkæn.sər]
176.	candidate	/ˈkæn.dɪ.deɪt/		[ˈkæn.dɪ.deːt]
177.	candy	/ˈkæn.di/		[ˈkæn.di]
178.	capacity	/kəˈpæ.sə.ti/	[kəˈpæs.ti]	[kəˈpæs.ti]
179.	card	/kɑːd/	[kɑːt]	[kɑːd]

180.	care	/keə/	[keːr]	[keər]
181.	career	/kəˈrɪə/		[keˈrɪər]
182.	carpet	/ˈkɑː.pɪt/	[ˈkaːr.pət]	[ˈkaːr.pɪt]
183.	case	/keɪs/	[keːs]	[keːs]
184.	castle	/ˈkɑː.səl/		[ˈkæː.səl]
185.	cat	/kæt/	[kæt]	[kæt]
186.	catch	/kætʃ/	[kætʃ]	[kætʃ]
187.	catering	/ˈkeɪ.tə.rɪŋ/	[kət.ˈrĩŋg]	[ˈkæt.rĩŋg]
188.	ceilling	/ˈsiː.lɪŋ/	[ˈsiː.lɪŋg]	[ˈsiː.lɪŋg]
189.	celebrity	/sɪ.ˈleb.rɪ.ti/		[sæ.lɪ.ˈbər.ti]
190.	centre	/ˈsen.tə/	[ˈsen.tər]	[ˈsen.tər]
191.	chain	/ʧeɪn/	[ʧæːn]	[ʧeːn]
192.	chair	/ʧeə/	[ʧeːr]	[ʧeːr]
193.	chalk	/ʧɔːk/	[ʧaːk]	[ʧaːk]
194.	challenge	/ˈʧæ.lɪndʒ/	[ʧæ.ˈlə̃ndʒ]	[ˈʧæ.ləndʒ]
195.	champion	/ˈʧæm.pi.ən/		[ˈʧæm.pi.ən]
196.	chance	/ʧɑːns/	[ʧə̃ns]	[ʧə̃ns]
197.	change	/ʧeɪndʒ/	[ʧə̃ndʒ]	[ʧə̃ndʒ]
198.	chapter	/ˈʧæp.tə/	[ˈʧəp.tər]	[ˈʧæp.tər]
199.	charge	/ʧɑːdʒ/	[ˈʧaː.rədʒ]	[ʧardʒ]
200.	chart	/ʧɑːt/	[ʧaːt]	[ʧaːt]
201.	chase	/ʧeɪs/		[ʧeːs]
202.	check	/ʧæk/	[ʧæk]	[ʧæk]
203.	cheeks	/ʧiks/		[ʧiks]
204.	cheese	/ʧiːz/		[ʧiːz]
205.	chest	/ʧest/	[ˈʧæː.sət]	[ʧest]
206.	chicken	/ˈʧɪ.kɪn/	[ˈʧiː.kən]	[ˈʧiː.kən]
207.	children	/ˈʧɪl.drən/		[ˈʧɪl.drən]
208.	chilli	/ˈʧɪ.li/		[ˈʧiː.li]
209.	choclete	/ˈʧɒk.lət/	[ˈʧək.let]	[ˈʧak.let]
210.	choice	/ʧɔɪs/	[ˈʧuː.væs]	[ˈʧuː.vaɪs]
211.	christmas	/ˈkrɪs.məs/	[kə.ˈrɪs.mɪs]	[kə.ˈrɪs.mɪs]
212.	church	/ʧɜːʧ/	[ˈʧər.rətʃ]	[ʧərtʃ]
213.	cigerret	/sɪ.gə.ˈret/	[ˈsɪɣ.rət]	[ˈsɪg.rət]
214.	cinema	/ˈsɪn.ə.mə/	[ˈsæl.mə]	[ˈsæn.mə]
215.	circuit	/ˈsɜː.kɪt/	[ˈsər.kət]	[ˈsər.kət]
216.	city	/ˈsɪ.ti/	[ˈsiː.ti]	[ˈsiː.ti]
217.	claim	/kleɪm/	[kə.ˈlæːm]	[kə.ˈleːm]
218.	clap	/klæp/	[kə.ˈlæːp]	[kə.ˈlæːp]
219.	clause	/klɔːz/		[kə.ˈlaːz]
220.	clay	/kleɪ/		[kə.ˈleː]
221.	clean	/kliːn/	[kə.ˈliːn]	[kə.ˈliːn]
222.	clear	/klɪə/	[ˈkɪl.jər]	[kə.ˈlɪər]
223.	clearance	/ˈklɪə.rəns/	[kə.ˈliː.rəs]	[kə.ˈliː.rəns]
224.	clerk	/klɑːk/	[kə.ˈlaːk]	[kə.ˈlaːk]
225.	clever	/ˈkle.və/		[kə.ˈlæ.vər]

226.	click	/klɪk/	[kə.ˈliːk]	[kə.ˈliːk]
227.	client	/ˈklaɪ.ənt/		[kə.ˈlãɪt]
228.	climax	/ˈklaɪ.mæks/	[kə.ˈlæː.məs]	[kə.ˈlaɪ.məks]
229.	clinic	/ˈklɪ.nɪk/	[kə.ˈliː.nək]	[kə.ˈliː.nək]
230.	clip	/klɪp/	[kəˈliːp]	[kəˈliːp]
231.	clock	/klɒk/	[kə.ˈlaːk]	[kə.ˈlaːk]
232.	close	/kləʊz/	[kə.ˈloːz]	[kə.ˈloːz]
233.	cloth	/klɒθ/	[kə.ˈlaːt̪ʰ]	[kə.ˈlaːt̪ʰ]
234.	cloud	/klaʊd/		[kə.ˈlaʊd]
235.	coat	/kəʊt/	[koːt]	[koːt]
236.	coffee	/ˈkɒ.fi/	[ˈkaː.fi]	[ˈkaː.fi]
237.	college	/ˈkɒ.lɪdʒ/	[ˈkaː.lədʒ]	[ˈkaː.lədʒ]
238.	colonel	/ˈkɜː.nəl/	[ˈkər.nəl]	[ˈkər.nəl]
239.	colour	/ˈkʌ.lə/	[ˈkəl.lər]	[ˈkəl.lər]
240.	combine	/kəmˈbaɪn/		[kəmˈbaɪn]
241.	commercial	/kəˈmɜː.ʃəl/	[kəˈmər.ʃəl]	[kəˈmər.ʃəl]
242.	compass	/ˈkʌm.pəs/		[ˈkəm.pəs]
243.	competent	/ˈkɒm.pɪ.tənt/		[ˈkəm.pɪ.tənt]
244.	complaint	/kəmˈpleɪnt/	[ˈkəmp.leːn]	[ˈkəmp.leːn]
245.	complete	/kəmˈpliːt/	[ˈkəmp.liːt]	[kəmpˈliːt]
246.	compliment	/ˈkɒm.plɪ.mənt/		[ˈkəmp.lɪ.mənt]
247.	computer	/kəm.ˈpjuː.tə/	[kəm.ˈpuː.tər]	[kəmp.ˈjuː.tər]
248.	concelar	/kənˈsiː.lər/		[kənˈsiː.lər]
249.	concentrate	/ˈkɒn.sən.treɪt/		[ˈkən.sən.treːt]
250.	conclusion	/kənˈkluː.ʒən/		[kən.kə.ˈluː.ʒən]
251.	conditional	/kənˈdɪ.ʃə.nəl/		[kənˈdɪʃ.nəl]
252.	conditioner	/kənˈdɪ.ʃə.nər/	[kənˈdɪʃ.nər]	[kənˈdɪʃ.nər]
253.	conductor	/kənˈdʌk.tə/	[kənˈtæk.tər]	[kənˈdək.tər]
254.	conference	/ˈkɒn.fə.rəns/	[kən.fə.ˈrans]	[ˈkan.fə.rəns]
255.	confidence	/ˈkɒn.fɪ.dəns/		[ˈkan.fɪ.dæns]
256.	confirm	/kənˈfɜːm/	[kənˈfər.rəm]	[kənˈfərm]
257.	connection	/kəˈnek.ʃən/	[kəˈnæk.ʃən]	[kəˈnæk.ʃən]
258.	consession	/kənˈse.ʃən/	[kənˈsæː.ʃən]	[kənˈsæː.ʃən]
259.	construction	/kənˈstrʌk.ʃən/		[kənsˈtrək.ʃən]
260.	contact	/ˈkɒn.tækt/	[kən.ˈtæk.kət]	[ˈkən.tækt]
261.	continent	/ˈkɒn.tɪ.nənt/		[ˈkən.tɪ.nænt]
262.	contract	/ˈkɒn.trækt/	[kə̃nt.ˈræk.kət]	[ˈkən.trækt]
263.	contrast	/ˈkɒn.trɑːst/	[kə̃nt.ˈraːs]	[ˈkən.traːst]
264.	convince	/kənˈvɪns/	[kənˈvæns]	[kənˈvæns]
265.	copy	/ˈkɒ.pi/	[ˈkə̃m.pi]	[ˈkaː.pi]
266.	coriander	/kɒ.ri.ˈæn.də/		[kə.ri.ˈæn.dər]
267.	corner	/ˈkɔː.nə/	[ˈkaːr.nər]	[ˈkaːr.nər]
268.	correct	/kə.ˈrekt/		[kə.ˈrækt]
269.	corruption	/kəˈrʌp.ʃən/	[kəˈrəp.ʃən]	[kəˈrəp.ʃən]
270.	cosmetic	/kɒzˈme.tɪk/	[kasˈmæː.tək]	[kasˈmæː.tək]
271.	cotton	/ˈkɒ.tən/	[ˈkaː.tən]	[ˈkaː.tən]

272.	council	/ˈkaʊn.səl/	[ˈkon.səl]	[ˈkaʊn.səl]
273.	country	/ˈkʌn.tri/	[ˈkə̃nt.ri]	[ˈkən.tri]
274.	coupon	/ˈkuː.pɒn/	[ˈkoː.pən]	[ˈkoː.pən]
275.	courage	/ˈkʌ.rɪdʒ/		[ˈkər.rədʒ]
276.	course	/kɔːs/	[ˈkoː.rəs]	[ˈkors]
277.	cousin	/ˈkʌ.zən/	[ˈkaː.zən]	[ˈkə.zən]
278.	crack	/kræk/	[kə.ˈræːk]	[kə.ˈræːk]
279.	crawl	/ kɹɔːl/		[kə.ˈraːl]
280.	cream	/kriːm/	[kə.ˈriːm]	[kə.ˈriːm]
281.	credit	/ˈkre.dɪt/		[kə.ˈræ.dət]
282.	cricket	/ˈkrɪ.kɪt/	[ˈkɪr.kət]	[ˈkɪr.kət]
283.	crockery	/ˈkrɒ.kri/	[kə.ˈrak.ri]	[kə.ˈrak.ri]
284.	cross	/krɒs /	[kə.ˈraːs]	[kə.ˈraːs]
285.	crowd	/kraʊd/		[kə.ˈraʊd]
286.	crown	/kraʊn/		[kə.ˈraʊn]
287.	cry	/kraɪ/		[kə.ˈraɪ]
288.	crystal	/ˈkrɪs.təl/	[kə.ˈrɪs.təl]	[kə.ˈrɪs.təl]
289.	cucumber	/ˈkjuː.kʌm.bə/		[kə.ˈkəm.bər]
290.	culture	/ˈkʌl.tʃə/	[ˈkəl.tʃər]	[ˈkəl.tʃər]
291.	cumin	/ˈkjuː.mɪn/		[kɪ.ˈjuː.mən]
292.	currency	/ˈkʌ.rən.si/	[kə.ˈrən.si]	[kə.ˈrən.si]
293.	curtain	/ˈkɜː.tən/	[ˈkər.tən]	[ˈkər.tən]
294.	cushion	/ˈkʊ.ʃən/	[ˈkuː.ʃən]	[ˈkuː.ʃən]
295.	custard	/ˈkʌs.təd/	[ˈkəs.təd]	[ˈkəs.təd]
296.	custom	/ˈkʌ.stəm/	[ˈkəs.təm]	[ˈkəs.təm]
297.	cycle	/ˈsaɪ.kəl/	[ˈsæk.kəl]	[ˈsaɪ.kəl]
298.	cylinder	/ˈsɪ.lɪn.də/	[sə.ˈlæn.dər]	[sə.ˈlæn.dər]
299.	damage	/ˈdæ.mɪdʒ/	[ˈdæː.mədʒ]	[ˈdæ.mədʒ]
300.	dance	/dɑːns/	/ˈdaː.nəs/	[dãns]
301.	dark	/dɑːk/	[ˈdaː.rək]	[dark]
302.	darling	/ˈdɑː.lɪŋ/		[ˈdar.lɪŋ]
303.	data	/ˈdeɪ.tə/		[ˈdeː.tə]
304.	deal	/diːl/	[diːl]	[diːl]
305.	death	/deθ/	[dæːt̪ʰ]	[dæːt̪ʰ]
306.	debate	/dɪˈbeɪt/		[dəˈbeːt]
307.	debit	/ˈde.bɪt/		[ˈdæː.bət]
308.	decent	/ˈdiː.sənt/		[ˈdiː.sənt]
309.	decision	/dɪ.ˈsɪ.ʒən/	[də.ˈsiː.ʒən]	[də.ˈsiː.ʒən]
310.	decline	/dɪˈklaɪn/		[ˈdək.laɪn]
311.	defeat	/dɪˈfiːt/		[dəˈfiːt]
312.	definition	/de.fɪˈnɪ.ʃən/		[dæ.fɪˈneː.ʃən]
313.	demand	/dɪ.ˈmɑːnd/	[də.ˈmə̃nd]	[də.ˈmə̃nd]
314.	dentist	/ˈdɛn.tɪst/	[ˈdæn.təs]	[ˈdæn.təs]
315.	deposit	/dɪ.ˈpɒ.zɪt/	[də.ˈpaː.zət]	[də.ˈpaː.zət]
316.	desert	/ˈde.zət/		[ˈdæː.zət]
317.	design	/dɪˈzaɪn/	[dəˈzæːn]	[dəˈzaɪn]

318.	dessert	/dɪˈzɜːt/		[dæˈzərt]
319.	detail	/ˈdiː.teɪl/	[dəˈteːl]	[ˈdiː.tel]
320.	dialogue	/ˈdaɪ.ə.lɒg/	[ˈdaɪ.lak]	[ˈdaɪ.lag]
321.	dictionary	/ˈdɪk.ʃə.nə.ri/		[ˈdɪk.ʃə.nə.ri]
322.	digital	/ˈdɪ.dʒɪ.təl/	[di.ˈdʒiː.təl]	[ˈdi.dʒɪ.təl]
323.	dinner	/ˈdɪ.nə/	[ˈdiː.nər]	[ˈdiː.nər]
324.	director	/daɪˈrek.tər/	[dəˈræk.tər]	[daɪˈrek.tər]
325.	dispose	/dɪsˈpəʊz/		[dəsˈpoːz]
326.	distance	/ˈdɪs.təns/		[ˈdɪs.təns]
327.	district	/ˈdɪs.trɪkt/		[ˈdɪs.trək]
328.	divide	/dɪˈvaɪd/	[dəˈvæːd]	[dəˈvaɪd]
329.	division	/dɪ.ˈvɪ.ʒən/	[dəˈviː.ʒən]	[dəˈviː.ʒən]
330.	divorce	/dɪˈvɔːs/		[daɪˈvors]
331.	doctor	/ˈdɒk.tə/	[ˈdak.tər]	[ˈdak.tər]
332.	dodge	/dɒdʒ/	[daːdʒ]	[daːdʒ]
333.	dog	/dɒg/	[daːg]	[daːg]
334.	dollar	/ˈdɒ.lə/	[ˈdaː.lər]	[ˈdaː.lər]
335.	donkey	/ˈdɒŋ.ki/		[ˈdəŋ.ki]
336.	donor	/ˈdəʊ.nər/	[ˈdoː.nər]	[ˈdoː.nər]
337.	double	/ˈdʌ.bəl/	[ˈdəb.bəl]	[ˈdəb.bəl]
338.	doubt	/daʊt/		[daʊt]
339.	down	/daʊn/	[doːn]	[daʊn]
340.	drama	/ˈdrɑː.mə/	[dəˈraː.mə]	[ˈdraː.mə]
341.	drawer	/drɔː(r)/		[draːr]
342.	drawing	/ˈdrɔː.ɪŋ/	[dəˈræŋg]	[dəˈraɪŋ]
343.	drink	/drɪŋk/	[dəˈrĩŋk]	[drĩŋk]
344.	driver	/ˈdraɪ.və/	[dəˈlæː.vər]	[ˈdræː.vər]
345.	drop	/drɒp/	[dəˈraːp]	[dəˈraːp]
346.	drum	/drʌm/	[dəˈraːm]	[drəm]
347.	dry	/draɪ/		[draɪ]
348.	dust	/dʌst/		[dəst]
349.	duty	/ˈdʒuː.ti/	[ˈdɪb.ti]	[ˈduː.ti]
350.	eagle	/ˈiː.gəl/		[ˈiː.gəl]
351.	earth	/ɜːθ/		[arʈʰ]
352.	easy	/ˈiː.zi/	[ˈiː.zi]	[ˈiː.zi]
353.	eat	/iːt/		[iːt]
354.	economics	/iː.kə.ˈnɒ.mɪks/	[ək.ˈnaː.məs]	[ik.ˈnaː.məks]
355.	effort	/ˈe.fət/	[ˈæf.fət]	[ˈæː.fət]
356.	egg	/eg/	[æg]	[æg]
357.	ego	/ˈiː.gəʊ/		[ˈiː.go]
358.	elastic	/i.ˈlæs.tɪk/	[ˈlaʃ.tək]	[ˈlas.tək]
359.	election	/i.ˈlek.ʃən/	[ˈlæk.ʃən]	[əˈlæk.ʃən]
360.	electronics	/ɪ.læk.ˈtrɒ.nɪks/	[læt.ˈraː.nəs]	[ə.læk.ˈtra.nəks]
361.	elementary	/e.lɪˈmen.tə.ri/	[ə.lɪˈmɪt.ri]	[æ.lɪˈmĩn.tri]
362.	elephant	/ˈel.ɪ.fənt/	[ə.lɪ.ˈfænt]	[ˈæ.lɪ.fænt]
363.	embarras	/ɪmˈbæ.rəs/		[əmˈbæː.rəs]

364.	embroidery	/ɪmˈbrɔɪ.də.ri/		[əmbˈraɪ.dri]
365.	employee	/ɪmˈplɔɪ.iː/		[ˈəmp.laɪ]
366.	enemy	/ˈe.nə.mi/		[ˈæː.ni.mi]
367.	engagement	/ɪnˈgeɪdʒ.mənt/	[ˈgeːdʒ.mɪt]	[ənˈgeːdʒ.mɪnt]
368.	engine	/ˈen.dʒɪn/	[ˈɪn.dʒən]	[ˈɪn.dʒən]
369.	engineer	/en.dʒɪˈnɪə/	[ən.dʒɪˈnɪər]	[ən.dʒɪˈnɪər]
370.	england	/ˈɪŋ.gl̩nd/	[ˈəŋg.lænd]	[ˈəŋg.lænd]
371.	english	/ˈɪŋ.glɪʃ/	[ˈɪŋg.ləʃ]	[ˈɪŋg.ləʃ]
372.	enjoy	/ɪn.ˈdʒɔɪ/		[ən.ˈdʒuː.vae]
373.	entry	/ˈen.tri/	[ˈæn.tri]	[ˈæn.tri]
374.	eraser	/ɪˈreɪ.zə/	[ˈreː.zər]	[ˈreː.zər]
375.	error	/ˈer.ə/		[ˈær.ər]
376.	essay	/ˈes.eɪ/		[ˈæs.se]
377.	establishment	/ɪ.ˈstæb.lɪʃ.mənt/		[əs.ˈtæb.ləʃ.mɪt]
378.	europe	/ˈjʊə.rəp/	[ˈjoː.rəp]	[ˈjoː.rəp]
379.	exam	/ɪg.ˈzæm/	[əg.ˈzaːm]	[əg.ˈzæm]
380.	examination	/ɪg.zæm.ɪ.ˈneɪ.ʃən/		[əg.zæ.mɪ.ˈneː.ʃən]
381.	expel	/ɪkˈspel/	[ˈəs.pæl]~[ək.səp.pæl]	[ɪksˈpæl]
382.	experience	/ɪk.ˈspɪə.riəns/		[əks.ˈpiː.rɪəns]
383.	expire	/ɪk.ˈspaɪər/	[ˈəs.pæːr]	[əks.ˈpaɪər]
384.	extra	/ˈek.strə/		[ˈæks.trə]
385.	eye	/aɪ/		[aɪ]
386.	fabric	/ˈfæb.rɪk/		[ˈfæb.rək]
387.	face	/feɪs/	[feːs]	[feːs]
388.	factor	/ˈfæk.tə/		[ˈfæk.tər]
389.	fake	/feɪk/		[feːk]
390.	fame	/feɪm/		[feːm]
391.	famous	/ˈfeɪ.məs/	[ˈfæː.məs]	[ˈfeː.məs]
392.	fan	/fæn/	[fæn]	[fæn]
393.	fancy	/ˈfæn.si/	[ˈfæn.si]	[ˈfæn.si]
394.	fantastic	/fænˈtæs.tɪk/		[fənˈtaːs.tək]
395.	farm	/fɑːm/	[faːm]	[faːm]
396.	farmer	/ˈfɑː.mə/	[ˈfaːr.mər]	[ˈfaːr.mər]
397.	fast	/fɑːst/		[fast]
398.	fat	/fæt/		[fæːt]
399.	father	/ˈfɑː.ðə/		[ˈfaː.ɖər]
400.	fax	/fæks/	[fæː.kəs]	[fæks]
401.	fee	/fiː/	[fiːs]	[fiːs]
402.	feel	/fiːl/	[fiːl]	[fiːl]
403.	field	/fiːld/	[ˈfiː.ləd]	[fiːld]
404.	fight	/faɪt/	[fæːt]	[faɪt]
405.	figure	/ˈfɪ.gə/	[ˈfig.gər]	[ˈfiː.gər]
406.	film	/fɪlm/	[ˈfiː.ləm]	[ˈfiː.ləm]
407.	filter	/ˈfɪl.tə/	[ˈfɪl.tər]	[ˈfɪl.tər]
408.	final	/ˈfaɪ.nəl/	[ˈfæn.nəl]	[ˈfaɪ.nəl]
409.	finger	/ˈfɪŋ.gər/	[ˈfɪŋ.gər]	[ˈfɪŋ.gər]

410.	finish	/ˈfɪ.nɪʃ/	[ˈfiː.nəʃ]	[ˈfiː.nəʃ]
411.	fire	/faɪə/	[fæːr]	[faɪr]
412.	fish	/fɪʃ/	[fiːʃ]	[fiːʃ]
413.	fit	/fɪt/	[fiːt]	[fɪt]
414.	fix	/fɪks/	[ˈfiː.kəs]	[fɪks]
415.	flag	/flæg/		[fə.ˈlæːg]
416.	flash	/flæʃ/	[fə.ˈlaːʃ]	[fə.ˈlæːʃ]
417.	flask	/ˈflɑsk/	[fə.ˈlaːs]	[fə.ˈlask]
418.	flat	/flæt/	[fə.ˈlæːt]	[fə.ˈlæːt]
419.	flaw	/ flɔː/		[fə.ˈlaː]
420.	flight	/flaɪt/	[fə.ˈlæːt]	[fə.ˈlaɪt]
421.	flirt	/flɜːt/	[fə.ˈlaːt]	[fə.ˈlərt]
422.	flop	/flɒp/	[fə.ˈlaːp]	[fə.ˈlaːp]
423.	flow	/fləʊ/		[fə.ˈloː]
424.	flower	/flaʊə/	[fə.ˈlaː.vər]	[fə.ˈlaː.vər]
425.	flu	/fluː/	[ˈfɪl.luː]	[fə.ˈluː]
426.	fold	/fəʊld/	[ˈfoː.ləd]	[fold]
427.	folder	/ˈfəʊl.də/	[ˈfʊl.dər]	[ˈfʊl.dər]
428.	folk	/fəʊk/		[foːk]
429.	food	/wʊd/	[wuːd]	[wuːd]
430.	form	/fɔːm/	[faːm]	[faːm]
431.	formula	/ˈfɔː.mjʊ.lə/		[ˈfar.muː.lə]
432.	forward	ˈfɔː.wəd		[ˈfar.wəd]
433.	fracture	/ˈfræk.tʃə/	[fə.ˈræk.tʃər]	[fə.ˈræk.tʃər]
434.	frame	/fɹeɪm/	[fə.ˈreːm]	[fə.ˈreːm]
435.	fridge	/frɪdʒ/	[fə.ˈrɪdʒ]	[fə.ˈrɪdʒ]
436.	frock	/fɹɒk/	[fə.ˈraːk]	[fə.ˈraːk]
437.	frog	/frɒg/		[fə.ˈraːg]
438.	front	/frʌnt/	[fə.ˈrə̃nt]	[fə.ˈrə̃nt]
439.	frozen	/ˈfrəʊ.zən/	[fə.ˈroː.zən]	[fə.ˈroː.zən]
440.	fruit	/fruːt/	[fə.ˈruːt]	[fə.ˈruːt]
441.	function	/ˈfʌŋk.ʃən/	[ˈfʌŋk.ʃən]	[ˈfʌŋk.ʃən]
442.	furniture	/ˈfɜː.nɪ.tʃə/	[fər.ˈniː.tʃər]	[ˈfər.nɪ.tʃər]
443.	gallery	/ˈɡæ.lə.ri/		[ˈgæl.ri]
444.	game	/geɪm/	[gæːm]	[geːm]
445.	garage	/ˈgæ.rɑːʒ/	[gə.ˈraːdʒ]	[gə.ˈraːdʒ]
446.	garden	/ˈgɑːdən/	[ˈgar.dən]	[ˈgar.dən]
447.	garlic	/ˈgɑː.lɪk/	[ˈgar.lək]	[ˈgar.lək]
448.	gas	/gæs/	[gæːs]	[gæːs]
449.	gender	/ˈdʒen.də/		[ˈdʒæn.dər]
450.	general	/ˈdʒe.nə.rəl/	[ˈdʒər.nəl]	[ˈdʒər.nəl]
451.	generator	/ˈdʒen.reɪ.tə/	[dʒən.ˈreː.tər]	[dʒən.ˈreː.tər]
452.	genuine	/ˈdʒen.ju.ɪn/	[ˈdʒæn.vən]	[ˈdʒæn.vən]
453.	geometry	/dʒi.ˈɒ.mə.tri/	[dʒəˈmæt.ri]	[dʒəˈmæ.tri]
454.	gift	/gɪft/	[ˈgiː.fət]	[gɪft]
455.	ginger	/ˈdʒɪn.dʒər/		[ˈdʒɪn.dʒər]

456.	girraffe	/dʒi.ˈra:f/		[dʒi.ˈra:.fɐ]
457.	glass	/glɑ:s/	[gə.ˈla:s]	[gə.ˈla:s]
458.	glitter	/ˈglɪ.tə/	[gə.ˈli:.tər]	[gə.ˈli:.tər]
459.	global	/ˈgləʊ.bəl/		[gə.ˌlo:.bəl]
460.	gloss	/glɒs/	[gə.ˈla:s]	[gə.ˈla:s]
461.	glove	/glʌv/	[ˈgəl.ləv]	[ˈgəl.ləv]
462.	glow	/gləʊ/		[gə.ˈlo:]
463.	glucose	/ˈglu:.kəʊz/	[gəl.ˈko:z]	[gəl.ˈko:z]
464.	glue	/glu:/	[ˈgɪl.ju:]	[ˈgɪl.ju:]
465.	goal	/gəʊl/	[go:l]	[go:l]
466.	goat	/gəʊt/	[go:t]	[go:t]
467.	golden	/ˈgəʊl.dən/	[ˈgol.dən]	[ˈgol.dən]
468.	golf	/gɒlf/	[ˈga:.ləf]	[galf]
469.	government	/ˈgə.vən.mənt/	[ˈgo:r.mɪt]	[ˈgo:r.mɪt]
470.	grammar	/ˈgræ.mə/		[gə.ˈræ:.mər]
471.	grape	/greɪp/		[gə.ˈre:p]
472.	grass	/grɑ:s/		[gə.ˈra:s]
473.	green	/gri:n/	[gə.ˈri:n]	[gə.ˈri:n]
474.	grey	/greɪ/	[ˈgər.re:]	[gə.ˈre:]
475.	grocery	/ˈgrəʊ.sər.i/		[gə.ˈra:s.ri]
476.	gross	/grəʊs/		[gə.ˈra:s]
477.	group	/gru:p/	[gə.ˈru:p]	[gə.ˈru:p]
478.	guarantee	/gæ.rən.ˈti:/	[gə.ˈrən.ti]	[gə.ˈræn.ti]
479.	guidance	/ˈgaɪ.dəns/		[ˈgaɪ.dəns]
480.	gum	/gʌm/		[gʌm]
481.	gymnastics	/dʒɪm.ˈna.stɪks /		[dʒəm.ˈnas.tək]
482.	hair	/heə/	[he:r]	[he:r]
483.	hall	/hɔ:l/	[ha:l]	[ha:l]
484.	hand	/hænd/	[hæ̃nd]	[hæ̃nd]
485.	hang	/hæŋ/	[hæ̃ŋg]	[hæ̃ŋg]
486.	hard	/hɑ:d/	[ha:t]	[ha:d]
487.	harsh	/hɑ:ʃ/	[ˈha:.rəʃ]	[harʃ]
488.	head	/hed/	[hæ:d]	[hæ:d]
489.	health	/helθ/	[ˈhæl.ləɬ^{h}]	[hælɬ^{h}]
490.	heart	/hɑ:t/	[ha:t]	[ha:t]
491.	heavy	/ˈhe.vi/	[ˈhæ:.vi]	[ˈhæ:.vi]
492.	helicopter	/ˈhæ.lɪ.kɒp.tər/	[hə.lɪ.ˈkap.tər]	[ˈhæ.lɪ.kap.tər]
493.	hello	/heˈləʊ/	[ˈhæ:.lo:]	[hæˈlo:]
494.	help	/help/	[ˈhæ:.ləp]	[hælp]
495.	herbal	/ˈhɜ:.bəl/	[ˈhər.bəl]	[ˈhər.bəl]
496.	hero	/ˈhɪə.rəʊ/	[ˈhi:.ro]	[ˈhi:.ro]
497.	hide	/haɪd/	[haɪt]	[haɪd]
498.	hockey	/ˈhɒ.ki/	[ˈha:.ki]	[ˈha:.ki]
499.	holder	/ˈhəʊl.də/	[ˈhol.dər]	[ˈhol.dər]
500.	home	/həʊm/	[ho:m]	[ho:m]
501.	horn	/hɔ:n/	[ˈha:.rən]	[harn]

502.	horror	/ˈhɒ.rər/		[ˈha:rər]
503.	horse	/hɔ:s/	[ˈha:.rəs]	[hars]
504.	hospital	/ˈhɒs.pɪ.təl/	[həs.pə.ˈʈa:l]	[ˈhəs.pə.ʈa:l]
505.	hostel	/ˈhɒs.təl/	[ˈhas.təl]	[ˈhas.təl]
506.	hot	/hɒt/	[ha:t]	[ha:t]
507.	hour	/aʊə/		[ˈa:.vər]
508.	house	/haʊs/	[ho:s]	[haʊs]
509.	hurry	/ˈhʌ.ri/		[ˈhər.ri]
510.	husband	/ˈhʌz.bənd/	[həs.ˈbænd]	[ˈhəz.bənd]
511.	ice	/aɪs/	[æs]	[aɪs]
512.	idea	/aɪ.ˈdɪə/	[ˈæd.ja]	[aɪ.ˈdɪə]
513.	impact	/ˈɪm.pækt/		[ˈɪm.pækt]
514.	important	/ɪmˈpɔ:.tənt/		[əmˈpa:.tə̃nt]
515.	impress	/ɪmˈpres/	[ˈəmp.ræs]	[ɪmpˈræs]
516.	in	/ɪn/	[ɪn]	[ɪn]
517.	include	/ɪn.ˈklu:d/	[ən.kə.ˈlu:d]	[ɪn.kə.ˈlu:d]
518.	income	/ˈɪn.kʌm/	[ˈɪn.kəm]	[ˈɪn.kəm]
519.	industry	/ˈɪn.də.stri/	[ˈdəs.ti]	[ˈən.dəs.tri]
520.	infection	/ɪnˈfek.ʃən/	[ənˈfæk.ʃən]	[ənˈfæk.ʃən]
521.	influence	/ˈɪn.flu.əns/		[ˈən.fə.lu.əns]
522.	information	/ɪn.fəˈmeɪ.ʃən/	[ən.fərˈme:.ʃən]	[ɪn.fərˈme:.ʃən]
523.	injection	/ɪn.ˈdʒæk.ʃən/	[ən.ˈdʒæk.ʃən]	[ɪn.ˈdʒæk.ʃən/
524.	ink	/ɪŋk/	[ĩŋk]	[ĩŋk]
525.	inspector	/ɪn.ˈspɛk.tə/	[əns.ˈpæk.tər]	[ɪns.ˈpæk.tər]
526.	install	/ɪn.ˈstɔ:l/	[əns.ˈta:l]	[ɪns.ˈta:l]
527.	instruction	/ɪnˈstrʌk.ʃən/	[ənsˈtək.ʃən]	[ɪnsˈtrək.ʃən]
528.	insult	/ˈɪn.sʌlt/	[ən.ˈsəl.lət]	[ˈən.səlt]
529.	insurance	/ɪnˈʃɔ:.rəns/	[ənˈʃo:.rəs]	[ənˈʃo:.rəns]
530.	interior	/ɪnˈtɪə.riər/		[ɪnˈtɪ.rɪər]
531.	internal	/ɪnˈtɜ:.nəl/	[ənˈtər.nəl]	[ənˈtər.nəl]
532.	Introduce	/ɪn.trəˈdʒu:s/	[ɪn.təˈdu:s]	[ɪn.təˈdu:s]
533.	invitation	/ɪn.vɪˈteɪ.ʃən/	[ɪn.vɪˈte:.ʃən]	[ɪn.vɪˈte:.ʃən]
534.	invite	/ɪnˈvaɪt/	[ənˈvæ:t]	[ənˈvaɪt]
535.	invoice	ˈɪn.vɔɪs	[ˈən.væ:s]	[ˈɪn.vaɪs]
536.	iron	/aɪən/	[ˈæ:.rən]	[ˈaɪ.rən]
537.	item	/ˈaɪ.təm/	[ˈæ:.təm]	[ˈaɪ.təm]
538.	jacket	/ˈdʒæ.kɪt/	[ˈdʒæ:.tək]	[ˈdʒæ:.kət]
539.	jam	/dʒæm/	[dʒa:m]	[dʒæm]
540.	jealous	/ˈdʒe.ləs/	[ˈdʒæl.jəs]	[ˈdʒæ:.ləs]
541.	jelly	/ˈdʒe.li/	[ˈdʒæ:.li]	[ˈdʒæ:.li]
542.	jewellery	/ˈdʒu:.əl.ri/	[ˈdʒu:l.ri]	[ˈdʒu:l.ri]
543.	job	/dʒɒb/	[dʒa:p]	[dʒa:b]
544.	join	/dʒɔɪn/	[dʒæ:n]	[dʒaɪn]
545.	joke	/dʒəʊk/	[dʒo:k]	[dʒo:k]
546.	journal	/ˈdʒɜ:.nəl/		[ˈdʒər.nəl]
547.	journey	/ˈdʒɜ:.ni/		[ˈdʒər.ni]

548.	judge	/dʒʌdʒ/	[dʒɐdʒ]	[dʒɐdʒ]
549.	juice	/dʒuːs/	[dʒuːs]	[dʒuːs]
550.	jumbo	/ˈdʒʌm.bəʊ/		[ˈdʒəm.bo]
551.	jumper	/ˈdʒʌm.pə/	[ˈdʒəm.pər]	[ˈdʒəm.pər]
552.	junior	/ˈdʒuː.ni.ə/	[ˈdʒuː.nɪər]	[ˈdʒuː.nɪər]
553.	junk	/dʒʌŋk/	[dʒə̃ŋk]	[dʒə̃ŋk]
554.	justice	/ˈdʒʌs.tɪs/	[ˈdʒəs.təs]	[ˈdʒəs.təs]
555.	kettle	/ˈke.təl/	[ˈkæː.təl]	[ˈkæː.təl]
556.	key	/kiː/	[kiː]	[kiː]
557.	kick	/kɪk/	[kɪk]	[kɪk]
558.	kid	/kɪd/	[kɪd]	[kɪd]
559.	kidney	/ˈkɪd.ni/	[ˈkɪd.ni]	[ˈkɪd.ni]
560.	kill	/kɪl/	[kɪl]	[kɪl]
561.	king	/kɪŋ/	/kĩŋg/	/kĩŋg/
562.	kitchen	/ˈkɪ.tʃən/	[ˈkiː.tʃən]	[ˈkiː.tʃən]
563.	knife	/naɪf/	[næːf]	[naɪf]
564.	knitting	/ˈnɪ.tɪŋ/	[nɪ.ˈtɪŋk]	[ˈniː.tɪŋg]
565.	knot	/nɒt/	[naːt]	[naːt]
566.	know	/nəʊ/		[noː]
567.	knowledge	/ˈnɒ.lɪdʒ/	/ˈnaː.lədʒ/	[ˈnaː.lədʒ]
568.	label	/ˈleɪ.bəl/	[ˈleː.bəl]	[ˈleː.bəl]
569.	labortary	/ləˈbɒr.ə.tər.i/	/ləˈbat.ri/	[ləˈboː.tri]
570.	lace	/leɪs/	[læːs]	[leːs]
571.	ladder	/ˈlæ.də/	[ˈlæː.dər]	[ˈlæː.dər]
572.	lady	/ˈleɪ.di/	[ˈleː.di]	[ˈleː.di]
573.	land	/lænd/	[læ̃nd]	[læ̃nd]
574.	language	/ˈlæŋ.gwɪdʒ/	[ˈlæŋg.wədʒ]	[ˈlæŋg.wədʒ]
575.	large	/lɑːdʒ/	[ˈlaː.rədʒ]	[lardʒ]
576.	last	/lɑːst/	[ˈlaː.sət]	[last]
577.	laugh	/lɑːf/		[laːf]
578.	laundry	/ˈlɔːn.dri/	[ˈlə̃nd.ri]	[ˈlan.dri]
579.	law	/lɔː/	[laː]	[laː]
580.	lawyer	/ˈlɔɪ.ə/	[ˈlaː.jər]	[ˈlaː.jər]
581.	layer	/ leɪə/	[leːr]	[leːr]
582.	lazy	/ˈleɪ.zi/	[ˈleː.zi]	[ˈleː.zi]
583.	leader	/ˈliː.də/	[ˈliː.dər]	[ˈliː.dər]
584.	lecture	/ˈlek.tʃə/	[ˈlæk.tʃər]	[ˈlæk.tʃər]
585.	left	/læft/	[læː.fət]	[læft]
586.	leg	/leg/	[læk]	[læg]
587.	lemon	/ˈle.mən/	[ˈlæː.mən]	[ˈlæː.mən]
588.	lesson	/ˈle.sən/	[ˈlæː.sən]	[ˈlæː.sən]
589.	letter	/ˈle.tə/	[ˈlæː.tər]	[ˈlæː.tər]
590.	lettuce	/ˈlɛ.tɪs/	/ˈlæː.təs/	[ˈlæː.təs]
591.	libral	/ˈlɪ.bə.rəl/	[ˈlɪb.rəl]	[ˈlɪb.rəl]
592.	library	/ˈlaɪ.bri/	[ˈlæb.ri]	[ˈlaɪb.ri]
593.	licence	/ˈlaɪ.səns/	[laɪ.ˈsə̃ns]	[ˈlaɪ.səns]

594.	life	/laɪf/	[læːf]	[laɪf]
595.	lift	/lɪft/	[ˈliː.fət]	[lɪft]
596.	light	/laɪt/	[læːt]	[laɪt]
597.	like	/laɪk/	[læːk]	[laɪk]
598.	lilac	/ˈlaɪ.lək/	[ˈlæː.lək]	[ˈlaɪ.lək]
599.	limit	/ˈlɪ.mɪt/	[ˈliː.mət]	[ˈliː.mət]
600.	line	/laɪn/	[læːn]	[laɪn]
601.	linguistics	/ lɪŋ.ˈgwɪs.tɪks/		[lɪŋg.ˈwɪs.tɪks]
602.	link	/lɪŋk/	[lĩŋk]	[lĩŋk]
603.	lion	/ˈlaɪ.ən/	[ˈlæːn]	[ˈlaɪn]
604.	liquid	/ˈlɪk.wɪd/	[ˈlɪk.wət]	[ˈlɪk.wəd]
605.	literature	/ˈlɪ.trə.tʃə/	[lətˈreː.tʃər]	[ləˈtre.tʃər]
606.	little	/ˈlɪ.təl/	[ˈliː.təl]	[ˈliː.təl]
607.	load	/ləʊd/	[loːt]	[loːd]
608.	location	/ləʊˈkeɪ.ʃən/	[ləˈkeː.ʃən]	[loˈkeː.ʃən]
609.	lock	/lɒk/	[laːk]	[laːk]
610.	locket	/ˈlɒk.ɪt/	[ˈlaː.kət]	[ˈlaː.kət]
611.	looking	/ˈlʊ.kɪŋ/		[ˈluː.kĩŋg]
612.	lord	/lɔːd/	[laːt]	[laːd]
613.	lorry	/ˈlɒ.ri/	[ˈlaː.ri]	[ˈlaː.ri]
614.	loser	/ˈluː.zə/		[ˈluː.zər]
615.	lost	/lɒst/		[last]
616.	lottery	/ˈlɒ.tə.ri/	[ˈlat.ri]	[ˈlaː.tri]
617.	loundge	/laʊndʒ/	[lãntʃ]	[lãntʃ]
618.	lucky	/ˈlʌ.ki/	[ˈlək.ki]	[ˈlək.ki]
619.	luggage	/ˈlʌ.gɪdʒ/		[ˈləg.gədʒ]
620.	lunch	/lʌntʃ/	[lə̃ntʃ]	[lə̃ntʃ]
621.	lung	/lʌŋ/	[lə̃ŋg]	[lə̃ŋg]
622.	lust	/lʌst/		[ləst]
623.	luxury	/ˈlʌk.ʃə.ri/		[ˈləg.ʒə.ri]
624.	machine	/məˈʃiːn/	[məˈʃiːn]	[məˈʃiːn]
625.	magic	/ˈmæ.dʒɪk/	[ˈmæː.dʒək]	[ˈmæː.dʒək]
626.	mail	/meɪl/		[meːl]
627.	major	/ˈmeɪ.dʒə/	[ˈmeː.dʒər]	[ˈmeː.dʒər]
628.	manage	/ˈmæ.nɪdʒ/	[ˈmæː.nədʒ]	[ˈmæː.nədʒ]
629.	management	/ˈmæ.nɪdʒ.mənt/	[məˈneː.dʒ.mɪt]	[ˈmæ.nədʒ.mɪnt]
630.	mandate	/ˈmæn.deɪt/		[ˈmæn.dət]
631.	manger	/ˈmeɪn.dʒə/	[məˈneː.dʒər]	[ˈmæ.ne.dʒər]
632.	mango	/ˈmæŋ.gəʊ/	[ˈmæ̃ŋ.go]	[ˈmæ̃ŋ.go]
633.	mansion	/ˈmæn.ʃən/	[ˈmæn.ʃən]	[ˈmæn.ʃən]
634.	manual	/ˈmæn.ju.əl/		[ˈmæn.vəl]
635.	map	/mæp/		[mæp]
636.	march	/mɑːtʃ/	[ˈmaː.rətʃ]	[martʃ]
637.	margin	/ˈmɑː.dʒɪn/	[ˈmar.dʒən]	[ˈmar.dʒən]
638.	marker	/ˈmɑː.kə/	[ˈmar.kəl]	[ˈmar.kər]
639.	market	/ˈmɑː.kɪt/	[marˈkiːt]	[ˈmar.kɪt]

640.	marks	/mɑ:ks/	[ˈma:.rək]	[maks]
641.	marriage	/ˈmærɪdʒ/	[ˈmæ:.rədʒ]	[ˈmæ:.rədʒ]
642.	married	/ˈmæ.rid/	[ˈmæ:.rət]	[ˈmæ:.rəd]
643.	mask	/mɒsk/	[ˈma:.sək]	[mask]
644.	master	/ˈmɑ:.stə/	[ˈmas.tər]	[ˈmas.tər]
645.	match	/mætʃ/	[mætʃ]	[mætʃ]
646.	material	/məˈtɪə.ri.əl/	[məˈti:.rəl]	[məˈti:r.jəl]
647.	matter	/ˈmæ.tə/		[ˈmæ:.tər]
648.	mattress	/ˈmæt.rəs/	[ˈmæt.rəs]	[ˈmæt.rəs]
649.	mature	/məˈtʃʊə/		[məˈtʃo:r]
650.	maximum	/ˈmæk.sɪ.məm/		[ˈmæk.sɪ.məm]
651.	mayor	/mɛ:/	[ˈməj.jər]	[ˈme:.jər]
652.	meaning	/ˈmi:.nɪŋ/		[ˈmi:.nĩŋg]
653.	measurement	/ˈmeʒ.ə.mənt/	[mə.ˈʒər.mɪt]	[ˈmə.ʒər.mĩnt]
654.	medal	/ˈme.dəl/	[ˈmæ:.dəl]	[ˈmæ:.dəl]
655.	media	/ˈmi:.di.ə/	[ˈmi:d.ja]	[ˈmi:d.ja]
656.	medicine	/ˈme.dɪ.sən/		[ˈmæ.dɪ.sən]
657.	meeting	/ˈmi:.tɪŋ/	[mi.ˈtĩŋk]	[ˈmi:.tɪŋg]
658.	melon	/ˈme.lən/		[ˈmæ:.lən]
659.	member	/ˈmem.bə/	[ˈmɪm.bər]	[ˈmæm.bər]
660.	menu	/ˈmen.ju:/	[ˈmi:.nu]	[ˈmæn.ju:]
661.	message	/ˈme.sɪdʒ/	[ˈmæ:.sətʃ]	[ˈmæ:.sədʒ]
662.	metal	/ˈme.təl/		[ˈmæ:.təl]
663.	middle	/ˈmɪ.dəl/	[ˈmi:.dəl]	[ˈmi:.dəl]
664.	mike	/ maɪk/	[mæ:k]	[maɪk]
665.	military	/ˈmɪ.lɪ.tə.ri/		[ˈmɪl.tri]
666.	milk	/mɪlk/	[ˈmi:.lək]	[ˈmi:.lək]
667.	million	/ˈmɪl.jən/	[ˈmɪl.jən]	[ˈmɪl.jən]
668.	minimum	/ˈmɪ.nɪ.məm/		[ˈmɪ.nɪ.məm]
669.	minister	/ˈmɪ.nɪs.tər/	[mə.ˈnɪs.tər]	[mə.ˈnɪs.tər]
670.	minor	/ˈmaɪ.nə/		[ˈmaɪ.nər]
671.	minute	/ˈmɪ.nɪt/	[ˈmi:.nət]	[ˈmi:.nət]
672.	mirror	/ˈmɪ.rə/		[ˈmi:.rər]
673.	miscartiage	/ˈmɪs.kæ.rɪdʒ/		[mɪs.ˈkæ:.rədʒ]
674.	missile	/ˈmɪ.saɪl/	[mə.ˈzæ:l]	[ˈmi:.zaɪl]
675.	mistake	/mɪˈsteɪk/	[məsˈte:k]	[mɪsˈte:k]
676.	mix	/mɪks/	[ˈmi:.kəs]	[mɪks]
677.	mobile	/ˈməʊ.baɪl/	[mə.ˈbæ:l]	[ˈmo:.baɪl]
678.	model	/ˈmɒ.dəl/	[ˈma:.dəl]	[ˈma:.dəl]
679.	modern	/ˈmɒ.dən/	[ˈmad.rən]	[ˈmad.rən]
680.	molecule	/ˈmɒl.ɪ.kju:l/		[ma.lɪ.ˈku:l]
681.	money	/ˈmʌ.ni/	[ˈmən.ni]	[ˈmən.ni]
682.	monitor	/ˈmɒ.nɪ.tə/	[mə.ˈni:.tər]	[ˈma:.nɪ.tər]
683.	monkey	ˈmʌŋ.ki	[ˈmãŋ.ki]	[ˈməŋ.ki]
684.	monthly	/ˈmʌn.θli/	[ˈmə̃nt̪ʰ.li]	[ˈmə̃nt̪ʰ.li]
685.	moon	/mu:n/	[mu:n]	[mu:n]

686.	morning	/ˈmɔː.nɪŋ/		[ˈmaːr.nĩŋg]
687.	mosque	/mɒsk/	[ˈmaː.sək]	[mask]
688.	mother	/ˈmʌ.ðə/		[ˈmaː.d̪ər]
689.	mountain	/ˈmaʊn.tɪn/		[ˈmaʊn.tæn]
690.	mouse	/maʊs/		[maʊs]
691.	mouth	/maʊθ/		[maʊt̪ʰ]
692.	movie	/ˈmuː.vi/	[ˈmuː.vi]	[ˈmuː.vi]
693.	mug	/məg/	[məg.ga]	[məg]
694.	murder	/ˈmɜː.də/		[ˈmər.dər]
695.	muscle	/ˈmʌ.səl/	[ˈməs.səl]	[ˈməs.səl]
696.	mushroom	/ˈmʌʃ.ruːm/		[ˈməʃ.ruːm]
697.	music	/ˈmjuː.zɪk/	[mə.ˈjuː.zək]	[mɪ.ˈjuː.zək]
698.	nail	/neɪl/	[neːl]	[neːl]
699.	name	/neɪm/	[naːm]	[næːm]
700.	narrow	/ˈnæ.rəʊ/	[ˈnæː.ro]	[ˈnæː.ro]
701.	national	/ˈnæ.ʃə.nəl/	[ˈnæʃ.nəl]	[ˈnæʃ.nəl]
702.	nature	/ˈneɪ.tʃər/		[ˈneː.tʃər]
703.	naughty	/ˈnɔː.ti/		[ˈnaː.ti]
704.	neck	/nek/	[næːk]	[næːk]
705.	necklace	/ˈnek.ləs/	[ˈnæk.ləs]	[ˈnæk.ləs]
706.	needle	/ˈniː.dəl/	[ˈniː.dəl]	[ˈniː.dəl]
707.	negative	/ˈne.gə.tɪv/	[ˈnæg.təv]	[ˈnæ.gə.tɪv]
708.	negotiate	/nəˈgəʊ.ʃi.eɪt/		[næˈgoː.ʃet]
709.	nervous	/ˈnɜː.vəs/	[ˈnər.vəs]	[ˈnər.vəs]
710.	net	/net/	[næːt]	[næt]
711.	neutral	/ˈnjuː.trəl/	[ˈnuːt.rəl]	[ˈnuː.trəl]
712.	nice	/naɪs/	[næːs]	[naɪs]
713.	niece	/niːs/		[niːs]
714.	night	/naɪt/	[næːt]	[naɪt]
715.	nomination	/nɒ.mɪ.ˈneɪ.ʃən/	[na.mɪ.ˈneː.ʃən]	[na.mɪ.ˈneː.ʃən]
716.	normal	/ˈnɔː.məl/	[ˈnaːr.məl]	[ˈnaːr.məl]
717.	notice	/ˈnəʊ.tɪs/	[ˈnoː.təs]	[ˈnoː.təs]
718.	novel	/ˈnɒ.vəl/		[ˈnaː.vəl]
719.	number	/ˈnʌm.bə/	[ˈnə̃m.bər]	[ˈnə̃m.bər]
720.	nurse	/nɜːs/	[nər.rəs]	[nərs]
721.	nursery	/ˈnɜː.sə.ri/	[ˈnər.sə.ri]	[ˈnər.sə.ri]
722.	objection	/əbˈdʒek.ʃən/	[əbˈdʒæk.ʃən]	[əbˈdʒæk.ʃən]
723.	ocean	/ˈəʊ.ʃən/		[ˈoː.ʃən]
724.	offence	/əˈfens/		[əˈfæns]
725.	offer	/ˈɒf.ə/	[ˈaf.fər]	[ˈaf.fər]
726.	office	/ˈɒ.fɪs/	[ˈaf.fəs]	[ˈaf.fəs]
727.	oil	/ɔɪl/	[aɪl]	[aɪl]
728.	omlette	/ˈɒm.lət/	[ˈam.let]	[ˈam.let]
729.	onion	/ˈʌn.jən/		[ˈon.jən]
730.	open	/ˈəʊ.pən/	[ˈoː.pən]	[ˈoː.pən]
731.	operation	/ɒ.pə.ˈreɪ.ʃən/	[pə.ˈreː.ʃən]	[əp.ˈreː.ʃən]

732.	opinion	/ə.ˈpɪ.njən/		[o.ˈpɪn.jən]
733.	opportunity	/ɒp.əˈtʃuː.nə.ti/		[ə.pərˈtʃuːn.ti]
734.	opposite	/ˈɒ.pə.zɪt/	[a.ˈpoː.zɪt]	[a.ˈpoː.zɪt]
735.	optical	/ˈɒp.tɪ.kəl/		[ˈap.tɪ.kəl]
736.	option	/ˈɒp.ʃən/	[ˈap.ʃən]	[ˈap.ʃən]
737.	orange	/ˈɒ.rɪndʒ/	[oː.ˈrə̃ndʒ]	[ˈoː.rə̃ndʒ]
738.	order	/ˈɔː.də/	[ˈaː.dər]	[ˈaː.dər]
739.	ordinance	/ˈɔː.dɪ.nəns/		[ˈaː.dɪ.nəs]
740.	original	/əˈrɪdʒ.ə.nəl/	[ˈrɪdʒ.nəl]	[o.ˈrɪdʒ.nəl]
741.	orphan	/ˈɔː.fən/	[ˈaːr.fən]	[ˈaːr.fən]
742.	out	/aʊt/	[oːt]	[aʊt]
743.	oven	/ˈʌv.ən/	[ˈəv.vən]	[ˈəv.vən]
744.	over	/ˈəʊ.və/	[ˈəv.vər]	[ˈoː.vər]
745.	pack	/pæk/	[pæːk]	[pæːk]
746.	package	/ˈpæ.kɪdʒ/	[ˈpæː.kətʃ]	[ˈpæː.kədʒ]
747.	packet	/ˈpæ.kɪt/	[ˈpæː.tək]	[ˈpæː.kət]
748.	pad	/pæd/	[pæːt]	[pæːd]
749.	paint	/peɪnt/	[pə̃nt]	[pə̃nt]
750.	painter	/ˈpeɪn.tə/	[ˈpæn.tər]	[ˈpen.tər]
751.	palace	/ˈpæ.lɪs/	[ˈpæː.ləs]	[ˈpæː.ləs]
752.	paper	/ˈpeɪ.pə/	[ˈpeː.pər]	[ˈpeː.pər]
753.	park	/pɑːk/	[ˈpaː.rək]	[park]
754.	parliament	/ˈpɑː.lɪ.mənt/		[ˈpar.lɪ.mɪnt]
755.	parlour	/ˈpɑː.lər/	[ˈpaːr.lər]	[ˈpaː.lər]
756.	parrot	/ˈpæ.rət/		[ˈpæː.rət]
757.	part	/pɑːt/	[paːt]	[paːt]
758.	party	/ˈpɑː.ti/	[ˈpaːr.ti]	[ˈpaːr.ti]
759.	passanger	/ˈpæ.sən.dʒər/		[pə.ˈsə̃n.dʒər]
760.	passport	ˈpɑːs.pɔːt	[ˈpaːs.bot]	[ˈpaːs.pot]
761.	patch	/pætʃ/	[pætʃ]	[pætʃ]
762.	patient	/ˈpeɪ.ʃənt/	[pe.ˈʃənt]	[ˈpeː.ʃənt]
763.	payment	/ˈpeɪ.mənt/	[ˈpeː.mɪt]	[ˈpeː.mɪnt]
764.	peace	/piːs/		[piːs]
765.	peak	/piːk/	[piːk]	[piːk]
766.	peanut	/ˈpiː.nʌt/		[ˈpiː.nət]
767.	pedal	/ˈpe.dəl/	[ˈpæː.dəl]	[ˈpæː.dəl]
768.	pedistal	/ˈpe.dɪs.təl/	[pə.ˈdɪs.təl]	[ˈpæ.dɪs.təl]
769.	peg	/peg/		[pæːg]
770.	penalty	/ˈpe.nəl.ti/	[pə.ˈnəl.ti]	[pæ.ˈnəl.ti]
771.	pencil	/ˈpen.səl/	[ˈpæn.səl]	[ˈpæn.səl]
772.	pendant	/ˈpen.dənt/		[ˈpæn.dət]
773.	pending	/ˈpen.dɪŋ/	[pæn.ˈtĩŋg]	[ˈpæn.dĩŋg]
774.	penny	/ˈpe.ni/	[ˈpæː.ni]	[ˈpæː.ni]
775.	pension	/ˈpen.ʃən/	[ˈpæn.ʃən]	[ˈpæn.ʃən]
776.	peper	/ˈpe.pə/	[ˈpeː.pər]	[ˈpeː.pər]
777.	percent	/pəˈsent/	[pər.ˈsə̃nt]	[pər.ˈsə̃nt]

778.	percentage	/pəˈsen.tɪdʒ/	[pərˈsən.tedʒ]	[pərˈsən.tedʒ]
779.	perfect	/ˈpɜː.fekt/	[pərˈfæk.kət]	[ˈpər.fækt]
780.	performance	/pəˈfɔː.məns/	[pərˈfaː.məs]	[pərˈfaː.məs]
781.	perfume	/ˈpɜː.fjuːm/	[pərˈfuːm]	[ˈpər.fɪ.juːm]
782.	period	/ˈpɪə.riəd/	[ˈpiːr.jət]	[ˈpiːr.jəd]
783.	permission	/pəˈmɪ.ʃən/	[pərˈmiː.ʃən]	[pərˈmiː.ʃən]
784.	person	/ˈpɜː.sən/	[ˈpər.sən]	[ˈpər.sən]
785.	personality	/pɜː.səˈnæ.lə.ti/	[pər.səˈnæl.ti]	[pər.səˈnæl.ti]
786.	petition	/pəˈtɪ.ʃən/	[pəˈtiː.ʃən]	[pəˈtiː.ʃən]
787.	petrol	/ˈpet.rəl/	[ˈpət.rol]	[ˈpæ.trol]
788.	pharmacy	/ˈfɑː.mə.si/	[farˈmeː.si]	[ˈfar.meː.si]
789.	philosophy	/fɪˈlɒ.sə.fi/	[fəˈlas.fi]	[fəˈlas.fi]
790.	phone	/fəʊn/	[fuːn]	[fuːn]
791.	photo	/ˈfəʊ.təʊ/	[ˈfoː.tu]	[ˈfoː.to]
792.	piano	/piˈæ.nəʊ/		[pəˈjaː.no]
793.	pick	/pɪk/	[piːk]	[pɪk]
794.	pickle	/ˈpɪ.kəl/		[ˈpiː.kəl]
795.	picture	/ˈpɪk.tʃə/	[ˈpɪk.tʃər]	[ˈpɪk.tʃər]
796.	pigeon	/ˈpɪ.dʒən/		[ˈpiː.dʒən]
797.	pillow	/ˈpɪ.ləʊ/		[ˈpiː.lo]
798.	pilot	/ˈpaɪ.lət/	[ˈpæː.lət]	[ˈpaɪ.lət]
799.	pin	/pɪn/	[pɪn]	[pɪn]
800.	pink	/pɪŋk/	[pɪŋk]	[pɪŋk]
801.	pipe	/paɪp/	[pæːp]	[paɪp]
802.	pistol	/ˈpɪs.təl/	[ˈpɪʃ.təl]	[ˈpɪs.təl]
803.	plain	/pleɪn/	[pəˈlæːn]	[pəˈleːn]
804.	planet	/ˈplæ.nɪt/		[pəˈlæː.nət]
805.	plant	/plɑːnt/	[pəˈlãnt]	[pəˈlãnt]
806.	plaster	/ˈplɑː.stə/	[pəˈləs.t̪ər]	[pəˈlaːs.tər]
807.	plastic	/ˈplæ.stɪk/	[pəˈlaʃ.tək]	[pəˈlas.tɪk]
808.	plate	/pleɪt/	[pəˈleːt]	[pəˈleːt]
809.	player	/ˈpleɪ.ə/	[pəˈleːr]	[pəˈleː.jər]
810.	please	/pliːz/	[pəˈliːz]	[pəˈliːz]
811.	pledge	/pledʒ/		[pəˈlæːdʒ]
812.	pliers	/plaɪəz/	[pəˈlaːs]	[pəˈlaɪr]
813.	plot	/plɒt/	[pəˈlaːt]	[pəˈlaːt]
814.	plug	/plʌg/	[pəˈlaːg]	[pəˈləg]
815.	plumber	/ˈplʌ.mə/	[pəˈləm.bər]	[pəˈləm.mər]
816.	pocket	/ˈpɒ.kɪt/		[ˈpaː.kət]
817.	poet	/ˈpəʊ.ɪt/		[ˈpoɪt]
818.	poetry	/ˈpəʊ.ɪ.tri/		[ˈpoɪ.tri]
819.	point	/pɔɪnt/		[ˈpuː.waɪnt]
820.	poison	/ˈpɔɪ.zən/		[ˈpoɪ.zən]
821.	police	/pəˈliːs/	[pəˈliːs]	[pəˈliːs]
822.	policy	/ˈpɒ.lɪ.si/	[pəˈliː.si]	[ˈpaː.lɪ.si]
823.	polish	/ˈpɒ.lɪʃ/	[ˈpaː.ləʃ]	[ˈpaː.lɪʃ]

824.	poll	/pəʊl/	[poːl]	[poːl]
825.	pollution	/pəˈluːʃən/		[pəˈluːʃən]
826.	poor	/pʊə/		[ˈpuːwər]
827.	popular	/ˈpɒ.pjə.lə/	[pa.ˈpuː.lər]	[pa.ˈpuː.lər]
828.	porch	/pɔːtʃ/	[ˈpoː.rətʃ]	[portʃ]
829.	portion	/ˈpɔː.ʃən/	[ˈpoːr.ʃən]	[ˈpoːr.ʃən]
830.	position	/pə.ˈzɪ.ʃən/	[pə.ˈziː.ʃən]	[po.ˈziː.ʃən]
831.	positive	/ˈpɒ.zə.tɪv/	[ˈpaːz.tɪv]	[ˈpaː.zɪ.tɪv]
832.	possible	/ˈpɒ.sɪ.bəl/	[pa.ˈsiː.bəl]	[ˈpaː.sɪ.bəl]
833.	post	/pəʊst/	[ˈpoː.sət]	[post]
834.	pot	/pɒt/		[paːt]
835.	potato	/pəˈteɪ.təʊ/		[poˈteː.to]
836.	pound	/paʊnd/	[pond]	[paʊnd]
837.	powder	/ˈpaʊ.də/	[ˈpoː.dər]	[ˈpaʊ.dər]
838.	prayer	/preə/		[pə.ˈreər]
839.	precious	/ˈpre.ʃəs/		[pə.ˈriː.ʃɪəs]
840.	pregnant	/ˈpreg.nənt/	[pə.ˈræg.nət]	[pə.ˈræg.nənt]
841.	president	/ˈpre.zɪ.dənt/	[pə.ræ.zɪ.ˈdənt]	[pə.ˈræ.zɪ.dənt]
842.	press	/præs/	[pə.ˈræːs]	[pə.ˈræːs]
843.	pretty	/ˈprɪ.ti/		[pə.ˈriː.ti]
844.	price	/praɪs/	[pə.ˈræːs]	[pə.ˈraɪz]
845.	primary	/ˈpraɪ.mər.i/	[pə.ˈræm.ri]	[pə.ˈraɪm.ri]
846.	prince	/prɪns/		[pə.ˈrɪns]
847.	principal	/ˈprɪn.sɪ.pəl/	[pə.ræn.ˈsiː.pəl]	[pə.ˈrɪn.sɪ.pəl]
848.	printer	/ˈprɪn.tə/	[pə.ˈrɪn.tər]	[pə.ˈrɪn.tər]
849.	private	/ˈpraɪ.vət/	[pə.ræ.ˈveːt]	[pə.ˈraɪ.vet]
850.	prize	/praɪz/	[pə.ˈræːz]	[pə.ˈraɪz]
851.	problem	/ˈprɒ.bləm/	[pə.ˈrab.ləm]	[pə.ˈrab.ləm]
852.	process	/ˈprəʊ.ses/	[pə.ˈraː.sæs]	[pə.ˈraː.sæs]
853.	produce	/prə.ˈdʒuːs/	[pər.ˈduːs]	[pər.ˈduːs]
854.	product	/ˈprɒ.dʌkt/		[pə.ˈraː.dəkt]
855.	production	/prə.ˈdʌk.ʃən/		[pə.ro.ˈdək.ʃən]
856.	profession	/prə.ˈfe.ʃən/	[pər.ˈfæː.ʃən]	[pə.ro.ˈfæː.ʃən]
857.	professor	/prəˈfe.sə/	[pər.ˈfæː.sər]	[pə.ro.ˈfæː.sər]
858.	profile	/ˈprəʊ.faɪl/	[pər.ˈfaɪl]	[pə.ˈroː.faɪl]
859.	profit	/ˈprɒ.fɪt/	[pə.ˈraː.fət]	[pə.ˈraː.fət]
860.	program	/ˈprəʊ.græm/	[pə.ˈroɣ.ram]	[pə.ˈrog.ram]
861.	progress	/ˈprəʊ.gres/	[pə.ˈrag.rəs]	[pə.ˈrag.rəs]
862.	project	/ˈprɒ.dʒekt /	[pə.ra.ˈdʒæː.kət]	[pə.ˈraː.dʒækt]
863.	prominent	/ˈprɒ.mɪ.nənt/		[pə.ˈraː.mɪ.nənt]
864.	promote	/prəˈməʊt/	[pərˈmoːt]	[pərˈmoːt]
865.	promotion	/prə.ˈməʊ.ʃən/	[pər.ˈmoː.ʃən]	[pər.ˈmoː.ʃən]
866.	proper	/ˈprɒ.pə /	[pə.ˈraː.pər]	[pə.ˈraː.pər]
867.	proton	/ˈprəʊ.tɒn/		[pə.ˈroː.tan]
868.	provide	/prəˈvaɪd/	[pər.ˈvæːt]	[pə.roːˈvaɪd]
869.	province	/ˈprɒ.vɪns/		[pə.ˈroː.vɪns]

870.	provision	/prəˈvɪ.ʒən/		[pə.roˈviː.ʒən]
871.	public	/ˈpəb.lɪk/	[ˈpəb.lək]	[ˈpəb.lək]
872.	publicity	/pəbˈlɪ.sə.ti/		[pəbˈliː.sɪ.ti]
873.	publish	/ˈpʌb.lɪʃ/	[ˈpəb.ləʃ]	[ˈpəb.ləʃ]
874.	pudding	/ˈpʊ.dɪŋ/	[puː.ˈtɪŋk]	[ˈpuː.tɪŋg]
875.	pump	/pʌmp/	[pəmp]	[pəmp]
876.	puncture	/ˈpʌŋk.tʃə/	[ˈpæn.tʃər]	[ˈpəŋk.tʃər]
877.	punishment	/ˈpʌ.nɪʃ.mənt/		[pəˈnɪʃ.mɪt]
878.	purple	/ˈpɜː.pəl/	[ˈpər.pəl]	[ˈpər.pəl]
879.	purse	/pɜːs/	[pər.rəs]	[pərs]
880.	pyjamas	/pɪˈdʒɑː.məz/	[pəˈdʒaː.ma]	[pəˈdʒaː.ma]
881.	quality	/ˈkwɒ.lɪ.tɪ/	[kəˈwal.tɪ]	[kəˈwal.tɪ]
882.	quarter	/ˈkwɔː.tə/	[kəˈwaː.tər]	[kəˈwaː.tər]
883.	query	/ˈkwɪə.ri/		[kəˈweː.ri]
884.	question	/ˈkwes.tʃən/	[kəˈwəs.tʃən]	[kəˈwəs.tʃən]
885.	quick	/kwɪk/	[kə.wiːk]	[kə.wiːk]
886.	rabbit	/ˈræ.bɪt/		[ˈræː.bət]
887.	race	/reɪs/	[reːs]	[reːs]
888.	rack	/ræk/	[ræːk]	[ræːk]
889.	racket	/ˈræ.kɪt/	[ˈræː.tək]	[ˈræː.kət]
890.	rank	/ræŋk/	[ræŋk]	[ræŋk]
891.	rat	/ræt/	[ræt]	[ræt]
892.	rate	/reɪt/	[ˈreːt]	[ˈreːt]
893.	recent	/ˈriː.sənt/		[ˈriː.sənt]
894.	red	/red/	[ræd]	[ræd]
895.	refuse	/rɪ.ˈfjuːz/	[rəf.ˈjuːz]	[rəf.ˈjuːz]
896.	rehearsal	/rə.ˈhɜː.səl/		[rɪ.ˈhər.səl]
897.	reject	/rɪˈdʒekt/	[rəˈdʒæː.kət]	[rəˈdʒækt]
898.	relax	/rɪˈlæks/	[rəˈlæː.kəs]	[rəˈlæks]
899.	remover	/rɪ.ˈmuː.və/	[rəm.ˈbuː.vər]	[rə.ˈmuː.vər]
900.	rent	/rent/	[rẽnt]	[rẽnt]
901.	repeat	/rɪ.ˈpiːt/	[rə.ˈpiːt]	[rə.ˈpiːt]
902.	reply	/rɪ.ˈplaɪ/	[ˈrəp.laɪ]	[ˈrəp.laɪ]
903.	report	/rɪˈpɔːt/	[rəˈpoːt]	[rəˈpoːt]
904.	reputation	/rep.jəˈteɪ.ʃən/		[ræ.po.ˈteː.ʃən]
905.	request	/rɪ.ˈkwest/	[rək.ˈwæː.sət]	[rək.ˈwæst]
906.	requirement	/rɪ.ˈkwaɪə.mənt/	[rək.ˈwær.mɪt]	[rək.ˈwaɪr.mɪt]
907.	research	/rɪˈsɜːtʃ/	[rəˈsər.rətʃ]	[rəˈsərtʃ]
908.	rest	/rest/	[ˈræː.sət]	[ræst]
909.	restaurant	/ˈres.trɒnt/		[ræs.ˈtuː.rənt]
910.	restriction	/rɪˈstrɪk.ʃən/		[rəsˈtrɪk.ʃən]
911.	result	/rɪˈzʌlt/	[rəˈzəl.lət]	[rɪˈzəlt]
912.	revenue	/ˈre.və.njuː/		[ˈræv.nɪ.juː]
913.	revision	/rɪ.ˈvɪ.ʒən/	[rə.ˈviː.ʒən]	[rə.ˈviː.ʒən]
914.	rich	/rɪtʃ/	[rɪtʃ]	[rɪtʃ]
915.	rifle	/ˈraɪ.fəl/	[ˈræː.fəl]	[ˈraɪ.fəl]

916.	right	/raɪt/		[raɪt]
917.	ring	/rɪŋ/	[rɪŋg]	[rɪŋg]
918.	risk	/rɪsk/	[ˈriː.sək]	[ˈriː.sək]
919.	river	/ˈrɪ.və/		[ˈriː.vər]
920.	road	/rəʊd/	[roːt]	[roːd]
921.	roast	/ɹəʊst/	[ˈroː.sət]	[rost]
922.	robot	/ˈrəʊ.bɒt/	[rə.ˈboːt]	[rə.ˈboːt]
923.	rocket	/ˈrɒ.kɪt/	[ˈraː.kət]	[ˈraː.kɪt]
924.	role	/rəʊl/	[roːl]	[roːl]
925.	root	/ruːt/		[ruːt]
926.	route	/ruːt/	[ruːt]	[ruːt]
927.	royal	/rɔɪəl/		[raɪl]
928.	rubber	/ˈrʌ.bə/	[ˈrəb.bət]	[ˈrəb.bəˌ]
929.	ruler	/ˈruː.lə/		[ˈruː.lər]
930.	run	/rʌn/	[rən]	[rən]
931.	safe	/seɪf/	[seːf]	[seːf]
932.	salary	/ˈsæ.lə.ri/	[ˈsel.ri]	[ˈsæl.ri]
933.	sale	/seɪl/	[seːl]	[seːl]
934.	salt	/sɒlt/	[ˈsaː.lət]	[salt]
935.	salute	/sə.ˈluːt/	[sə.ˈluːt]	[sə.ˈluːt]
936.	sauce	/sɔːs/		[saːs]
937.	save	/seɪv/	[seːv]	[seːv]
938.	scan	/skæn/	[sə.ˈkæːn]	[sə.ˈkæːn]
939.	scarf	/skɑːf/	[əs.ˈkaːf]	[əs.ˈkaːf]
940.	scary	/ˈskeə.ri/		[sə.ˈkeː.ri]
941.	scenery	/ˈsiː.nə.ri/	[ˈsiːn.ri]	[ˈsiːn.ri]
942.	scholar	/ˈskɒ.lər/	[əs.ˈkaː.lər]	[əs.ˈkaː.lər]
943.	school	/skʊəl/	[sə.ˈkuːl]	[sə.ˈkuːl]
944.	science	/saɪəns/	[sə̃ns]	[saɪns]
945.	scooter	/ˈskuː.tə/	[əs.ˈkuː.tər]	[sə.ˈkuː.tər]
946.	scope	/skəʊp/	[əs.ˈkoːp]	[sə.ˈkoːp]
947.	score	/skɔː/	[əs.ˈkoːr]	[əs.ˈkoːr]
948.	screen	/skriːn/	[sək.ˈriːn]	[sək.ˈriːn]
949.	screw	/skɹuː/	[ˈsək.ruː]	[ˈsək.ruː]
950.	scrutiny	/ˈskruː.tɪ.ni/		[sək.ˈruːt.ni]
951.	search	/sɜːtʃ/		[sərtʃ]
952.	season	/ˈsiː.zən/	[ˈsiː.zən]	[ˈsiː.zən]
953.	seat	/siːt/	[siːt]	[siːt]
954.	second	/ˈse.kənd/	[sə.ˈkĩnt]	[ˈsæ.kə̃nd]
955.	secondary	/ˈse.kən.dri/		[sə.ˈkæn.dri]
956.	secret	/ˈsiː.krət/		[ˈsiːk.rət]
957.	secretary	/ˈsek.rə.tər.i/		[ˈsæk.tri]
958.	section	/ˈsek.ʃən/	[ˈsæk.ʃən]	[ˈsæk.ʃən]
959.	sector	/ˈsæk.tə/	[ˈsæk.tər]	[ˈsæk.tər]
960.	security	/sɪˈkjʊə.rə.ti/	[səˈkoː.ti]	[səˈkoːr.ti]
961.	select	/sɪ.ˈlekt/	[sə.ˈlæː.kət]	[sə.ˈlækt]

962.	self	/self/	[ˈsæː.ləf]	[sælf]
963.	semester	/sɪˈmes.tə/	[səˈmæs.tər]	[səˈmæs.tər]
964.	senior	/ˈsiː.ni.ə/	[ˈsiːn.jər]	[ˈsiːn.jər]
965.	sentence	/ˈsɛn.təns/		[sən.ˈtæ̃ns]
966.	serious	/ˈsɪə.ri.əs/	[ˈsiːr.jəs]	[ˈsiːr.jəs]
967.	servant	/ˈsɜː.vənt/	[sər.ˈvə̃nt]	[ˈsər.və̃nt]
968.	service	/ˈsɜː.vɪs/	[ˈsər.vəs]	[ˈsər.vəs]
969.	settle	[ˈse.təl]	[ˈsæː.təl]	[ˈsæː.təl]
970.	sex	/seks/		[sæks]
971.	shadow	/ˈʃæ.dəʊ/		[ˈʃæː.do]
972.	shake	/ʃeɪk/	[ʃeːk]	[ʃeːk]
973.	shame	/ʃeɪm/	[ʃæːm]	[ʃæːm]
974.	shampoo	/ʃæmˈpuː/	[ˈʃæm.poː]	[ˈʃæm.puː]
975.	sharpner	/ˈʃɑː.pə.nə/	[ˈʃaːp.nər]	[ˈʃaːp.nər]
976.	shawl	/ʃɔːl/	[ʃaːl]	[ʃaːl]
977.	shift	/ʃɪft/	[ʃiː.fət]	[ʃɪft]
978.	shoot	/ʃuːt/		[ʃuːt]
979.	shop	/ʃɒp/	[ʃaːp]	[ʃaːp]
980.	shoping	/ˈʃɒ.pɪŋ/	[ʃaː.ˈpɪŋg]	[ˈʃaː.pɪŋg]
981.	short	/ʃɔːt/	[ʃaːt]	[ʃaːt]
982.	shoulder	/ˈʃəʊl.də/	[ˈʃol.dər]	[ˈʃol.dər]
983.	show	/ʃəʊ/	[ʃoː]	[ʃoː]
984.	signal	/ˈsɪg.nəl/	[ˈsɪg.nəl]	[ˈsɪg.nəl]
985.	signature	/ˈsɪg.ne.tʃə/		[ˈsəg.neː.tʃər]
986.	silk	/sɪlk/	[ˈsiː.lək]	[ˈsiː.lək]
987.	silver	/ˈsɪl.və/	[ˈsɪl.vər]	[ˈsɪl.vər]
988.	singer	ˈsɪŋ.ər	[ˈsɪŋ.gər]	[ˈsɪŋ.gər]
989.	single	/ˈsɪŋ.gəl/	[ˈsɪŋ.gəl]	[ˈsɪŋ.gəl]
990.	sink	/siŋk/	[sĩŋk]	[sĩŋk]
991.	sister	/ˈsɪs.tə/	[ˈsɪs.tər]	[ˈsɪs.tər]
992.	sit	/sɪt/	[sɪt]	[sɪt]
993.	six	/sɪks/	[ˈsiː.kəs]	[sɪks]
994.	skin	/skɪn/	[ˈəs.kɪn]	[ˈəs.kɪn]
995.	skip	/skɪp/		[ˈəs.kɪp]
996.	skirt	/skɜːt/		[əs.ˈkərt]
997.	skull	/skʌl/		[ˈəs.kəl]
998.	slate	/sleɪt/	[sə.ˈleːt]	[sə.ˈleːt]
999.	slice	/slaɪs/		[sə.ˈlaɪs]
1000.	slide	/slaɪd/	[sə.laɪt]	[sə.laɪd]
1001.	slim	/slɪm/	[sə.ˈliːm]	[sə.ˈliːm]
1002.	slip	/slip/	[sə.ˈliːp]	[sə.ˈliːp]
1003.	slow	/sləʊ/	[ˈsəl.loː]	[sə.ˈloː]
1004.	small	/smɔːl/	[sə.ˈmaːl]	[sə.ˈmaːl]
1005.	smart	/smɑːt/	[əs.ˈmaːt]	[əs.ˈmaːt]
1006.	smell	/smel/	[ˈəs.mæl]	[ˈəs.mæl]
1007.	smile	/smaɪl/	[əs.ˈmæːl]	[sə.ˈmaɪl]

1008.	snake	/sneɪk/		[əs.ˈneːk]
1009.	snow	/snəʊ/	[ˈsən.no]	[sə.ˈnoː]
1010.	soap	/səʊp/	[suːp]	[soːp]
1011.	social	/ˈsəʊ.ʃəl/	[ˈsoː.ʃəl]	[ˈsoː.ʃəl]
1012.	society	/səˈsaɪ.ɪt.i/		[soˈsaɪ.ti]
1013.	socket	/ˈsɒ.kɪt/	[ˈsaː.kət]	[ˈsaː.kət]
1014.	socks	/sɒks/	[saː.kəs]	[saks]
1015.	sofa	/ˈsəʊ.fə/	[ˈsoː.fɐ]	[ˈsoː.fɐ]
1016.	soldier	/ˈsəʊl.dʒə/		[ˈsol.dʒər]
1017.	solid	/ˈsɒ.lɪd/	[ˈsaː.ləd]	[ˈsaː.ləd]
1018.	solve	/sɒlv/		[salv]
1019.	sorry	/ˈsɒ.ri/	[ˈsaː.ri]	[ˈsoː.ri]
1020.	sound	/saʊnd/	[sond]	[saʊnd]
1021.	soup	/suːp/	[suːp]	[suːp]
1022.	source	/sɔːs/	[ˈsoː.rəs]	[sors]
1023.	space	/speɪs/	[əs.ˈpeːs]	[əs.ˈpeːs]
1024.	spare	/speə/	[sə.ˈpeːr]	[sə.ˈpeːr]
1025.	sparrow	/ˈspæ.rəʊ/		[sə.ˈpæː.ro]
1026.	speak	/spiːk/		[sə.ˈpiːk]
1027.	special	/ˈspe.ʃəl/	[əʃ.pæː.ʃəl]	[ˈspæː.ʃəl]
1028.	specialist	/ˈspe.ʃə.lɪst/		[əs.ˈpæː.ʃə.lɪst]
1029.	spectrum	/ˈspek.trəm/		[sə.ˈpæk.trəm]
1030.	speech	/spiːtʃ/		[əs.ˈpiːtʃ]
1031.	speed	/spiːd/	[əs.ˈpiːt]	[əs.ˈpiːd]
1032.	spicey	/ˈspaɪ.si/	[sə.ˈpaɪ.si]	[əs.ˈpaɪ.si]
1033.	sponsor	/ˈspɒn.sə/	[əs.ˈpan.sər]	[sə.ˈpan.sər]
1034.	spoon	/spuːn/		[sə.ˈpuːn]
1035.	spray	/spreɪ/	[ˈsəp.reː]	[ˈsəp.reː]
1036.	spread	/spred/	[ˈsəp.ræd]	[ˈsəp.ræd]
1037.	squeez	/skwiːz/		[sək.ˈwiːz]
1038.	stadium	/ˈsteɪ.dɪəm/	[əs.teː.ˈdɪəm]	[əs.ˈteː.dɪəm]
1039.	stage	/steɪdʒ/	[əs.ˈteːtʃ]	[əs.ˈteːdʒ]
1040.	stain	/steɪn/		[sə.ˈteːn]
1041.	stair	/steə/		[sə.ˈteːr]
1042.	stamina	/ˈstæ.mɪ.nə/		[sə.ˈtæm.nə]
1043.	stamp	/stæmp/	[əs.ˈtæmp]	[əs.ˈtæmp]
1044.	stand	/stænd/	[əs.ˈtænd]	[əs.ˈtænd]
1045.	standard	/ˈstæn.dəd/	[əs.ˈtən.dər]	[sə.ˈtæn.dər]
1046.	star	/stɑː/	[əs.ˈtaːr]	[əs.ˈtaːr]
1047.	start	/stɑːt/	[əs.ˈtaːt]	[əs.ˈtaːt]
1048.	state	/steɪt/	[əs.ˈteːt]	[əs.ˈteːt]
1049.	station	/ˈsteɪ.ʃən/	[əs.ˈteː.ʃən]	[əs.ˈteː.ʃən]
1050.	stationary	/ˈsteɪ.ʃə.nə.ri/		[əs.ˈteʃ.nə.ri]
1051.	status	/ˈsteɪ.təs/	[sə.ˈteː.təs]	[sə.ˈteː.təs]
1052.	steal	/stiːl/	[sə.ˈtiːl]	[sə.ˈtiːl]
1053.	step	/stæp/	[ˈəs.tæp]	[ˈəs.tæp]

1054.	stick	/stɪk/	[ˈəs.tɪk]	[ˈəs.tɪk]
1055.	sticker	/ˈstɪ.kə/	[əs.ˈti:.kər]	[əs.ˈti:.kər]
1056.	stitch	/stɪtʃ/		[ˈəs.tɪtʃ]
1057.	stock	/stɒk/	[əs.ˈta:k]	[əs.ˈta:k]
1058.	stone	/stəʊn/		[əs.ˈtu:n]
1059.	stool	/stu:l/		[sə.ˈtu:l]
1060.	stop	/stɒp/	[əs.ˈta:p]	[sə.ˈta:p]
1061.	store	/stɔ:/	[əs.ˈto:r]	[əs.ˈto:r]
1062.	storey	/ˈstɔ:.ri/	[əs.ˈto:.ri]	[əs.ˈto:.ri]
1063.	story	/ˈstɔ:.ri/	[əs.ˈto:.ri]	[əs.ˈto:.ri]
1064.	straight	/streɪt/		[sət.ˈre:t]
1065.	strange	/streɪndʒ/		[sət.ˈrẽndʒ]
1066.	straw	/strɔ:/		[ˈəs.tra:]
1067.	strawberry	/ˈstrɔ:.bər.i/		[əs.ˈta:b.ri]
1068.	street	/stri:t/		[sət.ˈri:t]
1069.	strict	/strɪkt/		[ˈsə.trɪk]
1070.	strike	/straɪk/	[sət.ˈræ:k]	[sət.ˈraɪk]
1071.	string	/strɪŋ/		[əs.ˈtrɪŋg]
1072.	strip	/strɪp/		[ˈsət.rɪp]
1073.	strong	/stɹɒŋ/		[əs.ˈtroŋg]
1074.	structure	/ˈstrʌk.tʃə/		[sət.ˈrək.tʃər]
1075.	student	/ˈstju:.dənt/	[sə.tu:.ˈdənt]	[sə.ˈtu:.dənt]
1076.	studio	/ˈstju:.di.əʊ/	[əs.ˈtu:.dɪo]	[əs.ˈtu:.dɪo]
1077.	study	/ˈstʌ.di/	[əs.ˈtəd.di]	[sə.ˈtə.di]
1078.	stunt	/ stʌnt/		[sə.ˈtənt]
1079.	style	/staɪl/	[əs.ˈtæ:l]	[sə.ˈtaɪl]
1080.	subject	/ˈsʌb.dʒækt/		[səb.ˈdʒækt]
1081.	submit	/səbˈmɪt/		[ˈsəb.mɪt]
1082.	sugar	/ˈʃʊ.gə/	[ˈʃu:.gər]	[ˈʃu:.gər]
1083.	suggestion	/səˈdʒes.tʃən/		[səˈdʒæ:.tʃən]
1084.	suit	/su:t/	[su:t]	[su:t]
1085.	summary	/ˈsʌ.mə.ri/		[ˈsəm.ri]
1086.	sun	/sʌn/	[sʌn]	[sʌn]
1087.	supply	/səˈplaɪ/	[ˈsəp.laɪ]	[ˈsəp.laɪ]
1088.	surf	/sɜ:f/	[sər.rəf]	[sərf]
1089.	surgeon	/ˈsɜ:.dʒən/	[ˈsər.dʒən]	[ˈsər.dʒən]
1090.	surgery	/ˈsɜ:.dʒə.ri/		[ˈsər.dʒə.ri]
1091.	survey	/ˈsɜ:.veɪ/		[ˈsər.ve:]
1092.	sweat	/swet/		[sə.ˈwæ:t]
1093.	sweater	/ˈswe.tə/	[sə.ˈwæ:.tər]	[sə.ˈwæ:.tər]
1094.	sweet	/swi:t/	[sə.ˈwi:t]	[sə.ˈwi:t]
1095.	swell	/swel/		[sə.ˈwæ:l]
1096.	switch	/swɪtʃ/	[su:tʃ]	[su:tʃ]
1097.	system	/ˈsɪs.təm/	[ˈsɪs.təm]	[ˈsɪs.təm]
1098.	table	/ˈteɪ.bəl/	[ˈte:.bəl]	[ˈte:.bəl]
1099.	tablet	/ˈtæb.lət/		[ˈtæb.lət]

1100.	tailor	/ˈteɪ.lə/	[ˈteː.lər]	[ˈteː.lər]
1101.	tall	/tɔːl/	[taːl]	[taːl]
1102.	tank	/tæŋk/	[tæŋk]	[tæŋk]
1103.	target	/ˈtɑː.gɪt/	[ˈtar.gət]	[ˈtar.gət]
1104.	tassel	/ˈtæ.səl/	[ˈtəs.səl]	[ˈtæː.səl]
1105.	taste	/teɪst/	[ˈteː.sət]	[test]
1106.	teach	/tiːtʃ/		[tiːtʃ]
1107.	technique	/tekˈniːk/		[təkˈniːk]
1108.	technology	/tekˈnɒ.lə.dʒi/	[təkˈnal.dʒi]	[tækˈna.lo.dʒi]
1109.	tennis	/ˈte.nɪs/		[ˈtæː.nəs]
1110.	term	/tɜːm/		[tərm]
1111.	terrorist	/ˈtɛ.rə.rɪst/	[tæ.ˈrɪst]	[ˈtæ.rə.rɪst]
1112.	theater	/ˈθɪə.tər/		[ˈt̪ʰeː.tər]
1113.	theory	/ˈθɪə.ri/		[t̪ʰə.ˈjuː.ri]
1114.	thermos	/ˈθɜː.məs/	[t̪ʰər.ˈmaːs]	[ˈt̪ʰər.məs]
1115.	thigh	/θaɪ/		[t̪ʰaɪ]
1116.	thin	/θɪn/		[t̪ʰin]
1117.	third	/θɜːd/	[t̪ʰəd]	[t̪ʰərd]
1118.	thought	/θɔːt/		[t̪ʰaːt]
1119.	thread	/θred/	[t̪ʰə.ˈræːd]	[t̪ʰə.ˈræːd]
1120.	threat	/θret/		[t̪ʰə.ˈræːt]
1121.	throat	/θrəʊt /		[t̪ʰə.ˈraːt]
1122.	ticket	/ˈtɪ.kɪt/	[ˈtiː.kət]	[ˈtiː.kət]
1123.	tiger	/ˈtaɪ.gər/	[ˈtaɪ.gər]	[ˈtaɪ.gər]
1124.	tight	/taɪt/	[tæːt]	[taɪt]
1125.	tin	/tɪn/	[tiːn]	[tɪn]
1126.	tissue	/ˈtɪ.ʃuː/	[ˈtiː.ʃu]	[ˈtiː.ʃu]
1127.	title	/ˈtaɪ.təl/		[ˈtaɪ.təl]
1128.	toast	/təʊst/	[toː.sət]	[tost]
1129.	toffee	/ˈtɒ.fi/	[ˈtaː.fi]	[ˈtaː.fi]
1130.	toilet	/ˈtɔɪ.lət/	[ˈtæː.lət]	[ˈtaɪ.lət]
1131.	tomato	/təˈmɑː.təʊ/		[təˈmaː.to]
1132.	tonic	/ˈtɒ.nɪk/		[ˈtoː.nɪk]
1133.	tonsil	/ˈtɒn.səlz/	[ˈtan.sər]	[ˈtan.sər]
1134.	tooth	/tuːθ/		[tuːt̪ʰ]
1135.	topic	/ˈtɒ.pɪk/	[ˈtaː.pək]	[ˈtaː.pək]
1136.	torture	/ˈtɔː.tʃə/	[ˈtaːr.tʃər]	[ˈtaːr.tʃər]
1137.	tour	/ tʊə/		[ˈtuː.vər]
1138.	towel	/taʊəl/	[ˈtaː.vəl]	[ˈtaː.vəl]
1139.	town	/taʊn/		[taʊn]
1140.	trace	/treɪs/	[tə.ˈreːs]	[treːs]
1141.	tractor	/ˈtræk.tə/	[tə.ˈræk.tər]	[ˈtræk.tər]
1142.	trade	/ treɪd/		[treːd]
1143.	traffic	/ˈtræ.fɪk/	[tə.ˈræː.fək]	[ˈtræː.fɪk]
1144.	tragedy	/ˈtræ.dʒə.di/		[ˈtræ.dʒə.di]
1145.	train	/treɪn/	[tə.ˈræːn]	[treːn]

1146.	transfer	/trænsˈfɜː/	[təˈrans.fər]	[ˈtrans.fər]
1147.	translation	/trænzˈleɪˌʃən/		[transˈleː.ʃən]
1148.	trap	/træp/		[træp]
1149.	trash	/træʃ/		[træʃ]
1150.	travel	/ˈtræ.vəl/	[təˈræː.vəl]	[ˈtræː.vəl]
1151.	treat	/triːt/	[təˈriːt]	[triːt]
1152.	tree	/triː/		[triː]
1153.	trifle	/ˈtɪaɪ.fəl/	[təˈræː.fəl]	[ˈtraɪ.fəl]
1154.	triple	/ˈtrɪ.pəl/	[təˈriː.pəl]	[ˈtrɪ.pəl]
1155.	trolley	/ˈtrɒ.li/	[təˈraː.li]	[ˈtraː.li]
1156.	trophy	/ˈtrəʊ.fi/	[təˈraː.fi]	[ˈtraː.fi]
1157.	trouble	/ˈtrʌ.bəl/		[ˈtrə.bəl]
1158.	truck	/trʌk/	[təˈraːk]	[trək]
1159.	trunk	/trʌŋk/		[trəŋk]
1160.	tube	/ tjuːb/	[tuːp]	[tɪ.ˈjuːb]
1161.	tuition	/tʃuː.ˈɪˌʃən/	[tʃə.ˈviː.ʃən]	[tʃə.ˈviː.ʃən]
1162.	tulip	/ˈtjuː.lɪp/	[ˈtuː.lɪp]	[ˈtuː.lɪp]
1163.	turbine	/ˈtɜː.baɪn/		[ˈtər.baɪn]
1164.	turmeric	/ˈtɜː.mə.rɪk/		[tər.ˈmæː.rɪk]
1165.	turtle	/ˈtɜː.təl/		[ˈtər.təl]
1166.	type	/taɪp/	[tæːp]	[taɪp]
1167.	tyre	/taɪə/	[tæːr]	[taɪr]
1168.	umbrella	/ʌm.ˈbrɛ.lə/		[əm.ˈreː.lə]
1169.	uncle	/ˈʌŋ.kəl/	[ˈæŋ.kəl]	[ˈəŋ.kəl]
1170.	university	/juː.nɪ.ˈvɜː.sə.ti/	[jun.ˈrəs.ti]	[juː.nɪ.ˈvərs.ti]
1171.	vacancy	/ˈveɪ.kən.si/		[vəˈkæn.si]
1172.	vacant	/ˈveɪ.kənt/		[ˈvæ.kənt]
1173.	vaccine	/ˈvæk.siːn/	[væk.ˈsiːn]	[ˈvæk.siːn]
1174.	valley	/ˈvæ.li/		[ˈvæː.li]
1175.	valve	/vælv/	[vaːl]	[vaːl]
1176.	van	/væn/	[væn]	[væn]
1177.	variety	/vəˈraɪə.ti/	[vəˈræː.ti]	[vəˈraɪ.ti]
1178.	varnish	/ˈvɑː.nɪʃ/	[ˈvar.nəʃ]	[ˈvar.nəʃ]
1179.	vein	/veɪn/	[væːn]	[veːn]
1180.	ventilator	/ˈven.tɪ.leɪ.tər/		[ˈven.tɪ.leː.tər]
1181.	venue	/ˈven.juː/		[ˈven.juː]
1182.	verbal	/ˈvɜː.bəl/		[ˈvər.bəl]
1183.	video	/ ˈvɪ.dɪəʊ/	[ˈvɪd.juː]	[ˈvɪd.jʊ]
1184.	village	/ˈvɪ.lɪdʒ/		[ˈviː.lədʒ]
1185.	vocabulory	/vəˈkæb.jə.lə.ri/		[vəˈkæb.lə.ri]
1186.	volume	/ˈvɒl.juːm/	[ˈval.jəm]	[ˈval.jəm]
1187.	volunteer	/vɒ.ləˈtɪə/		[va.ləˈtɪər]
1188.	vomit	/ˈvɒ.mɪt/		[ˈvə.mɪt]
1189.	waist	/weɪst/		[west]
1190.	wallet	/ˈwɒ.lɪt/	[ˈwaː.lət]	[ˈwaː.lət]
1191.	war	/wɔː/		[waːr]

1192.	ward	/wɔːd/	[waːt]	[waːd]
1193.	warden	/ˈwɔː.dən/	[ˈwar.dən]	[ˈwar.dən]
1194.	warm	/wɔːm/	[ˈwaː.rəm]	[warm]
1195.	warranty	/ˈwɒ.rən.ti/	[wa.ˈrən.ti]	[wa.ˈrən.ti]
1196.	wash	/wɒʃ/	[waːʃ]	[waːʃ]
1197.	waste	/weɪst/		[west]
1198.	watch	/wɒtʃ/	[waːtʃ]	[waːtʃ]
1199.	water	/ˈwɔː.tə/	[ˈwaː.tər]	[ˈwaː.tər]
1200.	wax	/wæks/	[ˈwæː.kəs]	[wæks]
1201.	weak	/wiːk/	[wiːk]	[wiːk]
1202.	wealth	/welθ/		[wælt̪ʰ]
1203.	week	/wiːk/	[wiːk]	[wiːk]
1204.	well	/wel/		[wæl]
1205.	west	/west/		[wæst]
1206.	wet	/wet/		[wæt]
1207.	white	/waɪt/	[wæːt]	[waɪt]
1208.	whole	[həʊl]	[hoːl]	[hoːl]
1209.	wife	[waɪf]	[wæːf]	[waɪf]
1210.	winner	[ˈwɪ.nə]	[ˈwiː.nər]	[ˈwiː.nər]
1211.	woman	/ˈwʊ.mən/		[ˈwuː.mən]
1212.	wood	/wuːd/	[wuːd]	[wuːd]
1213.	word	/wɜːd/		[wərd]
1214.	worry	/ˈwʌ.ri/		[ˈwər.ri]
1215.	worth	/wəːθ/		[wərt̪ʰ]
1216.	wrinkle	/ˈrɪŋ.kəl/		[ˈrɪŋ.kəl]
1217.	wrist	/rɪst/		[rɪst]
1218.	wrong	/rɒŋ/	[rãŋg]	[rãŋg]
1219.	zebra	/ˈzeb.rə/	[ˈzeb.rə]	[ˈzeb.rə]

Abbreviations

AJ&K	Azad Jammu and Kashmir
SSBE	Southern Standard British English
C	consonant
EB	MP-English ‘early bilingual’ speaker in this study
FT	Factorial Typology
H	heavy syllable
km	kilometres
L	light syllable
*L	losing candidate
LB	educated MP-English ‘late bilingual’ speakers in this study
LBQ	Language Background Questionnaire
L1	recipient/borrowing language
L2	source language/ donor
MP	Mirpur Pahari
MPL	English loanwords in Mirpur Pahari
ML	uneducated MP-‘monolingual’ speakers in this study
OT	Optimality Theory
P&D	Planning and Development
PF-04	female participant
PE	Pakistani English
POC	Partial Ordering Constraint
PP	Poonch Pahari
RCD	Recursive Constraint Demotion
RP	Received Pronunciation
S	superheavy syllable
SL	Source Language

TL	Target language
V	vowel
W	winning candidate
→	optimal candidate
<б>	syllable node
μ	mora
.	syllable boundary
ˈ	stressed syllable
ː	vowel lengthening
<C>	extrametrical element
*	ungrammatical form
~	alternate forms
=	equivalent
≠	non-equivalent
/ /	Input/underlying representation
[ ]	Output/surface representation
ˊ	rising tone
ˋ	falling tone
-	neutral or medial tone

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