# Emphasis, glottalization and pharyngealization in Semitic and Afroasiatic

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This paper investigates the phenomenon of emphasis in Semitic from a phonological perspective. It is well known that Semitic emphatics can be realized either as ejectives (Ethiosemitic) or as pharyngealized consonants (Arabic). Recent interest in the Modern South Arabian languages revealed that the emphatics in this group can be realized through an interaction of glottalization and pharyngealization. Starting from a general assessment of glottalization from a cross–linguistic perspective, a focus on Semitic emphatics will be given by using data from the endangered Modern South Arabian language, Baṭḥari. Our goal is to provide a feature analysis of emphasis in Baṭḥari and to correlate it with the rest of Semitic, with special attention to the peculiar phonological patterning of the emphatic /ṭ/. This consonant appears to pattern in Baṭḥari together with the class of breathed consonants (Heselwood and Maghrabi 2015), probably due to its peculiar features. It will be shown that, by adopting Duanmu's (2016) framework of phonological features, it is possible to provide a coherent model for the patterning of Baṭḥari and Modern South Arabian emphatics within Semitic. Furthermore, this paper will provide some tentative parallels between Semitic emphatics and glottalized segments found in the rest of Afroasiatic.

**Keywords**: Emphatics, Ejectives, Afroasiatic, Pharyngealization, Modern South Arabian

## 1. Introduction[1]

Much has been written concerning the phonological and phonetic status of emphatics in Semitic languages. Dolgopolsky (1977) already noticed the phonological opposition of Semitic emphatics according to the so–called 'triads' voiceless/voiced/emphatic, interpreted as 'opposition of the three main positions of the glottis: open glottis/vibrating vocal cords/closed glottis' (Dolgopolsky 1977: 3). Emphatics can be realized through different strategies in those Semitic languages where the merging with the plain series did not happen – as happened in Maltese, for example (Borg 1997) – ranging from

[1] This research is part of the project 'describing the Modern South Arabian Baṭḥari language' [ref. 40.20.0.007SL] funded by Fritz Thyssen Stiftung. I warmly thank Miranda J. Morris for sharing and allowing me to compare her Baṭḥari data with mine. This was of fundamental importance for the preparation of the present paper. I also thank two anonymous reviewers for their precious comments to the final draft.

the 'backed' (pharyngealized/uvularized)[2] realization of Arabic varieties to ejectiveness in Ethiosemitic emphatics. Bellem (2014: 13) demonstrates that 'ejectiveness patterns as a laryngeal (phonatory) contrast [and that] the laryngeal parameter involves laryngeal action in general, so not just voicing.' In fact, glottalized emphatics do not necessarily require opposition in voicing, since this feature is neutralized by glottal closure, whereas backed emphatics allow for such opposition – as it is the case for Arabic and Berber. There is no obvious connection between backed and glottalized realizations from a historical perspective, because they do not always pattern together phonologically: thus, the term 'emphatic' can be understood either as a resonance contrast (as happens in Arabic) or as a laryngeal contrast (as is the case of Ethiosemitic). Furthermore, groups such as North–Eastern Neo–Aramaic and Modern South Arabian languages (henceforth MSAL) appear to have 'hybrid' systems, where both pharyngealization and glottalization may take place (Dolgopolsky 1977; Watson and Bellem 2010). For this reason, great debate has been conducted over the years as to what might have been the identity of early Semitic emphatics. The most widely accepted theory is the so–called 'ejectives hypothesis,' according to which earlier emphatics were ejectives while pharyngealization developed as a secondary process in a part of Semitic; however, many scholars in the past argued the exact opposite, as to say that early Semitic featured a backed realization – see for example Moscati (1964).

Afroasiatic languages do 'share, minimally, triadic sets of obstruents in their consonant inventories' (Meyer and Wolff 2019: 264), based on the alternation of voiced/voiceless/glottalized. Some of these languages are devoid of glottalized phonemes: among these, we find Ancient Egyptian[3], various Cushitic languages such as Awngi and Galab and some Semitic languages – where the emphatics either merged with the voiceless unaspirated consonants with /k'/ optionally becoming /q/ (Bomhard 2014: 18), or display backed emphatics – and Berber – where emphatics underwent a process of backing similar to that of Arabic (Cohen 1968: 1302). Many processes of deglottalization have taken place across Afroasiatic, such as the diffusion of ejective stop/plain stop alternation in Ethiosemitic (Fallon 2002: 186-187).

According to Clements and Rialland's (2007) subdivision of the African linguistic landscape into six different phonological macro–areas, Afroasiatic languages fall into two of them, namely the Horn

[2] Pharyngealization is a kind of secondary articulation involving a constriction of the pharynx usually realized through tongue root retraction, while uvularization requires a constriction of the back of the tongue toward the uvula and upper pharynx (Ladefoged and Maddieson 1996). We will adopt the term 'backing' to refer to the general articulatory process typical of these realizations.

[3] Although Loprieno (1995:33-34) proposes the reconstruction of Egyptian emphatics as glottalized through comparative evidence.

of Africa – with Ethiosemitic in the north, Cushitic in the east and south, and Omotic in the west – and the Sudanic belt area (with Chadic languages), which includes the vast area of Subsaharan Africa bounded by the Sahel on the north, the Atlantic Ocean on the west, Ethiopia on the east and lake Albert on the south. The extensive presence of ejectives in the Horn of Africa has often been seen as one of the main features of the Macroethiopian language area (Zaborski 2010), as already postulated by Ferguson (1970: 69–70). This is indeed one of the best-known traits of Afroasiatic as a whole, and in fact glottalized sounds are reconstructed for the alleged protolanguage (Wedekind 1994). The very existence of a true language area in the Horn of Africa is still a subject of debate, though: the common Afroasiatic heritage together with prolonged contact may have allowed for the spreading and/or retention of many traits such as the one under scrutiny. In fact, scholars have been discussing extensively 'as to whether the presence of ejectives in Ethiosemitic languages is original or imported from Cushitic' (Kogan 2011: 59), and similarly Tosco (2000: 342). However, the works from Martinet (1953), Cantineau (1960) and Steiner's (1982) work on the affricated /ṣ/ provide valid proof for the ejective hypothesis. The latter work is of particular importance since the affricate realization of the ejective fricatives – demonstrated for Tigrinya (Shosted and Rose 2011; Moeng and Carter 2019) as well as for Mehri (Ridouane and Gendrot 2017) – cannot be proven to have developed from earlier pharyngealization or uvularization. Bellem (2014: 36) argues that 'these ejectives are often not phonemically, or at least systemically, affricates, but that affrication is a phonetic effect resulting from the need to maintain enough intra–oral air pressure to produce a salient glottalic release.' Indeed, this is not the only possible phonetic realization for ejective fricatives as found in the languages of the world: narrowing of the oral constriction, separation between frication and glottal constriction into a sequence and backing of the place of articulation are other articulatory strategies commonly found (Moeng and Carter 2019). The fact that the latter mechanism, according to which speakers decrease the supralaryngeal volume to produce ejective fricatives (Demolin 2002), is found in certain intervocalic environments in Tigrinya may point towards the hypothesis that languages with backed realization of emphatics may have started from this exact stage, followed by a further backing process which eventually led to pharyanglealized/uvularized realization (see below).

A final clue in favour of the ejective hypothesis can be found by examining one segment – the labial ejective /p'/, commonly found in Ethiosemitic but not in the rest of Semitic. This element is crucial since it cannot be reliably reconstructed as /ṗ/ for the whole Semitic family, according to Cantineau (1952) and Moscati (1964) *contra* Diakonoff (1965). A clear set of correspondences between Ethiosemitic /p'/ and labials in the rest of Semitic has not been established yet (cf. Kogan 2011: 80–81); however, it should be safe to consider it either as an earlier retention from Afroasiatic which was later

lost in the rest of the family outside Ethiosemitic, or a consequence of (rather unclear) contact (Ullendorff 1951: 208-209). This early phonological change agrees with the cross–linguistic rarity of the glottalized bilabial stop (Martinet 1953: 69–70; Bomhard 1988: 116), since 'bilabial ejective stops are disfavoured over dental/alveolar or velar ones' (Maddieson 1984: 107 and already Javkin 1977). The shift to a pharyngealized realization in Central Semitic is thus considered an innovation (Huehnergard 2005: 165–166); besides, the extensive presence of relatable /pʼ/ (and, indirectly, /ɓ/) in Afroasiatic may be a proof for this reconstruction.

Having agreed on the ejective nature of early Semitic emphatics, it might be convenient to explore in more detail what glottalization refers to, with special attention to ejectiveness.

## 2. Glottalization

Glottalization refers to a kind of secondary phonetic articulation where a tight constriction of the vocal folds and/or an upward or downward movement of the larynx can be witnessed. It is possible to distinguish three classes of glottalized elements according to how these movements pattern. Following Maddieson (2013), the first class is that of *ejectives*. It features a complete closure of the vocal folds followed by an upward movement of the larynx. When this movement is simultaneous to a moment of closure in the mouth as in the case of the articulation of a stop, the air in the mouth is compressed. At the moment of release, the characteristic explosive burst noise typical of this class is produced. The ejective mechanism can be used to produce a variety of sounds: most commonly stops and affricates, and more rarely fricatives.

The second class is that of *implosives*, a kind of stop usually featuring a downward rather than an upward movement of the larynx. According to the typical textbook definition, this movement leads air to briefly flow into the mouth at the time of closure release, hence the voiced ingressive nature of this sound. However, 'implosives cannot be neatly distinguished from non–implosive sounds in terms of an alleged glottalic airstream mechanism' (Clements and Rialland 2007: 55–56) cross–linguistically. Moreover, 'implosives' do not always entail inward oral air flow upon release as already noted by Ladefoged (1968). Clements and Osu (2002) define them as non–obstruents. Implosives have a narrower distribution when compared to that of ejectives: they are a feature characteristic of Nilo–Saharan languages and of a cluster of languages mainly belonging to the Austroasiatic and Kra–Dai families spoken in the Southeast of Asia, while they appear only sporadically among Native American languages (Maddieson 2013).

Finally, the third class is made of *glottalized resonants* or, more properly, *sonorants* (nasals, liquids and semivowels). This kind of articulation adds a glottal constriction during the production of plain

sonorants, thus modifying normal voicing. Glottalized sonorants will not be considered further in the following discussion since they involve a completely different class of phonemes, while ejectives and implosives involve the same places and manners of articulation (at least theoretically).

From a phonological perspective, these three groups share the privative feature [+ constricted glottis] (Halle and Stevens 1971; Fallon 2002) or Glottis-[+stop] (Duanmu 2016:120), hence their being grouped under the same label. In the following section a cross–linguistic overview on ejective segments will be proposed. This section will inform our further discussion on Semitic emphatics.

### 2.1 Ejectives in the world's languages

According to Henton, Ladefoged and Maddieson (1992), ejective stops are the fourth most common type of stop in the world's languages, after voiceless unaspirated stops, voiced stops, and voiceless aspirated stops. Estimates across the literature of their occurrence in the world's languages range around 18% (Maddieson 1984). Languages with ejectives are clearly concentrated in specific areas of the world: the Ethiopian Highlands in the Horn of Africa and the African Rift Valley, the Caucasus, the North American Cordillera, the Colorado Plateau and the Andes. Ejectives are found in Afroasiatic and Khoisan languages, across many American language families such as Mayan, Quechuan, Na–Dene, Wakashan and Salishan, and in the North Caucasian and Kartvelian languages (Maddieson 2013). Everett (2013) tentatively relates this peculiar distribution to geographic factors: according to this hypothesis, ejectives are more likely to occur in areas of high elevation, due to minor atmospheric pressure facilitating the articulation of ejective tokens. The paper raised considerable discussion immediately after its publication. A recent article by Urban and Moran (2021) eventually proves that such correlation does not exist, though. Phylogenetic factors (Clements and Rialland 2007) and areal contact are to be held responsible for this distribution. The latter is likely the case for languages with ejectives but belonging to other families: Koma (Niger–Kordofanian), various Nilo–Saharan languages, Sandawe and Hadza, Eastern Armenian (Indoeuropean), Kumyk (Altaic), Quileute (Amerind) (Fallon 2002). Yapese and possibly Waima'a (Austronesian) are the only ones displaying ejective consonants, independently from one another, among the languages of the Pacific area. Several other languages contain ejectives at the phonetic level – e.g. from synchronic fusion with glottal stops, allophony with voiceless stops or pre–pausal phonotactic phenomena: see Fallon (2002) – but they are not included in this count.

If, on the one hand, Fallon (2002) dealt exhaustively with the theoretical patterning of ejectives from a phonological perspective, on the other hand, it is possible to rely only on a very broad typology concerning the exact phonetic realization of such segments. Scholars may not agree on the description

of the same tokens for a single language and provide divergent analyses, occasionally showing lack of comprehension about the very nature of ejective consonants – as is the case of Bleek's (1962: 15) misleading description of Quiche's (Mayan) ejective stops and affricates as click consonants (Miller 2020: 439). Other times the phonetic description is purely tautological and of no real use whatsoever to the interested scholar.

Let us take as an example the case of Yuchi, an extremely endangered language isolate spoken in Oklahoma. Reportedly, Yuchi has a set of ejective stops and affricates [pʼ], [tʼ], [kʼ], [tsʼ] and [tɕʼ], together with ejective fricatives [fʼ], [sʼ], [ɕʼ] and [ɬʼ]. Despite the rather unique richness of Yuchi ejective class, there are no thorough phonetic descriptions: Crawford's (1973) first account only states that '[g]lottalized obstruents are [lenis and] postglottalized [while] [g]lottalized resonants are preglottalized' (Crawford 1973: 175). Ballard (1975: 164) describes the obstruent set as a sequence of stop followed by glottal stop rather than a single phoneme; finally, according to Linn (2000: 37) '[s]peakers maintain their oral closures while the glottis is raised [, while t]he oral closure is released when the glottal closure is released.' The author concludes that these are 'true ejective stops.' Unfortunately, no articulatory nor acoustic detail is provided in relation to the series of Yuchi ejective fricatives. This is particularly regretful given the extreme crosslinguistic rarity of these sounds: in fact, only ten languages in Maddieson's (1984) corpus are said to possess ejective fricatives (about 2.22% of the entire corpus), to which few others can be added: Hausa (only as a dialectal allophone of [tsʼ]), Dime, Lagwan, Tigrinya and MSAL (Afroasiatic), Koma and Berta (Nilo–Saharan), Ubykh and Kabardian (Caucasian), Tlingit (Na–dene), Lakota (Siouan), Totonac, Yuchi, Mazahua (Oto–Manguean) and various Keresiouan languages.

## 3. Addressing emphasis in Semitic

It is now time to investigate the change trajectory which can be traced in the phonological patterning of the emphatics in Semitic. According to Bellem (2014: 29) – after Dolgopolsky (1977) – a few stages can be identified:

- early Semitic had a contrast between glottalized emphatics and aspirated non–emphatics. This is the starting stage at which Ethiosemitic languages can still be found (i.e. ṭ [tʼ] vs. t [$t^h$]);
- as a consequence of a process of recession, the glottalic emphatics assume a secondary backed articulation, while the non–emphatics are distinguished by the additional trait of lack of backing (Stage 1);

- due to lenition, the emphatics progressively lose their glottalic feature (Stage 2), to the point that emphatics become defined by backing and lack of aspiration, opposite to their non–emphatic counterparts (Stage 3);
- because of the loss of aspiration contrast, emphatic and non–emphatic consonants are distinguished only through backing (stage 4). The last two stages are represented by most Arabic varieties spoken today (i.e. ṭ [tˤ] vs. t [t]), and of Berber languages outside of Semitic as well.

To sum up, Arabic backed emphatics developed through a process of relaxation of glottal adductive tension (Martinet 1959: 93–96). This model allows for a better comprehension of the peculiar variation found among the Semitic languages. Of peculiar interest is the case of MSAL, since their role in this context is crucial in that they constitute the missing link between early Semitic and Stage 4 (together with North–Eastern Neo–Aramaic varieties): in fact, they appear to cover Stages from 1 to 3.

As correctly summarized by Ridouane and Gendrot (2017: 144), understanding the real nature of MSAL emphatics was made hard by imprecise early reports, which partially failed to understand their phonetic realization and phonological patterning (Jahn 1902, 1905). Johnstone (1970, 1975) believed that the emphatic set of MSAL was post–glottalized and partially voiced – which, if it were correct, would have been a unicum in the languages of the world –, leaving to ambiguity whether he intended either weakly voiced or voiced for only a part of the sound. Johnstone inspired a considerable amount of phonetic and phonological work. Later authors agree in assigning large variability to the realization of MSAL emphatics: both glottalization and backing do take part into the realization of emphatics according to the phonetic environment of the segment and dialectal variation (Lonnet 1993; Lonnet and Simeone–Senelle 1997; Simeone–Senelle 2011; Watson and Bellem 2010; Watson 2012; Gasparini 2017; Watson, Heselwood et al. 2020).

Watson and Heselwood (2016: 7) state that 'authors to date describe voiced and emphatic (or glottalized/ejective) consonants contrasting with voiceless non–emphatic (or non–glottalized/non–ejective) consonants but fail to explain why voiced and emphatic consonants should form a natural class:' they argue that the major phonation distinction is between presence and absence of voiceless breath rather than voicing, proposing a contrast between constricted vs. unconstricted glottis. Ridouane and Gendrot (2017: 142) report that '[e]jectives were shown to pattern together with uvulars and pharyngeals as a natural class defined by the feature [+ low],' evidencing the fact that in MSAL ejectiveness and backing interact within the same phonological class (see also Watson and Bellem 2010: 346–347). This situation reflects that of states 1 to 3 described earlier, where a certain degree of backed articulation together with glottalization is implied. MSAL emphatics can be considered in transition

from a phonological system not far from Ethiosemitic towards an Arabic–like system. Since this is an ongoing process, each MSAL (or even each dialectal sub-variety) may be found at different stages with fuzzy boundaries: it is the case of Mehri, for example, where the voiceless stops *t* and *k* are usually aspirated, while the voiceless emphatic stops *ṭ* and *ḳ* are not; a backing effect on the surrounding vowels is triggered by the emphatics, which show considerable allophony: they may display a backed articulation, with optional ejective realization according to the environment, favoured in initial and pre-tonic position (Bellem 2014: 23). Emphatic (ejective) fricatives are way less widespread if compared to ejective stops, as expected by cross–linguistic comparison (Maddieson 2013). According to Maddieson (1998), ejective fricatives are 'disfavoured segments' from an articulatory and phonological perspective, due to the opposing properties of frication and glottal constriction. Within Afroasiatic, they are to be found only in MSAL and Tigrinya (Semitic), Xamtanga – Cushitic: see Fallon (2015) for an insight on the reconstruction of proto–Agaw ejectives – and Lagwan (Chadic) (Bouny 1977). Interest in MSAL fricative ejectives has been growing during the last decade (Watson and Heselwood 2016; Ridouane and Gendrot 2017; Gasparini 2017), while Shosted and Rose (2011) dealt with Tigrinya. Emphatic fricatives in MSAL show great variation both in acoustic and articulatory terms: for example, /ṣ/ 'exhibits significant VOT accompanied by no breath, which is typical of ejective stops and fricatives, in strong prosodic positions – i.e. usually at the onset of a stressed syllable; it frequently shows negative VOT in weak prosodic positions' (Watson and Heselwood 2016: 32), suggesting allophonic variation according to position, later confirmed by Ridouane and Gendrot (2017), who interpret dorsopharyngealization as a strategy to marginalize ejectiveness in fricatives, and Watson, Heselwood et al. (2020). It is thus possible to ascribe Mehri to Stages 1-3.

Baṭḥari, which is closely related to Mehri, shows a similar situation and allows for an acoustic investigation on the realization of emphatics. It also provides support for proposing a more detailed scale in the scale of phonological changes proposed by Bellem (2014) after Dolgopolsky (1977).

### 3.1 The phonology of emphatics in Baṭḥari

Table 1. shows the consonantal phonological inventory of Baṭḥari (adapted from Gasparini 2018):

| | | | Labial | Interdental | Alveolar | Lateral | Palatal | Velar | Pharyngeal | Laryngeal |
|---|---|---|---|---|---|---|---|---|---|---|
| Obstruents | Stops | Voiceless | | | t | | | k | | ʔ |
| | | Voiced | b | | d | | | g | | |
| | | Emphatic | | | ṭ | | | ḳ | | |
| | Fricatives | Voiceless | f | ṯ | s | ś | š | x | ḥ | h |
| | | Voiced | | ð | | | | ġ | ʕ | |
| | | Emphatic | | ð̣ | ṣ | ṣ́ | ṣ̌ | | | |
| Sonorants | Nasal | | m | | n | | | | | |
| | Liquids | | | | r | l | | | | |
| | Glide | | | | | | y | w | | |

*Table 1. Triads in Baṭḥari*

As expected, there is a three-way contrast between voiced, voiceless and emphatic elements at the velar and alveolar places of articulation (stops) and at the interdental and alveolar places of articulation (fricatives), whereas the palatal emphatic is only marginal and reconstructable only diachronically, since by all means it has merged with the lateral emphatic.

Emphatics pattern together with voiced obstruents and the glottal stop against voiceless, non-ejective (or breathed, Watson and Heselwood 2016) obstruents *f, h, ḥ, k, s, š, ś, t, ṯ, x*, similarly to what happens in Mehri: compare with Bendjaballah and Ségéral (2014), who describe this set of consonants through the term 'idle-glottis.' 'Breathed' consonants involve aspiration or the release of audible breath vs. 'unbreathed' consonants which do not involve aspiration on their release (Heselwood and Maghrabi 2015). This distinction treats the larynx as breath-regulator. The breathed phoneme class is active also in Baṭḥari and can be distinguished by the feature [+idle glottis] since the glottal area is not involved in the articulatory process. In Duanmu's (2016) terms, this would be Glottis-[+stiff]; we will use the [+ breathed] label as a cover term.

The effects of this patterning can be verified by observing the allomorphy of the definite article and verbal patterns. The prefixation of the definite article (which most often has an *e-* form) to a #C_ noun has different results, depending on the class to which C belongs:

*a)* e- + #C_ → əCC_ \ $C_{[+\ breathed]}$ (as in Mehri – Watson , Heselwood *et al.* 2020a)
*kədōt* → *əkkədōt* 'the dwelling'
*tét̠* → *əttét̠* 'the woman'
*śedḳ* → *əśśedḳ* 'the corner of the mouth'

vs.

*b)* e- + #C_ → eC \ $C_{[-\ breathed]}$
*ḳáṭaʃ* → *eḳáṭaʃ* 'the shared fishing area'
*ṣálaʃ* → *eṣálaʃ* 'the ribs'
*ġayg* → *aġayg* 'the man'

Two breathed consonants found in sequence within a verb root do not allow a short unstressed vowel (either *ə* or a) to appear between them (compare with Bendjaballah and Ségéral 2017). Below some verbs at the 3S.M of the Gb-stem[4] perfective, which follow the pattern $C_1v(v)C_2(v)C_3$:

*fesḥ* 'he permitted'
*nifx* 'he blowed'
*niṭḳ* 'he bit'

vs.

*ġērəḳ* 'he drowned'
*ġēlət̠* 'he made a mistake at speaking'
*wēṣaʃ* 'he ignited'

The Ĥ-Stem derivational stem features the prefixation of a *h- morpheme throughout the whole conjugation, according to the scheme *hv-$C_1ēC_2əC_3$ or *hv-$C_1əC_2ēC_3$, according to the type of Ĥ-Stem considered[5]. This *h- is normally realized as e-, but with a verb #$C_{[breathed]}$_ *h- is first assimilated and then elided due to syllabic structure constraint (as in *fēšər* < *ffēšər < *h-fēšər) – to be compared again with Mehri (Bendjaballah and Ségéral 2017). Some examples of this are:

[4] Gb-stem stands for Grundstamm (basic pattern) of the second type, as opposed to Ga-stems (see Dufour 2016).

[5] Five subtypes of Ĥ-Stems can be found in the language. They are distinguished according to stress position and presence or absence of a *-ən* suffix in the imperfective form. Only the perfective form is reported here.

*fōrək* 'he was angry with'
*kōməl* 'he finished'
*tōgər* 'he sold'
*kḥēl* 'to paint the rims of so.'s eyes with antimony'

vs.

*aḳātəl* 'he fished with hook and line'
*aśāməd* 'he used as bait'
*edḥēl* 'he pestered'

Now, we can focus our attention on the behaviour of /ṭ/. It must be pointed out that /ṭ/ can pattern phonologically both with the other voiced and emphatic consonants, as expected, and with breathed consonants, as in the following cases:

a. *optional* gemination caused by definite article prefixation[6]
*ṭádaʃ* → *aṭṭádaʃ* 'the back'
*ṭāsət* → *aṭṭāsət* 'the tin bowl'

b. assimilation and elision of *h-
*ṭārəb* 'he accepted so. under protection'
*ṭēbəḳ* 'he adhered to st.'
*ṭfēġ* 'he rinsed out the mouth'

instead of the expected forms **eṭádaʃ*, **eṭāsət*, **aṭārəb*, **aṭēbəḳ*, **aṭfēġ*. It needs to be remarked that the examples reported in (a) are in apparent free variation with non-geminated forms, and no apparent rationale behind this phenomenon has been individuated yet. The cases in (b) are probably due to /h/ clinging to $C_1$.

Occasionally, the constraint to the insertion of *ə* between $C_1$ and $C_2$ can be observed with the Ga-stem perfective form of roots having the phoneme *ḳ* in $C_1$ or $C_2$ due to the presence of a front-back C sequence, which deters the intrusive vowel:

*ḳhēb* 'he was at midday'

[6] Compare with Mahriyot, where emphatic /ṭ/ behaves like breathed consonants in gemination (Sima 2009:2). Compare also with Watson and Heselwood (2016: 13-14) and Watson, al-Mahri *et al.* (2020: 34-35).

*fḳād* 'he lost'

Regular forms occur with more frequency; furthermore, Ĥ-Stem verbs behave as expected:

*ḳəfō* 'he finished st.'
*səḳōf* 'he roofed over'
*aḳābəl* 'he kept an eye on'
*aḳātəl* 'he fished with hook and line'

If we now compare with what we find in Mehri (Watson, al-Mahri *et al.* 2020), a closely related MSAL variety, we can see that *ṭ* always behaves as an unbreathed emphatic:

*əṭayla* 'the going up'
*əṭām* 'the taste' (lack of doubling of *ṭ* after the article)
*aṭōbaḳ* 'he brought alongside'
*aṭyīn* 'he plastered with mud'
*həṭfūs* 'he made so. dirty' (maintaining of the h- prefix or its *a*- reflex)

However, in Baṭḥari *ṭ* can also pattern together with the other emphatics in that they trigger the lowering of the thematic vowel in II-emphatic Ga-stem verbs (i. e. *fḳād yəfaḳəd yəfḳād* 'to lose, mislay; to discover st. to be missing;' *bəśār yəbaśər yəbśēr* 'to tear, rip'). Below are reported some sample paradigms with perfective, imperfective and subjunctive 3S.M forms:

*ḥeḳāf yəḥéḳəf yəḥḳāf* '(mother) to try and deflect (usually) a father's anger'
*xaṭāf yəxaṭəf yəxṭāf* 'to pass by, go along'
*xaṭām yəxaṭəm yəxṭām* 'to tie up'
*xaṭār yəxaṭər yəxṭār* 'to travel'
*bəśāḳ yəbeśəḳ yəbśēḳ* 'to break st.'
*bəśār yəbaśər yəbśēr* 'to tear'

whereas the expected vowel for these verb forms would be *ō*:

*ḥəmōś yəḥimś yəḥmēś* 'to stir up trouble, spread dissension'
*kəlōṯ yəkilṯ yəklēṯ* 'to tell; to speak'
*gəsōr yəgísər yəgsēr* 'to feel at ease, feel relaxed with so.'
*rəgōz yərigəz yərgēz* 'to sing, sing and dance'

*stōl yəsitl yəstēl* 'to dismember, cut off, away'

Now, one may wonder what triggers the partial alignment of *ṭ* with breathed consonants. The fact that *ḳ* can sporadically behave in a similar fashion (with Ga-stem perfective forms) may suggest that emphatic stops may share some properties with breathed consonants, with *ṭ* being at a more advanced stage than *ḳ* in the process of assimilation. The reason behind this process needs then to be clarified.

It is safe to assume that the phonetic realization of the emphatics may be of relevance in this context. Gasparini's (2017: 82-83) preliminary observations on the emphatics in pre-tonic *ā* position reported that

> the only segment which regularly shows a fully ejective realization is /ḳ/ [...while] /ṭ/ occasionally shows ejective realization (concurrent with pharyngealization), but with a higher degree of variation than for /ḳ/. In intervocalic position only pharyngealization takes place.

The realization of the emphatic stops varies idiolectally between what Lindau (1984) and Kingston (2005) call 'stiff' vs. 'slack' ejectives (cf. also Wright *et al.* 2002), with the addition of evident pharyngealization at least in the case of *ṭ*. The status of the emphatic fricatives remained less clear, especially because of idiolectal variation and scarcity of material. After the examination of a wider amount of material, it can be said that these segments are generally realized as pharyngealized voiced fricatives: this feature causes the emphatic fricatives to always pattern with unbreathed consonants. The only position where a glottalized (in fact, pre-glottalized) realization is consistently found for the whole set of emphatics is in pre-pausal position. However, pre-pausal glottalization involves the whole class of unbreathed consonants and therefore it must be understood as a phonotactic rule of no interest for the current discussion.

The representation of the phonological features of Baṭḥari emphatics needs to consider both the phonological patterning of these segments and their phonetic realization; however, the ambiguous status of *ṭ* requires special treatment in order to fit it into a feature model.

### 3.2 Features of emphasis

We consider features to be articulatory gestures, 'where an articulator is a moveable part in the vocal tract whose gesture(s) can distinguish sounds' (Duanmu 2016: 103). The feature representation of non-pulmonic sounds such as ejectives and implosives is problematic, since they could be read as 'contour segments,' which are segments containing opposite values of the same feature (called 'contour

feature') (Sagey 1986). Furthermore, one may be left to wonder how complex segments such as Baṭḥari (or, more broadly, MSAL) emphatics may be rendered in a feature model.

For the definition of ejective segment, a feature [+ejection] was proposed by various scholars (Chomsky and Halle 1968: 323; Lloret 1988; Ladefoged 2007); however, such a choice still requires contour features. Indeed, ejectives apparently are complex sounds since they apparently involve a secondary articulation; however, they can still be represented as single sounds, since they usually occur 'with other sounds that provide some relevant features to complete the full ejective event' (Duanmu 2016: 139). Choosing to apply the 'one-sound' solution allows to take into consideration the phonological context in which emphatics are usually found and their phonetic properties. If we agree in defining a linguistic sound as 'a set of compatible feature values in one time unit' (Duanmu 2016: 122), as a consequence we should adopt Duanmu's (1994) No Contour Principle, a constraint according to which a sound cannot contain contour feature values (or sequential feature values): 'an articulator cannot act fast enough to perform two opposite gestures in one unit of time (and the ear probably cannot process two opposite values of the same feature in one unit of time either)' (Duanmu 2016: 125). Therefore, simplifying McCarthy's (1989) proposal and following Duanmu's (2016: 139) one–sound representation, one may analyse a sequence like [t'] as follows.

An ejective is produced through three sequential steps:

> *Steps in producing the ejective [t']* (adapted from Duanmu 2016:139)
> Step 1: preliminary step, where Larynx is not raised (possibly realized in the preceding segment); the status of Tip and Glottis are determined by the preceding segment, if any.
> Step 2: simultaneous closure of Tip and Glottis and raising of Larynx.
> Step 3: release of Tip and optional release of Glottis (i.e. when a vowel follows).

To clarify, the three steps composing an ejective do not need to be realized in the ejective itself, but the first step can be realized in the preceding sound and the third one in the following sound. The closure of the tongue body and glottis and the raising of Larynx can occur at the same time, the opening of Glottis is optional and when it occurs together with body release (for example with a following vowel), they can occur in the same step. We can thus consider the raising or lowering of the larynx as a measurable part of the phonetic system. These steps can be represented graphically according to the following feature representation scheme:

| | [1 | 2 | 3] |
|---|---|---|---|
| Tip-[stop] | | + | – |
| Larynx-[raised] | – | + | |
| Glottis-[stop] | | + | (–) |

According to the proposed representation, ejectives can be represented as single sounds if we accept the assumption that they always occur together with other sounds, which contribute with their own relevant features to the completion of the ejective event.

As for pharyngealized emphatics, we may propose to introduce the addition of the [–ATR] feature, which portrays the retraction of the tongue root typical of 'backed' articulations (Ladefoged and Maddieson 1996: 365), to the features of their plain counterparts. An emphatic like [tˤ] may be described as follows:

[tˤ]
Tip-[+stop]
Glottis-[+stiff]
Root-[–advanced]

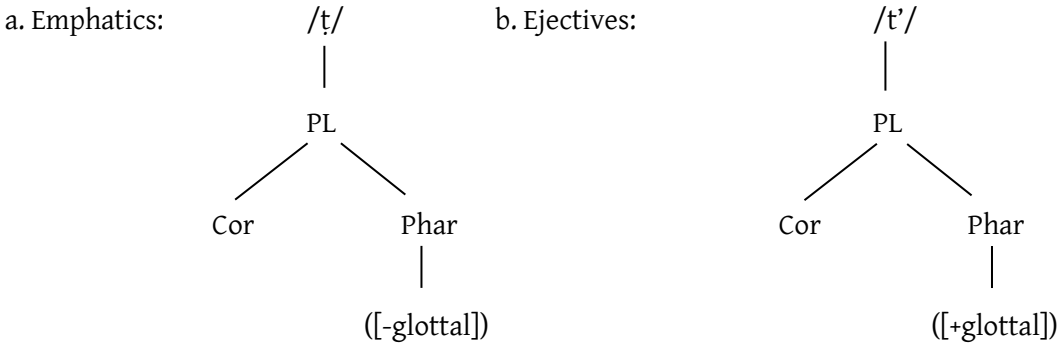
If we consider again Baṭḥari emphatics, according to what we reported earlier emphatic fricatives adhere to the latter characterization, with the Glottis feature being [–stiff] (which corresponds to [+voiced]) and with varying [location] values. In fact, Baṭḥari fricative emphatics cannot be considered proper ejectives and should be understood as pharyngealized segments instead.

The whole class of the unbreathed consonants thus becomes defined by the common feature [–stiff]. As for breathed consonants, Glottis-[+stiff] defines the unity of this class. We may now need to find a way to define *ṭ* in a way that may account for its patterning with both classes, and by doing so we shall deal with its mixed phonetic nature. A model as the following can serve our purpose:

| | | [ṭ] | |
|---|---|---|---|
| | [1 | 2 | 3] |
| Tip-[stop] | | + | – |
| Larynx-[raised] | – | + | |
| Glottis-[stop, stiff] | | + | (–) |
| Root-[advanced] | | (–) | (–) |

That is, we have introduced the Root-[–advanced] feature which accounts for an optional phonetic process of pharyngealization of the consonant and which is allowed from an articulatory point of view as a secondary gesture. Tongue root retraction may spread to the following vowel and be released after the vowel onset, as exemplified in step 3. The glottis is specified also for the [+stiff] feature which parallels the [+stop] one, since they co-occur at the same time, and unites *ṭ* with the class of breathed consonants, thus providing a valid reason for the peculiar patterning of *ṭ*. A similar view could be held for *ḳ*, with Body-[+stop] as place feature and a less frequent pharyngealization process.

McCarthy (1989) refers to the Pharyngeal place of articulation as the unifying feature of guttural consonants, and further specifies it with the dependent feature [±glottal] so to restrict the scope of Pharyngeal to true laryngeals, marking these as [+glottal] and true pharyngeals as [–glottal]. McCarthy (1989) considers Semitic emphatics to be complex segments redundantly marked [–glottal] when pharyngealized, and as [+glottal] when glottalized since they appear as true laryngeal sounds (see Lloret 1994: 127–128):




Our proposal deviates from McCarthy's characterization of Semitic emphatics in that it allows for the simultaneous qualification of Semitic emphatics as ejectives *and* pharyngealized. This way, there is not a dichotomic contrast between the two kinds of realization and the compresence of the two phenomena is allowed by the two independent features Larynx-[raised] and Root-[advanced]. The ambiguity of MSAL emphatics is thus solved, while at the same time the ejective realization of Ethiosemitic and the pharyngealized realization of Arabic, for example, can be considered harmoniously.

### 3.3. Back to Semitic emphasis and beyond

According to the evidence hereby portrayed, it seems necessary to posit a further stage between Bellem's (2014) stages 3 and 4 as reported earlier. Such a hypothetical stage would require a split in the

emphatic system, according to which only the ejective stops *k' and *t' maintain a proper laryngeal (ejective) quality, whereas the fricatives acquire a completely backed feature. Of the ejective stops, *t' is the first to undergo backing because the velar place of articulation is favoured for ejectives. This would explain both the case of Baṭḥari within the Semitic picture and the favoured retention of the ejective *k' versus the phonological patterning of *ṭ* with breathed consonants. *k' is of peculiar relevance since across Afroasiatic and especially in Semitic it has undergone voicing in many cases (Fallon 2002: 369). It is tempting to see this process as the basis of the distinction between *qāl* vs. *gāl* dialects of Arabic, demonstrating that Arabic emphatics were ejectives in its early stages – but such research has yet to be performed and thus has not been proved yet. Interestingly, no possible comparison was found with any Ethiosemitic language, which makes the case of MSAL and Baṭḥari even more peculiar.

To re-assess the topic of emphasis in Semitic from an Afroasiatic perspective, we may need to take into consideration the class of implosives, which is well-represented in the Chadic and, partially, in the Cushitic branch.

### 3.3.1 Implosives in Afroasiatic

Most feature theories – except for Clements and Osu (2002) – analyse implosives as obstruents, which are distinguished by an extra laryngeal feature. We will follow again Duanmu (2016:139) by saying that implosives are characterized by the Larynx-[–raised] feature. The high presence of bilabial and alveolar implosives was invoked as one of the distinguishing features of Greenberg's tentative 'Nuclear African area' (Greenberg 1959, 1983), and later of the 'Sudanic belt' by Clements and Rialland (2007: 40-41). According to them, these segments are twelve times commoner in the Sudanic belt than elsewhere in the world. Implosives are a feature peculiar to Chadic and, to a certain extent, to Cushitic. Generalizing over the data we examined, Chadic languages tend to contrast three series of stops (voiced, voiceless and implosive) at up to four places of articulation. Nearly all Chadic language have the implosives /ɓ/ and /ɗ/ (which are reconstructed for Chadic (Haruna 1995: 138) – while seldomly they have an additional palatal /ʄ/ or, in only one case (Tera: see Tench 2007) velar /ɠ/ implosive. The latter has most often developed as an ejective /k'/ or /q/ in Cushitic. See for example:

> Proto-East Cushitic *k'andʒ- 'udder' > Burji *k'ánʔ-i, k'ánɗ-i* 'clitoris;' Somali *qanj-iḍ* 'lymphatic gland;' Daasanach *ɠan-* 'udder;' Konso *qanɗ-itta* 'udder; swollen or abnormally big gland;' Hadiyya *gan-ce* 'udder;' Gollango *ɠan-te* 'udder.' East Cushitic: Kambata *k'an-* 'to

> suck (tr.), to nurse (intr.),' *k'an-s-* 'to nurse (tr.);' Sidamo *k'an-* 'to suck (tr.), to nurse (intr.),' *k'an-s-* 'to nurse (tr.)' (Bomhard 2014: 206).

A common feature of Chadic implosives is that voicing is not distinctive (Ladefoged 1968: 6). As for Semitic, there is the sole occurrence of the alveolar implosive /ɗ/ segment in Zay. However, it is a marginal phoneme appearing only in loanwords from Cushitic languages, especially from Oromo (Meyer 2005), due to the speakers' high rate of multilingualism. Furthermore, implosives in the non–basic lexicon of peripheral varieties of Arabic, such as Nigerian and Chadian Arabic (Owens 1985) and Djogari, a sub–dialect of the Bukharan area in Uzbekistan (Tsereteli 1939), and in Eastern Libyan Arabic as realizations of emphatic /ṭ/ (Rakas 1981) can be found. These occurrences were not considered since they undoubtedly are the consequence of extensive contact with other local languages and, in the case of Eastern Libyan, a specific local development. Notwithstanding these cases, the basic assumption that Semitic languages do not have implosives can be held true.

According to Bomhard (2008:83) – and already Martinet (1975) – the implosives extensively found in Chadic languages 'can be seen as having developed from earlier ejectives at the Proto–Chadic level' through a process of 'anticipation of the voice of the following vowel,' giving p' t' k' > ɓ ɗ ʄ. For this reason, it is possible to posit another typological trajectory of development of segments comparable to Semitic emphatics in the rest of Afroasiatic parallel to Dolgopolsky's model – discussion over this aspect is left to the Conclusions.

Ejectives and implosives often co-occur in Cushitic and Omotic. In the languages belonging to these groups which do not have glottalic consonants, the implosives are usually realized as retroflex /ɖ/ and uvular /q/ instead, such as in Somali and Afar (Sasse 1992: 326). It is argued that ejectives were lost diachronically in certain branches of Cushitic, and especially Agaw, but reintroduced through contact with Ethiosemitic (Crass 2002; Fallon 2015), and in fact ejectives apart from /k'/ occur predominantly in loanwords from Amharic and Tigrinya leaving their phonemic status problematic. Furthermore, it must be added that some languages of the Goemai West Chadic group have developed an ejective consonant series /p'/, /t'/ which contrast with the implosive series, but this is said to be a recent innovation with no historical relevance (Newman 2006: 192).

Ejective and implosive consonants appear to be in complementary distribution in some of these languages, while in others they don't. One may wonder about the possibility that the occurrence of both ejectives and implosives could be a hint of their patterning as a single class of glottalic elements. There seems to be language–specific variation on this matter: as an example, in a language such as Ts'amakko (Cushitic) ejectives and implosives clearly pattern together in a glottalic class. Let us examine its inventory of glottalic sounds and their plain counterparts as reported in Savà (2005: 19):

| | Bilabial | | Alveolar | | Palatal | | Velar | | Uvular | |
|---|---|---|---|---|---|---|---|---|---|---|
| | v– | v+ | v– | v+ | v– | v+ | v– | v+ | v– | v+ |
| Stops | p | b | t | d | c | | k | g | | |
| Fricatives | | | s | z | š | ž | | | x | |
| Glottalics | | ɓ | ts’ | ɗ | c’ | | | ɠ | q’ | |

*Table 2. Phonetic inventory of Ts'amakko*

Savà puts both implosives and ejective segments under the generic label ‘glottalic,’ suggesting their patterning in the same phonological class – with good reason: in fact, various allophonic processes result in free alternation between ejectives and implosives. As an example, ‘the articulation of the uvular ejective /q’/ may be implosive. There are two implosive realisations, [...] voiced uvular implosive [ɠ] ~ voiceless uvular implosive [ʛ̥], as in /q’eed/ [ʛ̥e:d ˜] lick!’ (Savà 2005:32). Furthermore, ‘when /ɗ/ is geminated one clearly perceives a glottal stricture before the release of the stop, which is postalveolar and apical’ (Savà 2005: 32), according to the rule /ɗɗ/ > [ˀɖ:][+postalveolar], as in /muɗɗe/ [muˀɖ:e] ‘handle of a headrest.’ The implosive /ʄ/ can have a devoiced realization and ‘[a] preceding /l/ may cause reduction of /ɗ/ to glottal stop’ (Savà 2005: 32). Therefore, we may portray Ts’amakko glottalics as being distinguished as a phonological class by an unspecified active larynx-[raised] feature.

Another example is Hausa (Cushitic). Hausa has a set of glottalized phonemes contrasting with voiced and voiceless plosives (Newman 2000: 392). Glottalized phonemes appear to pattern together with obstruents in that they can co-occur within the same word and trigger gemination in CC clusters, while sonorants do not.

A further example is Aari (Omotic) with the following inventory of glottalics (Hayward 1990: 429):

| | | Labial | Dental | Alveolar | Palatal |
|---|---|---|---|---|---|
| Plosive/ Affricate | voiced | b | d | | |
| | voiceless | p | t | ts | t͡ʃ |
| | glottalic | p’ | d’ | ts’ | t͡ʃ’ |

*Table 3. Glottalized consonants in Aari*

Hayward uses the ejective spelling for the whole set of glottalics, but he also notes that /p'/ has a partially–devoiced implosive [ɓ] realization and that /d'/ is a fully voiced implosive [ɗ]. Ejectives and implosives in Aari can be said to pattern under a generic 'glottalic' class.

As we have seen, it is far from uncommon to encounter oscillation between implosive and ejective realizations of the same segment at the phonetic level. An interesting case is that of Wellegga Oromo (Cushitic). Lloret (1995:261) reports a case of implosivization of the coronal ejective when it comes in contact with a following nasal, undergoing methatesis and implosivization: fit'–na > finɗa 'we finish,' lit'–na > linɗa 'we enter.' Another instance of a phonotactic process involving glottalics is found in Dime (Omotic), where /ɗ/ appears in alternation with /t'/ (Seyoum 2008: 12), a common feature of the Aaroid languages (Bender 1988: 124).

On the other hand, some languages can contrast an ejective with an implosive at the same place of articulation. We can have a closer look at the inventory of Dahalo (Cushitic). Dahalo has an apparently extraordinary wide set of phonemes– 65 phonemes in Maddieson *et al.* (1993), 50 in Tosco (1991) – but this complicated system seems caused mainly by allophonic and contact phenomena. If, following Tosco (1991: 8-9), we take in consideration only the consonants which can appear in stem-final position, and that therefore we can consider as part of the 'core-system' of the language, we find out that only 27 consonants can occur. Of these, we show the series showing a laryngeal contrast which involves glottalic consonants:

| | | Bilabial | Dental | alveolar | Velar | |
|---|---|---|---|---|---|---|
| | | | | | plain | round |
| Stop | voiceless | p | t | | k | $k^w$ |
| | voiced | b | d | | g | |
| | ejective | p' | t' | | k' | |
| | implosive | | ɗ | | | |
| Lateral | voiceless | | | ɬ | | |
| | voiced | | | l | | |
| | ejective | | | tɬ' | | |

*Table 4. Glottalized consonants in Dahalo*

One should look at the other phonemic distinctions as peripheral and not pertaining to the core phonological system of the language. The apparently striking simultaneous presence of dental and alveolar obstruents is the consequence of language contact: in fact, the set of alveolars is seen by Tosco

(1992: 145) as a borrowing from Bantu languages, since Cushitic languages usually have dental rather than alveolar stops and alveolars are found mainly in loanwords (and therefore they are excluded in table 4). Notably, Dahalo contrasts between ejective /p'/ and implosive /ɓ/, and between ejective alveolar /t'/ and implosive alveolar /ɗ/. This means that the patterning of implosives and ejectives under the same phonological class is not a linguistic universal.

This situation recalls the one described by Lloret (1997) for Oromo. She reports that

> [t]he fact that Oromo has /t'/ as well as /d'/ is another rarity, because if a language displays an ejective series it usually does not have implosives at the same point of articulation. In fact, most other Cushitic languages only present either the implosive/retroflex segment (e.g. Saho-Afar, Somali, Konso) or the ejective one (e.g. Hadiyya). Only one other Cushitic language presents both segments, namely Dullay (Gawwada and Gollango) (Lloret 1997: 501)

According to Lloret, it is difficult to group the glottalic sounds of Oromo as required by the phonology of the language. The activation of McCarthy's Pharyngeal articulator in ejectives and implosives 'depends on specific contrasts that languages make within the guttural series' (Lloret 1997: 132). However, these last remarks do not subtract validity to the general statement that the activation of the Larynx-[raised] feature characterizes Afroasiatic in general, notwithstanding the direction of this process: implosives can thus be understood as another diachronic manifestation of emphasis.

## 4. Conclusions

Re-introducing Afroasiatic in the picture, we can now re-work Dolgopolsky's (1977) and Bellem's (2014) typological scale as follows:

- Afroasiatic has a former contrast between glottalized and plain segments (Stage Ø). The Larynx-[raised] feature, where maintained, can either keep its positive [+raised] value or be activated in the opposite direction [–raised], as happened in Chadic;
- early Semitic had a contrast between glottalized emphatics and aspirated non–emphatics;
- because of a process of recession, the glottalic emphatics activate the [–ATR] feature as a secondary articulation. The non–emphatics are distinguished by the lack of this feature (Stage 1). This stage is not necessarily clear-cut, however, and can cause a split in the phonological behavior of the emphatics, leading to a progressive loss of the glottalic feature due to lenition (Stage 2), to the point that emphatics become defined by backing and lack of aspiration, opposite to their non–emphatic

counterparts (Stage 3). Baṭḥari (together with the rest of MSAL, tentatively) is found between stage 1 and stage 3 (see also Bellem 2014);

- because of the loss of aspiration contrast, emphatic and non–emphatic are distinguished only through backing (Stage 4).

To conclude, this study aimed to give a portrait of the development of emphasis in Semitic by using original data from one MSAL language, Baṭḥari, and adopting a broad phonological perspective. Furthermore, we tried to put in relation the Semitic process to the rest of Afroasiatic, individuating a phonological explanation for the development of implosives in other branches. MSAL emphatics surely are of extreme importance for the reconstruction of the historical development of Semitic emphatics and we hope that this paper showed how working on under-represented languages may lead to new perspectives and findings within the field.

## References

Ballard, William. L. 1975. "Aspects of Yuchi morphophonology." In: *Studies in Southeastern Languages*, edited by James M. Crawford, 163-187. Athens: University of Georgia Press.

Bellem, Alex. 2014. "Triads, Emphatics and Interdentals in Arabic Sound System Typology." *Journal of Semitic Studies Supplement* 34: 9-41.

Bender, Lionel. M. 1988. "Proto–Omotic Phonology and Lexicon." In: *Chushitic–Omotic Papers from the International Symposium on Chushitic and Omotic languages, Cologne, January 6–9, 1986*, edited by Marianne Bechhaus–Gerst and Fritz Serzisko, 121-159. Hamburg: Helmut Buske.

Bendjaballah, Sabrina and Philippe Ségéral. 2014. "The phonology of 'idle glottis' consonants in the Mehri of Oman (Modern South Arabian)." *Journal of Semitic Studies* 59/1: 161-204.

Bendjaballah, Sabrina and Philippe Ségéral. 2017. "The vocalic system of the Mehri of Oman." In: *Journal of Afroasiatic Languages and Linguistics* 9/1: 160-190 (edited by Sabrina Bendjaballah and Philippe Ségéral). Leiden: Brill.

Bleek, William. H. I. 1962. *A Comparative Grammar of South African Languages, part I: Phonology*. London: Trübner and Co. (original: 1862).

Bomhard, Allan. R. 1988. "The Reconstruction of the Proto–Semitic Consonant System." In: *Fucus. A Semitic/Afrasian Gathering in Remembrance of Albert Ehrman*, edited by Yoël Arbeitman, 113-140. Amsterdam: John Benjamins.

Bomhard, Allan. R. 2008. "A Sketch of Proto–Afrasian Phonology." In: *Semito–Hamitic Festschrift for A. B. Dolgopolsky and H. Jungraithmayr*, edited by Gábor Takács, 79-92. Berlin: Dietrich Reimer.

Bomhard, Allan. R. 2014. *Afrasian Comparative Phonology and Morphology*. Charleston, SC. Published on-line under a Creative Commons License.

Borg, Alexander. 1997. Maltese Phonology. In: *Phonologies of Asia and Africa, 1*, edited by Alan S. Kaye, 245-285. Winona Lake: Eisenbrauns.

Bouny, Paule. 1977. "Inventaire phonetique d'un parler Kotoko: le Mandagué de Mara." In: *Etudes Phonologiques Tschadiennes*, edited by Jean-Pierre Caprile (ed.), 59-77. Paris: SELAF.

Cantineau, Jean. 1952. "Le consonantisme du sémitique." *Semitica* 4: 79-94.

Cantineau, Jean. 1960. *Études de linguistique arabe*. Paris: Klincksieck.

Chomsky, Noam and Morris Halle. 1968. *The Sound Pattern of English*. New York: Harper and Row.

Clements, George N. and Sylvester Osu. 2002. "Explosives, implosives and nonexplosives: the linguistic function of air pressure differences in stops." In: *Laboratory phonology* 7 (edited by Carlos Gussenhoven and Natasha Warner): 299-350. Berlin: De Gruyter.

Clements, George N. and Annie Rialland. 2007. "Africa as a phonological area." In: *A Linguistic Geography of Africa*, edited by Bernd Heine and Derek Nurse, 36–85. Cambridge: Cambridge University Press.

Cohen, David. 1968. "Langues chamito-sémitiques." In: *Le langage*, edited by André Martinet, 1288–1330. Paris: Éditions Gallimard.

Crass, Joachim. 2002. "Ejectives and pharyngeal fricatives: Two features of the Ethiopian language area." In: *Ethiopian Studies at the End of the Second Millennium. Proceedings of the 14th International Conference of Ethiopian Studies, November 6!11, 2000, Addis Ababa*, edited by Baye Yimam, Richard Pankhurst, David Chapple, Yonas Admassu, Alula Pankhurst, and Berhanu Teferra, 1679-1691. Addis Ababa: Institute of Ethiopian Studies.

Crawford, James. M. 1973. "Yuchi phonology." *International Journal of American Linguistics* 39/3: 173-179.

Demolin, Didier. 2002. "The search for primitives in phonology and the explanation of sound patterns: The contribution of fieldwork studies." In: *Laboratory phonology* 7 (edited by Carlos Gussenhoven and Natasha Warner): 455-514. Berlin: De Gruyter.

Diakonoff, Igor. M. 1965. *Semito-Hamitic Languages*. Moscow: Nauka.

Dolgopolsky, Aharon B. 1977. "Emphatic Consonants in Semitic." *Israel Oriental Studies* 7: 1-13.

Duanmu, San. 2016. *A theory of phonological features*. Oxford: Oxford University Press.

Dufour, Julien. 2016. *Recherches sur le verbe subarabique modern*. Habilitation sous la direction de M. Gilles Authier, EPHE. École Pratique des Hautes Études.

Everett, Caleb. 2013. "Evidence for Direct Geographic Influences on Linguistic Sounds: The Case of Ejectives." *PLoS ONE* 8/6: e65275.

Fallon, Paul D. 2002. *The Synchronic and Diachronic Phonology of Ejectives*. New York: Routledge.

Fallon, Paul D. 2015. "Coronal Ejectives and EthioSemitic Borrowing in Proto–Agaw." In: *Selected Proceedings of the 44th Annual Conference on African Linguistics*, edited by Ruth Kramer, Elizabeth C. Zsiga and One Tlale Boyer, 71-83. Somerville: Cascadilla Proceedings Project.

Ferguson, Charles A. 1970. "The Ethiopian Language Area." *Journal of Ethiopian Studies* 8/2: 67-80.

Gasparini, Fabio. 2017. "Phonetics of Emphatics in Bathari." In: *RiCOGNIZIONI. Rivista di Lingue e Letterature straniere e Culture moderne* 7 (edited by Simone Bettega and Fabio Gasparini), 69-85.

Gasparini, Fabio. 2018. *Baṭḥari language of Oman: Towards a descriptive grammar.* PhD dissertation, Naples: Università "L'Orientale" di Napoli.

Greenberg, Joseph H. 1959. "An axiomatization of the phonologic aspect of languages." In: *Symposium on sociological theory*, edited by Lewellyn Gross, 437-482. New York: Harper and Row.

Greenberg, Joseph H. 1983. "Some areal characteristics of African languages." In: *Current Approaches to African Linguistics* 1 (edited by Ivan R. Dihoff): 3–21. Dordrecht: Foris.

Halle, Morris and Kenneth J. Stevens. 1971. "A note on laryngeal features." *Quarterly Progress Report* 101: 198-213.

Haruna, Andrew. 1995. On glottalic consonants in Chadic. In: Dymitr Ibriszimow, Rudolf Leger in collaboration with Gerald Schmitt (eds.), Studia Chadica et Hamitosemitica (Akten des Internationalen Symposions zur Tschadsprachenforschung Johann Wolfgang Goethe-Universität, Frankfurt am Main, 6.-8. Mai 1991), 138–162. Köln: Rüdiger Köppe.

Hayward, Richard J. 1990. "Notes on the Aari Language." In *Omotic Language Studies*, edited by Richard J. Hayward, 425-493. London: School of Oriental and African Studies, University of London.

Henton, Caroline, Peter Ladefoged and Ian Maddieson. 1992. "Stops in the world's languages." *Phonetica* 49: 65-101.

Heselwood, Barry and Reem Maghrabi. 2015. "An instrumental-phonetic justification for Sībawayh's classification of ṭā', qāf and hamza as majhūr consonants." *Journal of Semitic Studies* 60: 131-175.

Huehnergard, John. 2005. "Features of Central Semitic." In: *Biblical and Oriental Essays in Memory of William L. Moran*, edited by Augustinus Gianto, 155-120. Roma: Pontificium Institutum Biblicum.

Jahn, Alfred. 1902. *Die Mehri–Sprache in Südarabien. Texte und Wörterbuch.* Wien: Hölder.

Jahn, Alfred. 1905. *Grammatik der Mehri–Sprache in Südarabien.* Wien: Hölder.

Javkin, Hector. 1977. "Towards a phonetic explanation for universal preferences in implosives and ejectives." *Proceedings of the Berkeley Linguistics Society* 3: 559-565.

Johnstone, Thomas M. 1970. "A definite article in the Modern South Arabian languages." *Bulletin of the School of Oriental and African Studies* 33: 295-307.

Johnstone, Thomas M. 1975. "Contrasting articulations in the Modern South Arabian Languages." In: *Hamito–Semitica. Proceedings of a Colloquium held at the School of Oriental and African Studies, University of London, on the 18th, 19th and 20th of March 1970*, edited by James Bynon and Linguistics Association of Great Britain / Historical Section, 155–159. Le Hague: Mouton.

Kingston, John. 2005. "The phonetics of Athabaskan tonogenesis." In: *Athabaskan Prosody*, edited by Sharon Hargus and Keren Rice, 137-184. Amsterdam: John Benjamins.

Kogan, Leonid. 2011. "Proto–Semitic Phonology and Phonetics." In: *The Semitic languages: an international handbook*, edited by Stephan Weninger, 54-151. Berlin: De Gruyter.

Ladefoged, Peter. 1968. *A Phonetic Study of West African Languages.* London: Cambridge University Press.

Ladefoged, Peter. 2007. "Articulatory Features for Describing Lexical Distinctions." *Language* 83/1: 161-180.

Ladefoged, Peter and Ian Maddieson. 1996. *The Sounds of the World's Languages*. Oxford: Blackwell.

Lindau, Mona. 1984. "Phonetic differences in glottalic consonants." *Journal of Phonetics* 12: 147–55.

Linn, Mary S. 2000. *A grammar of Euchee (Yuchi)*. PhD dissertation. Ann Arbor: UMI.

Lloret, Maria-Rosa. 1988. *Gemination and vowel length in Oromo morphophonology*. PhD dissertation, Bloomington: Indiana University.

Lloret, Maria-Rosa 1994. "On the representation of ejectives and implosives." In: *Phonologica 1992: proceedings of the 7th international phonology meeting*, edited by Wolfgang U. Dressler, Martin Prinzhorn and John R. Rennison, 123-133. Torino: Rosenberg and Sellier.

Lloret, Maria-Rosa 1995. "The Representation of Glottals in Oromo." *Phonology* 12/2: 257–280.

Lloret, Maria-Rosa 1997. "Oromo Phonology." In: *Phonologies of Asia and Africa* 1, edited by Alan S. Kaye and Peter T. Daniels, 493-519. Winona Lake: Eisenbrauns.

Lonnet, Antoine. 1993. "Quelques résultats en linguistique sudarabique moderne." *Quaderni di Studi Arabi* 11: 37–82.

Lonnet, Antoine and Marie-Claude Simeone–Senelle. 1997. "La phonologie des langues sudarabiques modernes." In: *Phonologies of Asia and Africa (Including the Caucasus)* 1, edited by Alan S. Kaye, 337-372. Winona Lake: Eisenbrauns.

Loprieno, Antonio. 1995. *Ancient Egyptian: A linguistic introduction*. Cambridge: Cambridge University Press.

Maddieson, Ian. 1984. *Patterns of sounds*. Cambridge: Cambridge University Press.

Maddieson, Ian. 1998. "Why make life hard? Resolutions to problems of rare and difficult sound types." *UCLA Working Papers in Phonetics* 96: 106–118.

Maddieson, Ian. 2013. "Glottalized Consonants." In: *The World Atlas of Language Structures Online*, edited by Matthew S. Dryer and Martin Haspelmath. Leipzig: Max Planck Institute for Evolutionary Anthropology.

Maddieson, Ian, Siniša Spajić, Bonny Sands and Peter Ladefoged. 1993. "Phonetic structures of Dahalo." In: *UCLA working papers in phonetics: Fieldwork studies of targeted languages* 84 (edited by Ian Maddieson): 25-65, Los Angeles: The UCLA Phonetics Laboratory Group.

Martinet, André. 1953. "Remarques sur le consonantisme sémitique." *Bulletin de la Societé de Linguistique de Paris* 49: 67-78.

Martinet, André. 1959. "La palatalisation 'spontanée' de g en arabe." *Bulletin de la Societé Linquistique de Paris* 54: 90-102.

Martinet, André. 1975. *Évolution des langues et reconstruction*. Paris: PUF.

McCarthy, John J. 1989. *Guttural Phonology*. Amherst: University of Massachusetts.

Meyer, Ronny. 2005. *Das Zay: Deskriptive Grammatik einer Ostguragesprache (Äthiosemitisch)*. Köln: Rüdiger Köppe.

Meyer, Ronny and H. Ekkehard Wolff, H. 2019. "Afroasiatic Linguistic Features and Typologies." In: *The Cambridge Handbook of African Linguistics*, edited by H. Ekkehard Wolff, 246-325. Cambridge: Cambridge University Press.

Miller, Kirk. 2020. "False Alarms: Spurious Reports of Click Consonants." In: *Click Consonants*, edited by Bonny Sands, 438-443. Leiden: Brill.

Moeng, Emily and William Carter. 2019. "Factors in the affrication of the ejective alveolar fricative in Tigrinya." In: *Theory and description in African Linguistics: Selected papers from the 47th Annual Conference on African Linguistics*, edited by Emily Clem, Peter Jenks and Hannah Sande, 269-285. Berlin: Language Science Press.

Moscati, Sabatino (ed.) 1964. *An Introduction to the Comparative Grammar of the Semitic Languages.* Wiesbaden: Harrassowitz.

Newman, Paul. 2000. *The Hausa Language: An Encyclopedic Reference Grammar*. New Haven: Yale University Press.

Newman, Paul. 2006. "Comparative Chadic revisited." In: *West African Linguistics: Papers in Honor of Russel G. Schuh*, edited by Paul Newman and Larry M. Hyman, 188-202. Columbus: Ohio State University.

Owens, Jonathan. 1985. "Arabic Dialects of Chad and Nigeria." *Zeitschrift Für Arabische Linguistik* 14: 45–61.

Rakas, Mohammed S. 1981. *Phonological consonants and phonetic vowels in Eastern Libyan*. New University of Ulster. Unpublished M.A. thesis.

Ridouane, Rachid and Cédric Gendrot. 2017. On ejective fricatives in the Mehri of Oman. In: *Journal of Afroasiatic Languages and Linguistics* 9/1 (edited by Sabrina Bendjaballah and Philippe Ségéral): 160-190. Leiden: Brill.

Sagey, Elizabeth C. 1986. The representation of features and relations in nonlinear phonology. PhD dissertation. MIT.

Sasse, Hans–Jürgen. 1992. "Cushitic languages." In: *j*, edited by William Bright, 326–330. New York: Oxford University Press.

Savà, Graziano. 2005. *A Grammar of Ts'amakko*. Cologne: Rüdiger Köppe Verlag.

Seyoum, Mulugeta. 2008. *A grammar of Dime*. PhD dissertation. Leiden: Leiden University.

Shosted, Ryan K. and Sharon Rose, S. 2011. "Affricating ejective fricatives: The case of Tigrinya." *Journal of the International Phonetic Association* 41/1: 41–65.

Sima, Alexander. 2009. *Mehri-Texte aus der jemenitischen Sharqīyah: Transkribiert unter Mitwirkung von Askari Sa'd Hugayrān*. Edited, annotated and introduced by Janet C.E. Watson and Werner Arnold. Wiesbaden: Harrassowitz.

Simeone-Senelle, Marie-Claude. 2011. "Modern South Arabian." In: *The Semitic Languages: An International Handbook*, edited by Stefan Weninger, 1073-1113. Berlin: De Gruyter.

Steiner, Richard. C. 1982. *Affricated ṣade in the Semitic languages*. New York: American Academy for Jewish Research.

Tench, Paul. 2007. Tera. *Journal of the International Phonetic Association* 37/2: 227-234.

Tosco, Mauro. 1991. *A Grammatical Sketch of Dahalo (including texts and a glossary).* Hamburg: Helmut Buske.

Tosco, Mauro. 1992. "Dahalo: an Endangered Language." In: *Language Death: Factual and Theoretical Explorations*, edited by Matthias Brenzinger, 137-155. Berlin: Mouton de Gruyter:.

Tosco, Mauro. 2000. "Is there an 'Ethiopian Language Area'?" *Anthropological Linguistics* 42/3: 329–365.

Tsereteli, George V. 1939. "Materialy dl'a izučenija arabskix dialektov Srednej Azii." *Zapiski Instituta Vostokovedov Akademii Nauk SSSR* 7: 254-283.

Ullendorff, Edward. 1951. "Studies in the Ethiopic syllabary." *Africa: Journal of the International African Institute* 21/3: 207-217.

Urban, Matthias and Steven Moran. 2021. "Altitude and the distributional typology of language structure: Ejectives and beyond." *PLoS ONE* 16/2: e0245522.

Watson, Janet C. E. 2012. *The Structure of Mehri.* Wiesbaden: Harrassowitz.

Watson, Janet C. E. and Alex Bellem. 2010. "A Detective Story: Emphatics in Mehri." In *Proceedings of the Seminar for Arabian Studies* 40: 345-356.

Watson, Janet C. E. and Barry Heselwood. 2016. "Phonation and glottal states in Modern South Arabian and San'ani Arabic." In: *Perspectives on Arabic Linguistics* XXVIII: Papers from the Annual Symposium on Arabic Linguistics, edited by Y. Haddad and E. Potsdam, 3-36. Gainesville, Florida, 2014. Amsterdam: John Benjamins.

Watson, Janet C. E., Barry Heselwood, Gisela Tomé Lourido, Abdullah al–Mahri, and Andrea Boom. 2020. *Context is (almost) everything: Emphatics in Mehri*. Conference paper. Online workshop on Language and Nature in Southern Arabia, 27–10–2020.

Watson, Janet C. E., Abdullah M. al-Mahri, Ali al-Mahri, Bxayta M. B. K. al-Mahri and Ahmed M. al-Mahri. 2020. *Təghamk Āfyət: A Course in the Mehri of Dhofar*. Wiesbaden: Harrassowitz.

Wedekind, Klaus. 1994. "Ethiopian Semitic languages." In: *The encyclopedia of language and linguistics*, edited by Ronald E. Asher, 1148-1149. Oxford: Pergamon Press.

Wright, Richard, Sharon Hargus and Katharine Davis. 2002. "On the categorization of ejectives: Data from Witsuwit'en." *Journal of the International Phonetic Association* 32/1: 43–77.

Zaborski, Andrzej. 2010. "What is New in Ethiopian and other African Language Areas?" *Studies in African Languages and Cultures* 44: 29-45.

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