# Gutturals in phonetic terms



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**ABSTRACT:**
"Guttural" is a vaguely or variably defined term in the phonology of ancient Semitic languages, especially Tiberian Hebrew. It can include laryngeals, pharyngeals, epiglottals, uvulars, and sometimes postvelars; pharyngealized emphatics should be covered too, though they are not; and often, inexplicably, all rhotics are included, even though only uvular ones should be eligible. In general, "guttural" seems to be a purely phonology-based concept, out of step with phonetic considerations. Sounds of speech, however, are more than abstract nodes in charts; they have material substance, which both affects and is affected by neighboring sounds. Over time, a secondary manifestation can assume the phonological position of a sound, gradually making the sound itself redundant and prone to disappearance. This may well have been the origin of the disputed Semitic *ġ, provided that a secondary articulation, velarization or possibly pharygealization, took over and became a full-fledged [ɣ].

If teachers employ the inherited term "gutturals", they sometimes tend to present them as imposing [a]-vowels wherever possible. This is a phonetically unsubstantiated claim, as laryngeals impose no vocalic colour; uvulars and postvelars would enhance [o] and [u], if anything at all; epiglottals may front the back vowels (i.e. towards [e]) and lower only the front vowels; the inherent [ɑ]-colour of pharyngeals seems to lag behind rather than anticipate (which might be language-specific); and pharyngealized consonants, excluded from gutturals in any case, are observed to move vowels back rather than down. Articulations "behind the tongue", so crucial for Semitic phonologies, present numerous complexities: difficult to observe, frequently substituting for one another, and involving issues of terminology as well as interpretation of scripts. Here too, modern phonetic studies can furnish acoustic and physiological data to support hypotheses about languages of the ancient world.

**KEYWORDS:**
Afroasiatic languages, Semitic languages, Tiberian Hebrew, phonetics, gutturals, laryngeals, pharyngeals, radicals, epiglottals, uvulars, postvelars, emphatics, ejectives, vocal folds, glottal plosive, glottalization, laryngealization, pharyngealization, velarization

Gutturals can broadly be defined, for the purpose of this essay, as including consonants articulated on the posterior soft palate (velum), i.e. postvelars, as well as beyond and below: uvulars, pharyngeals, epiglottals and laryngeals. These sounds are, or should be, points of interest for Semitologists.[1] The term has traditionally been of importance in Tiberian Hebrew phonology, though Hebrew scholars have not been in

1 Including epiglottals, as sounds considered pharyngeal can in fact be epiglottal. These are recognised in non-Semitic languages of the Afroasiatic family and occasionally identified as allophones in Semitic languages.

complete agreement concerning its extent. (*a*) Some phonologists include postvelars and uvulars. Understandably, the line dividing anterior and posterior velars is fuzzy. Prevelars and plain velars, however, ought to be excluded from this broad category, since velars (as well as palatals) are considerably affected by vowels articulated in the same syllable. The consonants whose primary gesture is made further back tend in turn to affect vowels, while remaining largely unaffected themselves. This is what postvelars have in common with other sounds in the general "guttural" category, radicals and laryngeals. (*b*) Some scholars include *r* regardless of its pronunciation (if known). Still, only uvular and velar rhotics that vibrate the velar edge or uvula make any phonetic sense. (*c*) Few phonologists include the sounds traditionally called "emphatic" in the category of gutturals.[2] These, however, cannot be left out of the phonetics of the category, provided they represent pharyngealized and glottalized sounds, rather than ejectives. (Still, there are good reasons to deal also with ejectives.)

As a prerequisite, the record should be set straight for two common misconceptions:

(1) *Pronunciation is a physical string of sounds.*

A string of sounds is a psychological entity (treated as such in phonology). Physically, i.e. in articulation and acoustics, it is a continuum of events running in parallel. Their realization can often assume more values than simple presence or absence. Psychologically, a sound is audible or inaudible, to be delivered or deleted. Optional sounds aside, these two conditions are inadequate for the physical and physiological reality of a speech sound that is psychologically and phonologically present. The researcher frequently needs to ask: how much, to what degree.[3]

(2) *If a sound is present, it is found exactly where it is transliterated.*

Not necessarily. The presence of a sound is indicated by multiple signals, some of which can be more salient than others. The signals can substitute for each other and

2 McCarthy is one of them, cf. esp. 2003 (≃ 1989, 1991). He proposed and defended "a [pharyngeal] feature". Its four physical characteristics (pp. 7–8: posterior region, high F1, nonturbulent voiced and turbulent voiceless consonants), however, seem to manifest the heterogeneity of the feature. (A high F1, the only difference from all the oral sounds, is brought about with a decreased pharyngeal volume.) Malone (1993) proposes another phonology: his [+low] feature (p. 28) incorporates *r* but excludes "emphatics" (cf. also p. 194). The feature is criticized by Churchyard (1999: 165–169).

3 The question of degree, substantiated in phonetics, is quite relevant in phonology as well. Variable articulator approximation helps distinguish two categories of manner: narrow-constriction *fricatives* and wide-constriction *approximants*. What is "narrow" and "wide" in constriction is decided by the presence or absence of turbulent flow. Turbulent noise is different in sound from resonance and nonturbulent flow, and the acoustic distinction between them is sharp. Phonology also distinguishes the two manners of articulation regularly (though e.g. Semitic pharyngeal fricatives are frequently approximants). *Timing* is another graded value: affricates can be described as slow release plosives. Release is not a binary concept, either.

need not be found in the position of the sound only, but also in the positions around — sometimes more or even exclusively so, while the position of the sound itself is void.



## LARYNGEALS AND THE ACTION OF THE VOCAL FOLDS

The inadequacy of (1) and (2) can be demonstrated for the glottal plosive, called *aleph* or *alif*. It might seem that the vocal folds are either closed (hence not vibrating) or open (able to vibrate). The yes/no question is, however, too simplistic. A more fine-grained investigation asks "how much", and has more questions to ask. Why?

The vocal folds know a continuum of working modes to use for speaking as well as distinguishing sounds with linguistic relevance. They are produced by graded compression of the folds, their stiffness (thus vibration characteristics), mutual positioning of arytenoid cartilages, possibly also motion of the larynx up or down. The compression grade can identify two to three modes close to complete closure. They consist of strictures with a weaker or incomplete occlusion.

A complete occlusion, which is a total break in vibration, is not so common. Few tokens of [ʔ] demand it. Such is the geminated glottal stop [ʔʔ] in Arabic, where in turn the simple glottal stop [ʔ] continues vibrating the closed vocal folds, be it in a limited way.[4] The cartilaginous portion either fails to vibrate, or does so out of phase with the ligamental portion of the folds, which can seemingly increase the vibration frequency. If the periods are irregular, they alter the timbre of the voice. The increased air pressure can make the amplitude go up, instead of down as in regular phonation. As this is a phonation alternative, the speech organs may (or may not) simultaneously articulate another sound, which can overlap with this period of active or arrested glottis completely or partially. Three types of sound can be created in this way: *preglottalized* if the vocal fold compression starts earlier; *postglottalized* if it ends later; and glottalized or *laryngealized*[5] if the complete or partial compression aligns with the sound. Certainly, the complete compression that makes phonation cease makes sense only in voiceless plosives, but a somewhat "rasping" or "grating" phonation (in nonphonetic terms) is obviously capable of occurring with any speech sound, with fricatives as well as vowels. Such sounds are called laryngealized, or the phonation is termed *stiff* (which is in fact laryngealization to a lower degree). The very breaking of the voice (a glottal plosive) can be preceded or followed by this limited

4 Ladefoged — Maddieson (1996) provide graphic examples on p. 75 (fig. 3.13) for [faˈʔiɪ] and [ˈfaʔʔaɪ] of Lebanese colloquial Arabic, and on pp. 76–77 for a more restricted phonation, which phonologies of the language label a "voiced glottal stop", a not very sensible term. The latter is rather a glottal approximant, different from both a full-fledged stop as well as an intervocalic gap, and apparently voiced. Though real, it has no standard transcription and no established name.

5 No need to dwell on transcription issues here. The IPA can combine preglottalization [ʔ͡ʟ], glottalization [ʟˀ] and postglottalization [ʟ͡ʔ] fairly consistently. However, it offers only a single degree for limited vibration and no phase-shift distinction by means of a *creaky* phonation diacritic, [◌̰]. Any symbols researchers can agree on are as good as any others.

type of phonation, which can itself become a sufficient signal for the expected glottal stop in spite of its possible absence in the string. In other words: If it is [eʔe] that is expected, [e̬e̬] is enough to make one hear it. Provided a language distinguishes e.g. /t/ from /tˀ/, it can be enough if the vowel following [t] shows "a sharper onset", e.g. of a higher frequency and less damped than with /t/; consequently, /tˀ/ is perceived. Meaningful distinctions tend to be secured with more features, such as making /t/ phonetically aspirated [tʰ] or holding /tˀ/ longer than /t/. Then any *t* that is not an aspirated [tʰ], and/or is longer than a [t] would be in that position, can be heard by speakers of the language as a glottalized /tˀ/, even if it is not so articulatorily. Such potential differences in perception are useful to keep in mind if the researcher works with expressions transcribed in scripts originally designed for other languages, a fairly common condition in ancient Semitic studies.

As glottalization/laryngealization is in fact a higher degree of vocal fold compression, it can transpire simultaneously with or subsequently to an ascending or descending move of the whole larynx. A downward move creates *implosives* (for which it is this move that is characteristic, not a drop in oral air pressure, which may possibly not occur at all). Again, since it is not a binary category but rather an issue of degree (for several variables at once: how far, how quick, and when exactly), it would be more appropriate to speak of implosivity or implosive character. Indeed, many ordinary speech sounds can be more or less implosive, though they are not transcribed [ɓ, ʄ, ɠ] etc. As the compression is independent, implosives can be and will be laryngealized at times (less air escapes through the tighter slot, thus further decreasing the low air pressure in the oral cavity, enhancing the effect of the sound).

An upward move of the larynx creates *ejectives*, familiar to Afroasiatic linguists from e.g. Chadic languages. For the larynx to work efficiently as a piston pushing the air out of mouth, the vocal folds should provide a complete obstruction. (A leaking piston, i.e. vibrating vocal folds, is not unobtainable, only unattested.[6]) Consequently, ejectives tend to be voiceless, whereas implosives show the inverse trend, though not consistently. The compression with a slower release can cause the voice to sound somewhat creaky, i.e. as a laryngealized vowel. If the consonant provides enough "volume" (time and resonance or noise energy), its ejectivity will come out in the acoustics within its duration as a rise-fall resonance in a higher frequency (e.g. around 5000 Hz with [sˀ]). Still, it is not unreasonable to expect that the follow-up laryngealization could itself become an adequate signal of a preceding ejective in a language, even if the larynx movement is minor or missing.[7]

6 Ladefoged — Maddieson (1996: 80–81) furnish examples of allegedly voiced ejectives, which they analyse as sequences of voiced–voiceless, e.g. [dtˀ], or a prevoiced split unit. Mixed voicing is phonetically not impossible; all depends on the phonology of the language, not known to me. Still, the waveforms provided (fig. 3.16) appear to confirm this view. Both the presence and disappearance of voice can be observed.

7 One language is attested with solely a stricture in vocal folds being indicative, regardless of whether the accompanied move is ejective or implosive; the latter is secondary and individual (see Ladefoged — Maddieson 1996: 89–90). Another language in turn makes a meaningful distinction between ejectives and implosives (pp. 100–101). So the question

## PHARYNGEALS AND EPIGLOTTALS

Such sounds make an exotic impression, and most people link them with Semitic tongues, though they also occur in many other languages of the world and make more contrasts in some than in those Semitic languages where they are prominent. Rarely, pharyngeals and epiglottals stand in a relationship of mutual contrast. More often, the whole large area behind the tongue root is a single phonological area of articulation where pharyngeals and epiglottals can substitute as allophones. Due to the fact that the tongue root can make no obstruction against the rear pharyngeal wall, the upper pharynx produces only constrictives, which are commonly labelled as fricatives [ħ, ʕ], though their lumen would rather suggest approximants. The lower portion of the space makes more gestures possible. The epiglottis does not follow the tongue root movements only passively, but is itself an active articulator. It can make vibrations, a genuine fricative noise, and even an occlusion. Epiglottal plosives are attested as phonemes, though not in Semitic languages, where they can appear as occasional allophones of "fricatives".[8] The IPA offers symbols for voiced and voiceless fricatives [ʢ, ʜ], and also a stop [ʡ]. The latter is considered voiceless, but e.g. in South-Cushitic Dahalo, it is phonologically voiced and phonetically can be partially or weakly voiced too, in initial and intervocalic positions.[9]

## UVULARS AND POSTVELARS

The fricatives articulated back on the rim of the soft palate make this organ (be it the uvula or the velar rim) quiver and vibrate. It is thus hardly possible to differentiate a pure fricative from a trill. The probable consequence is that the sound system would turn either a kind of back *kh*, *gh* or a kind of back *r* into phonemes, but not both concurrently. A posterior *r* can be enhanced with pharyngealization so much that the sound will be reliably identified as *r* even without actual vibration (such as the current Danish *r*, which is more of a pharyngeal approximant [ʕ] than a uvular trill [ʀ] or a fricative [ʁ], though speech style and position in the syllable are also important

of relevance is phonological. In the Afroasiatic family, standard Hausa modifies voiceless affricates and plosives as ejectives, and voiced ones as implosives. The only deviating member seems to be /jˀ/, which Schuh — Yalwa (1999) classify as ejective, Zima (1973: 25) as "injective", i.e. implosive. (The description of the phonetic details by Zima exceeds what is usually found in textbooks and makes the latter reference seem trustworthy.) The solution that appears fairly obvious, considering the table in Schuh — Yalwa, is made explicit and proved in Ladefoged — Maddieson (1996: 85–86): Implosives and ejectives belong to a single series of modified laryngealized (Carnochan 1952: "glottalized") consonants.

8 Maddieson (1993) refers to Laufer — Condax 1979 and Laufer — Baer 1988 for Arabic and Sephardic Hebrew.

9 The spectrograms in Maddieson (1993: 31, 32, 38, 42) offer no certainty due to their low resolution. But the fact of a vibrating epiglottis colouring Khoisan vowels seems to suggest that voiced plosives make sense.

factors). Uvular *r* is a speech sound typical of Europe (standard in a few West European languages and a more or less frequent variant in a few others), but it is rare outside of Europe. It was drawn to the attention of Semitologists as a kind of *r* probably through Yiddish (from French or German), which affected the phonetics of Modern Hebrew. A pure trill, however, is not always found even in the languages where the uvular sound is standard or frequent, as a fricative or approximant portion typically follows inside the sound. A uvular fricative [ʁ] is often a more common allophone than the trill (e.g. in French).

## EMPHATIC SOUNDS

As the resonance properties of the pharynx (its volume, length as well as wall stiffness) do not directly depend on resonance properties of the oral cavity nor the position and working mode of the vocal cords, many other sounds, vowels and consonants alike, can be made "emphatic" apart from those that are regularly labelled as such. The feature can also qualify a word as a whole, as Semitic scholars are well aware. Some dialects of Arabic and Neo-Aramaic are considered to have an emphatic phoneme that is *suprasegmental* rather than a separate pharyngealized or velarized segmental sound. As a result, words can be marked with a distinctive "emphasis", mostly velarization.[10] This state of affairs may be the result of radiating velar or pharyngeal attributes to the neighbouring sounds, as a natural consequence of the fact that an attribute can sometimes be more apparent around a speech sound than within it. This concerns plosives most, as they are very short and offer minimal space for resonance, so that a different colour can show only in their proximity, typically in vowels. It is not essential if such a secondary articulation modifies the resonance in the upper or lower pharynx, and if it is velarization or pharyngealization that applies, since the larynx moves slightly upward in both anyway (in pharyngealization as concomitant to narrowing of the pharynx; in velarization probably related to lifting of the tongue root toward the uvula). The two kinds of secondary articulation have so much in common that the IPA offers the option to mark them with a single diacritic, [~].

As mentioned above concerning pharyngeals, their articulation can be made over a larger target than velarization. There is no need to perform secondary pharyngealization at the same height of the pharynx as the primary consonant gesture is made. Those dialects of Arabic that pharyngealize (rather than velarize) and whose X-rays have been published[11] seem to suggest that the secondary pharyngealization is concentrated in about half the distance between the uvula and the epiglottis, i.e. higher than the primary gesture is made in most of the dialects. The available data do not indicate, however, if the findings also apply to the spread of the secondary colouring to

10 Variants of Arabic (as well as e.g. Tsungu Even) have lexical root pharyngealization.

11 Ladefoged — Maddieson (1996) count "over a dozen" speakers, naming one, Bukshaisha (1985). The initial sound he studied in the word [sˤad] showed a marked narrowing of the pharynx along the whole length comparing to [sad]. Uncited reports include Delattre (1971) and Ghazeli (1977), unavailable to me.

the primary consonant's neighbouring segments, which are often more instrumental in identification of the consonant.

It should be kept in mind that the "radiation" of a secondary articulation to its environment affects the articulation base as a whole, not just vowels. In velarization, it implies more than just spreading the vocalic base of [u] (more appropriately [ɯ], as what is meant is the lingual setting of the dorsum, not the lip rounding). When the dorsum approaches the velum, a new consonant can emerge. Those that come to mind first include [ɯ̟], [ɣ] or [ʁ]. What originally used to be a mere manifestation of a shift in the articulation base can gradually develop into a consonant and replace the original "emphatic" segment.

The dispute concerning the secondary character of the sound **ġ* in Semitic languages (see Čech 2007) may be understood in this way as a dispute whether [ɣ] can be explained as a manifestation of suprasegmental velarization. It is not incidental that the IPA selected the symbol of this very sound for index meaning *+velarization* feature to mark a velarized consonant, i.e. [ɹˠ]. It is easy to imagine that the secondary feature could have prevailed in a former *[θˠ] or [zˠ], where the [θ] or [z] component gradually disappeared, leaving [ɣ].[12] The process may have been more complicated: the originally pharyngeal coarticulation may have started to move upwards, making the "emphasis" more velar than pharyngeal ([ɹˤ]→[ɹˠ] or [ɹɑ]→[ɹʌ]→[ɹɤ]→[ɹɯ]).[13] At some stage, the original primary articulation faded away, leaving the velar feature to assume the value of the consonant. If the original consonant happened to be [ʕ] or [ʢ], *ayin*, its velarization would have caused the loss of the original *ayin* almost unavoidably. The reason would be the double constriction (easier to visualize for [ʢˠ]). The constriction closer to the outlet, i.e. [ˠ], as soon as it reached its fricative degree, would manifest the trend to mask with its sound effect the other, deeper and weaker friction. The masked friction [ʕ] would thus be destined to sink into the background, giving [ɣˤ].[14] Provided the sound [ɣ] was unique in the phonology of the language, its coarticulation with [ʢ] would be redundant.[15]

12 Transcription graphics can sometimes mislead. Obviously, it is irrelevant for the evaluation of any real event how it is conventionally recorded in script. In this case, however, the common phonetic transcription seems fairly fitting.
I do not deal here with the historical and comparative aspects of **ġ*, which are treated by Čech (2006), with bibliography on the issue. See Petráček (1989) for a systematic introduction.

13 [ɹˠ] and [ɹɯ] are considered equivalent in IPA, cf. *Handbook of the IPA*, p. 17.

14 More exactly, it would become an approximant. Maintaining two frictions is demanding and produces flat results. It is the fricatives out of all sounds that require the most precise setting of the width and shape of the slot and control the speed of the flow. Maintaining high precision in two places differently and simultaneously is close to useless, given that the sound generated in a more anterior position would prevail anyway.

15 Petráček (1989: 282–284) supposed the emergence of /x/, /ɣ/ out of Proto-Afroasiatic */ħ/, */ʕ/ in this way and went so far as to attach a diagnostic importance to it (see also pp. 281, 288–289). Petráček apparently postulated the simple correlation *basic* : *emphatic* in a few members in proto-Afroasiatic. Such pairs became differentiated in various linguistic groups, and the phonetics of emphasis could also change. As I have tried to show, this is possible phonetically and is not without parallels in other languages. Interestingly,

## AN IMPOSED TIMBRE [A]

Finally, a brief comment may be made concerning another widely held opinion, familiar to Hebrew scholars, which seems hard to prove unequivocally with phonetic observation.

(3) *Gutturals need* [a] *to be articulated correctly and impose the timbre on the vowels around.*

Actually, most targets, including "guttural" ones in the broadest sense, appear to induce either no specific vowels, or enhance different vocalic properties than the traditionally held [a] colour.

(a) The **laryngeal** gesture enforces no vocalic timbre at all, as it is independent of the position and shape of the tongue. The vocal apparatus assumes a setting needed to articulate an imminent vowel during the gestures for [h], [ɦ] and [ʔ], or it moves from the preceding to the following setting. The sound [ʔ] has been treated above. The difference between [ɦ] and [h] need not be voiced/voiceless only. Rather, it involves the shape and size of the aperture of the glottis: [ɦ] corresponds to the breathy setting, [aɦa]=[aa̤a]; the distinct noise of [h] comes close to a sort of glottal constrictive.

(b) The **velar** gesture in turn is frequently affected by vowels, so that e.g. [k] is regularly fronted with front vowels and articulated to the back with back vowels. The difference is mostly nonphonological, and speakers are generally not even aware of it. It is language-specific how much [k], [g] and other velars vary. That is why prevelars and velars were suggested above for exclusion.

(c) **Uvulars**, which are found outside the area directly affected by vowels and produced inside a narrow space, themselves have the power to shift vowels, but not towards [a], rather toward the closer vowels [o] and [u]. Al-Ani (1970) published acoustic results for a speaker of Arabic that seem to show that uvular plosives lower the F2 values for a following [i] or [a] and slightly raise them for a following [u]. If I interpret these results correctly, [i] is moved closer to [u] (which comes as if to "meet" it), while [a] is coloured to [o].[16] A formerly uvular *r* in dialects of German as well as Danish (see

Thelwall — Sa'adeddin (1999) analyse colloquial Arabic (in the context of more standard and accepted descriptions) as having a six-member series of pharyngealized consonants, one being /ʔˤ/, i.e. a pharyngealized glottal stop ("Retracted Tongue Root glottal stop"). Unless they mean epiglottal plosive [ʡ], other options include a laryngealized fricative [ʕ̰]; they are not explicit. They only agree with other authors that they encountered a pharyngeal fricative [ʕ] nowhere. In any case, this reduces the system of glottals. */ʔ/ as a laryngeal base can be modified in more ways and itself could have affected the articulation of neighbouring sounds, where it could have been conserved and later projected back to its former position, only in a different form. This would support the hypothesis by Petráček (and earlier by Růžička). Čech (2006: 46–49) confronted the hypothesis with later research and suggested how it could be redefined.

16 It goes without saying that /i/, /a/, /u/ are the vowel phonemes of Standard Arabic. This was probably the reason Al-Ani considered them as basic and felt no need to include more

above) transforms into a voiced approximant of the vocalic colour [ɐ], which is in fact a lowered šwa [ə], not [a].[17]

(d) Thelwall — Saʿadeddin (1999) describe the standard colloquial Arabic of the Fertile Crescent with a shift of all front and central vowels to the back, /a/→[ɑ], /i/→[ɨ]~[ɤ],[18] as a consequence of coarticulation with "emphatic" consonants which they term "Retracted Tongue Root", simultaneously **pharyngealized** and **velarized**. My impression is that their "vanishing point" is found midway back (rather than around [ɑ]) — not unexpectedly, given that the tongue moves all the way back. The same might have applied also to "emphatic *r*" (even if it was retroflex in reality) wherever that variant was distinguished.

(e) Maddieson et al. (1993: 30) points out that epiglottals in Dahalo affect /a/, /o/, /u/ substantially by fronting them, and /i/ and /e/ by lowering them. They reproduce two spectrograms on p. 168 of the words [muħar] and [mɛʜɛr] in the Burkikhan dialect of the Lezgic branch of Northeast Caucasian (Dagestanian) Aghul, where the **pharyngeal** [ħ] and **epiglottal** [ʜ] fricatives stand in phonological contrast. The authors comment (op. cit., 1996) that the F1 and F2 (the lowest and most important formants) of the pharyngeal fricative meet each other at a rather high value of cca 1000 Hz, to descend subsequently during the early stage of the next vowel. My interpretation is that the pharyngeal [ħ] resonates on the vocalic timbre [ɑ]. The spectrogram provided (5.23) appears to show clearly that the [u] colour of the word [muħar] goes on for the whole initial third of [ħ], i.e. for about 50 ms, only slowly reaching the resonance that I visually estimate as roughly [ɑ], and which then provides the resonance base of the [ħ].[19] The [ɑ] setting of the vocal tract then approaches a regular [a] value during about the first quarter of the subsequent [a] (again, cca 50 ms). Hebrew scholars may notice that no trend to *muaħ* can be observed with this pharyngeal, but rather an inverse process — a lag of "physiological [ɑ]". Compared to the spectrogram of the word [mɛʜɛr] with an epiglottal fricative (the references quoted above point out that [ħ] and [ʜ] are common allophones in current Arabic and Hebrew), the [ʜ] sound shows an articulation base obviously identical with the surrounding [ɛ]: F1 below 1000 Hz, F2 between 2000–3000, F3 above 3000 Hz, which is F2 and F3 at least 500 Hz higher than with [ħ] and too high for an [a].[20]

The picture provided by Maddieson et al. exactly fits the appended remark that [ʜ]

vowel shades. The study was not available to me (it was only referenced in Ladefoged — Maddieson 1996: 36), so I cannot check my interpretation.

17 It is well known that the vowel that obtains in the *r*-dropping dialects of English is transcribed simply as [ə]. The original English *r* is not uvular, however, so the phenomenon is not well comparable.

18 The authors write [ɣ] in place of [ɤ], which I considered a misprint (p. 53), but I prefer to admit it here.

19 Noises can also have a kind of peaks of resonance; voiceless fricatives can as well, though not so prominent.

20 F2 and F3 in [ʜ] would relate better to Czech [i, i], and in [ħ] to Czech [e, e]. Only F1 comes any closer to [a]. But the characteristic of [a] is that F1 and F2 meet in a high value. This is not seen in pharyngeals or velars.

has a strong source of noise of its own, independent of the colours of the surrounding vowels. What follows for Hebrew scholars is that the sounds called "pharyngeals", whether produced with a purely pharyngeal or an epiglottal gesture, need not impose any [a] colouring on the preceding vowel. If such colouring does happen in a language, it will require separate research to find out why. What can be dropped is the idea that [a] + a following pharyngeal is a physiologically necessary combination. Even if the gesture is purely pharyngeal, making the pharyngeal cavity narrow laterally (as observed by Catford in languages of the Caucasus), the larynx tends to shift up, which in my view must affect the position of the tongue root and consequently make an [a] resonance less probable. In this connection, note that some languages that contrast pharyngealized and nonpharyngealized vowels are able to put [aˤ] and [a] side by side with nothing but a hiatus between,[21] as the two are clearly distinguishable vowels.

## CONCLUSION

Categorial perception of sounds in language is necessary. Still, attempts at reconstruction of internal processes and evaluation of what was possible are required to avoid oversimplifications. Clean and simple universal categories are frequently not adequate. To compound the issue, Semitists often face the task of analyzing or comparing languages for which no reliable phonetic analyses are available. The proper resort is to find analogies in (living) languages which have been the subject of such phonetic investigations, in order to try to envisage the events considered in a more realistic manner.

The area of articulation "behind the tongue" is harder to project hypotheses on, for multiple reasons: it is difficult to observe directly; events substitute and replace each other there more often than in the oral cavity; finally, terms, descriptions and explanations of phenomena occurring there differ more than in the vicinity of the tongue and lips. It was this very area that was affected by many alterations in Afroasiatic languages.[22] Historical reconstruction can be hindered by serious incompatibility between languages, in that one or more languages lacked specific sounds or had them in a reduced set, or simply kept leaving them out in transcribing foreign expressions. Furthermore, a script formerly created for a language with a substantially different

21 Trail (1985, apud Ladefoged — Maddieson 1996: 309) provides spectrograms and X-ray tracings of a Khoisan word [q aˤ a] in !Xoo. Two out of four speakers show [aˤ] of a dissimilar vocalic quality; the vowels are not alike for the other two speakers either. A potential counterexample in support of the necessity of a *patach furtivum* in Hebrew might perhaps be drawn from the claim by Trail that the gesture of [uˤ] does not appear as a high back vowel. The study, however, was unavailable to me, and, apart from a single tracing (9.26) that seems to support it, Ladefoged — Maddieson (1996) provide no additional data.

22 Unlike "emphasis" as such, which appears to be a pan-Semitic feature (apart from some peripheral cases) that developed over time.

phonology might misrepresent the way the language actually sounded. Both of these complications frequently apply to postdorsal, radical and laryngeal sounds. All this forces the Semitist to cope with remarkably many variables.

An acoustic and physiological approach to glottal articulations can help identify seemingly different categories that coincide in a single phenomenon in practice (e.g. postvelar or uvular fricatives [ʁ] with the trill [ʀ]). It can show that a process is possible, for some disputed issues (e.g. the secondary emergence of /ɣ/). In turn, it can help expose some undisputed convictions to more questions, such as if an expected process was not necessary to take place (e.g. overgenerating of /ɑ/). There are other phenomena that have no category of their own, let alone a standardized transcription symbol, and await proper identification and analysis. It thus makes good sense to be reminded of all these options and admit a healthy dose of uncertainty.

Simply put, there are languages and there are languages. Analogies may fail.

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