

## Adaptation of Arabic gutturals in Turkish: an optimality theoretic perspective<sup>1</sup>

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## Abstract

This paper examines the repair strategies for adapting Arabic gutturals in Turkish such as Debuccalization, Uvular Fronting, and Guttural Deletion from an Optimality Theoretic perspective. It concludes that the debuccalization of the Arabic /χ/ and /ħ/ to the Turkish /h/ results from the non-readability of the Retracted Tongue Root (henceforth [RTR]) (i.e. circled [RTR]) and the availability of the Pharyngeal node as well as the [-voice] Laryngeal feature in Turkish (i.e. based on the availability of the Turkish /h/). The Arabic /q/ is adapted as the Turkish velar's /k/ (i.e. Uvular Fronting) to concur with the *No Place Node Branching Constraint* through the avoidance of the binary place node in the feature representation of /q/. The adaptation of the Arabic /ʁ/ as the Turkish /ɣ/ is to avoid the voiced glottal fricative /ɦ/ as a non-existent consonant in Turkish. The deletion of Arabic /ʕ/ and /ʔ/ is attributed to the Non-Availability of the [+constricted glottis] feature in Turkish, while the Arabic /h/ is preserved in Turkish in the word-initial position only. Optimality Theory (henceforth OT) is successfully utilized to account for the above repair strategies.

**Keywords:** Arabic gutturals; loanwords; adaptation; debuccalization; guttural deletion; uvular fronting.

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## 1. Introduction

Languages are different in terms of their specific principles and constraints; thus, a loanword is subject to the constraints of the borrowing language before adaptation. If a loanword violates the constraints of the borrowing language, it is modified to conform with the grammar of the borrowing language. The modification may occur on different levels: segmental, syllabic, prosodic or morphological levels. These modifications are largely analysed in recent decades (Silverman, 1992; Yip, 2002; Kang, 2003; Kenstowicz, 2003; Paradis and LaCharité, 1997; Broselow, 2009; Msuya and Mreta, 2019; Alqarni, 2021; Kim, 2021; among others).

Gutturals, according to McCarthy (1991, 1994), allude to sounds that are primarily or secondarily produced at the back of the vocal tract along with constriction of the pharynx. Gutturals (i.e. Uvulars, Pharyngeals, and Laryngeals), as a sound class, are uncommon cross-linguistically (Stoltzfus, 2014). They are far less common than Dorsals and Coronals (De Lacy, 2005). The fact that gutturals are uncommon phonemes is scrutinized by Delattre (1971) who eventually states that these sounds (i.e. gutturals) are not immensely used by all languages in the world, albeit by a few of them. Maddieson (1984), for example, discovered that 99.7% of languages have a dental or alveolar stop while only 14.8% of languages have a uvular stop. Likewise, according to Maddieson (1984), the voiceless pharyngeal fricative /ħ/ with its voiced counterpart /ʕ/ which are the least common fricatives are classified under the guttural category. The non-existence of guttural laterals and nasal gutturals which are physically impossible is documented by Maddieson (1984). Gutturals are not adapted in L1s that lack the pharyngeal primitive (Pharyngeal Place node) unless these sounds have an Oral Place node such as /x/ and /ɣ/ which are adapted as /k/ and /g/ respectively (Paradis and LaCharité, 2001; Stoltzfus, 2014). Paradis and LaCharité (2001) report that L2 gutturals are mostly subject to deletion in languages without the pharyngeal primitive. Following Paradis and LaCharité's (2001) view, Stoltzfus (2014) presents the importation (loan) rates for gutturals in her corpus in the table below: hence, the total rate of importation remains low throughout, ranging from 9% for /ʔ/ to 16% for /ħ/.

**TABLE 1**

Importation rates of gutturals in Stoltzfus' (2014: 186) corpus

GUTTURAL C	IMPORTATIONS/ TOTAL PHONOLOGICAL CASES	IMPORTATION RATE
/ħ/	19/117	16%
/h/	91/857	11%
/ʕ/	10/103	10%
/ʔ/	3/35	9%

Paradis and LaCharité (2001: 282) conduct their study on the treatment of the Arabic guttural /ħ/ in English, with a primitive to adapt gutturals, and French without this primitive as in (1):

- (1) The treatment of the Arabic guttural /ħ/ in English and French (Paradis and LaCharité, 2001: 282).

Arabic		English	French	Gloss
halal /ħa.la:l/	→	[həla:l]	[_ala]	'killed according to Islamic law'
hajj /ħa:dʒdʒ/	→	[hadʒ]	[_aʒ]	'pilgrimage to Makkah'

Stoltzfus (2014) posits that many languages appear to lack not only the capacity to adapt a guttural (see Paradis and LaCharité, 2001) but also the ability to import them readily, as demonstrated above, which is directly tied to the fact that gutturals are cross-linguistically uncommon.

Turkish comprises twenty distinct consonantal phonemes that are divided according to voicing (i.e., laryngeal feature), places of articulation, and manners of articulation (Van der Hulst and Van De Weijer, 1991; Kornfilt, 1997; Yavuz and others, 2011; W.F. Alshammari and A. Alshammari, 2020); hence, table 2 shows the 7 places of articulation plus 7 manners of articulation where Turkish consonantal phonemes are allocated to.

**TABLE 2**

The consonantal phonemic inventory of Turkish (Van der Hulst and Van De Weijer, 1991; Kornfilt, 1997; Yavuz and others, 2011; W.F. Alshammari and A. Alshammari, 2020)

MANNER OF ARTICULATION	PLACE OF ARTICULATION						
	BILABIAL	LABIO-DENTAL	ALVEOLAR	POST-ALVEOLAR	PALATAL	VELAR	LARYNGEAL
Plosives	p b		t d			k g	
Fricatives		f	s z	ʃ ʒ		ɣ	h
Affricates				tʃ dʒ			
Nasals	m		n				
Tap			r				
Approximant		u			j		
Lateral			l				

Concerning table 2, most of the gutturals in Arabic, such as uvulars /q, χ, ʁ/, pharyngeals /ħ, ʕ/, and the laryngeal /ʔ/, are not found in Turkish, except for /h/: This would recall the historical neutralization of Arabic gutturals into Turkish presented by Al-Hashmi (2016) as follows:

(2) Historical neutralizations of Arabic gutturals into Turkish (Al-Hashmi, 2016: 49):

Arabic		Ottoman		Turkish	
ʕ	→	ʔ	→	∅	(/sa:ʕah/ → /saʔat/ → /saat/ 'hour/watch')
ʔ	→	ʔ	→	∅	(/maʔmu:r/ → /meʔmûr/ → /memur/ 'official')
χ	→	h	~	h	(/ta:ri:χ/ → /târîh/ → /tarih/ 'history')
ʁ	→	g or ğ	~	g or ğ	(/ʁa:fil/ → /ġafil/ → /gafil/ 'headless') and (/maʁfu:r/ → /mâfûr/ → /mafur/ 'forgiven')
ħ	→	h	~	h	(/ħa:l/ → /hâl/ → /hal/ 'condition/state')
h	→	h	~	h	(/ʔaha:li:/ → /ʔahâlî/ → /ahali/ 'inhabitants')
q <sup>2</sup>	→	k	→	k	(/baqqa:l/ → /bakkâl/ → /bakkal/ 'grocer')

/h/ and /ʔ/ were the only gutturals pronounced by Osmanli users, except for those who spoke Arabic and Persian in addition to Turkish (i.e. bilingual and trilingual Ottomans) (Al-Hashmi, 2016). According to Lewis (2000: 8), the two functions of the glottal stop were to represent either the original Arabic Hamza /ʔ/, e.g. in /fiʕl/ → /fiʔl/ → /fil/ 'act', or the Arabic voiced pharyngeal /ʕ/, e.g. *şerʕ* /ʃarʕi/ → /ʃerʕi/ 'pertaining to the sacred law', Qur'an. Lewis (2000) reports that both sounds were lost in the intervocalic position, e.g. *müdafaa* /muda:faʕah/ → /mydafa:/ 'defence', *teesüf* /taʔasuf/ → /te:syf/ 'regret'.

With regard to the features of gutturals, the following chart is to show the values of the relevant features for gutturals.

Gutturals	Place of articulation	Manner of articulation	Features						
			[anterior]	[coronal]	[dorsal]	[pharyngeal]	[RTR] <sup>3</sup>	[constricted glottis] <sup>4</sup>	[voice]
/q/	Uvular	Plosive	-	-	+	+	+	-	-
/χ/	Uvular	Fricative	-	-	+	+	+	-	-

2 Al-Hashmi (2016) notes that /q/ in Ottoman Turkish was pronounced like a [k] and the velar stop /k/ was pronounced as a palatalized k, i.e. /c/, although the uvular stop [q] was written as /q/ in Ottoman Turkish. Al-Hashmi (2016) reports that the orthographical q in the 20<sup>th</sup> century is eliminated from Turkish.

/ʁ/	Uvular	Fricative	-	-	+	+	+	-	+
/ħ/	Pharyngeal	Fricative	-	-	-	+	+	-	-
/ʕ/	Pharyngeal	Fricative	-	-	-	+	+	+	+
/ʔ/	Laryngeal	Plosive	-	-	-	+	-	+	-
/h/	Laryngeal	Fricative	-	-	-	+	-	-	-

The current study aims to demonstrate how the repair strategies such as debuccalization, uvular fronting, and deletion are utilized to adapt Arabic gutturals in Turkish and to account for the aforementioned strategies using Optimality Theory as a framework. To do so, the following questions should be addressed: why are the voiceless uvular and pharyngeal fricatives debuccalized to the Turkish /h/? To what extent are the Arabic uvulars, /q/ and /ʁ/, subject to uvular fronting in Turkish? Why are the voiced pharyngeal fricative /ʕ/ and the glottal stop /ʔ/ targeted by the deletion in Turkish? How can OT account for the aforementioned repair strategies? Based on what this study is concerned, the next section is devoted to the previous studies on the adaptation of Arabic gutturals in Turkish.

## 2. Previous Studies

The adaptation of Arabic gutturals has aroused the interest of scholars of Turkish linguistics, including McCarthy (1970), Zimmer (1985), Van der Hulst and Van De Weijer (1991), Oytunaltun (2015), Al-Hashmi (2016), and W. F. Alshammari and A. Alshammari (2020). McCarthy (1970) affirmed that a glottal stop is lost in some Arabic loanwords in Turkish, e.g., *ʔudʒrah* > *üjret* 'rent/fee'. Zimmer (1985) reported that the voiceless uvular stop /q/ in Arabic loanwords in Turkish is realized as a voiceless velar stop /k/; hence, educated Turkish speakers tend to pronounce a voiceless uvular stop /q/ in Arabic loanwords as /k/. Similarly, Van der Hulst and Van De Weijer (1991) observed that the Arabic /q/ is replaced by a voiceless velar stop /k/ in Turkish, e.g., /naqd/ → /nakt/ 'in cash'. Oytunaltun (2015), who worked on the adaptation forms of loanwords from Arabic origin in Kazakh and Turkish, posited that the Arabic /q/ is replaced by the Turkish /k/, e.g., *fäqîr* > *fakir* 'poor'. Furthermore, his study is not restricted to the realization of the Arabic /q/ as the native Turkish /k/. He indicated the adaptation of other Arabic gutturals in Turkish. For instance, according to him, the Arabic /ʔ/ and /ʕ/ undergo deletion in Turkish, e.g., *ʕämäl* > *amel* 'work' and *ʔîmân* > *îmân* 'faith'. Unlike

3 Hamann (2002: 14) defines 'Retraction' as "a displacement of the tongue dorsum or root toward, the pharynx or velum".

4 Odden (2005) mentions that consonants with the [+constricted glottis] feature are produced with the constriction of vocal folds.

the adaptation of Arabic /ʔ/ and /ʕ/, Oytunaltun (2015) pointed out that a voiceless uvular fricative /χ/ and a voiceless pharyngeal fricative /ħ/ in Arabic loanwords in Turkish are realized as a voiceless laryngeal fricative /h/, e.g., *ħarf* > *harfi* 'a letter' and *χilâfât* > *hilâfet* 'caliphate'. Al-Hashmi's (2016) findings in her study matched with Oytunaltun's (2015); hence, the Arabic /ʔ/ and /ʕ/ are prone to deletion, while the Arabic voiceless /χ/ and /ħ/ are realized as a voiceless laryngeal fricative /h/. She also added that a voiced uvular fricative /ʁ/ in Arabic is adapted as a voiced velar stop /g/ in Turkish. Consider the following examples:

(4)

- I) The adaptation of a glottal stop and a voiced pharyngeal fricative:
  - a. /ʔinsa:n/ → /insan/ 'human being'
  - b. /ʕaða:b/ → /azap/ 'punishment'
- II) The adaptation of uvular fricatives and a voiceless pharyngeal fricative:
  - a. /faχri:/ → /fahri/ 'honorary'
  - b. /maʃbu:l/ → /meʃgul/ 'busy'
  - c. /ħa:l/ → /hal/ 'condition'

Al-Hashmi's (2016) findings were consistent with the ones shown by W. F. Alshammari and A. Alshammari (2020); thus, both researchers investigated the phonological and morphological adaptation of Turkish loanwords originating from Arabic. Consider the following examples:

(5)

- a. /taʔli:f/ → /telif/ 'compromise'
- b. /ʕilm/ → /ilim/ 'science'
- c. /χaja:l/ → /hajal/ 'imagination'
- d. /ħisa:b/ → /hesap/ 'account/bill'
- e. /ʔiqtisʕad/ → /iktisat/ 'economy'

Concerning the scholars' works mentioned above, none of these studies on the adaptation of Arabic gutturals in Turkish demonstrates how the repair strategies of Debuccalization, Uvular Fronting, and Guttural Deletion are used for adapting Arabic gutturals and how these strategies are accounted for using OT. Accordingly, this research gap is taken into consideration in section 4. The following section is to expose to the reader how the data were gathered.

### 3. Theoretical framework: Optimality Theory

Optimality Theory (OT) falls under the broader umbrella of generative grammar. This linguistic model was first proposed by Prince and Smolensky (1993) and is based on the notion that the observed forms of language are the result of the best satisfaction of competing con-

straints. OT is different from other phonological analysis methods, which frequently employ rules rather than constraints. However, rule-based and constraint-based models can coexist alongside phonological representational models such as autosegmental phonology, prosodic phonology, and linear phonology. In OT, grammars of languages are seen as systems that offer mappings between inputs and outputs; typically, the underlying representations represent inputs whereas their surface representations refer to outputs (Prince and Smolensky, 1993).

According to McCarthy (2008), the OT mechanism is an input-output relationship in which each input has a specific output. Two key elements that are active in any grammar, GEN (i.e. GENERATOR) and EVAL (i.e. EVALUATOR), operate this mechanism (Kager, 2010). A limitless number of potential candidates are functionally created by GEN, and these candidates are then evaluated by EVAL using a set of constraints. These constraints are assumed to be universal and that the ranking between them is language-specific (Kager, 2010). These basic components set OT apart as a parallel input-output relation theory. For instance, in languages that forbid onsetless syllables, ONS is ranked higher as an OT constraint that requires an onset, whereas the same constraint is ranked lower in languages that do not forbid them (Alqahtani, 2014). Thus, EVAL selects the best candidate from among competing candidates.

Markedness and Faithfulness constraints are the two types of OT constraints (Prince and Smolensky, 1993; McCarthy and Prince, 1995; McCarthy, 2008; Kager, 2010); while faithfulness constraints make sure that the result is exactly corresponding to the input, markedness constraints are concerned with structural well-formedness. Every type is important to the theory in some way. Faithfulness constraints prevent every input from being realized as a completely different form, while markedness constraints encourage changes from the underlying form.

## 4. Data collection

The research method in this study relies mainly on the data harvested from the extant literature, including articles, textbooks, and theses. Data were also gathered from some TV shows, videos on YouTube, songs, and online dictionaries. The entire data were transcribed in IPA (International Phonetic Alphabet). Furthermore, the author consulted five native speakers of Turkish to verify the data which was already collected. The data analysis is demonstrated in the next section.

## 5. Data Analysis

### 5.1. Debuccalization

Debuccalization is defined by O'Brien (2012: 1) as “a weakening phenomenon whereby various consonants with oral constriction reduce to laryngeal consonant”. In other words, it is the loss of oral place of articulation (O'Brien, 2012). Arabic gutturals are treated differently in

Turkish in terms of the way they are adapted. For instance, the Arabic voiceless uvular fricative /χ/ is mapped onto /h/ in Turkish, compared to the adaptation of the Arabic uvulars /q/ and /ʁ/ as discussed in the next subsection. Likewise, the Arabic voiceless pharyngeal fricative /ħ/ is mapped in Turkish onto /h/. Consider the following examples:

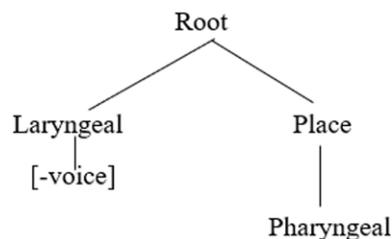
(6)

I)	Arabic	Turkish	Gloss
a.	/χaja:l/	/hajal/	'imagination'
b.	/χaʔin/	/hain/	'traitor'
c.	/χabar/	/haber/	'news'
d.	/χafin/	/hafin/	'tough'
e.	/buχa:r/	/buhar/	'steam'
f.	/ta:ri:χ/	/tarih/	'history'
g.	/faχri:/	/fahri/	'honorary'
h.	/maχlu:q/	/mahluk/	'creature'
i.	/muχtalif/	/muhtelif/	'diverse'
II)			
a.	/ħisa:b/	/hesap/	'account/bill'
b.	/ħa:l/	/hal/	'condition'
c.	/ħuqu:q/	/hukuk/	'rights'
d.	/sʰa:ħib/	/sahip/	'possessor'
e.	/ħasʰi:r/	/hurs/	'greed; being a minster'
f.	/ħa:fiðʰah/	/hafuza/	'memory'
g.	/ħakam/	/hakem/	'referee'
h.	/ħarf/	/harf/	'letter (of the alphabet)'
i.	/maħal/	/mahal/	'place, spot'
j.	/ħa:dʰir/	/hazur/	'prepared'
k.	/ħika:jah/	/hikeje/	'story'
l.	/ħumma/	/huma/	'fever'
m.	/tuħaf/	/tuhaf/	'odd'
n.	/tardʒi:ħ/	/terdzih/	'preference'

The examples in (6-I, II) reveal debuccalization as a repair strategy for adopting the Arabic voiceless uvular and pharyngeal fricatives, i.e. /χ/, /ħ/, in Turkish; hence, both consonants are debuccalized to Turkish /h/. The question that deserves to be addressed in this case is why are the voiceless uvular and pharyngeal fricatives debuccalized to the Turkish /h/?

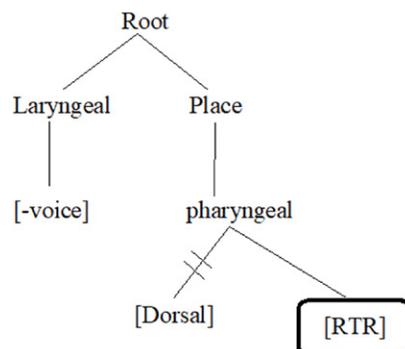
To answer this question, it is crucial to investigate where debuccalization stems from in Turkish. Considering the consonantal phonemic inventory of Turkish discussed earlier, the Pharyngeal Place node is available in Turkish based on the availability of the voiceless glottal fricative /h/. Consider its feature representation below:<sup>5</sup>

(7) The feature representation of /h/ in Turkish<sup>6</sup>:



The debuccalization of /χ/ to the Turkish /h/ is executed by the delinking of the [Dorsal] feature and circling [RTR], i.e. inert [RTR], due to its non-readability in Turkish: the primary Pharyngeal Place node with its inaccessible [RTR] is preferred above the [Dorsal] articulator.<sup>7</sup> The same behavior is attested in Indonesian, Sudanese, Standard Kiswahili, and Swahili where the Pharyngeal node with its inaccessible [RTR] is more prioritized than the preservation of [Dorsal], resulting in /h/ (Batais, 2013). Consider the following representation:

(8) Arabic /χ/ → Turkish /h/<sup>8</sup>



5 This representation is cited from Paradis and LaCharité (2001: 267).

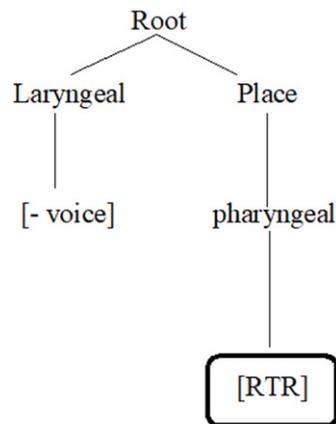
6 [+spread glottis] can also be a dependent Laryngeal feature.

7 Paradis and LaCharité (2001: 285) state that any unavailable primitive in any language is phonologically inert and phonetically un-interpreted (i.e., non-readable or non-treatable). They also present an example of the [+constricted glottis] as an unavailable primitive in English which is circled. The same phenomenon is expressed in Turkish later on.

8 In the representation of Arabic /χ/ and /ʁ/, Batais (2013: 259) states that the [+continuant] feature is not used to distinguish between uvular fricatives and a uvular stop or plosive since uvular fricatives are the only consonants in Arabic whose Pharyngeal Place node dominates both [Dorsal] and [RTR].

The debuccalization of /ħ/ to the Turkish /h/ is simply indicated by circling [RTR]. To put it simply, the debuccalization of the Arabic /ħ/ to the Turkish /h/ is a consequence of the non-treatment of [RTR], i.e. circling [RTR]. The same process is attested in English (Paradis and LaCharité, 2001), Guinea Fula (Diallo, 1992), and Sudanese Fula (Fulfulde) (Abu-Manga, 1986). Consider the following representation:

(9) Arabic /ħ/ → Turkish /h/.



Based on representations (8) and (9), the debuccalization of the Arabic /χ/ and /ħ/ to the Turkish /h/ originates from the non-treatment of the [RTR] (i.e. circling) and the availability of the Pharyngeal Place node, as the primary place node, along with the [-voice] laryngeal feature<sup>9</sup>. The aforementioned statement is the answer to the question of “why are the voiceless uvular and pharyngeal fricatives debuccalized to the Turkish /h/?”.

The above repair strategy is accounted for using OT as a framework. The list of OT constraints below is to evaluate the candidates of the inputs /χafin/ ‘tough’ and /ħarf/ ‘letter (of the alphabet)’ in the following tableaux:

(10) OT constraints:

- a. \*[cg] (Beckman, 1998: 198):  
Assign a violation mark for every segment associated with [+constricted glottis].
- b. \*[RTR]-C:<sup>10</sup>  
Assign a violation mark for each consonant of the [RTR] feature.

9 The Turkish /h/ is the closest phonological match for the Arabic /χ/ and /ħ/. It has the Pharyngeal node as the primary place node as do the Arabic /χ/ and /ħ/, and it shares the [-voice] laryngeal feature with the Arabic /χ/ and /ħ/ respectively.

10 [RTR] stands for Retracted Tongue Root.

- c. IDENT(voice) (Kager, 1999: 14):  
The specification for the feature [voice] of an input segment must be preserved in its output correspondent.
- d. IDENT(Manner) (Batais, 2019: 200):  
An input segment and its output correspondent must be identical in the manner of articulation.
- e. MAX-C (McCarthy, 2008):  
Consonant deletion is prohibited.
- f. IDENT (McCarthy and Prince, 1995):  
No change of input features in the output.

The following set of OT constraints is used in the following tableaux to evaluate candidates of the inputs /**χ**aʃin/ 'tough' and /**ħ**arf/ 'letter (of the alphabet)':

(11)

\*[cg], \*[RTR]-C >> IDENT(voice) >> IDENT(Manner) >> MAX-C >> IDENT

Based on the above set of OT constraints, \*[cg] and \*[RTR]-C equally outrank other constraints to eliminate candidates with consonants of the [+constricted glottis] feature as well as the [RTR] feature. IDENT(voice) is another highly ranked constraint that militates against candidates whose voicing feature is not compatible with the same feature of the input. IDENT(Manner) which is ranked higher than MAX-C is violated by the difference between the input and the output in terms of the manner of articulation. MAX-C which outranks IDENT and functions against the deletion of consonants. IDENT is to assure the full faithfulness of candidates to the input. Consider the evaluation of candidates of the inputs /**χ**aʃin/ 'tough' and /**ħ**arf/ 'letter (of the alphabet)' in the following tableaux:

**TABLE 3**

Evaluating the candidates of the input /**χ**aʃin/ 'tough'

\*[cg], \*[RTR]-C >> IDENT(voice) >> IDENT(Manner) >> MAX-C >> IDENT

/ <b>χ</b> aʃin/	*[cg]	*[RTR]-C	IDENT(voice)	IDENT(Manner)	MAX-C	IDENT
a. <b>χ</b> aʃin		*!				
b. ?aʃin	*!			*		*

c. ħafin						*
d. řafin	*!	*	*			*
e. ħafin		*!				*
f. ʁafin		*!				*
g. afin					*!	*
h. kafin				*!		*
i. yafin			*!			*
j. gafin			*!	*		*

The above tableau identifies candidate (c) as optimal since it avoids the violation of \*[cg], \*[RTR]-C, IDENT(voice), IDENT(Manner), and MAX-C, compared to other candidates. The fatal violation of \*[cg] by candidates (b) and (d) eliminates them. Candidates (a), (e), and (f) fail to be optimal due to the fatal violation of \*[RTR]-C. The (voicing) feature in candidates (i) and (j) is not correspondent to the one in the input which, therefore, incurs the fatal violation of IDENT(voice). The manner of articulation of candidate (h) is different from the one of the input, yielding the fatal violation of IDENT(Manner). Candidate (g) fatally violates MAX-C due to consonant deletion. The candidates of the input /ħarf/ ‘letter (of the alphabet)’ are subject to evaluation in the next tableau:

**TABLE 4**

Evaluating the candidates of the input /ħarf/ ‘letter (of the alphabet)’

\*[cg], \*[RTR]-C>>IDENT(voice)>>IDENT(Manner)>>MAX-C>>IDENT

/ħarf/	*[cg]	*[RTR]-C	IDENT(voice)	IDENT(Manner)	MAX-C	IDENT
a. ħarf		*!				
b. řarf	*!			*		*
c. ħarf				*		**!
d. garf			*!	*		*
e. řarf	*!	*	*			*
f. ʁarf		*!	*			*

g. arf					*!	*
h. @karf				*		*
i. arf				*	*!	**
j. xarf		*!		*		**

Candidate (c) fails to be optimal since it fatally violates IDENT, nonetheless, it matches with \*[cg], \*[RTR]-C, IDENT(voice), and MAX-C, while the wrong candidate (h) is chosen as optimal since it does not fatally violate the above constraints. \*[cg] is subject to the fatal violation by candidates (b) and (e). Candidates (a), (f), and (j) fatally violate \*[RTR]-C. IDENT(voice) is prone to fatal violation by candidate (d) while the fatal violation of the same constraint is avoided by candidates (g) and (i) through consonant deletion. However, this repair strategy leads to the fatal violation of MAX-C. The following OT constraints can be used to eliminate candidate (h)

(12) \*r (Mahyoob, 2021):

Assign a violation mark for any tril /r/.

The above constraint is ranked equal to \*[cg], \*[RTR]-C in the following set of ranking constraints to determine candidate (c) as optimal.

**TABLE 5**

Evaluating the candidates of the input /ħarf/ 'letter (of the alphabet)'

\*[cg], \*[RTR]-C, \*r >> IDENT(voice) >> IDENT(Manner) >> MAX-C >> IDENT

/ħarf/	*[cg]	*[RTR]-C	*R	IDENT(VOICE)	IDENT(Manner)	MAX-C	IDENT
a. ħarf		*!	*				
b. ʔarf	*!		*		*		*
c. ħ harf					*		**
d. garf			*!	*	*		*
e. ʕarf	*!	*	*	*			*
f. ʁarf		*!	*	*			*
g. arf			*!			*	*

h. karf			*!		*		*
i. arf						*!	**
j. χarf		*!			*		**

Candidate (c) in the above tableau has been successfully distinguished as optimal due to the satisfaction of the \*r constraint which is, on the other hand, subject to the fatal violation by candidate (h) as the most challenging one. The fatal violation of the same constraint yields the elimination of candidates (d) and (g).

To conclude, this subsection is devoted to elaborating on the reason behind the debuccalization of the Arabic /χ/ and /ħ/ to the Turkish /h/ as one of the repair strategies for adapting Arabic gutturals in Turkish. The non-treatment of the [RTR] and the availability of the Pharyngeal Place node as well as the [-voice] laryngeal feature manifest why the aforementioned Arabic gutturals are subject to the debuccalization to /h/ in Turkish. Hence, the debuccalization of /χ/ to the Turkish /h/ is achieved by the delinking of the [Dorsal] feature and circling [RTR] in Turkish where the primary Pharyngeal Place node with its inaccessible [RTR] is preserved. The debuccalization of /ħ/ to the Turkish /h/ is executed by circling [RTR] where the primary Pharyngeal Place node remains. This subsection also discloses the justification for using OT as a framework rather than other phonological approaches and how OT is capable of accounting for the debuccalization of the Arabic /χ/ and /ħ/ to the Turkish /h/. The next subsection is to demonstrate *Uvular Fronting* as another repair strategy for adapting the Arabic uvulars /q/ and /ʁ/ in Turkish in light of OT.

## 5.2. Uvular Fronting

The Arabic voiceless uvular fricative /χ/ is demonstrated in the previous subsection as the uvular that is prone to debuccalization to the Turkish /h/. Conversely, other Arabic uvulars /q/ and /ʁ/ are liable to Uvular Fronting (i.e. changing to velar consonants) when adapting them to Turkish. Consider the following examples:

(13)

<b>I)</b>	<b>Arabic</b>	<b>Turkish</b>	<b>Gloss</b>
a.	/ba <b>qq</b> al/	/bak <b>k</b> al/	'grocer'
b.	/ħu <b>q</b> u:q/	/hu <b>k</b> uk/	'rights'
c.	/ja: <b>q</b> u:t/	/ja <b>k</b> ut/	'ruby'
d.	/ma <b>q</b> a:m/	/ma <b>k</b> am/	'position; office'
e.	/ <b>q</b> alam/	/ka <b>k</b> em/	'pen'
f.	/ <b>q</b> ism/	/ku <b>k</b> sum/	'section'

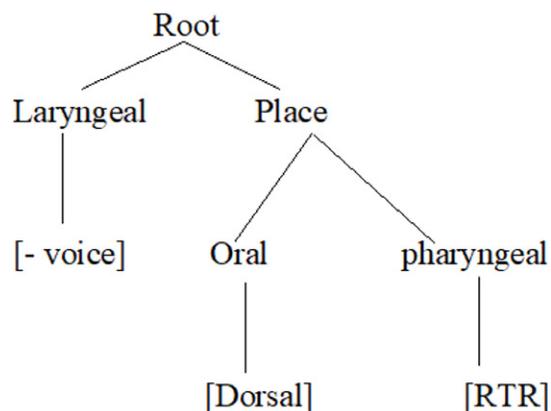
g. /maχlu:q/	/mahluk/	'creature'
h. /rafī:q/	/rafīk/	'companion'
i. /farq/	/fark/	'difference'
j. /muwaffaq/	/muvaffak/	'successful'
k. /rizq/	/ruzk/	'daily bread; food'
l. /ʕirq/	/wīrk/	'race'
m. /sa:biq/	/sabwīk/	'former; previous'
n. /ʔufuq/	/ufuk/	'horizon'

## ii)

a. /ʔifʕa:l/	/ifyal/	'distraction'
b. /mafʕu:l/	/mefyul/	'busy'
c. /ʕamm/	/yam/	'grief; sorrow, worry'
d. /ʕiða:ʔ/	/yū.da/	'nourishment'
e. /ʕuru:r/	/yurur/	'pride'
f. /ʕasʕb/	/yasp/	'law wrongful seizure'

Uvular Fronting is shown in the examples above (13 I, II) as a repair strategy for adapting the Arabic uvulars /q/ and /ʕ/ as the Turkish /k/ and /y/. Accordingly, the question that should be asked in this case is “To what extent are the Arabic uvulars, /q/ and /ʕ/, subject to uvular fronting in Turkish?” To answer the aforementioned question, it is crucial to consider how the adaptation of Arabic uvulars /q/ and /ʕ/ as the Turkish /k/ and /y/ occurs. To begin, the Arabic uvular /q/ is distinguished from other Arabic uvulars /χ, ʕ/ through its representation as shown later on. Following McCarthy (1994), Rose (1996), and Paradis and LaCharité (2001), the representation of /q/ is in (14):

(14) The feature representation of Arabic /q/



The place node in the representation of /q/ in (14) is binary, composing of [Dorsal] node under the Oral Place node and Pharyngeal Place node (with its dependent [RTR]): This is because the Arabic /q/ has a primary dorsal articulation, i.e. including the body of the tongue, in the vocal tract concomitant with some constriction at the pharynx (McCarthy, 1994). Note the division of the Place node in (14) is exclusively confined to the Arabic /q/ in the consonantal phonemic inventory of Arabic which is why the Root node above is not necessarily specified with [-continuant] (Paradis and LaCharité, 2001; Batais, 2013)<sup>11</sup>.

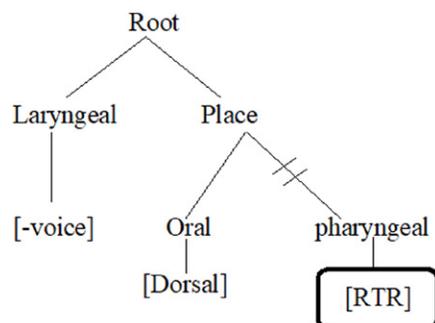
The adaptation of the Arabic /q/ into Turkish /k/ relates to the fact that native Turkish Phonology forbids any branching of the Place node. This adaptation would, therefore, invoke the ‘No Place Node Branching Constraint’ proposed by Batais (2013) with the reference to the adaptation of Arabic uvular and emphatics in Indonesian, as stated below:

(15) *No Place Node Branching Constraint* (Batais, 2013: 246):

“Indonesian's native phonology restricts the occurrences of two nodes, namely Oral and Pharyngeal under the Place node. If the Pharyngeal node has a dependent (inaccessible) [RTR], it is the whole Pharyngeal node plus [RTR] that will be deleted, and the Oral node will remain unchanged (readable). However, if the Pharyngeal node does not have dependent [RTR], the Oral node or Pharyngeal node is optionally delinked provided the sound resulting from either node delinking exists in the native inventory of Indonesian”.

Based on the above constraint, the adaptation of the Arabic uvular /q/ as the Turkish /k/ is accomplished by the detachment of the Pharyngeal node, as the second-place node, with its circled [RTR] whilst the retention of the Oral node with its [Dorsal] feature, as the primary place node. Consider the following representation:

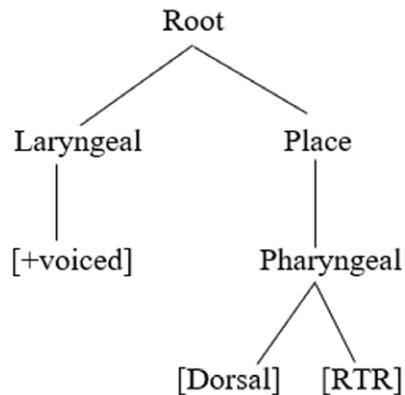
(16) Arabic /q/ → Turkish /k/



11 In the representation of Arabic /q/, Batais (2013: 257-258) states that the Root node of the aforementioned consonant is not obligatorily specified with [-continuant] since its place node is distinguished from other gutturals through the division of the place node into [Dorsal] Oral place node and Pharyngeal Place node (with dependent [RTR]).

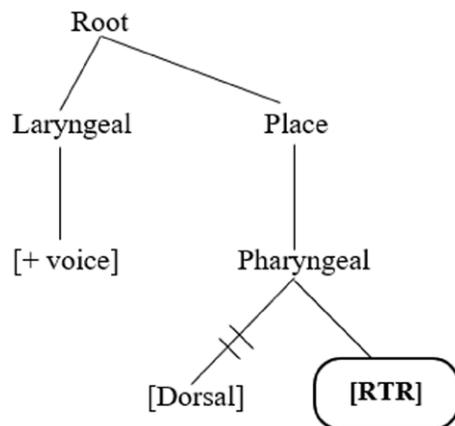
The feature representation of the Arabic uvular /ʁ/ is different from /q/ based on the Laryngeal node feature and the primary place node; hence, the Laryngeal feature is [+voice] and the Pharyngeal node is the primary place node. Following McCarthy (1994), Rose (1996), and Paradis and LaCharité (2001), the feature representation of the Arabic uvular /ʁ/ is shown below:

(17) The feature representation of the Arabic uvular /ʁ/



When it comes to the adaptation of the Arabic /ʁ/ in Turkish, the preservation of the Pharyngeal Place node with its circled [RTR] and the delinking of the [Dorsal] feature would be problematic, resulting in the voiced glottal fricative /ħ/ as a non-existent phonemic inventory in Turkish, as shown in the following representation:<sup>12</sup>

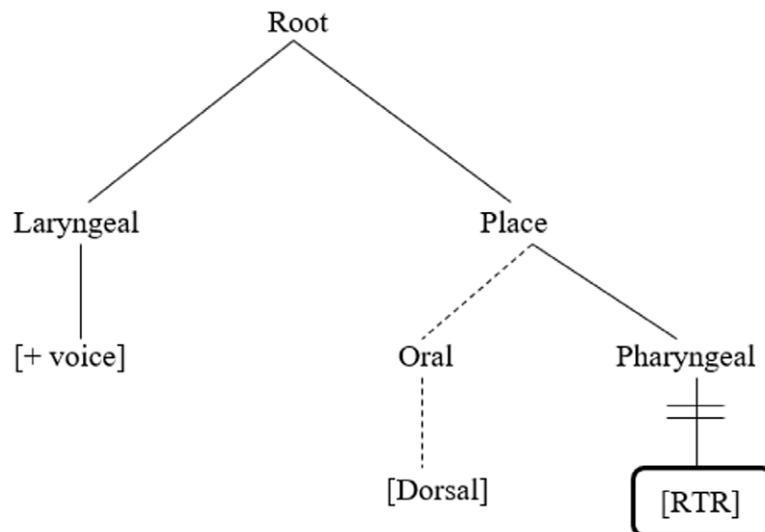
(18) Arabic /ʁ/ → \*/ħ/



12 The above finding is supported by Batais (2013) who states that same phenomenon (i.e. the adaptation of the Arabic /ʁ/ as the Indonesian /g/) in Indonesian where the retention of the Pharyngeal Place node is blocked by the preservation of the [Dorsal] Oral node that is based on the presence of the [+voice] Laryngeal feature in order to avoid yielding the voiced glottal fricative /ħ/ that never exists in the Indonesian Phonemic inventory.

To avoid yielding the voiced glottal fricative, the [Dorsal] feature must be preserved while the Pharyngeal node with its circled [RTR] must be delinked (i.e. adaptation as the voiced velar stop /g/ in Turkish) or the circled [RTR] is delinked (i.e. adaptation as velar fricative /ɣ/). To do so, Archangeli and Pulleyblank's (1994: 23) *Node Generation Convention* is invoked to generate an Oral node that can dominate the [Dorsal] feature. Concerning the two solutions above, the Arabic /ʁ/ is adapted as the Turkish /ɣ/ rather than the Turkish /g/ since /ʁ/ and /ɣ/ share the same voicing and manner features, compared to the voiced velar stop /g/. The Arabic /ʁ/ is mapped onto the Turkish /ɣ/ through major changes such as generating the Oral node that dominates [Dorsal] and delinking the circled [RTR]. These changes result in the interpretation of [Dorsal] feature. It is worth mentioning that the *No Place Node Branching Constraint* is not implemented in the adaptation of the Arabic /ʁ/ (20) since the Pharyngeal Place Node is not delinked. The same behaviour is attested in the adaptation of the voiceless uvular fricative /χ/ as the Indonesian peripheral /x/ in a few Arabic Loanwords in Indonesian (Batais, 2013). That is, the voiceless uvular fricative /χ/ in Arabic loanwords in Indonesian, as reported by Batais (2013) is imported as a 'more fronted' fricative, namely the voiceless velar fricative /x/; hence, mapping of Arabic /χ/ onto the Indonesian peripheral /x/, according to Batais (2013), is executed by major changes including the insertion of an Oral node which dominates [Dorsal] and the deletion of the circled [RTR]. These changes aim to make the [Dorsal] feature dominated by the Oral more interpreted. Consider the following Arabic /ʁ/ → Turkish /ɣ/ representation:

(20) Arabic /ʁ/ → Turkish /ɣ/<sup>13</sup>



13 The [+continuant] feature is not added to this representation since the branching of the place node into the [Dorsal] Oral Place Node and Pharyngeal Place Node distinguishes the voiced velar fricative /ɣ/ from other consonants in Turkish.

To account for the Uvular Fronting of the Arabic uvulars, /q/ and /ʁ/ in Turkish using OT, the following tableaux evaluate the candidates of the inputs /farq/ ‘difference’ and /ʁuru:r/ ‘pride’.

**TABLE 6**

Evaluating the candidates of the input /farq/ ‘difference’

\*[cg], \*[RTR]-C, \*r>>IDENT(voice)>>IDENT(Manner)>>MAX-C>>IDENT

/farq/	*[cg]	*[RTR]-C	*r	IDENT(voice)	IDENT(Manner)	MAX-C	IDENT
a. farq		*!	*				
b. fark			*!				*
c.  fark					*		**
d. farʁ	*!	*	*	*	*		*
e. farh			*!		*		*
f. farħ		*!	*		*		*
g. farχ		*!	*		*		*
h. farʔ	*!		*				*
i. far					*	*!	**
j. far			*!			*	**

The tableau above shows the desired candidate (c) as optimal due to its matching with the constraints that are fatally violated by other candidates such as \*[cg], \*[RTR]-C, \*r, and MAX-C. \*[cg] is fatally violated by candidates (d) and (h). Therefore, they fail to be chosen as optimal. Candidates (a), (f), and (g) fatally violate \*[RTR]-C. Therefore, they cannot be determined as optimal. The trill sound in candidates (b), (e), and (j) incurs that fatal violation of \*r, nonetheless, these candidates avoid the violation of \*[cg] and \*[RTR]-C. Candidate (i) as the most challenging one fails to be optimal due to the fatal violation of MAX-C. The next tableau evaluates the candidates of the input /ʁuru:r/ ‘pride’.

**TABLE 7**

Evaluating the candidates of the input /ɸuru:r/ 'pride'

\*[cg], \*[RTR]-C, \*r&gt;&gt;IDENT(voice)&gt;&gt;IDENT(Manner)&gt;&gt;MAX-C&gt;&gt;IDENT

/ɸuru:r/	*[cg]	*[RTR]-C	*r	IDENT(voice)	IDENT(Manner)	MAX-C	IDENT
a. ɸuru:r		*!	**				
b. ʔuru:r	*!		**	*	*		*
c. ɣurur					**		****
d. gurur					***!		****
e. ɟuru:r	*!	*	**				**
f. huru:r			*!*	*			*
g. urur					**	*!	****
h. ħuru:r		*!	**	*			*
i. kuru:r			*!*	*	*		*
j. χuru:r		*!	**				*
k. ħurur					**		****

The table above fails to identify one of the candidates as optimal since the desired candidate (c) and the wrong candidate (k) equally violate IDENT, nonetheless, both candidates avoid the fatal violation of \*[cg], \*[RTR]-C, \*r, IDENT(Manner) and MAX-C, unlike the rest of candidates. The following OT constraint can be used to eliminate candidate (k):

(21) \*ħ

Assign a violation mark for any voiced glottal fricative.

The above constraint outranks IDENT in the following set of ranking constraints to determine candidate (c) as optimal.

(22)

\*[cg], \*[RTR]-C, \*r&gt;&gt;IDENT(voice)&gt;&gt;IDENT(Manner)&gt;&gt;MAX-C&gt;&gt;\*ħ &gt;&gt;IDENT

The set of OT constraints above is used in the following tableau to evaluate the candidates of the input /ɸuru:r/ 'pride'.

**TABLE 8**

Evaluating the candidates of the input /ʁuru:r/ 'pride'

\*[cg], \*[RTR]-C, \*r&gt;&gt;IDENT(voice)&gt;&gt;IDENT(Manner)&gt;&gt;MAX-C&gt;&gt;\*ħ &gt;&gt;IDENT

/ʁuru:r/	*[cg]	*[RTR]-C	*r	IDENT(voice)	IDENT(Manner)	MAX-C	*ħ	IDENT
a. ʁuru:r		*!	**					
b. ʔuru:r	*!		**	*	*			*
c. ɣurur					**			****
d. gurur					***!			****
e. ʒuru:r	*!	*	**					**
f. huru:r			*!*	*				*
g. urur					**	*!		****
h. ħuru:r		*!	**	*				*
i. kuru:r			*!*	*	*			*
j. χuru:r		*!	**					*
k. ħurur					**		*!	****

The \*ħ constraint successfully determines the desired candidate (c) as optimal since it is violated by the wrong candidate (k).

To summarise, the Uvular Fronting, as a repair strategy, is demonstrated in this subsection as a process that helps to adapt the Arabic uvulars /q/ and /ʁ/ as the Turkish velars /k/ and /ɣ/. Turkish conforms to the *No Place Node Branching Constraint* which can be seen through the adaptation of the Arabic uvular /q/; hence, the feature representation of the Arabic uvular /q/ has two place nodes where the Oral node, as the primary place node, dominates the [Dorsal] articulator while the Pharyngeal node, as a secondary place node, dominates the circled [RTR]. The adaptation of the Arabic uvular /q/ as the Turkish /k/ is achieved by the delinking of the Pharyngeal Place node with its circled [RTR], whereas the Oral Place node with its [Dorsal] feature remains. The adaptation of the Arabic uvular /ʁ/, like the Turkish /ɣ/, aims to avoid the voiced glottal fricative /ħ/ that is unavailable in the *convention*, which, in turn, generates an Oral node, as the primary place node, that can dominate the [Dorsal] feature, whereas the circled [RTR] that is dominated by the Pharyn-

geal Place Node is delinked. This subsection also shows how OT can account for the Uvular Fronting of the Arabic uvulars /q/ and /ʁ/ in Turkish. The next subsection is to elaborate on Guttural Deletion as another repair strategy for adapting Arabic gutturals in Turkish concomitant with an OT analysis.

### 5.3. Guttural deletion

The Arabic Pharyngeal /ʕ/ and the glottal stop /ʔ/ are treated differently in Turkish, compared to other gutturals. They are vulnerable to deletion in Arabic loanwords in Turkish even though the Pharyngeal node is primitive based on the availability of /h/ in the consonantal phonemic inventory of Turkish. Consider the following examples:

(23)

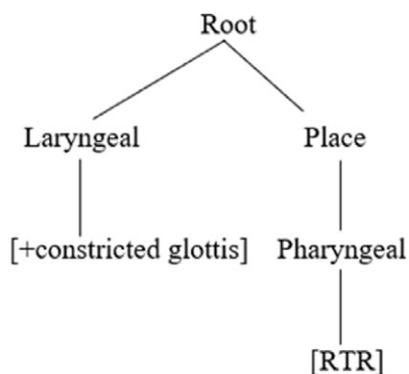
	Arabic	Turkish	Gloss
I)	a. /ʕaða:b/	/azap/	'punishment'
	b. /ʕilm/	/ilim/	'science'
	c. /ʕurf/	/örf/	'custom'
	d. /ʕirq/	/ırk/	'race'
	e. /ʕabaθ/	/abes/	'uselessness'
	f. /muʕtadil/	/mutedil/	'moderate; mild'
	g. /ta:biʕ/	/tabi/	'dependent'
	h. /maʕruʕ/	/meʕru/	'legal'
II)	a. /ʔibtʕa:l/	/ibtal/	'cancellation'
	b. /ʔifʕa:l/	/ifgal/	'distraction'
	c. /ʔufuq/	/ufuk/	'horizon'
	d. /ʔiqtisʕad/	/iktisat/	'economy'
	e. /ʔusʕu:l/	/usul/	'fundamentals'
	f. /ʔardʕ/	/arz/	'earth'
	g. /ʔimdʕa:ʔ/	/imza/	'signature'
	h. /ʔatʕra:f/	/etraf/	'sides'
	i. /ʔibtʕa:l/	/ibtal/	'cancellation'
	j. /ʔin.sa:n/	/in.san/	'human being'
	k. /ʔism/	/isim/	'name'

l. /ʔilza:m/	/elzem/	'most necessary'
m. /taʔli:f/	/telif/	'compromise'
n. /biða:ʔ/	/guda/	'nourishment'
o. /taʔsi:s/	/tesis/	'establishing'
p. /bina:ʔ/	/bina/	'building'

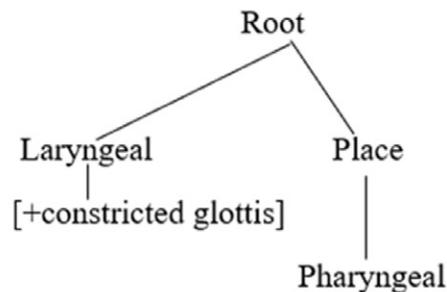
Guttural deletion, as shown in the examples above (23-I, II), targets The Arabic pharyngeal /ʕ/ and the glottal stop /ʔ/, nonetheless, Turkish employs the Pharyngeal node based on the availability of /h/ in its consonantal phonemic inventory, compared to other languages such as French, Italian, and Portuguese (Paradis and LaCharité, 2001). Accordingly, the question that should be taken into consideration is “Why are the voiced pharyngeal fricative /ʕ/ and the glottal stop /ʔ/ targeted by a deletion in Turkish?”<sup>14</sup>. Before answering this question, consider the feature representations of the Arabic Pharyngeal /ʕ/ and the glottal stop /ʔ/ below (Paradis and LaCharité, 2001: 267):

(24)

a. Voiced Pharyngeal fricative /ʕ/



b. Glottal Stop /ʔ/

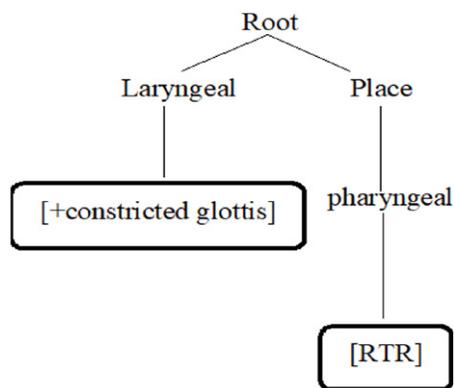


By looking at the feature representations above (24a, b), regardless of the dependent [RTR], both consonants have the Pharyngeal node (i.e. the primary place node) that is also employed in Turkish based on the availability of /h/. However, the non-availability feature such as [+constricted glottis] plays a role in the deletion of the Arabic /ʕ/ and /ʔ/ in Turkish. The same

14 See Algarni (2021) for similar wonder in a different study. In particular, he showed, when discussing the adaptations of Arabic laryngeals and pharyngeals in Amharic and Argobba, that the Non-Availability Hypothesis (proposed by Paradis and LaCharité, 2001: 265) fails to account for the deletions of these segments although the primitives of laryngeals and pharyngeals are employed in Amharic and Argobba.

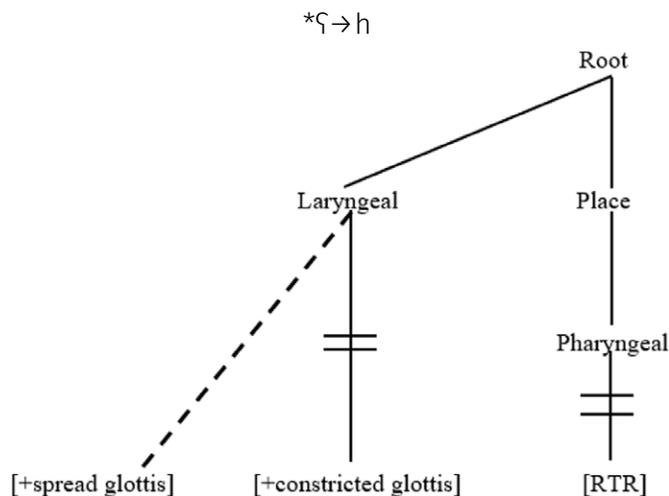
behaviour is reported by Paradis and LaCharité (2001) when accounting for the adaptation of the Arabic pharyngeal fricative in /ʕ/ and glottal stop /ʔ/; hence, both consonants undergo deletion even though the Pharyngeal node is employed in English based on the availability of the voiceless glottal fricative in the consonantal phonemic inventory of English. The same phenomenon is attested in other languages such as the Ethiopian Semitic languages, Amharic, and Argobba (Paradis and LaCharité, 2001). Turning to Turkish, the representation below shows how the Arabic pharyngeal fricative /ʕ/ is adapted in Turkish through deletion:

(25) Arabic /ʕ/ → ∅ in Turkish



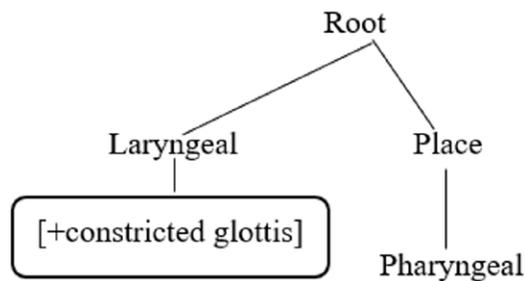
Considering the representation above, the [+constricted glottis], as a non-available primitive feature in Turkish, has been circled as well as the dependent [RTR]. Both features are not delinked, otherwise, this would incur the subsequent insertion of the [+spread glottis] as the default feature for the Turkish /h/. This finding is correspondent with Paradis and LaCharité's (2001) when accounting for the case of adaptation of Arabic /ʕ/ in English as seen in the following representation:

(26) The adaptation of Arabic /ʕ/ as English /h/ (Paradis and LaCharité, 2001: 291):



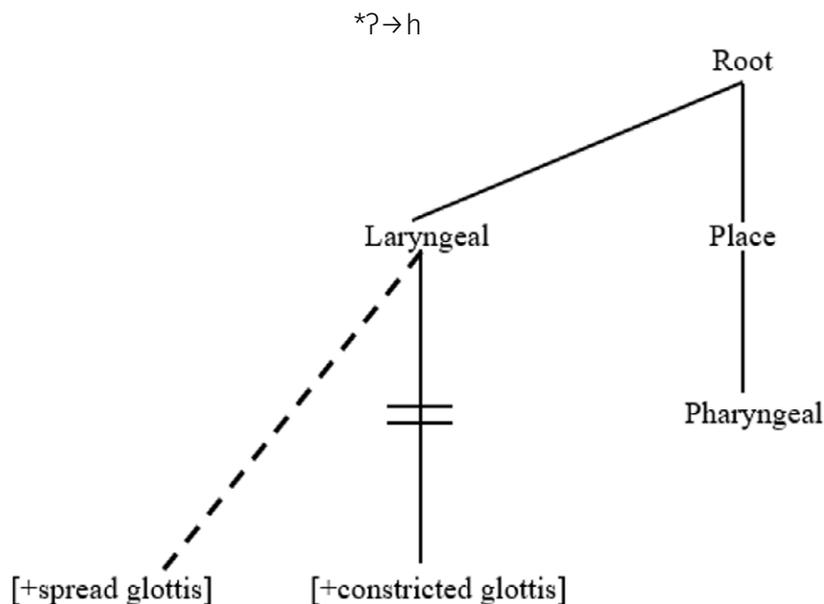
Paradis and LaCharité (2001) report that the representation (26) shows the adaptation of the pharyngeal /ʕ/ as English /h/ is achieved by the delinking of both [+constricted glottis] and [RTR] from the structure, resulting in the subsequent insertion of the [+spread glottis], as a default feature for English /h/. The representation below shows how the Arabic glottal stop /ʔ/ is adapted in Turkish through deletion:

(27) Arabic /ʔ/ → ∅ in Turkish



Based on the representation above (27), the adaptation of the Arabic glottal stop in Turkish through deletion is executed by circling the [+constricted glottis] as a non-available primitive feature in Turkish. Similarly, the delinking of the [+constricted glottis] would yield the insertion of [+spread glottis] as the default feature for the Turkish /h/. This finding concurs with Paradis and LaCharité's (2001) report peculiar to the adaptation of the Arabic glottal stop in English through deletion where the [+constricted glottis] is circled rather than being delinked to avoid the insertion of [+spread glottis] as the default feature for the English /h/. Consider the following representation:

(28) The adaptation of Arabic /ʔ/ as English /h/ Paradis and LaCharité (2001: 291)



To account for the guttural deletion of the Arabic pharyngeal fricative in /ʕ/ and glottal stop /ʔ/ in Turkish using OT, the following tableaux evaluate the candidates of the inputs /ʕurf/ ‘custom’ and /ʔufuq/ ‘horizon’.

**TABLE 9**

Evaluating the candidates of the input /ʕurf/ ‘custom’

\*[cg], \*[RTR]-C, \*r>>IDENT(voice)>>IDENT(Manner)>>MAX-C>>\*ħ >>IDENT

/ʕurf/	*[cg]	*[RTR]-C	*r	IDENT(voice)	IDENT(Manner)	MAX-C	*ħ	IDENT
a. ʕurf	*!	*	*					
b. ʔurf	*!		*	*	*			*
c. örf					*	*		***
d. görf					**!			***
e. ʕörf	*!	*						***
f. ʔörf		*!						***
g. hörf			*!	*				**
h. körf				*!	*			***
i. ħörf		*!		*				***
j. χörf		*!		*				***

Candidate (c) has been distinguished in the tableau above as optimal since it matches with the \*[cg], \*[RTR]-C, \*r, and IDENT(voice). Furthermore, it minimally violates IDENT(Manner) while candidate (d), as the most challenging one, violates the aforementioned constraint twice even though this candidate successfully avoids the violation of \*[cg], \*[RTR]-C, \*r, and IDENT(voice). Candidates (a), (b) and (e) fatally violate\*[cg]. Consequently, they fail to be optimal. \*[RTR]-C is subject to fatal violation by candidates (f), (i), and (j). Candidate (h) is eliminated due to the fatal violation of IDENT(voice). The next tableau evaluates the candidates of the input /ʔufuq/ ‘horizon’.

**TABLE 10**

Evaluating the candidates of the input /ʔufuq/ 'horizon'

\*[cg], \*[RTR]-C, \*r&gt;&gt;IDENT(voice)&gt;&gt;IDENT(Manner)&gt;&gt;MAX-C&gt;&gt;\*ħ &gt;&gt;IDENT

/ʔufuq/	*[cg]	*[RTR]-C	*r	IDENT(voice)	IDENT(Manner)	MAX-C	*ħ	IDENT
a. ʔufuq	*!	*						
b. ʕufuq	*!	*		*	*			*
c. ʔufuk						*		**
d. gufuk				*!				**
e. ʕufuk	*!	*		*	*			**
f. ʁufuk		*!		*	*			**
g. hufuk					*!			**
h. kufuq		*!						*
i. ħufuk		*!			*			**
j. χufuk		*!			*			**
k. ħufuk				*!	*		*	**

Candidates (a), (b), and (e) are not to chosen as optimal due to the fatal violation of \*[cg]. \*[RTR]-C is fatally violated by candidates (f), (h), (i), and (j). Consequently, they fail to be distinguished as optimal. Candidates (d) and (k) are eliminated since they fatally violate IDENT(voice). IDENT(Manner) is prone to fatal violation by candidate (g). Therefore, this candidate is not determined as optimal. Candidate (c) has been identified as optimal since it matches with the above constraints.

Based on the availability of /h/ in the consonantal phonemic inventory of Turkish, the Arabic glottal fricative /h/ is preserved in Turkish but this preservation is restricted to the word-initial position. Consider the following examples:

(29)

Arabic	Turkish	Gloss
a. /hawas/	/heves/	'obsession'

- b. /hajkal/ /heykel/ 'structure'  
 c. /hudhud/ /hüthüt/ 'hoopoe'  
 d. /hawa:ʔ/ /have/ 'air'  
 e. /haru:n/ /harun/ 'Aaron; a proper name'  
 f. /hudzu:m/ /hydzu:m/ 'assault'

To account for the adaptation of the Arabic /h/ in Turkish, the following tableau evaluates the candidates of the input /haru:n/ 'Aaron; a proper name'.

**TABLE 11**

Evaluating the candidates of the input /haru:n/ 'Aaron; a proper name'

\*[cg], \*[RTR]-C, \*r >> IDENT(voice) >> IDENT(Manner) >> MAX-C >> \*h >> IDENT

/haru:n/	*[cg]	*[RTR]-C	*r	IDENT(voice)	IDENT(Manner)	MAX-C	*h	IDENT
a. ʔaru:n	*!		*		*			*
b. ɣaru:n	*!	*	*	*				*
c.  harun					*			***
d. garu:n			*!	*	*			*
e. arun					*	*!		**
f. ɸaru:n		*!	*	*				*
g. ɦaru:n			*!	*			*	*
h. karu:n			*!		*			*
i. ħaru:n		*!	*					*
j. χaru:n		*!	*					*
k. haru:n			*!					

Candidate (c) has been identified in the tableau above as optimal since it avoids the fatal violation of \*[cg], \*[RTR]-C, \*r, and MAX-C, unlike other candidates. \*[cg] is fatally violated by candidates (a) and (b). Therefore, both candidates are eliminated. \*[RTR]-C is liable to

fatal violation by candidates (f), (i), and (j). The trill consonant in candidates (d), (g), (h), and (k) incurs the fatal violation of \*r. Consonant deletion in candidate (e) leads to the fatal violation of MAX-C.

Mielke (2002), Göksel and Kerslake (2005), and Al-Hashmi (2016) posit that compensatory lengthening in Turkish targets /h/, /ʁ/, /ʕ/, and /ʔ/ in Arabic loanwords in intervocalic position and codas.<sup>15</sup> Consider the following examples:

(30)

<b>I)</b>	<b>Arabic</b>	<b>Turkish</b>	<b>Gloss</b>
	a. /mu <b>h</b> endis/	/muandis/	'engineer'
	b. /timsa <b>h</b> /	/timsa:/	'crocodile'
<b>II)</b>	a. /tabli <b>ʁ</b> /	/tebli:/	'notification'
	b. /ma <b>ʁ</b> lu:b/	/ma:lup/	'defeated'
	c. /ma <b>ʁ</b> a:ra/	/maara/	'cave'
<b>III)</b>	a. /mu <b>ʕ</b> amalah/	/mua.me.le/	'treatment'
	b. /ji <b>ʕ</b> r/	/ji:r/	'poetry'
	c. /ħa <b>ʔ</b> in/	/hain/	'traitor'

To conclude, guttural deletion in this subsection is demonstrated as a repair strategy used to adapt both the Arabic pharyngeal /ʕ/ and the glottal stop /ʔ/ even though the pharyngeal node in the feature representations of both consonants is also employed in Turkish based on the availability of the voiceless glottal fricative. The deletion of the Arabic /ʕ/ and the glottal stop /ʔ/ in Turkish is attributed to the non-availability of the dependent [+constricted glottis]. The adaptation of the voiced pharyngeal fricative is achieved by circling the [+constricted glottis] and [+RTR] rather than being delinked to block the insertion of [+spread glottis] as the default feature for the Turkish /h/. Similarly, the adaptation of the Arabic glottal stop in Turkish is through the circling of the [+constricted glottis] rather than delinking for the same reason. The Arabic /h/ remains unchanged in Turkish in the word-initial position while it undergoes deletion intervocalically and word-finally along with /ʁ/, /ʕ/, and /ʔ/, resulting in vowel lengthening. The entire section shows how OT is capable of accounting for the repair strategies for adapting Arabic gutturals in Turkish including Debuccalization, Uvular Fronting, and Guttural Deletion.

15 Compensatory lengthening is out of the scope of this study.

## 6. Conclusion

This study has investigated the repair strategies for adapting Arabic gutturals such as Debuccalization, Uvular Fronting, and Guttural Deletion in light of OT as a framework. The non-treatment of the [RTR] (i.e. circled [RTR]) plus the availability of the Pharyngeal node and the [-voice] Laryngeal feature in Turkish (i.e. based on the availability of /h/ in Turkish) lead to the debuccalization of the Arabic /χ/ and /ħ/ to the Turkish /h/. The Uvular Fronting of the Arabic /q/ is motivated by the avoidance of the binary place node in the feature representation of the Arabic /q/ (i.e. conformity to the *No Place Node Branching Constraint*). The Uvular fronting of the Arabic /ʁ/ is motivated by the avoidance of the voiced glottal fricative /ɦ/ that is not in the consonantal phonemic inventory of Turkish. The non-availability of the [+constricted glottis] (i.e. the circled [+constricted glottis]) Laryngeal feature in Turkish explains why the Arabic Pharyngeal /ʕ/ and the glottal stop /ʔ/ undergo deletion in Turkish. The Arabic /h/ is adapted as the Turkish /h/ in the word-initial position. OT is shown in the current study as a phonological approach that is competent to account for the adaptation of Arabic gutturals in Turkish through Debuccalization, Uvular Fronting, and Guttural Deletion.

This study has viewed some cases of the deletion of Arabic gutturals /ʁ, ʕ, ʔ, h/ intervocally and word-finally in Turkish due to the compensatory lengthening rule. This view would acknowledge the need for specific research related to using compensatory lengthening to adapt the gutturals above into Turkish.

## 7. References

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