

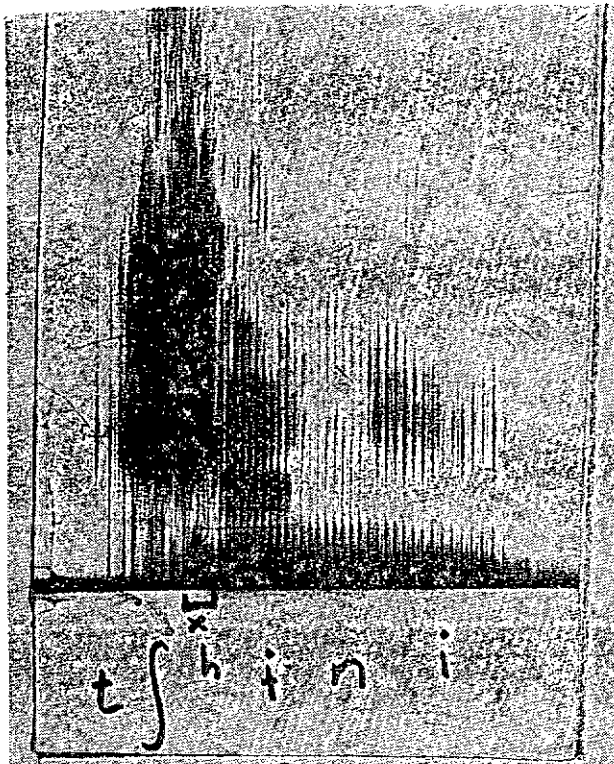
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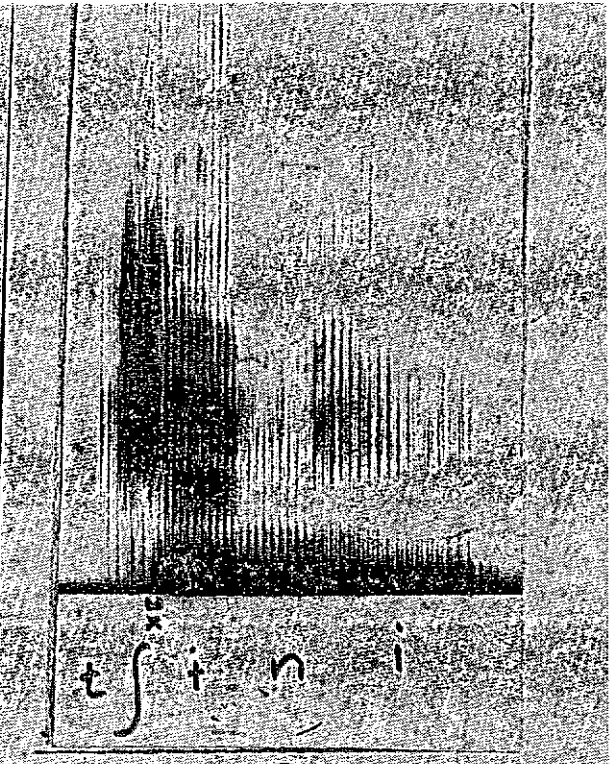
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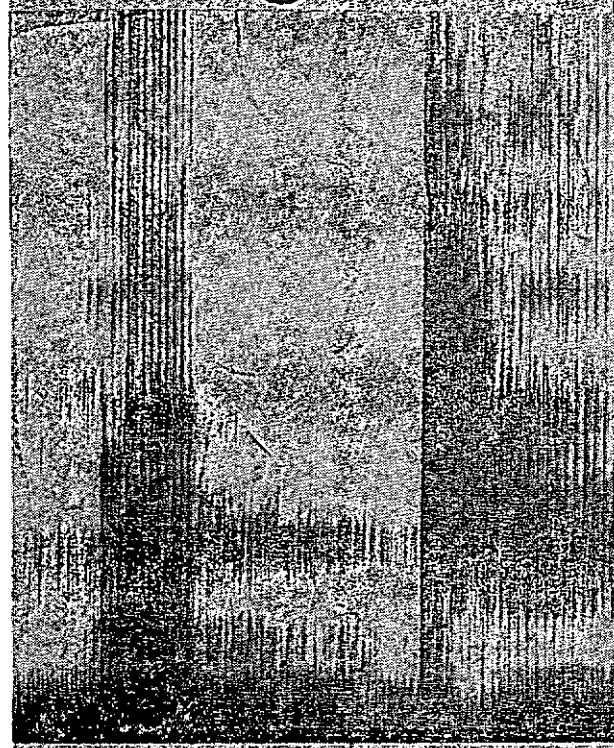
tʃ^h i n i

④



tʃ^h i n i

⑤



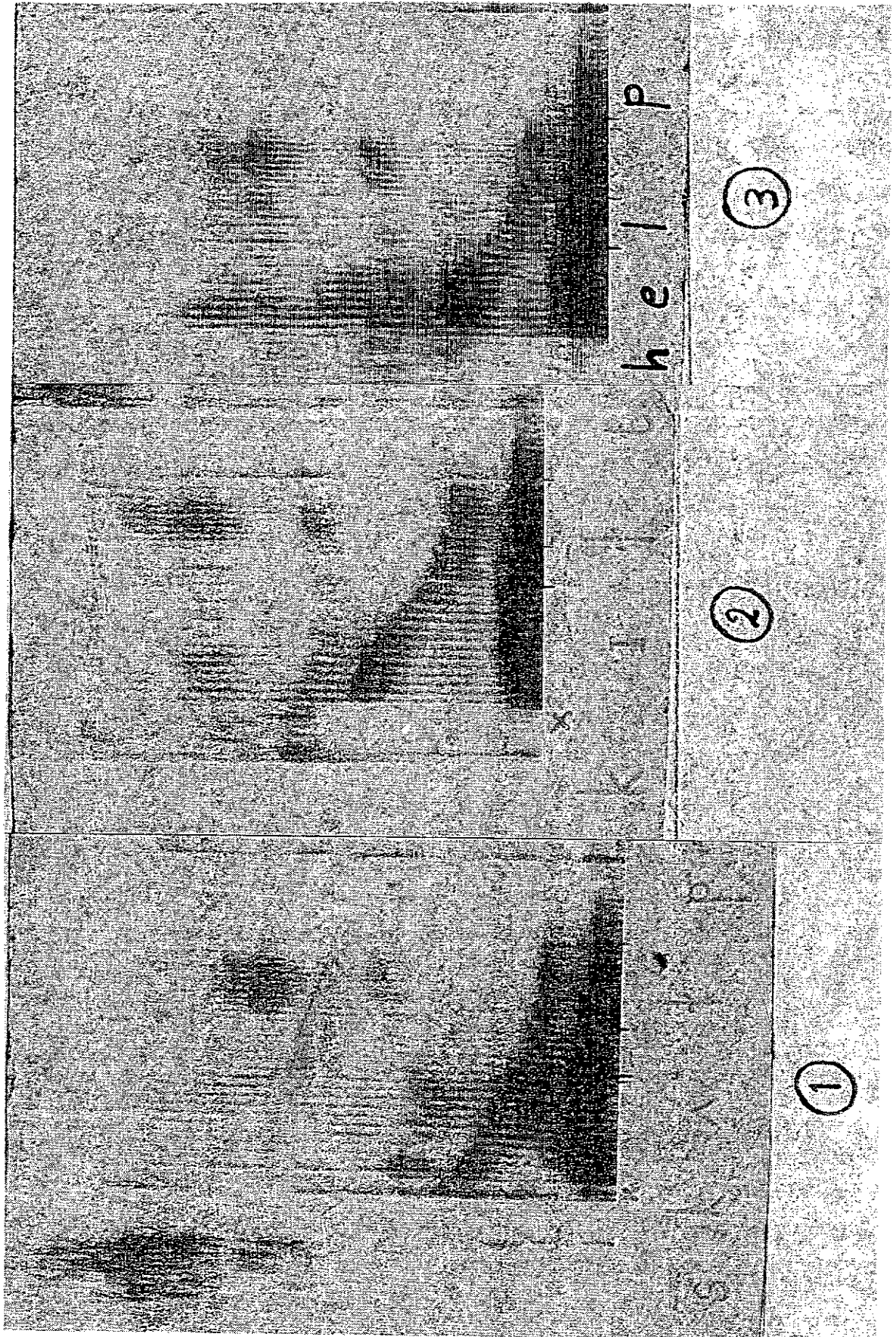
n a b k i

⑥



n a o t a

⑦



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can occur in this position as in the words /ste/ (star), stu: / (neck and /kast/ (broke).

Generally speaking, aspiration poses no serious problem for Iraqi Kurdish students. The deaspiration of an initial bilabial plosive in such words as pint and pot an error often detected in the performance of Kurdish students, can be attributed to the phonemic differences between the two languages (i.e. Kurdish and English). When a student says [paint] instead of [p^haint] he seems to be using the Kurdish phoneme /p/ which can occur in the same phonetic context as the aspirated allophone of the English plosive/p/.

Conclusion

Aspiration is an important cue for distinguishing between the English voiceless and voiced plosives in certain contexts. Since voicing may disappear or diminish in plosives used initially and finally, aspiration remains a crucial factor for distinguishing one type from another.

In Arabic, aspiration is not distinctive. However, it is important for differentiating two pairs of phonemes. In combination with the place of articulation, it helps to distinguish between /t/ and /t/, and between /k/ and /q/.

Unlike aspiration in the two languages mentioned above, it is phonemic in Kurdish. Here, aspiration is the sole feature which distinguishes one set of voiceless plosives from another. Apart from the aspirated/ unaspirated plosives, Kurdish has aspirated and unaspirated voiceless affricates, a fact which has so far been overlooked.

Yet this dichotomy (i.e. aspirated/ unaspirated) is not phonetically based since the physical correlates of aspiration are actually present; such a distinction is, therefore, phonological with the auditory variation in /tʃ^h/ and /tʃ/, for example, resulting from a difference in the duration of frication and aspiration and not from their actual presence or absence.

the distinction between the aspirated and unaspirated affricates. He implicitly considers [tʃ^h] and [tʃ] as allophones of the phoneme /tʃ/.

To verify the contrast shown in the minimal pairs above, the two words /tʃ^h in:/ and /tʃ ni:/ were analysed spectrographically on a Key Sonograph. The words were fed directly by the author with the microphone held about two inches from the mouth. The spectrograms of the two words show striking differences (see spectrograms 4 and 5). The release of the closure for [t] in both words is followed by frication which, in turn, is followed by an area of weak energy representing aspiration. Since these two phases of frication and aspiration appear on the spectrograms of both words, the difference in the auditory impression of /tʃ^h/ and /tʃ/ must be a consequence of the difference between the duration of these phases in the two segments. The duration of frication and aspiration in [tʃ^h] is almost double the duration of the two phases in [tʃ] it being 13 cs. in the former and approximately 6.5 cs. in the latter. The duration of the area of weak energy representing aspiration in [tʃ^h] is 3.5 cs. while it is only 1-1.5 cs. in [tʃ] (cf spectrograms 4 and 5). Therefore, this distinction viz. aspirated/unaspirated is only phonological and not phonetic since the physical realization of aspiration (as defined by Fant) is present on the spectrograms.

MacKenzie has also ignored the distinction between /t^h/ and /t/ which he regards as members of the same phoneme /t/. These two can be regarded as two phonemes on the basis of two considerations. First /t^h/ and /t/ occur in identical phonetic environments as in the words /t^h apak/ and /tapik/ where the plosive is followed by the same vowel. Secondly, this phoneme falls within the general pattern of the phonemic distinctions (i.e. aspirated plosives vs. unaspirated plosives.)

Similar to the aspirated allophones of the plosives of English and Arabic, Kurdish aspirated phonemes do not occur after the voiceless fricatives [s] and [ʃ]. Only unaspirated plosives

[t^h], a voiceless aspirated alveolar (or dental) plosive; [t], a voiceless unaspirated alveolar (or dental) plosive; [t^h], a voiceless aspirated emphatic alveolar (or dental) plosive; [t], a voiceless unaspirated emphatic alveolar (or dental) plosive; [k^h], a voiceless aspirated velar plosive; [k], an unaspirated voiceless velar plosive, and [q], a voiceless unaspirated uvular plosive. The Kurdish voiceless affricates are [tʃ^h], a voiceless aspirated palato-alveolar affricate; and [tʃ], a voiceless unaspirated palato-alveolar affricate.

The above mentioned plosives (except [q]) are arranged in pairs the members of which are identical in all features except one viz. aspiration. In Kurdish phonology the members of each pair contrast with each other. It may not always be possible to find minimal pairs to show this contrast; still, their phonemic status can be established on the basis of the identical phonetic environment in which they occur. Thus /p/ and /p^h/ contrast in /pe:s/ (in sight of) and /p^he:s/ (a fly); /t^h/ and /t/ contrast /t^hi:k/ (a sign of approval) and /ti:k/ (a crack); /t^h/ and /t/ contrast in the words / t^h apak/ (a pat) and /tapik/ (ball) and in the words / t^ha: za/ (beautiful) and / ta: zi/ (bruised); /k^h/ and /k/ contrast /k^har/ (donkey) and /kar/ (half) and in /k^hu: la :n / (digging) and /ku: la:n/ (lane).

The voiceless affricates /tʃ^h/ and /tʃ/ contrast in the words / tʃ^hyr/ (kind of goat) and /tʃyr/ (creak), and in /tʃ^htni:/ (crumb) and /tʃtni:/ (picked).

The phonemic distinction between aspirated and unaspirated plosives has been made to some extent by Mackenzie in his *Kurdish Dialect Studies* (1961). He mentions that the type of Kurdish spoken in Amadiya (which is the dialect in question) has /p^h (,p/ t^h/, /t/, /k^h/ and /k/ as separate phonemes which he has fixed on a consonant chart. But he has ignored

the voiceless [s,s] and [ʃ] as in [ʔ askata] (silenced), [ʃi] taka:] (complained) and [ʔiska:n] (housing), a case which is similar to that of the English plosives following that voiceless fricative [s] as in step and spot. This judgement is based on an auditory impression. Twenty five native speakers of Arabic were asked to read the following Arabic sentences:

- /ʔ askanahu fasi:ha dʒanna:tihi/ (housed him in Paradise)
- /ʔiʃ taka: ʔila: ʔabi:hi/ (He complained to his father.)
- /ʔaskata tiflahu/(He silenced his child.)

The informants invariably used an unaspirated plosive after the fricative in the first word of each sentence. This phenomenon (i.e. the deaspiration of plosives after voiceless fricatives) perhaps seems to be universal. It is found in other languages such as English, German and Kurdish.

This deaspiration of voiceless plosives after voiceless fricatives could be taken as a reason for the appearance of [t] in such words as [ʔistabara] and [ʔistalaha] where the plosive [t] might have become emphatic due to coarticulation with the preceding emphatic [s] and the plosive was deaspirated due to the preceding voiceless fricative (see odisho 1977 p.95).

In word final position, however, the plosives of SA may be unreleased in which case they are unaspirated, the release being essential for any aspirated plosive. Yet even when they are released, they may be only weakly aspirated.

Aspiration in Kurdish

In Kurdish, aspiration is a feature of voiceless plosives and voiceless affricates. Fricatives can also be slightly aspirated but they have not been taken into consideration in this paper . The voiceless plosives of Kurdish are: [p^h], a voiceless aspirated bilabial plosive; [p], a voiceless unaspirated bilabial plosive;

an allophone of /k/ occurring in the proximity of back vowels, it will prove wrong the statement made by Fudge that an Arab can easily distinguish between the initial sounds of /ki:l/ and /kɔ:l/ while an Englishman will find that difficult (Fudge 1970 p.70). While it is true that an Arab can easily distinguish between the initial plosives of /kum/ (sleeve) and /qum/ (get up) as they are separate phonemes, it is very difficult for him—as rightly observed by Odisho (1977)—to distinguish [k^h] from [k^h] since they are, as has been argued, positional variants of the same phoneme, a situation which is identical to that in English .

Another pair of phonemes distinguished by aspiration among other features is /t,t/. The emphatic quality of the latter member of the pair is not the only feature which distinguishes it from the former. If we take /t/ in the words /ta:ha/ (got lost) and /tasannaʕa/ (pretended) we will find that it is a voiceless aspirated dental plosive in the first word whereas in the second it is a velarized (or emphatic) voiceless aspirated dental plosive. Still the two sounds [t^h] and [t^h] belong to the same phoneme /t/. [t^h] occurs in the proximity of other emphatic sounds, and [t^h] elsewhere. Here we find that the feature of velarization (emphaticness) is not distinctive. However, if we consider the two words /ti:n/ (fig) and /ti:n/ (mud), allophonically transcribed as [thi:n] [ti:n], we find that the initial sounds differ from each other in two features: first, velarization and second, aspiration, which is as important a feature as velarization in distinguishing between the two sounds.

As has already been mentioned, /t/ and /k/ are aspirated as in [k^hat^haba] (he wrote) and [k^haʃafa] (revealed). But these plosives lose their aspiration when immediately preceded by

Odisho (personal communication) to the effect of the preceding vocalic element, which I find doubtful, for such striations do not appear on the spectrograms of voiceless plosives which are preceded by voiced sounds as in the English words /help/ and /kilt/ (see spectrograms 2 and 3). Secondly, there is a considerable level at higher frequencies, which is an unambiguous cue for the identification of voiced plosives. Halle et al (1959 p. 113) state that "the lax stops show a significant drop in level the high frequencies. This high frequency loss is a consequence of the lower pressure associated with the production of lax stops, and is therefore a crucial cue for this class of stops.

Aspiration has an important function in the phonology of SA. In combination with other features such as velarization and pharyngealization it helps to distinguish some Arabic phonemes from others. SA has /k/ and /q/ as two phonemes since they contrast in minimal pairs such as /kalb/ (dog) and /qalb/ (heart), /kul/ (eat) and /qul/ (say). These two phonemes are not distinguished only by the place of articulation, the former being a voiceless velar plosive and the latter a uvular (or post velar) voiceless plosive. If the place of articulation were the only distinctive feature, then [k^h] (a back or post velar plosive as in /kul/) would be more closely related to /q/ than to /k/. But the other feature which, together with the place of articulation, distinguishes /k/ from /q/ is aspiration, the former being aspirated (unless preceded by [s] or [ʃ] and the latter unaspirated. With the feature of aspiration taken into consideration, then the [k^h] of /kul/ will be related to /k/ and not to /q/ since, on an articulatory basis, it has two features common with /k/ (i.e. place of articulation and aspiration) but only one feature with /q/. And once [k^h] in /kul/ is considered

also be a consequence of the omission of aspiration from the bilabial plosive with the resultant sound resembling a devoiced /b/.

Aspiration In S A

In SA aspiration is a characteristic feature of two voiceless plosives¹: /t/ and /k/. The other plosives (i.e. /b, t, d, d, q/ and /ʔ/) are unaspirated. Of the plosives mentioned above [b] is a voiced bilabial plosive which has no phonological contrast with [p], the latter, if found at all, being treated as an allophone of /b/.

In order to investigate whether /b/ is realized as [b] or [p] in the proximity of voiceless consonants, the two Arabic words /nabta/ (a plant) and /nabki/ (we weep) were analysed spectrographically², and the analysis shows that the segments preceding [t] and [k] bear no evidence of their being [p] (see spectrograms 6 and 7).

Since in /nabta/ and /nabki/ the bilabial plosive is followed by [t] and [k] respectively, it lacks plosion (in the sense of Arnold and Fant'), and hence there is no aspiration. Yet this segment can be identified as [b] and not as [p] on the basis of two other spectral properties. First, the striations representing vocal vibration at the base of the segment continue for a considerable duration. This vocal-cord vibration has been ascribed by Dr.

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- 1 . *The fricatives, which may also be slightly aspirated, have not been taken into consideration.*
 - 2 . *I am grateful to Dr. Edward Y. Odisho for enabling me to have access to the sound spectrograph available at the Department of English, College of Arts, Al-Musstansriya , University, and for his patient help and valuable comments.*

is more strongly aspirated than the second; and the first /t/ of "title" is similarly more strongly aspirated than the second.

On the other hand, these plosives, from an auditory point of view, lose their aspiration when preceded by [s] (cf Gimson 1970 p. 151). Yet when a plosive is said to be deaspirated after [s], it does not mean that phonetically this aspiration is absent. The phase which correlates with aspiration is actually present on spectrogram but it is of a duration substantially shorter than that of an initial plosive (of the areas marked X on spectrograms 1 and 2).

In English, not only the plosives are aspirated, but also the fricatives may have this feature. The turbulent noise characteristic of frication is an English fricative such as [s] or [ʃ] is also followed by an area of relatively weak energy preceding the onset of voicing for the following vowel (spectrograms 8 and 9), and this agrees with Ladefoged (1975 p. 271); he states that, "English fricatives are also slightly aspirated when they occur before a vowel in a stressed syllable."

However, aspiration is not distinctive in the phonology of English. An aspirated and unaspirated /p/, for example, are positional variants; that is to say they are allophones of the same phoneme, the feature of aspiration being predictable from the phonetic context. Yet despite the nondistinctiveness of this feature, a lot of trouble is caused by its omission from a plosive.

An Iraqi Arab student coming from some rural area, for instance, is often heard to say /ben/ instead of /pen/, and /b&d/ instead of /p&d/. These two mispronunciations can be attributed to the difference between the sound systems of the two languages in that English has a voiceless bilabial plosive as a phoneme whereas Arabic does not. However, in my view, this error can

as in "heating" and "heeding" /t/ is distinguished from /d/ by two features: first, /t/ is voiceless but /d/ is voiced; secondly, /t/ is aspirated whereas /d/ is unaspirated. In such a position it would be difficult to say which feature is more important for the identification of the plosive as /t/ or /d/. But in other contexts such as the initial position aspiration remains a crucial factor since /b d g/ in this position may be produced without vocal-cord vibration. In this respect Ladefoged (1975 p. 43) mentions that [p] and [b] in "pie" and "buy" are essentially voiceless. What distinguishes one sound from another in such a position, then, is aspiration .

In word final position, however, neither voicing nor aspiration can distinguish p/ from b/ or t/ from b/ for plosives may be devoiced and can be unreleased in this position. The factors that distinguish one plosive from another in this position are the muscular tension that accompanies the articulation of the two sounds and the length of the preceding vowel, for a vowel is longer before a voiced plosive than before a voiceless one.

The degree of aspiration in the English plosives depends on two factors: place of articulation, and the degree of stress on the syllable which contains the plosive or on the syllable following the plosive. The more advanced the place of articulation, the weaker the degree of aspiration. Thus [k^h] is more strongly aspirated than [t^h], and the latter, in turn, is more strongly aspirated than [p^h] (of Ladefoged 1975 p. 271).

The English plosives /p,t/ and /k/ may occur in strongly accented syllables as in "pill, till" and "kill". In this case they are more strongly aspirated than when they are in or followed by weakly accented syllables. The first /p/ of "piper", for example,

psychologically perceptible. Thus, when speaking of an "unaspirated" voiceless plosive, for example, we are making a phonological rather than a phonetic statement.

This phonetic difference, however, is not of equal significance in all languages. In English, for example, there is some variation in the degree of aspiration. A plosive may be strongly aspirated, weakly aspirated or unaspirated. Yet this does not effect a semantic signal; that is to say there is no change of meaning accompanying the substitution of one variant for another.

In SA, aspiration may have played an important role in the historical development of the sound system.¹ But synchronically, aspiration is not phonemic though in combination with some other articulatory features such as the place of articulation it may distinguish phoneme from another. This point will be further elaborated in a later part of this paper.

In Kurdish, on the other hand, aspiration has a phonemic status, and it is the sole feature that distinguishes one set of phonemes from another, as will be discussed below.

Aspiration in English

In English Received Pronunciation (RP), aspiration is some times crucial for distinguishing between two groups of plosives: b d g/p t k. These plosives are normally termed voiced/voiceless respectively, though voicing is not the only feature that distinguishes the first group from the other. In an intervocalic position

1 . Odisio, Edward Y. (1976,) "Aspiration and Its Role in the Sound Systems of Languages", *Afaq Arabiyya*, Vol.1, pp. 102-104

This feature can be detected spectrographically. A plosive normally has three stages (Gimson 1970, P. 150): the closing stage, which is characterized by shifts in formant frequencies of the vowels adjacent to the plosive; the hold, which is characterized by absence of acoustic energy; and the release, which shows up as a spike on the spectrogram. Arnold (1973 p. 30) adds another auditory phase which he calls "plosion". This fourth phase corresponds to what Fant (1960) calls "frication" and "aspiration". Friction is represented by intense aperiodic energy following the spike and continuing up to the top of the spectrogram. This area of intense energy is, in the case of aspirated plosives, followed by a phase of silence shown on the spectrogram as weak energy which disappears at high frequencies, unlike friction which continues up to the top of the spectrogram. This period of silence, normally called aspiration, correlates physiologically with an open glottis at the time of articulating the consonant, which causes more pressure to be built up behind the supraglottal stricture.

The phase representing aspiration is actually found on the spectrogram of any voiceless plosive which has the three (or four) phases mentioned above. Thus phonetically aspiration is present, but when a voiceless plosive, for example, is said to be unaspirated, it is only in comparison with another plosive heard to be more strongly aspirated that such a judgement is passed. Though the silent phase representing aspiration found is on the spectrogram, the consonant is said to be unaspirated perhaps because the duration of aspiration and friction in such a consonant is less than half of that of an "aspirated" consonant. In other words, friction and aspiration in an "unaspirated" consonant, say a plosive, do not have a duration that would be

ASPIRATION IN ENGLISH, ARABIC AND KURDISH

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Introduction

The sound systems of both Standard Arabic (SA) and Kurdish (Bahdinani dialect) have been worked out, with varying degrees of emphasis on certain features (i.e. voicing, place of articulation and emphaticness) whereas another feature, namely aspiration, has received, perhaps, less attention than the other features despite its important role in the sound systems of both languages.

This study, therefore, sought to examine aspiration in SA and Kurdish in an attempt to contribute to the knowledge available on the phonology of the two languages as compared to that of English, and hence to throw some light on the difficulties encountered by Iraqi Arab and Kurdish students of English.

Phonetic And Phonological Aspiration

Aspiration has been defined as a puff of air following the release of some consonant sounds such as voiceless plosives in English, Arabic and Kurdish. However this is not to say that aspiration is a feature attributed to voiceless plosives only; it may also be a feature of voiceless affricates as is the case in Kurdish and Neo-Aramaic, and of voiced and voiceless consonants as in Sindhi.

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1 . Odisho, Edward Y. (1978), 'The Opposition /ts vs./ts h/ in Neo-Aramaic jJIPA No.2, 79-83