

# Diphthongization in Five Iranian Balochi Dialects

Farideh Okati, University of Zabol and Uppsala University

farideh.okati@uoaz.ac.ir

Pétur Helgason, Uppsala University

petur.helgason@lingfil.uu.se

Carina Jahani, Uppsala University

carina.jahani@lingfil.uu.se

## Abstract

This paper deals with the phenomenon of diphthongization, *e* > *ie* and *o* > *ue*, in different varieties of Iranian Balochi dialects spoken in the five regions of Sistan, Saravan, Khash, Iranshahr and Chabahar in the southeast corner of Iran. The study reveals that diphthongized production of these vowels is predominant in the Khash dialect, suggesting that they should be represented as the diphthongs *ie* and *ue* in the vowel inventory of this dialect. In the Iranshahr and Chabahar dialects, which show the second and third highest degrees of diphthongization among the dialects under study, the data indicate a diphthongization tendency rather than a shift to predominantly diphthongized productions. Sistan and Saravan show only sporadic tendencies toward diphthongization. Balochi, in general, has eight vowels *i*, *iː*, *u*, *uː*, *a*, *aː*, *e*, *o*: (also called the Common Balochi vowel system), as well as the speech sounds *ay* and *aw*, which are referred to as diphthongs by some scholars and are believed to be sequences of V+C by others. The occurrence of diphthongization in the dialects under study seems to be system-internal rather than due to external influence. Factors such as age, education, or language contact with surrounding languages such as Persian, do not appear to contribute to the occurrence of diphthongized vowel production.

*Keywords:* Balochi, Iranian Balochi dialects, vowels, diphthongization, Persian

## 1. Introduction

The Balochi language is mainly spoken in southwestern Pakistan, southern Afghanistan, and southeastern Iran. This language is considered a Northwestern Iranian language, and is most closely related to “Kurdish, Tati, Talyshi and other Northwestern Iranian languages” (Jahani 2003: 114). Jahani and Korn (2009: 636) divide Balochi into the three major dialects of Western, Southern, and Eastern Balochi, among which there are diverse varieties. The Balochi varieties spoken in Iran belong to Western and Southern Balochi.

Factors such as geographical distribution, contact with surrounding languages such as Persian, Pashto, Urdu, Panjabi, and Sindhi, as well as borrowings from these languages account for the existence of many dialect variants of Balochi. For the Iranian Balochi dialects, Mahmoodzahi (2003: 148) points out that “Balochi and Persian must have been to at least a certain degree in constant contact with each other for centuries.” The existence of a younger generation who receive education (in the dominant language) further increases dialect divergences.

This study investigates the status of diphthongization of *e*: to *ie* and *o*: to *ue* in the Iranian Balochi dialects spoken in five selected locations, Sistan (SI), Khash (KH), Saravan<sup>1</sup> (SA), Iranshahr (IR), and Chabahar (CH) in Sistan and Baluchestan<sup>2</sup> prov-

<sup>1</sup> Spelled *Sarawan* in some sources.

<sup>2</sup> This is the official English spelling used in Iran; also spelled *Sistan va Baluchestan*.

ince in the southeast of Iran.<sup>3</sup> The language data were gathered in the form of free speech and verbal elicitation from more than 20 literate and non-literate male and female language consultants. In most cases, the sentences and words were elicited from the consultants by asking them to translate the Persian sentences or words into Balochi and repeat them four times (in Balochi). The set of targeted words contained the vowels /e:/ and /o:/, which tend to be diphthongized in all or some of the dialects under investigation.

The elicited data for this study were in the form of unscripted speech. The age of the consultants ranged from 25 to 82, though the majority of them were in the age range 40 to 70. For each dialect, 2 males and 2 females were used for the spectral (i.e. formant) measurements of vowels. The data were recorded in a lossless audio format using a handheld, digital recording device with built-in microphones. The data were labeled using WaveSurfer (Sjölander and Beskow 2000) and the labeling was used as the basis for automatic extraction of spectral and durational information. For the formant analysis, the program Praat<sup>4</sup> was used. Numerical analysis and graphing were done using MS Excel as well as the statistical program Minitab.

Since not all the Balochi dialects in Iran can be described using the same vowel inventory, Jahani and Korn (2009: 642) present two different inventories for the vowel systems in these dialects. Thus, some dialects show a system with the monophthongs *a, a:, e, e:, i:, u:, o, o:*, as well as the vowel + glide sequences *ey* and *ow*, while other dialects show a system with the monophthongs *a, a:, e, i:, u:, o*, the diphthongs *ie* and *ue*, as well as the vowel + glide sequences *ey* and *ow*.<sup>5</sup> There is no mention of the distribution of these two systems across Balochi dialects spoken in Iran.

The following table presents a sample of words used for the diphthongization analysis.

/e:/ >	[ie]	/o:/ >	[oe]
ke:p >	kɪɛp 'bag'	bo: >	boe 'smell'
se:b >	sɪɛb 'apple'	go:š >	goeš 'ear'
re:k >	rɪɛk 'sand'	do:g >	doeg 'buttermilk'
je:b >	ɟɪɛb 'pocket'	go:k >	goek 'cow'
de:r >	dɪɛr 'late'	do:st >	doest 'like'
de:m >	dɪɛm 'face'	go:št >	goešt 'meat'
sre:n >	sɪɛn 'waist'	čo:ne >	čoene 'how are you'
če:ra: >	čɪɛra: 'under'	bšo:d >	bšoeđ 'wash!'
be:ga: >	bɪɛga: 'afternoon'	lo:ti:n >	loeti:n 'I want'
ge:štir >	gɪɛštɪr 'more'	na:ko: >	na:koe 'uncle'
gre:tun >	grɪɛtun 'I cried'	o:šta:t >	ošta:t 'he/she stood'
be:ho:š >	bɪɛhoeš 'forget'	balo:č >	baloeč 'Baloch'
ne:mro:č >	nɪɛmroeč 'noon'	do:či:n >	doeči:n 'I sew'

**Table 1.** Examples of words with diphthongization

<sup>3</sup> The data for this study were gathered by Farideh Okati and the phonetic analysis was carried out by Farideh Okati and Pétur Helgason. All three authors contributed to the final editing of the text.

<sup>4</sup> <http://www.fon.hum.uva.nl/praat/>

<sup>5</sup> Based on the text in Jahani and Korn (2009: 642). Table 11: 3 in Jahani and Korn (*ibid.*) gives *u* instead of *o*, which according to personal communication with Jahani is a *lapsus calami*.

## 2. Previous studies

Previous studies on the Balochi language mention the existence of different speech sounds in the vowel systems of the Balochi dialects, which are referred to as diphthongs by some scholars, while others regard them as sequences of V+C (glide) in view of the existing syllable patterns (Jahani and Korn 2009: 641). For example, *ai* and *au* are reported in Eastern Balochi by Dames (1891) and in Eastern and Western Balochi by Grierson (1921); *ay* and *aw* in the Rakhshani dialect by Barker and Mengal (1969) and in Balochi in general by Elfenbein (1989); *ay*, *ey*, and *aw* in the Saravani dialect by Spooner (1967) and by Baranzehi (2003); *ai*, *ao*, and *ei* in Karachi Balochi by Farrell (1990); and *ey*, *ow*, *ie*, *ue* in Balochi dialects in Iran by Jahani and Korn (2009).

Dames (1891: 6) divides his vowel list into “Short”, “Long”, and “Diphthongs” and displays “e, ai, o, au” under the name of diphthongs; he does not explain why he categorizes *e* and *o* under this group. Grierson (1921: 336) presents the *ai* and *au* in the vowel list and does not refer to them separately as diphthongs or sequences of sounds. Gilbertson (1923: 2–3) refers to *au* and *ai* as “diphthongs” and explains that they sound like “‘ou’ in the English word ‘house’” and “‘ai’ in the word ‘aisle’” respectively. Barker and Mengal (1969: xlv) refer to *ay* and *aw* as sequences of a vowel and an off-glide; they emphasize that “[t]hese sequences must be carefully distinguished, since Baluchi has some rather similar vowel clusters: e.g. /əi/, /æe/, /əo/.” Elfenbein (1989: 352) also divides the Balochi vowels into “short”, “long”, and “diphthongs” and places the *ay* and *aw* under the diphthongs division. Farrell (1990: 11) lists *æe*, *əo*, *ao*, *ei*, *ai* in a phonemic representation (in / /), under the name of diphthongs, but he does not include them in the vowel chart he presents later on the following page. Jahani and Korn (2009: 642) categorize *ie* and *ue* under the diphthongs for Iranian Balochi, but they believe that *ey* and *ow* are sequences of a vowel plus a glide (V+C).

## 3. Diphthongs in neighbouring languages

There are different views about the diphthongs in Persian, which belongs to the Southwestern group of Iranian languages and is the language most in contact with the Balochi dialects spoken in Iran. Samareh (1368) posits six diphthongs for the Persian language varieties spoken in Iran, but points out that they are only diphthongs from a phonetic point of view and can also be described as sequences of V+C. Ganjavi *et al.* (2003) believe there are no diphthongs in Iranian Persian, while Yaesoubi (2010) holds that it has two diphthongs, *ej* and *ow*, although he does not mention if these diphthongs have phonemic or phonetic status. Hakimi (2012: 9) finds that the “digraphs or diphthongs” in Iranian Persian, *ay*, *ey*, *uy*, *oy*, *ay*, and *ow*, are combined sequences of a vowel plus a consonant from a phonemic viewpoint. Hakimi (*ibid.*) also points out that Tajiki has “four diphthongs”, *ay*, *aw*, *uy*, and *o:y*, which have the same phonemic status (V+C) as those in Iranian Persian.

Hatami (2011), studying Ruini, a dialect of Khorasani Persian, uses the term diphthongs to refer to *aw*, *ao*, *oe* in this dialect, but declares that the second components in these diphthongs are not vowels at all, but are semivowels and change to /v/ and /

y/ before vowels (e.g. *ǰelaw* > *ǰe.la.ve*). Diphthongs are also reported for other languages in Iran; e.g. the diphthongs /*aw*, *ew*, *ow*, *øw*, *əw*, *ey*/ are reported for Laki spoken in Kermanshah, by Mirdehghan and Moradkhani (2010). Apparently, these so-called diphthongs are sequences of V+C in this dialect, because Mirdehghan and Moradkhani (*ibid.*: 515) point out that “an extra semi-vowel /w/ is observed in the dialect comparatively to Persian”.<sup>6</sup> Aldaghi and Tavakoli (2011) mention eight diphthongs, as they call them, *ay*, *ey*, *oy*, *uy*, *iy*, *ay*, *aw*, *ow*, e.g. in *tow* ‘fever’ and *kawsh* ‘shoes’, for the Sabzevari dialect, a Persian dialect spoken in Khorasan in Iran, and Ebrahimi (2012) indicates *ey*, *oy*, *a:y*, *ow* for Bayzai dialect, a Persian dialect spoken in Fars in Iran. Although Ebrahimi (*ibid.*) refers to these sounds as diphthongs, he describes them as sequences of a vowel plus the semi-vowels *w* and *j*.

Urdu, which belongs to the Indo-Aryan branch of the Indo-Iranian family, is one of the languages in contact with the Balochi dialects. Hussain *et al.* (2011) point out that, unlike English, Urdu lacks diphthongs, but sometimes English diphthongs such as *ai*, which have entered Urdu through loanwords, are not modified and therefore are preserved as diphthongs in this language.

#### 4. Diphthongization analysis

The diphthongs *ie* and *ue*, derived from the long vowels *e:* and *o:*, are observed in the five Iranian Balochi dialects investigated in this study. The data analysis shows that the diphthongization is not present to the same extent in all five dialects. It is the predominant production type in the Khash dialect, but is less prominent in Iranshahr and even weaker in Chababar. No consistent diphthongization is seen in Sistan and Saravan. Only a few cases, with a low degree of diphthongization, are found in the speech of one consultant from the town of Gosht, close to the border of Khash region, where diphthongization is predominant and a very weak trace of diphthongization is also observed in the speech of one speaker of the SI dialect. These very small tendencies toward diphthongization in SA and SI can, of course, be a starting point from which this phenomenon will grow in these dialects in the future.

The following spectrograms show examples of the diphthongization of *o:* to *ue* in the word *go:k* ‘cow’ (Figures 1–5, female speakers) and *e:* to *ie* in the word *se:b* ‘apple’ (Figures 6–10, male speakers), in the different dialects. For *go:k* ‘cow’, in Figures 1 through 5, the rise in the frequency of F2, the second line from the bottom (the green line) in the spectrograms indicates the degree of diphthongization of *o:* to *ue* in the different dialects under study. A back high vowel [o] should have a low F1 and a low F2 throughout its production. A rise in F2 indicates that the vowel becomes fronted (and possibly unrounded). The greater the rise, the greater the diphthongization tendency in the *o:*.

<sup>6</sup> [w] is also observed as allophone of /v/ in Sistani Persian spoken in the Sistan region in the southeast of Iran (Okati, *The phonology of the Iranian Sistani dialect*, forthcoming).

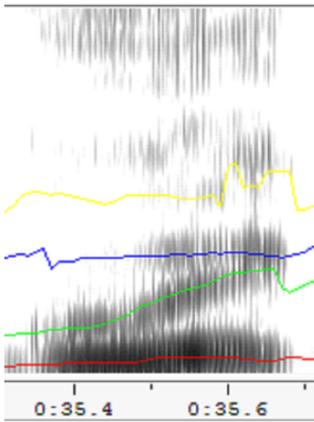


Figure 1. go:k 'cow'- KH

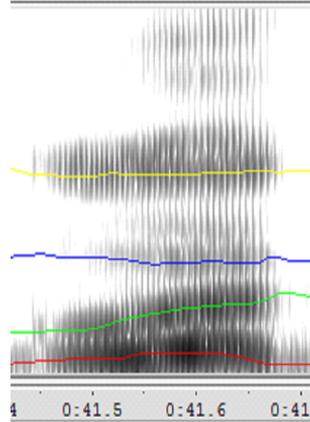


Figure 2. go:k 'cow'- IR

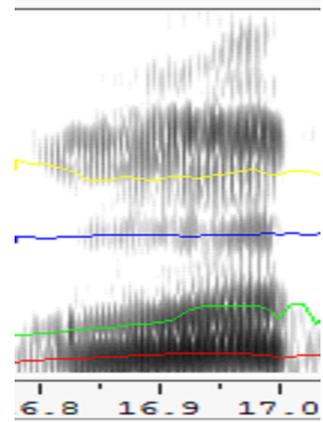


Figure 3. go:k 'cow'- CH

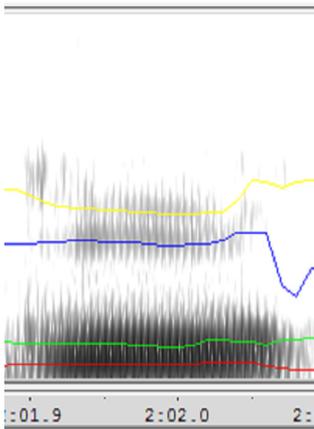


Figure 4. go:k 'cow'- SA

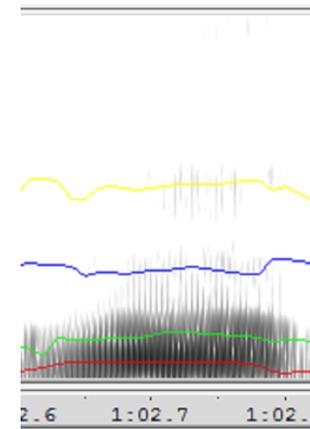


Figure 5. go:k 'cow'- SI

For *se:b* 'apple', in Figures 6 through 10, the fall in the frequency of F2 indicates the degree of diphthongization for *e:* to *ie:*; a front high vowel [e] should have a high F2 throughout its production. A fall in the frequency of F2 indicates that the vowel becomes lower and possibly more centralized. The sharper the fall, the greater the diphthongization tendency in the *e:*.

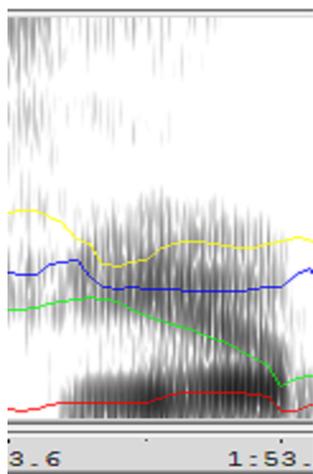


Figure 6. se:b 'apple'- KH

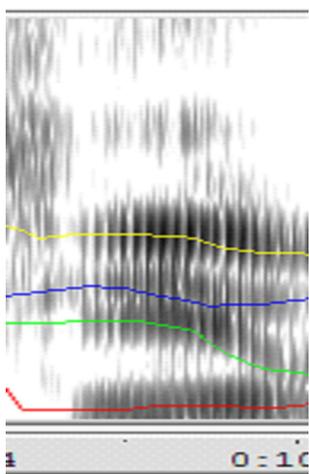


Figure 7. se:b 'apple'- IR

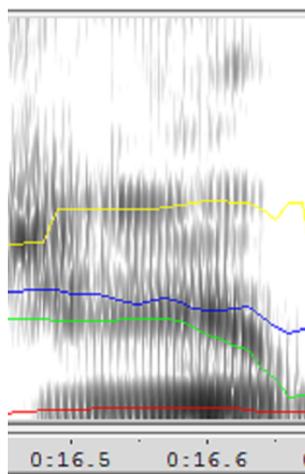


Figure 8. se:b 'apple'- CH

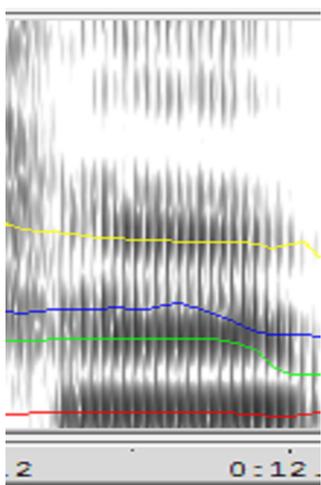


Figure 9. se:b 'apple'- SA

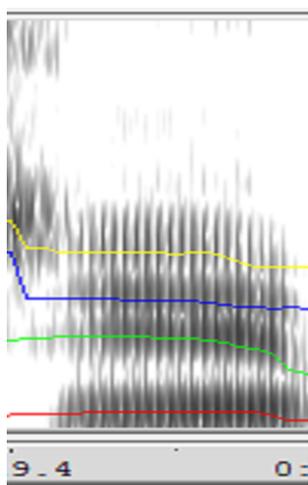


Figure 10. se:b 'apple'- SI

In order to compare the degree of diphthongization of /o:/ and /e:/ in the different dialects, the changes in the frequency of the second vowel formant (F2) during the production of the vowel can be estimated. For a diphthongized /o:/, F2 rises, and the degree of diphthongization is directly correlated with the degree of rise in the formant. Conversely, when /e:/ is diphthongized, F2 sinks, and the degree of diphthongization is correlated with the degree of lowering. Therefore, formant frequency measurements are made at three different time points in the vowel. The first time point is determined by multiplying the total vowel duration by 0.1, yielding a time point 10% into the vowel duration, i.e. near the onset of the vowel. This measure-

ment is henceforth referred to as the *initial* formant measurement, or *ini* for short. The second time point is determined by multiplying the total vowel duration by 0.5, yielding a time point 50% into the vowel duration, i.e. at the centre of the vowel. This measurement is henceforth referred to as the *medial* measurement, or *mid* for short. Lastly, the third time point is determined by multiplying the total vowel duration by 0.9, yielding a time point 90% into the vowel duration, i.e. near the end of the vowel. This measurement is henceforth referred to as the *final* measurement, or *fin* for short.

To be able to use the measured changes in F2 at these three time points to make comparisons across dialects and speakers, two obstacles have to be overcome. First, for cross-dialect comparisons, the variability in phonetic contexts does not allow the pooling of formant measurements for a specific dialect. This is because the various places of articulation of consonants before and after the vowel affect the formant trajectories in differing ways, which may obscure the F2 differences. Pooling formant measurement values obtained near vowel onset and offset from different words would therefore not give representative results. Instead, the approach adopted here is to select specific words for which several tokens for each dialect have been obtained and to compare the degree of diphthongization in the target vowel in these words in the different dialects. The second obstacle is that the speakers have vocal tracts of different sizes, which results in differences in formant frequencies: long vocal tracts yield lower formant frequencies than shorter ones. This means that the frequency measurements should be normalized for vocal tract size.

For the present comparison of the degree of diphthongization, normalization is achieved by estimating the relative deviation of the initial and final F2 measurements from the medial measurement. First, the initial F2 measurement is divided by the medial measurement, which yields a quotient that indicates how much the formant has changed from vowel onset to the middle of the vowel. This quotient will be referred to here as the initial  $F2_Q$ . Then the final F2 measurement is divided by the medial measurement, which yields a quotient that indicates how much the formant has changed from the middle of the vowel to the end of the vowel. This quotient will be referred to as the final  $F2_Q$ . The medial measurement divided by itself always yields the value 1, which therefore can serve as a baseline for F2 comparisons across speakers and dialects. This constant value will be referred to as the baseline value.

Let us illustrate this using a hypothetical example. Suppose that, for a specific word and one speaker, the initial, medial, and final F2 measurements for a token of /o:/ yield the values 1500 Hz, 2000 Hz, and 2500 Hz respectively. By dividing the initial value by the medial value (1500/2000) we get an  $F2_Q$  of 0.75. Thus we have effectively obtained a measure of the relative deviation between the initial and the medial measurements; the initial F2 value is 75% of the medial one. By dividing the final value by the medial value (2500/2000) we get an  $F2_Q$  of 1.25; the final F2 value is 125% of the medial one. Measuring the deviation of the start and end point values from the medial value for every vowel token for a word allows us to compare all tokens of a particular word in a way that is effectively normalized for vocal tract length. Suppose now that, for an /o:/ vowel token from the same word as the previous example, but for another speaker, we have obtained the values 1200 Hz, 1600

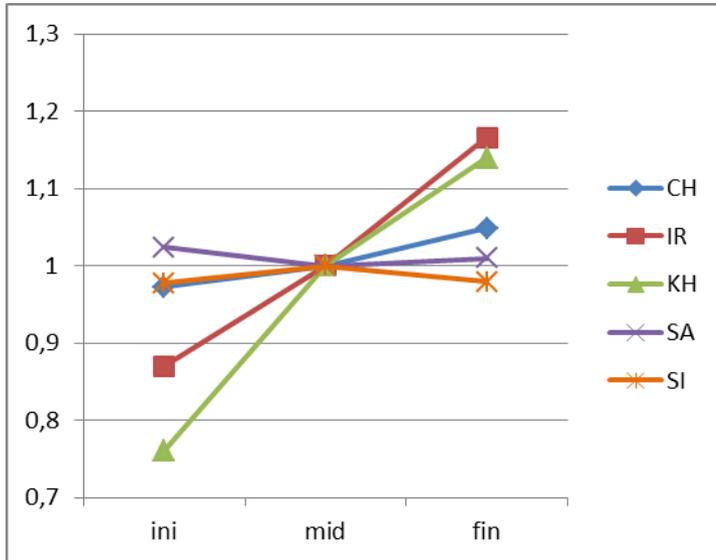
Hz, and 2000 Hz. These values may at first seem very different from the first set of values but, in fact, the initial  $F2_Q$  is 0.75 and the final  $F2_Q$  is 1.25, just as in the first example. Thus we have established that these two hypothetical vowels are very similar in terms of how F2 changes in the vowel during its production. Lastly, we can plot a trajectory for the relative formant changes in the vowel from the initial  $F2_Q$  to the final  $F2_Q$ . For the medial measurement, a quotient value is obtained by dividing the medial formant frequency by itself. This, of course, always yields 1, a constant that serves as the baseline for comparison across speakers and dialects.

Several words, such as *go:k* ‘cow’, *go:š* ‘ear’, *balo:č* ‘Baloch’, *se:b* ‘apple’, *be:ga:* ‘afternoon’, and *če:ra:* ‘under’, have been used to compare the degree of diphthongization of /o:/ and /e:/ in the five dialects under study. Among these, the words *go:k* ‘cow’ and *se:b* ‘apple’ have been chosen to be presented here as examples. The graphs in Figures 11 and 12 show the degree of diphthongization in these words in the different dialects. The graphs show the initial  $F2_Q$  (ini), the baseline for the vowel (mid, which is always 1), and final  $F2_Q$  (fin). The related tables following each figure show the  $F2_Q$  for the initial and final F2 measurements in the vowel, as well as the difference between the initial and final  $F2_Q$  values.

Figure 11 compares the degree of diphthongization of /o:/ in the word *go:k* ‘cow’ in different dialects. If *go:k* is produced with little or no diphthongization, one would expect the initial and final  $F2_Q$  values to be similar without much deviation from the medial (baseline) value, since the preceding and following velar stops are highly compatible with the production of a back, high vowel. However, if the /o:/ in *go:k* is diphthongized and produced as [œ], one can expect a sharp rise from the initial  $F2_Q$  to the final  $F2_Q$ ; i.e. F2 increases considerably. Table 2 gives the initial and final quotients (rows 1 and 3) and the baseline (row 2). In addition, Table 2 shows the difference between the initial and final  $F2_Q$  values (bottom row), which can be used as a rough indicator of degree of diphthongization – the greater the increase from initial to final  $F2_Q$ , the more diphthongization there is in the /o:/ vowel.

In Figure 11, the initial and final  $F2_Q$  values in both SA and SI are similar and do not deviate much from the baseline, which means that these dialects have no tendency toward diphthongization in *go:k*. CH appears to have similar  $F2_Q$  values as SA and SI, but it should be noted that the initial value is below the baseline and the fin value is above the baseline, which indicates a greater rise in F2 from the start to the end of the vowel than was found for SA and SI. In terms of the difference between the initial and final  $F2_Q$ , the KH and IR dialects have by far the greatest degree of diphthongization in *go:k*, with a difference in initial and final  $F2_Q$  of 0.38 and 0.30 respectively. CH shows a slight tendency toward diphthongization (0.08), but SA and SI do not show any such tendency at all (–0.01 and 0.00 respectively).

In the diphthongization of /e:/, the movement of the tongue is primarily from a front mid-high position to a more back and slightly lower position. Acoustically, this movement means that F2 is lowered. Thus, for /e:/ one can compare the degree of diphthongization in the different dialects by calculating the initial and final  $F2_Q$  to obtain a normalized estimate of how much F2 is lowered. Figure 12 and Table 3 compare the degree of diphthongization of the word *se:b* ‘apple’ in the five dialects. If the vowel is produced as a monophthongal [e] vowel, neither the coronal /s/ pre-



**Figure 11.** Comparison of the degree of diphthongization of the vowel /o:/ in go:k ‘cow’ in different dialects. The y-axis shows a normalized F2 deviation quotient (F2<sub>Q</sub>) calculated at three time points in the vowel: an initial F2<sub>Q</sub> value (ini) is obtained by measuring the F2 frequency near the onset of the vowel and dividing it by the F2 measurement made at the centre of the vowel; a final F2<sub>Q</sub> value (fin) is calculated by measuring F2 near the end of the vowel and dividing it by the F2 measurement at the centre. The mid value is a baseline value obtained by dividing the measurement at the centre of the vowel by itself, which always yields the value 1. Further explanation in text.

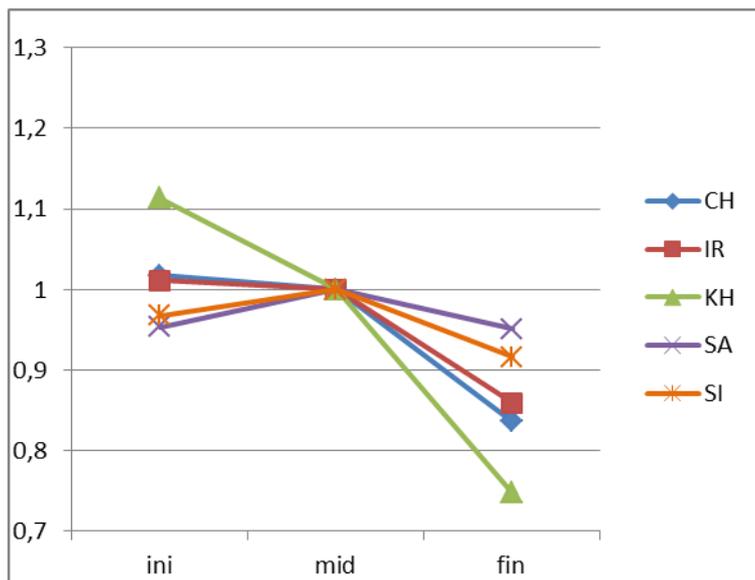
Dialect	CH	IR	KH	SA	SI
<b>F2</b>					
F2 <sub>Q</sub> -ini	0.972253	0.869918	0.76121	1.023486	0.977694
Baseline	1	1	1	1	1
F2 <sub>Q</sub> -fin	1.048096	1.165517	1.139368	1.009649	0.979231
F2 <sub>Q</sub> -ini – F2 <sub>Q</sub> -fin	0,08	0,30	0,38	-0,01	0,00

**Table 2.** The normalized F2 deviation quotient (F2<sub>Q</sub>) for the word go:k ‘cow’ in different dialects. Row one shows the initial F2<sub>Q</sub>, row two shows the baseline, and row three shows the final F2<sub>Q</sub>. The bottom row shows the difference between the initial and final F2<sub>Q</sub>.

ceding the vowel nor the bilabial /b/ following it should affect the F2<sub>Q</sub> values to any great extent; i.e. the initial and final F2<sub>Q</sub> values should be similar. However, if the vowel is diphthongized and produced as [ɪɛ], one would expect to see a sharp fall from the initial F2<sub>Q</sub> to the final F2<sub>Q</sub>.

A similar pattern as for /o:/ emerges for /e:/ in se:b. Figure 12 shows that in KH, IR, and CH there is a fall in F2<sub>Q</sub>, whereas for SI there is only a slight decrease and in SA the initial and final F2<sub>Q</sub> values are almost equal. Table 3 shows that the difference between the initial and final F2<sub>Q</sub> in KH is –0.37, indicating a far greater degree

of diphthongization than in CH and IR, for which the differences are  $-0.18$  and  $-0.15$  respectively. For SI the difference is  $-0.05$  and for SA it is  $0.00$ , which indicates that these dialects have little or no tendency toward diphthongization.



**Figure 12.** Comparison of the degree of diphthongization of *se:b* ‘apple’ in different dialects. Further explanation in text as well as in the caption to Figure 11.

Dialect	CH	IR	KH	SA	SI
<b>F2</b>					
F2 <sub>Q</sub> -ini	1,017641	1,011199	1,113282	0,953745	0,967414
Baseline	1	1	1	1	1
F2 <sub>Q</sub> -fin	0,836703	0,85938	0,747476	0,951256	0,916288
F2 <sub>Q</sub> -ini – F2 <sub>Q</sub> -fin	-0,18	-0,15	-0,37	0,00	-0,05

**Table 3.** F2<sub>Q</sub> values for the word *se:b* ‘apple’ in different dialects; initial F2<sub>Q</sub> is given in row one, the baseline in row two, final F2<sub>Q</sub> in row three, and the difference between initial and final F2<sub>Q</sub> in the bottom row.

## 5. Discussion and conclusions

The data show that the speakers in these five dialects have varying tendencies toward diphthongization, with some of the speakers displaying diphthongization more strongly in their speech than others. Generic factors such as speech rate and idiolect cause some of the variability in the degree of diphthongization, but overall, the primary source of this variability in diphthongization is greater tendency of the speakers of the KH dialect to produced diphthongized variants.

The speakers of IR, which has the second highest rate of diphthongization among the dialects investigated, do not show the same degree of diphthongization in their speech as do the KH speakers. This means that there are eligible words which are not always pronounced with a diphthong by the speakers of this dialect. It seems that the females use the diphthongs more markedly in their utterances than the males, but still diphthongization is seen in the speech of all speakers in the IR dialect. The speakers of the CH dialect show diphthongization to a less extent than the speakers of KH and IR, and diphthongization does not appear in all eligible words. The female speakers show more diphthongization than the males, yet they do not utter all target words with a diphthong. Finally, in the SA and SI dialects, there is no strong evidence of a diphthongization process in the speech of any of the speakers investigated.

It was observed that in the word-final position, regardless of the environment, the degree of diphthongization of /o:/ is weaker and it is less salient in impressionistic analysis, e.g. in *bo*: ‘smell’ as *bue*, *na:ko*: ‘uncle’ as *na:kue*. In addition, it seems that in retroflex contexts, the degree of diphthongization of /o:/ is lesser than in the other contexts, e.g. before the retroflex /r/ in the word *na:jo:r* ‘ill’. However, the data show no apparent restriction on the diphthongization of /e:/ in different contexts.

Factors such as age, gender, and education do not seem to correlate with the diphthongization in the Balochi dialects spoken in Iran. Because various diphthongs have been reported for different Balochi dialects in general, and because there are no diphthongs in the systems of the surrounding languages and dialects, the appearance of diphthongs in the Iranian Balochi dialects can be attributed to an inherent tendency. A similar process of monophthongization, the opposite of diphthongization, has been taking place in Standard Persian which is the dominant surrounding language of these dialects. In this process *ow* shifts to *o*:.<sup>7</sup>

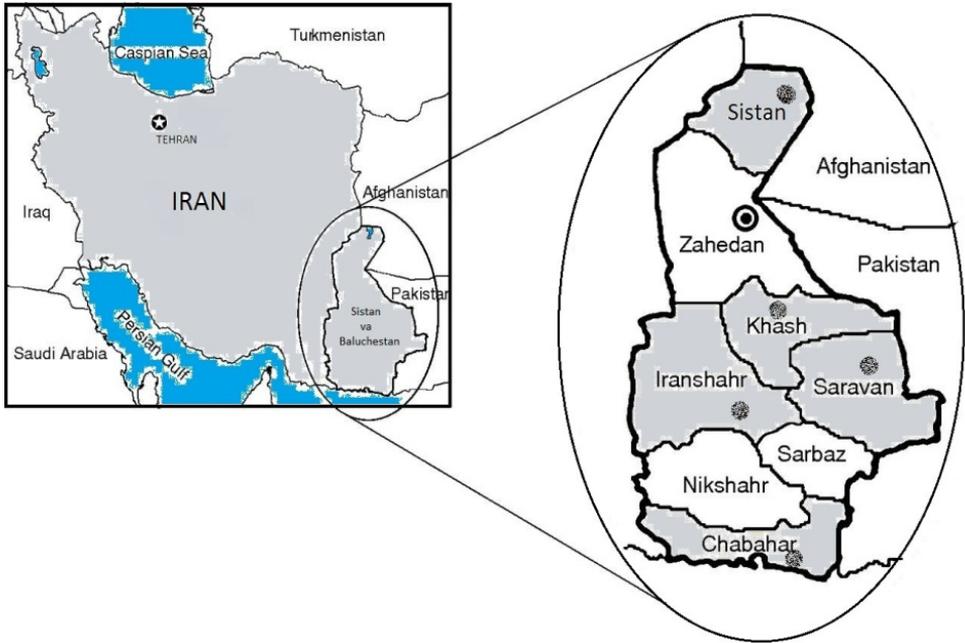
To conclude, diphthongization is a predominant feature in the production of the Common Balochi *e*: and *o*: in the Khash dialect, and is observed to occur to a lesser degree in the Iranshahr dialect and only occasionally in the Chabahar dialect. Diphthongization is practically absent in the Sistan and Saravan dialects, as only in a few cases was a weak tendency toward diphthongization observed. The available evidence shows that neither factors such as age, sex, or education, nor the influence of Persian, the surrounding dominant language with no diphthongs in its inventory, can account for the diphthongization in the Balochi dialects spoken in Iran. Instead, this phenomenon seems to be a system-internal development constituting a vowel change in the KH dialect, and, possibly, the start of a process of vowel change in the IR and CH dialects.

Seeing phonemic representation as an abstract representation of relations in the vowel system, the traditional phonemic representation of the Common Balochi *e*: and *o*: as /e:/ and /o:/ can be used for descriptive purposes in the dialects discussed here, although for the KH dialect, it seems more straightforward to describe these vowels phonemically as the diphthongs /ie/ and /ue/.

<sup>7</sup> An example of this process is *xosrow* pronounced as *xosro*: ‘Khosro’; of course the form *ow* is still used in poetry, and also exists in some Persian dialects.

## References

- Aldaghi, Anita, and Tavakoli, Nastaran (2011). "Major Phonetic Processes in Sabzevari Dialect." *Theory and Practice in Language Studies* 1(3), pp. 292–301.
- Baranzehi, Adam Nader (2003). "The Sarawani Dialect of Balochi and Persian Influence on It." In: Jahani, Carina, and Korn, Agnes (eds), *The Baloch and Their Neighbours: Ethnic and Linguistic Contact in Balochistan in Historical and Modern Times*. Wiesbaden: Reichert, pp. 75–111.
- Barker, Muhammad Abd-al-Rahman, and Mengal, Aqil Khan (1969). *A Course in Baluchi*, I. Montreal: McGill University.
- Dames, M. Longworth (1891). *A Text Book of the Balochi Language: Consisting of Miscellaneous Stories, Legends, Poems, and a Balochi-English Vocabulary*. Lahore: Punjab Government Press.
- Ebrahimi, Ghorbanali (2012). "Investigating the Linguistics Features of Bayza Dialect." *Journal of Language Teaching and Research* 3(3), pp. 369–378.
- Elfenbein, Josef (1989). "Balochi." In: Schmitt, Rüdiger (ed.), *Compendium Linguarum Iranicarum*. Wiesbaden: Reichert, pp. 350–362.
- Farrell, Tim (1990). *Basic Balochi, An Introductory Course* [Baluchistan Monograph Series, 1]. Naples: Istituto Universitario Orientale.
- Ganjavi, Shadi, Georgiou, Panayiotis G., and Narayanan, Shrikanth (2003). "ASCII Based Transcription Systems for Languages with the Arabic Script: The Case of Persian." In: *Proceeding of Automatic Speech Recognition and Understanding (ASRU) 2003*, pp. 595–600.
- Gilbertson, George Waters (1923). *The Balochi Language. A Grammar and Manual*. Hertford.
- Grierson, George A. (1921). "Balōchī." In: Grierson, George A. (ed.), *Linguistic Survey of India (LSI) X*, pp. 327–451.
- Hakimi, Abdolazim (2012). "Comparative Phonetic Study of Frequently Used Words in Iranian Farsi versus Tajik Farsi." *Journal of American Science* 8(4), pp. 6–16.
- Hatami, Mohammad-Hasan (2011). "Phonetic Processes in Ruini Dialect." *Journal of American Science* 7(8), pp. 679–682.
- Hussain, Qandeel, Mahmood, Rashid, and Mahmood, Muhammad Asim (2011). "Vowel Substitution: A Comparative Study of English Loans in Punjabi and Urdu." *International Journal of Linguistics* 3(1), pp. 1–13.
- Jahani, Carina (2003). "The Case System in Iranian Balochi in a Contact Linguistic Perspective." In: Jahani, Carina, and Korn, Agnes (eds), *The Baloch and Their Neighbours: Ethnic and Linguistic Contact in Balochistan in Historical and Modern Times*. Wiesbaden: Reichert Verlag, pp. 113–132.
- Jahani, Carina, and Korn, Agnes (2009). "Balochi." In: Windfuhr, Gernot (ed.), *The Iranian Languages*. London and New York: Routledge, pp. 634–692.
- Mahmoodzahi, Moosa (2003). "Linguistic Contact in Iranian Balochistan in Historical and Modern Times." In: Jahani, Carina and Korn, Agnes (eds), *The Baloch and Their Neighbours: Ethnic and Linguistic Contact in Balochistan in Historical and Modern Times*. Wiesbaden: Reichert, pp. 147–156.
- Mirdehghan, Mahinnaz, and Moradkhani, Simin (2010). "Personal Pronouns in the Kakavandi Laki Dialect of Harsin (Kermanshah, Iran)." *Iranian Studies* 43(4), pp. 513–531.
- Samare, Yadollah (Samare, Yadollāh) (1368 [1989–90]). *Āvāšenāsi-ye zabān-e fārsi, āvāhā va sāxt-e āvāyi-ye hejā*, Tehran: Markaz-e Našr-e Dānešgāhi.
- Sjolander, K., and Beskow, J. (2000). "WaveSurfer – an Open Source Speech Tool." In: Yuan, B., Huang, T., and Tang, X. (eds), *Proceedings of ICSLP 2000, 6th International Conference on Spoken Language Processing*. Beijing, pp. 464–467.
- Spooner, Brian (1967). "Note on the Balochī Spoken in Persian Baluchistan." *Iran, Journal of the British Institute of Persian Studies* 5, pp. 51–71.
- Yaesoubi, Maziar (2010). *Machine Transcription Conversion between Perso-Arabic and Romanized Writing Systems*. Master thesis, Linköpings University. Online at: <http://liu.diva-portal.org/smash/record.jsf?pid=diva2:360341> [Retrieved November 10, 2012].



**Map 1.** Map of Iran with Sistan and Baluchestan province enlarged