The phonetic status of Arabic within the world's languages: the uniqueness of the *luˇAt Al-dˇAAd*

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1. Introduction

Arabic belongs to the Afro-Asiatic group of languages (formerly known as Hamito-Semitic), most of which are spoken in Africa, and which comprises four main branches: Semitic, Berber, Chadic (e.g. Hausa), Cushitic (e.g. Somali), and Ancient Egyptian (and its modern descendant, Coptic, which has survived as a liturgical language). Traditionally (e.g. S. Moscati 1964), Arabic (sometimes called North Arabic to distinguish it from South Arabian, usually known as Epigraphic South Arabian - the language of ancient south-west Arabian city-states) has been put in the south-western branch of the Semitic group of languages, which also includes Amharic (the main language of Ethiopia), with the north-western group being made up of the Canaanite dialects (e.g. Hebrew), Aramaic (the language spoken in Palestine at the time of Christ but which has survived in a few villages in the Fertile Crescent) and the latter's eastern sister Syriac (spoken in Iraq and Iran).[1]

Arabic is currently the sixth most widely spoken language in the world, with approx. 186 million native speakers, cutting across a wide geographical area from North Africa to the Middle East. It is the official language in some seventeen countries,[2] whereas there are substantial Arabic-speaking communities in many countries. In addition, it is also the liturgical language for about one billion Muslims worldwide.

Based on lexical, syntactic and phonological differences, the varieties of Arabic are commonly classified as Classical Arabic (more precisely, its modern descendant), Eastern Arabic (within which the two most prestigious varieties are those of Greater Syria and Cairene), Western Arabic, and Maltese. There are considerable differences between and within groups, resulting in many often mutually unintelligible varieties. The normative variety of the language, i.e. the modern variant of Classical Arabic (the language of the Quran), is usually referred to as Modern Standard Arabic (MSA) as well as Modern Literary Arabic, both of which correspond to the German Neuarabisch (also modern Hocharabisch, Hocharabisch der Gegenwart, Neuhoch-Arabisch), the French

[1] Also see De Lacy O'Leary 1923; M. Ruhlen 1987.
[2] These are: Morocco, Algeria, Tunisia, Libya, Egypt, Sudan, Saudi Arabia, Yemen, Oman, Bahrain, Qatar, the United Arab Emirates, Kuwait, Jordan, Syria, Lebanon, Iraq.

Néo-Arabe, arabe néo-classique, arabe littéraire or arabe moderne, and the Spanish árabe estándar moderno.

In Arabic, the 'distance' or 'gap'between the normative (written) and vernacular (spoken) varieties is such that it is a prototype of diglossia (or even triglossia, tetraglossia) a phenomenon which has been well documented (W. Marçais 1930 ; C. Ferguson 1959a/b ; P. Wexler 1971 ; S. Altoma 1969 ; K. Walters 1996 ; A. Kaye 1970, 1972, 2001; S. El-Hassen 1978 ; M. Ennaji 2002 ; G. Meiseles 1980 ; B. Hary 1996 ; M. Zughoul 1980 ; M. Eid 1988 ; H. Palva 1982 ; M. Ibrahim 1986). In Arabic, as in other languages affected by *diglossia*, the written and spoken varieties are at either pole of a continuum of styles, which to a large extent operate in complementary distribution ; the written (normative) variety is exclusively used in formal contexts, whereas the spoken (vernacular) forms are limited to informal settings. Naturally, all languages are subject to a certain degree of diglossia in that there are always differences between the standard and colloquial varieties. However, in the case of Arabic (and languages like it), the differences between the two are such that individuals must formally acquire the normative variety in order to gain access to newspapers, most radio- and television broadcasts, literary works (both modern and classical), etc. When Arabic-speakers of different linguistic backgrounds meet, they have recourse either to 'pure' MSA or to a variant of it which has been called inter-Arabic (W. Bishai 1966) or Educated Spoken Arabic (ESA) (S. El-Hassen 1978; T. Mitchell 1978, 1980, 1982, 1986,1990-3; G. Meiseles 1980), a 'middle' Arabic, with selected borrowing from regional vernaculars. At the same time, it must be stated that along the various levels of the continuum there are influences from other styles, with vernacular borrowings being found in the highest register, and classical borrowings occurring in the lowest register.

As far back as the Middle Ages, Arabic philologists, starting with the Persian-born Sibawayh (8th century), the author of the very first Arabic grammar - which was also one of the earliest Arabic books – highlighted the uniqueness of Arabic. These scholars were also consummate phoneticians as revealed by their highly meticulous descriptions of Arabic sounds. It was the pharyngealized sounds, which today still are most associated with Arabic, which led them to the claim that Arabic was unique. Traditionally, it has been called the *lu"At Al-dˁAad* [3] ('the language of *dˁAAd*) - the name of the letter representing the voiced pharyngealized dento-alveolar plosive.[4] Our aim, here, is to find out just how unique the Arabic phonemic inventory is within the world's languages.

[3] In line with common practice, the Arabic long vowels appear in this paper as geminates.
[4] See A. Roman 1983: I, 167-70.

The phonemes discussed in this paper are those of Classical Arabic (CA) as realized in the highest register in Modern Standard Arabic (MSA).

2. Phonetic Framework and Reference Materials

For the purposes of this paper, the phonetic framework is that of the IPA as used within the UCLA Phonological Segment Inventory Database – commonly known as UPSID – and reported by Maddieson (1984). As a result, the rather ambitious 'the world's languages' should be taken to mean the 317 languages presented by Maddieson. For each language, UPSID provides a phonological inventory of phonemically contrastive segments, classified according to (combinations of) 58 phonetic features.

The present author concurs wholeheartedly with Verhoeven's criticism regarding the representativeness of UPSID[5], with the inclusion of only one language of each small grouping within a family precluding various potentially insightful lines of inquiry. In addition, the choice of language variety is also of some importance ; for instance, the UPSID data for Arabic are not those of CA/MSA, but of the Egyptian Arabic dialect, whose phonemic inventory reveals a number of discrepancies. Nevertheless, it is still the only instrument available for any cross-language comparative phonemic research.

3. The Sounds of Arabic

3.1. Overview

Classical Arabic contains 30 *phonetically distinct* consonant segments, whose manners and places of articulation may be represented in table 1. This brings the total of sound segments at 36 – 30 consonants and 6 vowels.The smallest number of contrastive sounds within UPSID's sample is eleven (Rotokas and Mura), with the'largest' language, !Xu boasting 141. Arabic is to be situated within the average range of 20 and 37 segments established in UPSID, though in practice languages would seem to tend towards 20 to 27 sounds (Maddieson 1994). The number of consonants is well *above* the mean of 22.8, whereas the number of *distinctive vowel qualities* is well *below* that of the mean (8.7). The discrepancy widens even further if we add the 24 geminates (i.e. lengthened variants), which have a separate entry within UPSID, but not in the traditional IPA framework.[6] This would bring the total number of consonant segments to 53 (2.3 times the mean).

[5] See 'The sound system of Dutch in a general phonetic perspective' in the present volume.

[6] This number excludes the contrast between [l$^{\text{ˤ}}$] and [l$^{\text{ˤ͡ʷ}}$] as in Classical Arabic only the long reflex of the pharyngealized lateral segment occurs (*vide infra*).

Table 1: The Arabic consonant inventory

	Bilabial	Labio-dental	Dental	Dento-alveolar	Post-alveolar	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosive	b		t d				k	q		/
Nasal	m			n						
Trill				r						
Tap				R						
Fricative		f	T D	s z	S			X "	□ ÷	h
Approximant						j	w			
Lateral				l						

Pharyngealized consonants : $t^{\div}$ $d^{\div}$ $s^{\div}$ $D^{\div}$ $l^{\div}$

Affricate : dZ

As far as the vowels are concerned, the traditional picture is the following :

Table 2 : The vowels of Arabic[7]

	Front	**Central**	**Back**
Close	i i˘		u u˘
Open		a a˘	

3.2. Plosives (stops)

Arabic is one of only thirty-five languages within UPSID (11%) to have stop phonemes in five different places of articulation (the most common number being three, found in 53.9% of the sample). It has two series of stops, a voiceless series at four places of articulation ([t],[k],[q],[?]) and one plain voiced series with two places of articulation ([b],[d]). The presence of [d] and [b] but the absence of the voiced counterpart of [k], i.e. [g], is significant as this is only true for 21 languages (6.6%) in the UPSID sample.

[7] The vowel inventory of colloquial Arabic varieties differs considerably and for most, the following (contrastive) vowel phonemes would have to be added: [e˘] (front mid), [A] (back open), [o˘] (back mid/half-close). For Egyptian, for instance, see Gairdner 1925; N. Tomiche 1964; W. Cowan 1970.

It is also worth pointing out that the absence of [p] in Arabic is consistent with Berber, Shilha and Tuareg and the Cushitic Somali[8], but it makes it the odd one out among Semitic sister tongues.

The voiced plosives are fully voiced and unaspirated, whereas the voiceless ones are aspirated, with the exception of [q], which is never aspirated. Next to the high front vowels, i.e. short/long [i], [k] is palatalized. The voiced bilabial [b] is often devoiced next to voiceless sounds. The uvular plosive [q] is undoubtedly the least stable sound inasmuch as in many local varieties of Arabic it is realized either as a voiced velar plosive [g] (e.g. Upper Egypt, parts of Libya and Tunisia) or as a glottal stop ([/]) , as is the case in the Syro-Lebanese and Cairene prestige dialects. Still in terms of place of articulation, one should remark on the relative rarity of [q], recorded in only 38 languagess (11.9%) in UPSID.

However, the singular status of Arabic stops emerges most clearly through the presence of the long (geminate) stop segments, which are quite rare within the sample : [bˇ] (5 languages, i.e. 1.5%, which includes Shilha where it was borrowed from Arabic), [tˇ] (2 languages, i.e. 0.6%), [dˇ] (3 languages, i.e. 0.9%), [kˇ] (9 languages, i.e. 2.8%), [qˇ] (only in Arabic), [/ˇ] (only in Arabic).

Equally rare are the pharyngealized stops ([t5$^{\div}$] and [d5$^{\div}$]) which are used only in Arabic and Tuareg (in which it was borrowed from Arabic), whereas the long counterparts ([t5$^{\div}$˜] and [d5$^{\div}$˜]) are peculiar to Arabic. In this respect, one should add that Shilha has dental-alveolar [t5$^{\div}$] and [d5$^{\div}$], as well as a pharyngealized voiceless velar [k$^{\div}$].

3.3. Nasals

Of the 47 different nasal phonemes in the UPSID sample, 88.4% are plain voiced sounds. This is also true for the Arabic nasals, whose number (2) falls well within the average range, as this is found in 31.9% of the languges in UPSID. Similarly, its nasals are produced in the two most frequent places of articulation, i.e. dental/alveolar (33.68%) and labial (32.73%). One should hasten to add that the Arabic [n] is predominantly dental ([n5]).

3.4. Trills

[8] It must be added that these three languages have undergone considerable influence from Arabic as a result of geographical proximity.

Within the UPSID sample, 88.95% of languages contain at least one r-sound, with the majority (57.7%) having only one ; 97.5% of them are voiced and 86.4% are produced in the dental/alveolar region, with the alveolar r-sounds being more numerous than any other category (44.6%). Within the r-category, the trills are by far the most common as they are found in 134 languages (47.5%). As a result, the status of the Arabic voiced alveolar trill [r] (sometimes realized as a dental [r5], though) may be said to be well within the norm. However, it is usually realized as [rˇ], which sound only occurs in three languages in the UPSID sample (Arabic, Shilha, Somali). Within the database, 44.9% of r-sounds reported are taps/flaps (within which category they account for 36.9%), the majority of which are alveolar, just as the Arabic (voiced) [R] It should be pointed out, however, that the status of the latter sound is subject to debate, as some researchers report a short trill ([r]) instead.[9]

3.5. Fricatives

Nearly all the world's languages contain at least one fricative sound. The UPSID data base contains 118 contrastive fricative phonemes, with the total number of fricatives in any given language ranging between 0 and 23, the average being a mere two (19.6% of languages). With its eleven segments, Arabic exceeds the norm more than five times, with only 5 languages (1.6%) in UPSID sharing this feature. The most frequently found fricatives are s-sounds (83% of languages), followed by the voiceless palato-alveolar sibilant [S] (46%). Arabic has four pairs of fricatives in a voicing contrast, whereas the three 'stand-alone' fricatives are voiceless, which confirms Maddieson's observation that if there is only one fricative in a given place of articulation it tends to be voiceless.

Most of the languages included in UPSID have fricatives in the anterior region (i.e. palato-alveolar onwards). Arabic occupies a rather exceptional position in that nearly half of its fricative inventory is situated far back in the uvular, pharyngeal and glottal areas.

The voiced and voiceless dental fricatives [T] and [D], which are usually realized in Arabic vernaculars as, respectively, [t]-[s] and [z]-[d], are relatively rare within the UPSID sample, with only 18 languages (5.6%) having[T]and 21 (6.6%)[D]. The longer variants, [Tˇ] and [Dˇ] are unique to Arabic.[10]

The voiceless uvular fricative [X] (which is sometimes realized as a velar [x] occurs in only 27 languages (8.5%) within the database (interestingly enough from nearly every

[9] e.g. al-Ani 1970; but also see T. Mitchell 1990-3: I, 46ff.

[10] Maddieson's (1984: 227-8) claim that [T] and [D] are rare in Arabic is, of course, due to the fact that he presents the phonological inventory of the Egyptian dialect, in which it is not used – except, that is in formal MSA or in the High Classical style of Quran reading. This may also explain why Maddieson does not include [Tˇ] and [Dˇ] in his chart of the Arabic inventory.

continent), whereas the lengthened variety [Xˇ] is limited to only three (Arabic, the Eskimo-Aleut Greenlandic, and the Caucasian Lak). Its voiced counterpart [“] is even rarer and is reported in only 14 languages (4.38%), while the long sound [“ˇ]is peculiar to Arabic.

The pharyngeal set is equally interesting with the voiceless [□]occurring in only 13 languages (4.1%), its longer variant in only 2 (Arabic and Shilha). The voiced pharyngeal fricative [÷]is limited to eight languages (2.5%) – five of them Afro-Asiatic – whereas [÷ˇ] is unique to Arabic. One should hasten to add, however, that this sound is subject to some controversy. Although most researchers (J. Eslin 1996 ; A. Laufer 1981 ; T. Mitchell 1990-3 ; Gairdner 1925 ; Delattre 1971) agree that this is a fricative, others (al-Ani 1970 ; Kästner 1981) identify it as a voiceless stop, or pharyngealized glottal stop (Thelwall & Sa’adeddin 1990), whereas physiological investigation suggested that it is an approximant (A. Laufer 1996) or voiced ‘frequentative’ trill (M. Ghali 1983). Our own research would seem to suggest that in the High Classical style of Quran recitation, the sound is realized as a *fricative*, whereas in formal MSA it tends to be a *stop*, depending on the linguistic background of the speaker.

More than 60% of the languages in UPSID are reported to have a voiced glottal fricative [h]; however, the long variant [hˇ] is found only in Arabic and in the Algonkian Delaware (!).[11]

Finally, Arabic also contains a number of pharyngealized fricatives, i.e. [s$^{\div}$] and [D$^{\div}$], both of which are unique to Arabic, as are the long counterparts [s$^{\div\check{}}$] and [D$^{\div\check{}}$]. In unclassical pronunciation, [D$^{\div}$]-[D$^{\div\check{}}$] are realized as [z$^{\div}$]-[z$^{\div\check{}}$] in a number of varieties, most notably in Egyptian and Syrian colloquials.

3.6. Affricates

Whereas 141 UPSID languages (44.4%) have a voiceless palato-alveolar affricate [tS], only 80 (25.2%) have the voiced counterpart [dZ]. Maddieson also reports that although the places of articulation for affricates can go up to 6 (25 languages), the most frequent number is three, whereas the palato-alveolar position is by far the most popular.

It must be observed that [dZ] is realized in a number of different manners across the varieties of Arabic, most notably as a palatal affricate, as /g/ (e.g. Lower Egypt, Morocco) or [Z], which is also the usual reflex in MSA (q.v. T. Mitchell 1990-3 : I, 51, II, 18-20 ; A. Kaye 1972 ; Gairdner 1925 : 23-4 ; Kästner 1981: 64-5 ; al-Ani 1970 : 32).

3.7. Approximants

[11] On the status of the sound, also see Laufer 1991.

The Arabic voiced palatal approximant [j] and voiced labial-velar approximant [w] are found in most languages of the world, and occur in, respectively, 86.1% and 75.5% of languages of UPSID. Again, it is, however, the longer counterparts which merit attention, with [j□] and [w˘] being reported in only very few languages besides Arabic: the Turkic Chuvash ([j˘], [w˘]) and Delaware ([w˘]).

3.8. Laterals

The Arabic voiced dento-alveolar /l/ is an approximant, i.e. the air is allowed to flow relatively freely through the vocal tract without giving rise to audible friction. About 75% of the languages in UPSID have plain voiced laterals, whereas the dental-alveolar region is the most common place of articulation (86.5%). The long [l˘] is quite rare and besides Arabic is only reported for four other languages – the already-mentioned Chuvash, Shilha and Delaware, added with Wolof (a member of the West Atlantic sub-group within the Niger-Kordofanian family). Even rarer is the pharyngealized reflex [l$^{\dot{+}}$] , which, as stated above, is only realized in the High Classical style as [l$^{\dot{+}\breve{}}$] in the Arabic word for 'God' – [/al$^{/\breve{}}$aah] -, though [l$^{\dot{+}}$] is found as an allophone of [l] in the vicinity of pharyngeal consonants through a process of assimilation.[12]

3.9. The Vowels

As mentioned before, the Arabic vowel inventory is well below the mean within the UPSID languages in terms of vowel *quality*, with a mere 5.4% of languages having only three vowel qualities (the largest group counting 15), which is also the smallest number recorded. Unsurprisingly, the three vowel qualities are also the three most common, with [i, u, a] being found in, respectively, 91%, 83.9% and 88% of languages in the data base.

The vowel-consonant ratio (the number of vowels divided by the number of consonants) is also quite uncommon, and goes against the prevailing orthodoxy that most languages reveal an 'association between overall inventory size and consonant/vowel balance' (Maddieson 1984 : 9). For Arabic, this number (again entering the different vowel qualities into the equation) is 0.1, as opposed to the UPSID median ratio of 0.36. Though this is unusual within the UPSID database, it is, however, entirely consistent with the situation in other Semitic tongues.

All Arabic vowels are oral and fully voiced. The MSA vowel inventory does not contain any diphthongs. Figure 1 summarizes the results of acoustic measurements of the vowels of Standard Arabic in isolation and figure 2 for the vowels in connected speech.

[12] Also see, e.g. Ferguson 1956; Petrácek 1952.

Figure 1 : Scatterplot of formant values (F1-F2) for the six Standard Arabic vowels[13]

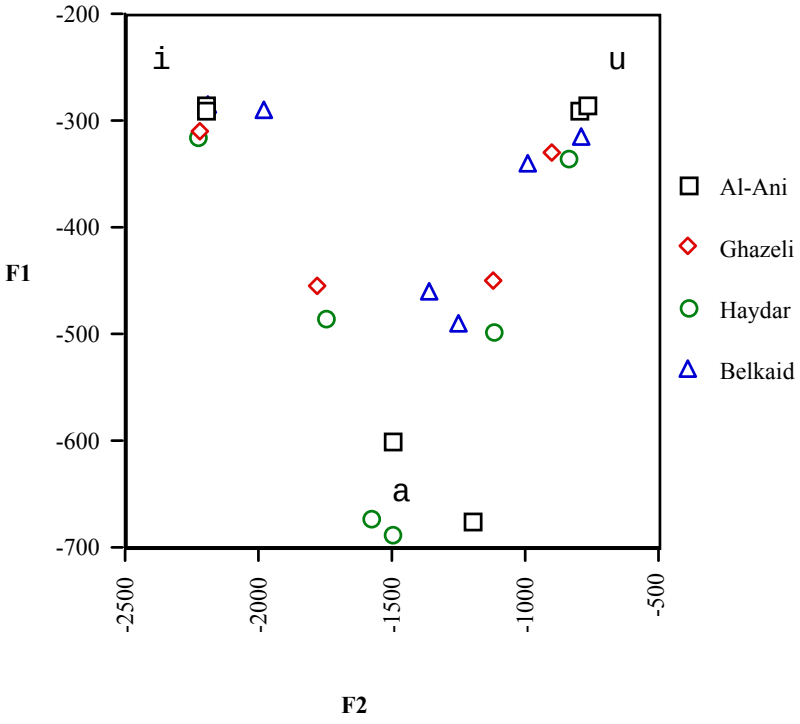
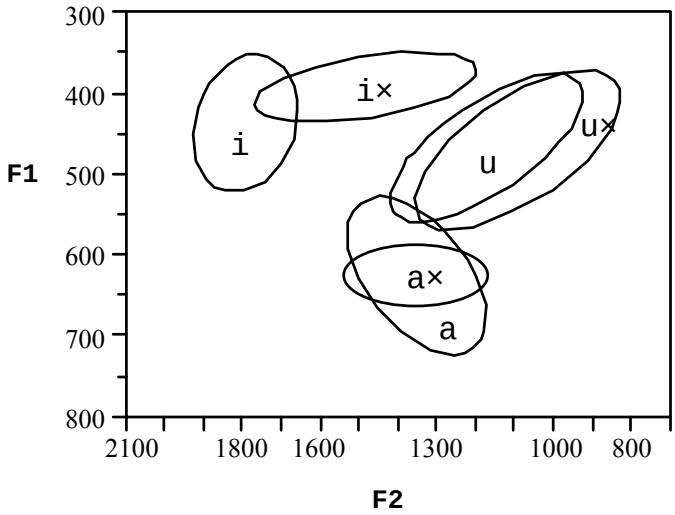


Figure 2 : Formant values (F1-F2) for the six Arabic vowels in connected speech



4. Summary

[13] Based on al-Ani 1970; Belkaid 1984; Ghazeli 1979; Abou Haidar 1994. I am grateful to Jo Verhoeven for plotting the data in figures 1 and 2.

A comparison of the Arabic phonemic inventory with the systems of the languagesincluded in UPSID reveals that in a number of respects Arabic deviates considerably from what is common within the world's languages. This is borne out by the number of consonants (above average) the consonant-vowel ratio (below average), the below-average number of different vowel qualities, and the high number (12) of consonant segments that are unique to Arabic, most notable of which are the pharyngealized sounds. If we add the sounds shared by languages that derived them from Arabic, the total goes up to some 17 sounds, with Arabic thus contributing 4.7 % of the 359 unique sounds in the UPSID database (second only to !Xu with 70).

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