ENGLISH AND ARABIC ASPIRATION: A CONTRASTIVE STUDY

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Abstract

Not all languages have voiceless plosives of this type, but English does and the initial [p] [t] [k] sounds of words such as pound, time, keen, are aspirated. The symbol for aspiration a superscript [ʰ] following the sound affected - so [pʰ tʰ kʰ] and so on. Aspiration is generally thought to be the product of straightforward and allophonic rule which strengthens voiceless stops.

Some phonologists argue that sounds, which are aspirated, are produced with spreading of the vocal cords, others suggest that aspiration is produced by a delay in the onset of voicing after a stop closure has been released, as in the pronunciation [pʰɪt], in which it is claimed that there is a delay between the release of the bilabial stop closure and the onset of voicing for the following vowel [ɪ]. Aspirated stops are also referred to as fortis stop.

The study falls into three sections with an introduction and conclusions. The fist section deals with aspiration in English. It clarifiers voice onset time, the closure release and aspiration rules. Section two is devoted to the concept of aspiration in Arabic and the different phases in the production of Arabic plosives. Finally, the are the major findings that the researcher reached throughout the study.
### Phonemic Transcription:
#### Consonants in Arabic

<table>
<thead>
<tr>
<th>Arabic symbol</th>
<th>English symbol</th>
<th>Example in Arabic</th>
<th>Meaning in English</th>
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<tr>
<td>1</td>
<td>أ</td>
<td>/؟/</td>
<td>/ارد/ (أرض)</td>
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<td>2</td>
<td>ب</td>
<td>/ب/</td>
<td>/باب/ (باب)</td>
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<td>3</td>
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<td>/ت/</td>
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<td>4</td>
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<td>/ه/</td>
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<td>خ</td>
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<td>د</td>
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<td>/ /</td>
<td>/شر/ (شعر)</td>
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<td>14</td>
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<td>/س/</td>
<td>/سندوق/ (صندوق)</td>
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<td>Arabic Short Vowel</td>
<td>English Symbol</td>
<td>Example in Arabic</td>
<td>Meaning in English</td>
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<th>Meaning in English</th>
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<td>/uu/</td>
<td>/uu/</td>
<td>/uruuq/</td>
<td>Shining</td>
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<tr>
<td>/ii/</td>
<td>/ii/</td>
<td>/fiil/</td>
<td>Elephant</td>
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1. Introduction

Iverson and Salmans (1995: 369-72) suggest that phonetic aspiration is present before a vowel in initial position but is suppressed after [s] in a cluster in English because [spr] feature is shared between the fricative and the stop. Aspiration in English does not directly depend on stress. They identify the location of aspiration in English as the beginning of a stress foot. For instance, time [tʰ]ime, typhoon [tʰ]yphoon, potato [pʰ]otato. In addition, foot as a prosodic unit consisting of one or more syllables of which one is stressed, there are also cases where aspiration appears at the beginning of word, internal unstressed syllables. For example, 'oppor[tʰ]unistic, medit[tʰ]erranean. The degree of aspiration in English correlates with the degree of stress (ibid: 378).

Kim (1970: 109) assumes that aspiration is nothing but a function of the glottal opening at the time of release. He proposes the voicing delay after voiceless stops is due to the narrowing of the glottis before voicing starts, as in:

... the length of aspiration or voicing appears to be equal to the time it takes for the open glottis to close for the vibration of the following vowel.

Thus, English /p, t, k/ are aspirated when initial in a full-vowelled syllable. Elsewhere they have less aspiration or none. Hence, the aspiration of the /p/ after /m/ in plump pie but its absence in plumb eye. The /t/ of a tease is aspirated as is that of attack /tæk/ but not that of at ease (Jones, 1931: 60).

2. Voice Onset Time

Lisker and Abramson (1964: 387) propose voice onset time as an acoustic measure that correlates with aspiration. They justify this by pointing out that the noise heard as aspiration occurs during the period of voicelessness between the release of the stop and the start of voicing of the following vowel, as in:
"Aspiration …is regarded simply as a large delay in voice onset."

Moreover, when one produce a stop consonant in which the vocal cords are not vibrating and then follows this with a vowel sound, there may be a delay in the onset of voicing in the vowel. When this happens, we say that the stop in question is aspirated, as in the English word pad [pʰæd]. If there is no such delay in voice onset time, we say that the stop is unaspirated as in the word pain [pɛrn] (Carr, 2008: 188).

To conclude voiceless plosive consonants, the vocal fold vibration is stopped for a period that is a little longer than the hold phase (the time when the mouth is blocked) so that the there is still vocal fold vibration around the moment of release (when the articulators part and the pllosion is heard. This delay, measured from the start of the explosion to the point where vocal fold vibration begins, is called the voice onset time.

3. Aspiration in Languages

The commonest pattern in languages around the world is for voiceless plosives to have a short voice onset time, they are therefore voiceless unaspirated plosives. The voiced plosives with which they contrast tend to be fully voiced, that is to have vocal fold vibration started well before the explosion. Among languages which do use are French, Spanish, Italian, Greek, Dutch, Russian, Arabic. English does it in a different way. The voiceless plosives have a longer voice onset time and are thus aspirated. The voiced plosives do not need to be fully voiced depending on the context in which they appear. They may lack vocal fold vibration for some or all the hold (Michael and Maidment, 2005: 1).

The remarks so far apply to plosive consonants in initial position directly before a vowel. If a language distinguishes voiced and voiceless plosives at all it will do so in that position.
In other positions, the sounds may be modified. For instance, voiced plosives may become fricatives or approximant when flanked by voiced sounds (ibid: 2).

4. Devoicing

English [p t k] are aspirated when at the beginning of a stressed syllable, if an approximant rather than a vowel follows. For example:
price, play, twin, cute

The aspiration takes the form of devoicing the approximant so:
[pɹaɪs], [pˈeɪ], [tɪn], [kjuːt]

If [s] precedes, there is no aspiration and, correspondingly, little or no devoicing of any approximant, so for example:
Sprain [sprɛɪn]
Splash [splæʃ]
Squeak [skwiːk]
Studio [stjuːdiə]

English consonants are sometimes called lenis (weak, i.e. short, quiet, unaspirated, sometimes, voiced) and fortis (strong, i.e. long, loud, aspirated, always voiceless (ibid: 4).

5. Voicing and Aspiration

Generally speaking, the English /p/ which is distinguished from /b/ by a small burst of noise when the lips open followed by a slightly noisy interval of about 30 ms before the vowel starts. The difference between the sounds can be shown by a small raised /ʰ/ (Ladafoged, 2005: 135).

Abercrombie (1967: 148-9) defines aspiration as a period of voicelessness that follows the voiceless closure phase of a stop. The diagram will make these relationships of stops with glottal states clearer. The lower line represents the states of the glottis. It is wavy if the glottis is in vibration, straight if it is not.
In addition, the English /b, d, g/ are fully voiced. In English the vocal folds are apart and not vibrating while the lips are closed for /p/, and while the tongue is touching the roof of the mouth for /t/ or /k/. They do not come together and start vibrating immediately after the closure is released. There is as a small delay before the following vowel in which the air rushes out, forming what is known as aspiration. The English stops /p, t, k/ are said to be aspirated. The interval between the release of a stop and the start of a following vowel is called the voice onset time. (Ladafoged, 2005: 136)

5.1 The Closure Release

Robins (1980: 78) clarifies that the release of a closure may be followed by a small puff of air (aspiration). This is the case with the standard English voiceless plosives in initial position (narrow) symbolized [pʰ] [tʰ] [kʰ] and distinguishes them from the French voiceless plosives and from these in some northern English dialects, which do not have this aspiration. They are called unaspirated voiceless plosives. Voiced plosives can be aspirated with voiced aspiration intervening though these are less common. Some languages like India have all four types [t] [tʰ] [d] [dʰ], etc.
In English whispered speech, the aspiration of the voiceless plosives of the features maintaining the distinction between normally voiced and voiceless consonants.

5.2 The English Aspiration Rule

Bloch (1948: 7) states that English aspiration rule /p/ →[pʰ]/. Meaning a /p/ phoneme corresponds to a [pʰ] phone in syllable-initial position." The alphabet of each level is autonomous, and thus the latter [p] at the phonetic representation. Accordingly, the phoneme /t/ in English word-initial position always maps to an aspirated [tʰ] and the phone [tʰ] always maps to the phoneme /t/. thus, [p] and [pʰ] are not distinct phonemes in English, the contexts where [p] appears, are the complement of those where [pʰ] appears; therefore, the phones [p] and [pʰ] are members of the phoneme [p], and [p], and [pʰ] are the allophones of /p/. The pair /p/ and /b/ are separate phonemes.

6. Plosive Stops in Arabic

The air which rushes out from the lungs is fully blocked resulting in holding of the air. The air is compressed then the airway suddenly released, causing a plosive sounds. These sounds are called stops. But because of the plosion, they are called plosives. They are divided into eight sounds:(،ب،ت،د،ث،ض،ط،ظ،ین). Western scientists divided them into eight too, but they replaced the phoneme (ض) by Arab (ج) and called them strong consonants. The Arabs interpreted intensity as stops. Bishr (2000: 247-250) classifies Arabic stops as follows:

6.1 (ب) /albaa?/

In the production of albaa? the air that comes from the lungs is fully obstructed at the lips, as they are pressed together and compressed the air for a short period of time. The lips are suddenly separated resulting in a plosive sound from the mouth. The vocal cords vibrate during the pronunciation this sound.
(ب), is then a voiced bilabial plosive stop. It is noticed that many Arabs make an error in the pronunciation of the voiceless [p] in the English. For instance, they pronounce it like a voiced consonant corresponding to the Arab [b] that is made voiceless in some of its positions, like كتاب /kitæb/. In this case, the voicelessness is accompanied by a lack of full plosion. This is perhaps one of the reasons for Arabs emphasis on the necessity of pronouncing 'albaa' with 'alfatha' instead of alsukoon to achieve the complete plosion.

6.2 التاء /altaa?/

The air that comes from the lungs is fully obstructed at the point where the tip of the tongue is against the palate and the front part of the alveolar. The air is compressed for a while and then the tongue is moved suddenly, leaving that point which leads to a plosive sound. The vocal cords do not vibrate in the production of altaa?. It is then, voiceless dento-alveolar stop.

6.3 الدال /addal/

It is the counterpart of the voiced consonant "ت". The is no difference between them except that the vocal cords vibrate with addal. so, addal is voiced dento-alveolar stop.

6.4 الطاء /altaa?/

الطاء: is the velarized counterpart of altaa?. In the articulation of altaa?, the back of the tongue is raised backwards, moves backwards slightly towards the back wall of the throat. Some phoneticians state that in the articulation of altaa? the tongue is curved. الطاء is voiceless velarised dento-alveolar stop.
7. The Different Phases in the Production of Arabic Plosives

(Mukhtar(2006: 117-119) mentions the following phases:

7.1 Complete Closure

The result of this phase are the so-called the stop consonants, also called plosives as well as being called occlusive. Plosives are described as aspirated, accompanied by aspiration. The aspirated symbol is either an apostrophe (p') or a small (ʰ). Some distinguish between two types of plosive sounds. If the explosion is out, as in (pa), they are called explosives. If it is internal, they are called implosives.

Sometimes the explosion happens by removing the closure class causing a sudden release of the compressed air in the mouth, exploding through the nose. This occurs when the nasal sound is located immediately after a stop consonant as in cabman, enda. This kind of explosion is called nasal plosion.

7.2. Narrowing:

The result of this is the continuant sounds. They are divided into:

1. sibilants: such as the (س) and (ز). They are called sibilants because of the force friction with them. The reason for the force friction is that the same amount of air (with ث) must pass with (س) through narrower passage. Some others divided sibilants into hissing (s) and hushing. (ʃ)
2. Fricatives: they are also called constrictives and spirants, like (ف) and (ذ)
3. Closure and narrowing: The sound in this case is called an affricate, or an affricated release or semi-stop.
8. Consonant Systems in Languages:

1. **Stops**: All languages have plosives in two places, at least in the places of articulation. Either /p/ or /t/ and as well as /k/. More common than this are three different places for (p, t, k) as in English, French and Portuguese. There are languages with four stops (p, t, k, q). It is rare to find five different places, and that are found in Arabic in the form of (p, t, k, q,?).

2. **Fricatives**: these are common in languages. The places of fricatives are more than the places of the stops. There are five fricative places while stops have only three places in English, German and Polish. Arabic has six places for fricatives in the pronunciation of ف، س، ش، ح، خ as compared with five stops. The Spanish and Russian have for fricatives as compared with three stops.

3. **nasals**: English and German have three nasals like French, Italian and German.

4. **Laterals**: Most languages have one lateral sound that is /l/, as in English, German, French and Arabic.

   (ibid: 42)

9. Aspirated sounds:

   These are the sounds that are followed or preceded by a buff of air. As for how to produce this type of sounds, it is clarified as follows:

   The organs of speech are separated so as the air stream pass quickly and strongly between the vocal cords resulting in a sound like a (الهاء), which is described as a buff of air. Consequently, the Arab (تاء) at the standard level is aspirated.

   It is noted that the separation of the organs of speech when the voiceless aspirated sounds are articulated, are stronger than the voiced aspirated sounds. Therefore, the buff of air which follows the following voiceless aspirated sounds [pʰ, tʰ, kʰ] is
stronger than what follows the following voiced sounds: [bʰ, dʰ, gʰ]. This is phonetically speaking regardless of the use of these sounds in a specific language. Some believe that the buff of air that follows voiced stop sounds is weak and like a part of that sound. (Istata, 2003: 134-135).

10. Intensity and laxity

The opinion of scientists in the fortis and lenis sounds is that fortis articulated by the sudden confluence of the organ of speech with another. They separate suddenly producing the sound. Whereas the lax means that convergence between them is not strong, allowing the passage of friction sound. Sibawayhi defined the fortis as that ((which prevents the sound from taking place, which are د، ث، ج، ف، س، ض، ص، ز، ه، د، ب، ط، ك، ه). He pointed out that the lax sounds as ن، ل، ر، ه، ح، ق، غ، خ، ص، ض، س، ب، ث، ز، س، ع، ف، ح، ش، ح، ث، ذ، ض، ص، ز، س، ع، ف.

The adoption of the Arabs to the flow of the breath and whether or not in the fortis and lax caused mixing and overlapping between them and the voiced and voiceless and made the distinction between them, depending on this, difficult at the beginning. However, the Arabs noted to the flow or not of air an issue that was fully agreed by a group of Western scientists such as (Kantinmo p 35) which proved their view that counting the fortis sounds as occlusive that can not be articulated for ending the obstruction caused by the two organs. On the contrary, lax sounds has as continuous repetition (Al-Atiya, 1983: 45-46).

There are three types of these sounds:
1. Full intensity: the sounds are eight (ب، د، ط، ث، ج، ف، ض، ص، ز، ه).
2. Medium between fortis and lenis. The sounds of the five (ن، ل، ر، ه، ع).
12. The Production of the sounds and the factors of their variety

Exhaled air is a substance that does not stop as long as human lives in this life and if he wants to speak, his mind gives a stimulus to the organs of speech to obstruct the exhaled air narrowing its course, or blocked for a moment that leads to the articulation of the sound.

13. The most important factors affecting the production of sounds

1. The state of the vocal cords:

   The vocal cords take several positions during the process of producing the sounds of language:

   i. The vocal cords to be apart, the air passing through them without a change in the nature of the breath until it reaches to the upper speech cavities where it exposes to holding and narrowing producing the sound. The sounds that occur in this case are called voiceless.

   ii. The vocal cords came close each other to obstruct the breath and lead to its vibration producing a laryngeal tone sounds that accompany the articulation of voiced consonants.

2. The position of breath obstruction

   Breath obstruction is happening in the throat cavity. If it exceeded throat cavity it may take its way through the oral cavity and often can take the way to the nasal cavity at (م) and an (ن).

3. How to intercept breath

   The breath-holding in the place of articulation or narrowing its way, and how that narrowing occurs, are factors that lead to the diversity of sounds resulting from these positions:
i. A complete lock of breath in a position of obstruction leads to holding of breath and pressing back into the position behind the place of obstruction, then it releases producing a sound very like (ق، ت، ق) and the like, these are called plosive.

ii. The obstruction of the organ of speech lead to narrowing the oral cavity in the position of the obstruction and allows air to pass in a narrow port that leads to the pronunciation of a lax sound, such as (غ، خ، ش، ف، بث) which are called fricatives.

iii. The sound may be between the average sound intensity and laxity in somewhere such as a sound (ل، ر، م) and (ن).

iv. If there is an obstruction to the breath in the mouth and took its way through the nasal cavity, the soft palate is lowered, the result is a nasal sound which is called nasalization such as (م) and (ن).

Conclusions

Throughout the study, the researcher has come up with the following findings:

1- Aspiration is longer for stops that begin a stressed syllable and shorter for stops that begin an unstressed syllable.

2- Velar stops have longer aspiration than bilabial and alveolar stops.

3- There is more variation in the duration of aspiration for the word initial than for the word medial position.

4- Aspiration depends to a great extent, on the place of articulation of a stop.

5- English plosives are aspirated at the beginning of a stressed syllable if an approximant rather than a vowel follows.

6- The length of aspiration is equal to the time it takes for the open glottis to close for the vibration of the following vowel.

7- The air modifications take different shapes which happens in the air passage.

8- There are two types of plosive stops, the first is explosives and the second is explosives.

9- Most languages have plosive consonants in two different places of articulation, others have three places as in English, French and Portuguese. Arabic has five plosive stops (p, t, k, g, ?).

10- Arabic is significant in that it does not have an aspirated stop series, and also lacks the /p-b/ contrast.
References


المصادر العربية:


