

Meroitic – an Afroasiatic language?*

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0 Introduction

Research into the classification of Meroitic within a language family has consistently focused upon the Nilo-Saharan phylum (Trigger 1964, 1977, Bender 1981a, Hintze 1989, Peust 1999a, Aubin 2003, Rilly 2003, 2004a, 2005). However, this paper puts forward the proposal that the investigation should instead be concentrated on the Afroasiatic phylum. This is due to the process of consonantal compatibility restrictions being evident across languages within the Afroasiatic phylum, and that through the investigation set forward in this paper, it is found that these restrictions also exist in the Meroitic language.¹ This investigation rests upon the firmest known aspect of the language, namely the phonemic values of the signs and their distribution.

This paper discusses the literature on the proposed linguistic association of Meroitic with other languages. It is evidenced here that research into the linguistic association of Meroitic has focused specifically on the Nilo-Saharan phylum because data used in a paper by Zhylarz (1930) to show an affinity between Meroitic and Afroasiatic was discredited (Hintze 1955). Subsequently, so was the line of inquiry into Meroitic being a member of the Afroasiatic phylum.

The process of consonantal compatibility restrictions in languages across the Afroasiatic phylum is explained through subsections on a selection of these languages. This discussion then leads on to the core analysis of these restrictions in the Meroitic language. Further evidence is given which shows that the affiliation of Meroitic with the Nilo-Saharan Nubian language should finally be abandoned as this proposal consistently reappears even though it has drawn no conclusive evidence in the hundred years in which it has been constantly investigated.

This paper is a small part of an investigation into Meroitic phonology that has wider implications for any linguistic analysis of the language. The investigation into consonantal compatibility restrictions was initiated through a reanalysis of a long-held supposition of the representation of the Meroitic vowel sign - *e* (Rowan 2006).

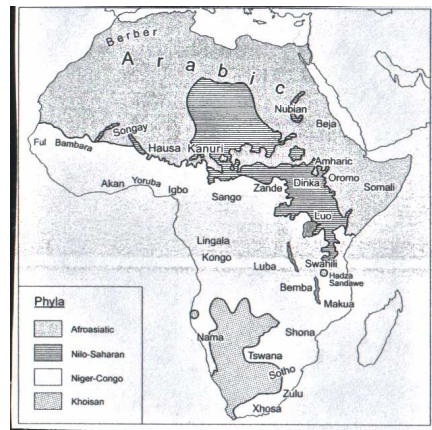
1 African Languages' Classification

As this paper specifically re-examines the association of the Meroitic language within two of the four major African language phyla, namely Nilo-Saharan and Afroasiatic, a geographical positioning of these phyla is given (fig. 1). The Kingdom of Kush 900BC – 320AD (variously known as the Kingdom of Napata and Meroe) encompassed an area stretching north of Khartoum to the border with Egypt in present day Sudan. The Meroitic civilisation existed in an area where the Nilo-Saharan Nubian language is found which is essentially surrounded by predominately Afroasiatic languages.

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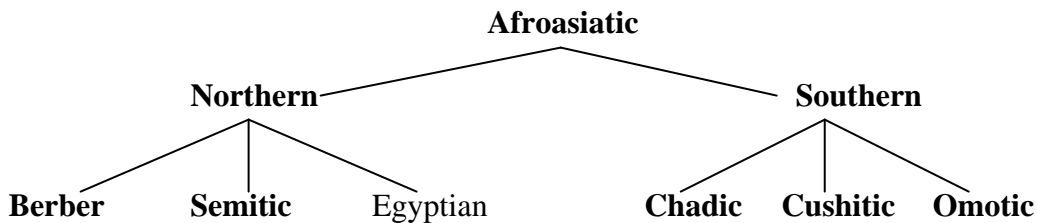
¹ Consonantal compatibility restrictions are variously termed as consonantal co-occurrence restrictions or dissimilation.

(1) African phyla and major languages (Heine & Nurse 2000:2).



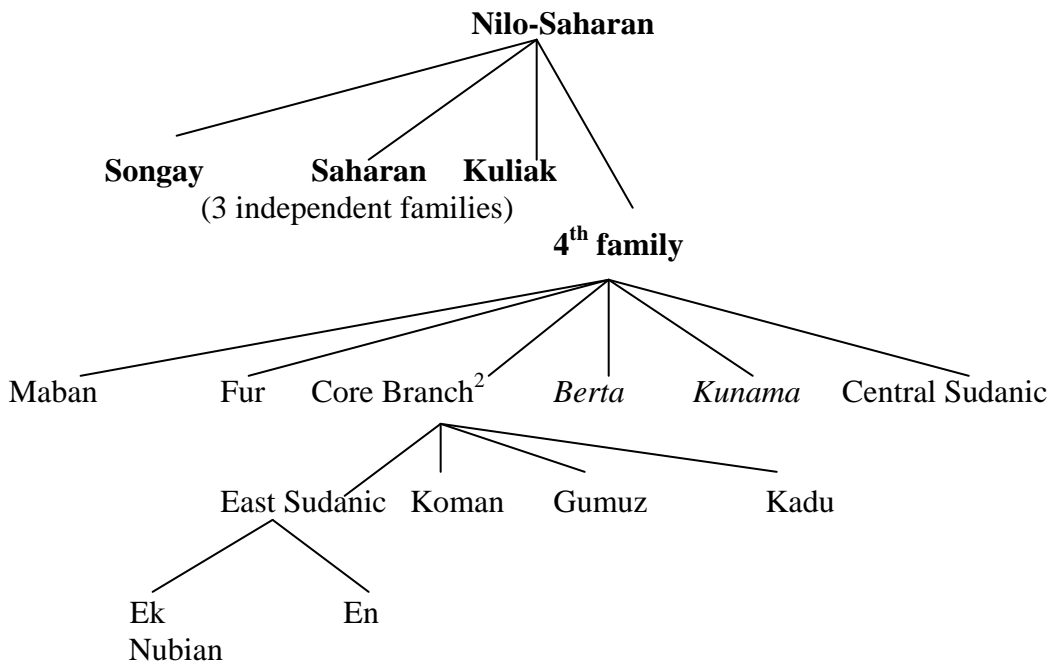
(2) Partial Afroasiatic Phylum

The Afroasiatic phylum is divided into six major branches ‘families’ (following Hayward’s 2000:75) ‘neutral’ positioning:



(3) Partial Nilo-Saharan Phylum

The Nilo-Saharan language phylum is extremely diverse and one of the least widely accepted. The following outline of this phylum is adapted from Bender (2000):



² Greenberg’s (1966) Chari-Nile family.

2 The classification of Meroitic

From an early paper into African linguistic classification, Greenberg asserted that ‘the [Meroitic] language does not appear to be related to any existing language of Africa.’ (1950a:391). Subsequently, Greenberg’s (1966) major study into the proposals for the classification of African languages positioned the Meroitic language as unclassified.³ Further reasons into the Meroitic language’s unclassified status were given by Greenberg in a later publication ‘In the absence of bilingual inscriptions of any significant extent, our knowledge of the Meroitic language, lexically and grammatically, remains very limited and uncertain to a degree.’ (1971:438). The dearth of assured knowledge of Meroitic lexical and grammatical items cautioned Greenberg’s inclusion of Meroitic within any African language family. However, Meroitic scholars have been far from cautious in trying to ascertain the language family of Meroitic as it is believed that the discovery of a cognate language would enhance the understanding of the language of the Meroites.

Griffith, who determined the values of the Meroitic signs, believed that if a closely related language to Meroitic could be found, the progress of decipherment and the understanding of the language would be greatly enhanced. Griffith’s initial assessment of Meroitic to other languages was that it was possible that Meroitic could be related to the Nilo-Saharan⁴ language Nubian and further that ‘Meroitic may belong to the Hamitic [Cushitic] or to the negro group of languages, or even to the Semitic.’ (1909:54). Although in a later study (1911), once Griffith’s research into the values of the signs had been roughly determined, he advocated the theory that Meroitic might be an older form of the Nubian language.⁵ He found ‘analogies to Nubian both in structure and vocabulary’ (1911:22) which he believed were worth mentioning. Griffith further stated that ‘The language appears to be agglutinative, without gender, the place of inflexions taken by post-positions and suffixes.’ Although he was ‘disconcerted’ to find that the few native (Meroitic) words, which were then known, did not resemble the Nubian equivalents.⁶ Griffith then made a further assertion that would have an implication into the association of Meroitic within a language family, and would revise his initial suggestion of 1909 when he stated that ‘[the] Absence of the peculiarly Semitic consonants and a general simplicity in the sounds of the language seem certain’ (1911:22). Although, Griffith writing further in this same publication remarks that the association of the Meroitic language with Nubian is ‘very slight’ based on the evidence of the inscriptions that were known at that time (1911:83). Furthermore, Griffith outlines that the scanty lexical items that seem to share equivalences in Meroitic and Nubian could be a case of lexical borrowing (especially as the given example *Mash* is a religious deity) or that ‘while Meroitic was

³ See also Tucker and Bryan (1966).

⁴ For recent research into the classification of the Nilo-Saharan family see Ehret (1989; 2001) and Bender (1997).

⁵ The Nubian language has a known written tradition stretching back to roughly the 8th century CE (Browne 2002). Its orthography uses a form based on Coptic (heavily borrowed from the Greek script). The language is spoken in the Nile Valley and beyond, from Upper Egypt through to northern Sudan. Under Greenberg’s classification (1966) Nubian is a member of Eastern Sudanic – sub-group of Chari-Nile a member of the Nilo-Saharan language phylum. In geographical terms, Nubian and Meroitic are in close proximity. The nineteenth century scholar Lepsius initially thought Meroitic might also be closely related to Nubian but revised this view to Beja. Lepsius’s views were based on historical association rather than linguistic exactitude (1880), as it was not until Griffith’s (1911) breakthrough into the phonemic representation of the Meroitic signs that there was any real understanding of the language of the script.

⁶ Griffith saw a comparison with the Meroitic and the Nubian word for ‘water’, although he could not see any similarity with the word for ‘beget/bear’ in these two languages. (1911:22-23).

the official language for writing, Nubian was the mother-tongue of Lower Nubia, so that Mash would not be truly Meroitic, but the local Nubian name of the Sun-god retained in official documents' (1911:83). Later on, the case of lexical borrowing became a stronger argument for Griffith, 'borrowing of individual words may therefore have gone on freely between Nubians ... and Meroites, but so far the language of the Meroitic inscriptions does not appear to have been the ancestor of the Nubian dialects' (1916:123). Subsequently, Griffith did not pursue this line of investigation further in any other of his later works.

As Griffith had left open the investigation into the linguistic affinities of Meroitic with other African languages and moreover, that he had abandoned the Nubian link hypothesis, two other scholars took up the issue. The scholar Zyhlarz, through his academic expertise in Nubian, concluded that Meroitic and Nubian were unrelated (1930). However, certain scholars have raised objections to Zyhlarz's investigation as they believe it was fundamentally biased, rather than being objective, in that he propounded a theory put forward by the other scholar Meinhof (1921/22) in a publication that predates Zyhlarz's investigation. Meinhof (1921/22) claimed that Meroitic was a primitive 'Hamitic' (Cushitic branch of Afroasiatic) language. Zyhlarz (1930; 1956), following Meinhof, pushed his investigation into promoting the association of Meroitic with the Cushitic group of languages, such as Beja, Saho, Afar etc. Furthermore, Zyhlarz's argument (1930) was left unchallenged for nearly quarter of a century until the publication of Hintze's article (1955) where Hintze thoroughly dismissed Zyhlarz's research. Hintze argued that the similarities given by Zyhlarz, between Meroitic and these Cushitic languages were based on manipulations of the content of the texts and that most of his assumptions were speculative. Hintze (1955:372) concluded this article by claiming Meroitic therefore, was not a Hamitic (Cushitic) language and further by reiterating Greenberg's (1950a:391) assertion that Meroitic did not seem 'to be related to any existing language of Africa.'

However, a publication by Trigger (1964), nearly ten years later, would take up this issue again.⁷ In this paper, Trigger argues that as there are advances in African linguistic classification, it 'would be profitable to see if a genetic relationship could be discovered between Meroitic and some known African language or group of languages.' (1964:188). Trigger, after analysing a few lexical items, goes on to assert that 'while Nile Nubian is not a descendant of Meroitic or even a particularly closely related language, the two may belong to a common larger linguistic unit.' (1964:191). Trigger's hypothesis that Meroitic is a member of the Eastern Sudanic branch of Nilo-Saharan, 'the scanty data presently suggests that Meroitic is a member of Greenberg's Eastern Sudanic family' (1964:192), was flawed from the beginning as he used Zyhlarz's data, discredited by Hintze (1955). Hintze (1955), in his critique of Zyhlarz's paper, argued that most of the words in this data could not be proven to have the associated meanings.⁸

In another publication, Hintze (1974) critically remarked on the associations drawn and the conclusion made in Trigger's paper (1964). In summary Hintze's remarks include the following points; (i) 'the meaning of only a few Meroitic words is well enough established to be used as a basis for lexical comparison' (1974:75). (ii) A

⁷ Vycichl's (1958) proposal that Meroitic is a 'negro' language is built upon converting the negative conclusion of Hintze's (1955) paper that Meroitic is not a Hamitic language into a positive assertion (but the use of the old 'racial' term is still implicit). His proposal would be that Meroitic is a non-Afroasiatic language.

⁸ See Haycock (1978:61-62) for an overview refutation of the word list used by Trigger. Cf. Priese (1971) and Schenkel (1972) for further investigations into this association.

comparison with Nubian ‘is made even more difficult because of the known existence of Meroitic loan words in Nubian’ (1974:75). (iii) There are no established sound change rules to show regular equivalents in the different languages. (iv) The grammatical elements should be concentrated on more than lexical comparisons as these are ‘partially much better known than the meaning of words’ (1974:76). Finally, Hintze showed that by Trigger’s method, one could also erroneously propose that if Meroitic is a member of the Eastern Sudanic family and therefore related to Nubian, with more linguistic data it could be shown that Nubian, and subsequently Meroitic, is a member of the Ural-Altai languages (1974:76-78).⁹

Hintze’s conclusion to his paper states that he is in doubt whether ‘a kind of comparative method, which compares isolated elements from different languages without considering their inner history, will help us very much in the better understanding of the Meroitic language and texts’ (1974:78).

However, in response to Hintze’s criticisms, Trigger (1977) outlines that the aim of his paper (1964) was meant as an encouragement to ‘professional linguists’ to investigate the connection between Meroitic and the Eastern Sudanic languages more, and that this paper ‘did not pretend to prove that such a relationship existed’ (1977:422). Within his discussion, Trigger does raise certain important issues in regard to the classification of Meroitic. He points to the recent splitting of the Cushitic branch of Afroasiatic into Cushitic and Omotic¹⁰ and outlines that this indicates ‘greater complexity among these languages than was formerly recognised.’ Trigger also importantly states that ‘It is therefore more prudent to conclude that Hintze proved the inadequacy of any existing arguments that Meroitic is an Afroasiatic language rather than that Meroitic is not Afroasiatic.’ (1977:422). In concluding this paper however, Trigger (1977:433) still pursues his original proposal, although now he bases it upon geographical grounds, that Meroitic may be related (in descending order) to Eastern Sudanic, Nilo-Saharan and Afroasiatic.

A paper put forward by Bender (1981a) also worked with the same data as Trigger’s paper (1964) (although there is no reference to Hintze’s criticisms (1955; 1974)). From his analysis, Bender puts forward a cautious assertion that ‘Meroitic was probably an East Sudanic language’ (1981a:22). However, Bender would revise this assertion in a publication of the same year (1981b) which again looked at lexical correspondences with sample languages, and then stated that ‘one cannot conclude that Meroitic was Nilo-Saharan, much less East Sudanic’ (1981b:28).¹¹

The Russian scholar Militariiev (1984) put forward the hypothesis that Meroitic may be a member of the Afroasiatic language family. Militariiev’s hypothesis was designed in order to understand more about African linguistic studies in a historical context. Within the field of Meroitic research, Militariiev’s theory was not taken up, as the line of inquiry was stubbornly focused upon the Nilo-Saharan connection with Hintze (1989) reviving the issue of a relationship between Meroitic and (Old) Nubian once more. In this paper, Hintze demonstrated some structural similarities between the two languages, such as:

⁹ Unfortunately, some scholars did not notice the point of Hintze’s (1974) comparison of Meroitic with Ural-Altai languages to show that scanty data could be used to evidence erroneous proposals and saw this association as a valid line of research thereby proposals have been put forward that Meroitic is a Ural-Altai language (Hummel 1992, 1993, 1995).

¹⁰ Referring to Flemming (1969).

¹¹ Cf. Bechhaus-Gerst (1984:94) for a few words of possible Nubian origin in Meroitic, but she states that this is not sufficient evidence to claim a link between these languages.

- (i) Meroitic: SOV/Post/N + Gen/N + Adj
- (ii) Old Nubian: SOV/Post/Gen + N/N + Adj

Although, Hintze concluded that these similarities could be nothing more than coincidence and therefore did not concretely prove a genetic relationship.¹² Hintze's 'coincidence' could be a case of areal diffusion and he was correct in concluding that this did not support a genetic relationship. If this structural similarity is a case of areal diffusion it does not point to evidence of a family relationship between Meroitic and Old Nubian, in fact this type of evidence is usually used erroneously as evidence of relatedness in languages where classification is circumspect and/or unknown.

Consequently, the investigation into an affiliation of Meroitic with any other African language had drawn no unanimity amongst scholars.¹³

However, recent research into the language family of Meroitic has again proposed the Nilo-Saharan phylum as being the likeliest candidate.¹⁴ Peust (1999a) believes that with further research Nubian and Meroitic might indeed be related languages. Rilly also advances the Nilo-Saharan phylum as the related language family. Rilly (2003; 2004a)¹⁵ uses a 'multicontextual' approach in order to suggest translations for new words.¹⁶ These words are then subjected to a lexicostatistical analysis and to the classical comparative method of other Nilo-Saharan languages. This language family was analysed following Rilly's initial premise 'to reconsider the relation of Meroitic with Nilo-Saharan and possibly spot inside this phylum a specific family where Meroitic could belong.' (2004a: 2). Rilly asserts that a link with the other major African phyla is 'unlikely' (2004a:2) and so his analysis is not extended to any non-Nilo-Saharan language.

Fundamentally, the association that Meroitic is not an Afroasiatic language is based upon Hintze's refutation of the Meroitic data Zhylarz put forward. By discounting Zhylarz's paper, Hintze and subsequent Meroitic scholars have, in turn, discounted the overall premise that the Afroasiatic languages are a valid line of research. Subsequently, even though that evidence is abandoned it should not mean that the investigation of an affiliation of Meroitic with an Afroasiatic language should be as well. Again, as Trigger correctly stated 'Hintze proved the inadequacy of any existing arguments that Meroitic is an Afroasiatic language rather than that Meroitic is not Afroasiatic.' (1977:422). As these investigations into the linguistic affinities of Meroitic have always focused on lexical and grammatical relatedness with other

¹² It is the syntactic structural similarities between Meroitic and Old Nubian that most scholars who support the Nubian link hypothesis base their associations upon. Although, word order is not the most reliable guide to classification as it is very easily influenced by the word ordering of neighbouring languages. Akkadian, a Semitic language, has SOV word order because of its contact with Sumerian further the Ethiopic Semitic languages are SOV due to their contact with Cushitic languages. In fact the SOV word order of Meroitic and its use of postpositions (which should not be taken as two separate structural similarities as this ordering occurs cross-linguistically with this word ordering) is seen across Afroasiatic languages; Cushitic, Ethiopian Semitic and Omotic.

¹³ Various other proposals have been put forward cf. Hummel (1992) for Meroitic belonging to the Altaic family; Sharman for a Sumerian connection (1974) and Böhm (1988) for a hypothesis of an "Indo-nilotischen" proto-language connection. Orlando (1999) puts forward the hypothesis that Meroitic is a member of the Afroasiatic language family although I consider the evidence unsatisfactory.

¹⁴ See Aubin (2003) for this proposal again, based on epigraphical considerations.

¹⁵ See also Rilly (2005) for more on this.

¹⁶ This approach is not specifically detailed in these papers (2003; 2004a), although Rilly states that 'The archaeological and iconographical context can be very helpful, since very often, the short texts are the description with words of a painted or engraved image.' (2004a:2).

languages (where these elements are assumed and/or known), this paper puts forward a different type of evidence particularly based upon the most fundamentally understood aspect of the script, namely the sound values of the signs. Subsequently, this evidence comes from an analysis of the morpho-phonology of Meroitic. However, before this is discussed, the reader is familiarised with an overview of a phonological process that is evident across Afroasiatic languages.

3 Consonantal compatibility restrictions in Afroasiatic

The first seminal study into consonant compatibility restrictions (or dissimilation) is Greenberg's 1950b paper.¹⁷ In this study, Greenberg analysed and discussed the evident restrictions between certain consonantal segments in the verbal roots, but not on derived forms, of Semitic languages. His investigation, which included the Semitic languages Syriac, Hebrew, Ugaritic, South Arabian, Ethiopic and Assyrian, was also extended to Egyptian, an autonomous branch of Afroasiatic. This led him to make the important assertion that 'The general subject of the patterning of consonantal phonemes within the morphemes of Hamito-Semitic [Afroasiatic] languages would seem to be a promising subject of investigation and one whose results must be kept in mind for their bearing on the historical analysis of this family of languages' (1950b:181). Bender (1978) extended Greenberg's study to other branches of the Afroasiatic phylum and from the positive results obtained led him to conclusively state that '...the co-occurrence restrictions are a good Afroasiatic isomorph...' (1978: 9).

The following sections overview the restrictions that take place in a selection of languages from the Afroasiatic phylum.

3.1 Semitic Languages¹⁸

3.1.1 Arabic

Of all the Afroasiatic languages, Arabic has one of the most well documented phonological dissimilatory processes in terms of its root consonantal system and this has led to many phonological discussions and analyses into these consonantal compatibility restrictions. The fundamental characteristic of Semitic morphology is the consonantal root template, where vowels are inserted between the consonants to make forms according to a CV template (McCarthy 1979). Subsequently, Semitic languages are classed as having a non-concatenative morphological system.

The most common root type throughout the Semitic languages is the trilateral root form whereby a root is made up of three consonants, although, Semitic roots can also be biliteral and quadrilateral. Greenberg's (1950) study specifically dealt with the combinations of consonants that could occur in the trilateral root forms.

¹⁷ Although, as Greenberg (1950b:162) points out 'The only general study of the topic under discussion is that of J. Cantineau [1946], which arrives independently at the same conclusions described here. However, Cantineau's study is more restricted in scope, only Arabic being considered, and without discussion of patterning in the first and third positions. None of the standard Semitic comparative grammars mention this topic.'

¹⁸ For more on incompatibility in Semitic languages cf. Zaborski (1994), Voigt (1981), Petráček (1964), Kuryłowicz (1972). Cf. Zaborski (1996) for a refutation of alleged exceptions to incompatibility rules in Arabic verbal roots.

A Semitic trilateral root can take the form such as /drs/ made up of three consonants or 'radicals'. These fixed ordered consonants have a range of templates where vowels are interspersed, depending on the grammatical form, which can also take inflectional affixes, shown in the following example:

- (1) a. daras-a 'he studied'
 b. dars-un 'a lesson'
 c. diraas-ah 'studies'
 d. daaris 'studying'

Greenberg's (1950) study showed was that the combination of consonants that can make up a root in Arabic is restricted. There is not a free co-occurrence of consonants. These restrictions depend upon the placement of consonants within a root. Therefore, a trilateral root has consonants in the placement of C₁ C₂ or C₃ positions:

- (2) C₁ C₂ C₃
 | | |
 d r s

The adjacency of the positions C₁ C₂, and C₂ C₃ was found to have the strongest restrictions in which consonants could occur, with the non-adjacent C₁ and C₃ positions still having an avoidance constraint, although a weaker one. Greenberg (1950:162) concluded that not only are identical adjacent consonants prohibited in a root but also that consonantal homorganicity (non-identical consonants sharing the same place of articulation) were strongly dispreferred. McCarthy (1979; 1988; 1994) developed Greenberg's observation, specifically with regards to Arabic, and demonstrated further that the consonant compatibility restrictions were fundamentally determined by the place of articulation and furthermore by the major manner feature of [sonorant] for the coronal place articulator.

McCarthy (1988; 1994) set the consonants of Arabic into the following articulatory groups or natural classes. Note that the coronal place of articulation has subsets of three groups that are determined by their manner feature specification being [±sonorant] and [±continuant]:¹⁹

- (3) a. labials [f, b, m]
 b. coronal sonorants [l, r, n]
 c. coronal stops [t, d, ṭ, ḍ]
 d. coronal fricatives [ð, θ, s, z, ʃ, ʒ, ʕ]
 e. dorsals [g, k, q]
 f. gutturals [ʔ, h, ʕ, ħ, ʁ, χ]

Fig. 4 shows Kenstowicz's (1994:163) results table of the distribution of a sample of trilateral roots with adjacent consonants; C₁ C₂, and C₂ C₃:²⁰

| (4) | | labial | cor.son | cor.stop | cor. fric | dorsal | guttural |
|-----|---------|----------|-----------|----------|-----------|--------|----------|
| | labial | 0 | 210 | 125 | 138 | 82 | 151 |
| | cor.son | 196 | 15 | 122 | 161 | 165 | 208 |

¹⁹ Cf. Pierrehumbert (1993) for more on dissimilation in Arabic.

²⁰ Data taken from Wehr's (1976) Arabic-English dictionary.

| | | | | | | |
|----------|-----|-----|----------|----------|----------|-----------|
| cor.stop | 118 | 153 | 7 | 26 | 29 | 105 |
| cor.fric | 196 | 211 | 58 | 5 | 89 | 168 |
| dorsal | 118 | 167 | 66 | 105 | 1 | 79 |
| gutteral | 211 | 252 | 148 | 182 | 81 | 11 |

The table shows the vertical column represents the first adjacent consonant with the horizontal column representing the second adjacent consonant. The series' are given of the consonants depending upon their place of articulation. What can be seen from the table is that there is an overwhelming dispreference for two adjacent consonants of a trilateral root sharing the same place specification (diagonal axis highlighted in bold).²¹

Furthermore, analyses of the first and third consonants in a trilateral root also show a dispreference for the consonants sharing the same articulator, as shown in the following table, again taken from Kenstowicz (1994:164):

(5)

| | labial | cor.son | cor.stop | cor. Fric | dorsal | gutteral |
|----------|-----------|-----------|----------|-----------|----------|-----------|
| labial | 20 | 88 | 53 | 37 | 41 | 79 |
| cor.son | 97 | 76 | 52 | 83 | 47 | 85 |
| cor.stop | 36 | 53 | 9 | 29 | 28 | 45 |
| cor.fric | 93 | 127 | 61 | 14 | 46 | 88 |
| dorsal | 74 | 72 | 44 | 53 | 3 | 54 |
| gutteral | 126 | 162 | 66 | 85 | 64 | 37 |

It is evident that there are a high proportion of occurrences of the coronal sonorant consonants [n, l, r] that can occur in the nonadjacent first and third positions of a trilateral root, subsequently the coronal sonorant set is separated to distinguish between [+nasal].

Conclusively, this data shows that there are consonantal compatibility restrictions in Arabic verbal roots, whereby the occurrence or non-occurrence of consonants is determined by their articulatory place specification.²²

3.1.2 Tigrinya

Tigrinya is an Ethio-Semitic (South Semitic) language that also shows the same restrictions as Arabic on the occurrences of consonants within a root (Buckley 1997). Even though Tigrinya does not share the exact phonemic inventory as Arabic, it is still seen that the co-occurrence of these consonants rests upon which articulatory sets they are divided into, and again the class of coronals is further subdivided. The Tigrinya inventory has the following classification:

(6)²³ a. labials [f, p, b, p, m]

²¹ It is pointed out that this table only deals with trilateral roots. It is evidenced in Arabic that there are no templates with just two consonantal positions. Subsequently, when a root has only two consonants and it is associated with a trilateral template, the final consonant occupies the last two positions. Subsequently, templates are found of the form *sdd*, where these forms are underlyingly /sd/ showing spreading and not a violation of the OCP (see §3.4 for more on this) but never **ssd*, where the constraint on identical consonants holds for the first and second position of a trilateral form but not on the second and third. This can be termed as a positional gradient restriction.

²² See Frisch et al. (2004) who put forward psychological and phonetic evidence for their analysis of Arabic consonantal compatibility restrictions.

| | |
|-----------------------|--------------------|
| b. coronal sonorants | [r, n, l] |
| c. coronal stops | [t, d, tʃ] |
| d. coronal fricatives | [s, z, ʃ, ʒ] |
| e. velars | [k, g, kʷ, gʷ, kʷ] |
| f. post-velars | [h, ʔ, ʕ, ɦ] |

Buckley (1997) draws upon a corpus of Tigrinya verb roots and finds that there are no roots containing adjacent identical consonants. However, there are some roots found with nonadjacent identical consonants (1997:12):

- (7) sls ‘plow a field for a third time’
 lʃl ‘raise, lift off the ground’
 trt ‘tell stories, old traditions’

Although, Buckley points out that some of these roots have known historical origins in roots without identical consonants, such as /sls/ is the root for ‘three’ where in Ge’ez it is /ʃls/. Further, Buckley states that only 12 such roots exist in his corpus of 2744 roots. But what is salient about this data is that the roots with nonadjacent identical consonants nearly always involve the coronal articulator class.

Within the coronal sonorant class, Tigrinya makes a further distinction between the feature [\pm nasal]. As Greenberg (1950:172) noted, the coronal sonorant /n/ can occur freely (whether adjacent or nonadjacent) with /l/ and /r/, but there is a strong prohibition on the liquids /l/ and /r/ occurring together. As Buckley (1997:14) states ‘...the most salient feature among the sonorants is [\pm nasal], splitting the members into two classes /n/ and /l, r/. Within either class the co-occurrence restriction is absolute in effect, but across the classes the effect is weaker.’ As with the Arabic co-occurrence restrictions, the feature [\pm continuant] is needed to define two further subsets of the coronal class in that the coronal fricatives ([+continuant] /s, z, ʃ/) can occur with the coronal stops ([-continuant] /t, d, tʃ/) but the co-occurrence of these consonants from the same subset is dispreferred.²⁴ In light of the occurrences of adjacent and nonadjacent coronal consonants, this major articulatory class has to have further subdivisions.

Moving on to the velar class of consonants, Tigrinya exhibits an interesting contrast between plain velars and labialised velars. Whereby the co-occurrence of plain velars is strongly prohibited, whether adjacent or nonadjacent, the co-occurrence of labialised velars is more particular. Although in adjacent position labialised velars are prohibited, they can co-occur in non-adjacent position. Buckley’s (1997:15) study does not take into account six suspicious cases of co-occurring labialised velars in quadrilateral roots. He omits these from his analysis because he believes these are cases of historical reduplication of biliteral roots or from a trilateral with infixation (where the same process is attested in Arabic). Furthermore, he proposes that these suspicious cases, and the asymmetry between the plain velars and labialised velars is

²³ Inventory given in Yohannes (2002) although certain phonemes have been omitted due to their rarity usually from loans: /tʃ, tʃ, dʒ, ʒ, ɲ/. Further, within Ethio-Semitic languages (Tigrinya) the emphatic consonants are realised as ejectives.

²⁴ There is a freer co-occurrence of voiceless coronal fricatives with voiceless coronal stops. However, when these consonants are both voiced or ejectives, there is a stronger dispreference for their co-occurrence. See Buckley (1997:17-18) for the analysis of this data contributing to claims that the feature specification of laryngeal is privative.

due to the labialised velars not being inherited from Proto-Semitic, but attributable from borrowed forms from the Cushitic substrate in Ethiopia.

3.1.3 Akkadian

Akkadian is classified as being an East Semitic language of the Afroasiatic phylum. The language, although now deceased, was spoken in ancient Mesopotamia and is known through written records – 2400BC to 100AD. The following classification gives the inventory of the literary dialect of Akkadian (Reiner 1966):

| | | |
|-------------------|-----------------------|--------------|
| (8) ²⁵ | a. labials | [p, m, b] |
| | b. coronal sonorants | [n, r, l] |
| | c. coronal stops | [t, d, ʔ] |
| | d. coronal fricatives | [s, ʃ, z, ʒ] |
| | e. dorsals | [k, g, x, q] |

Identical adjacent consonants are prohibited in Akkadian verb roots. Again, the root is almost canonically made up of three consonants, although some quadrilateral roots are attested. Reiner (1966:51) states that two adjacent homorganic consonants are also prohibited and puts this non-co-occurrence down to phonotactics as ‘both the first and second, and the second and third consonants of a root come into contact position in some inflectional forms.’ The co-occurrence of consonants that are drawn from the same articulatory set is prohibited in Akkadian. However, the set of coronal sonorants needs further explanation.

Akkadian makes the same distinction within the coronal sonorants of the feature [+nasal] as does Tigrinya. Therefore, the coronal sonorants /r/ and /l/ are prohibited to co-occur in the same root, although the coronal sonorant [+nasal] /n/ is allowed to co-occur with the [-nasal] coronal sonorants /r/ and /l/ but only when it is following - /ln/ or /rn/ but never */nl/ or */nr/.²⁶ Reiner (1966:50) labels these restrictions as ‘non-reversible’ and gives further instances of non-reversible clusters where these are all instances of consonants from the coronal articulatory set.²⁷ Further, she states that ‘...this list goes beyond occurrences limited to “root-incompatibility”.’

It is seen in (9) that when there are co-occurrences of coronals consonants, the primary coronal is drawn from the coronal fricative set and the secondary coronal from the coronal stop set and, importantly these sequences are prohibited from co-occurring in reverse order (Reiner 1966:41):

²⁵ Reiner proposes that the Akkadian emphatic consonants are pharyngealised and transcribes them following standard Semitic transcription practice (i.e. dotted underneath the consonant), rather than ejectives. The consonant /q/, as transcribed by Reiner (1966), partakes in the pharyngeal co-occurrence restriction and is known to phonologically behave like /k^ʕ/ which is representative of the three-way voicing contrast in Semitic languages, these being – voiceless, voiced and emphatic whereas in Ethio-Semitic languages the emphatic contrast is realised as an ejective. Reiner also states that the incompatibility of ‘emphatics’ (pharyngeals) was not operative in the Akkadian dialect of Neo-Assyrian (1966:51). She proposes this is because this dialect did not have a three-way contrast of stops but only two. See Bellem (2004) for more on the investigation into pharyngeal and emphatic representations and their analysis in Semitic languages.

²⁶ This sequential incompatibility */nl/ and */nr/ may also be true of Arabic (Wehr 1976).

²⁷ Only one non-reversible cluster that is not drawn from the coronal set is the sequence /xk/ is given in Reiner’s data (1966:50).

(9) /st/, /sd/, /st̥/, /zt/, /zd/, /zt̥/, /ʃt/, /ʃd/, /ʃt̥/, /ʃd̥/, /ʃt̥̥/, /ʃd̥̥/

A further restriction is that two emphatic coronals cannot co-occur:

(10) */ʃt̥/

Moreover, this restriction on emphatic consonants co-occurring is evidenced when the consonants are drawn from across the articulatory sets. This is known as an instantiation of Geers Law (1945):

(11) */tq/, */qt/, */qʃ/, */qq/

Reiner (1966:50) points out that it is difficult to discern in instances when these consonantal compatibility restrictions are not respected whether these violations are due to the ‘approximation of foreign words in the vocabulary’ or to ‘actual phonetic realisations.’ Furthermore, she addresses the issue that certain combinations such as /mb/ occur morpho-phonologically as a dissimilation of /b:/ in that /m/ and /b/ are not successive consonants in a root. However, as with other analyses of restrictions in Semitic languages of consonantal compatibility (Greenberg 1950), there are instances of geminated consonants in only second and third positions of trilateral roots but never in first and second position. Generally, this has been attributed to a diachronic process of alteration to the template pattern of biliteral roots transformed into trilateral ones.²⁸

The instances of consonant compatibility restrictions in Akkadian are not restricted to root forms but can also straddle a morpheme boundary when the affix is derivational. Reiner (1966:51) shows this with the example of the derivational morpheme prefix /ma/ ~ /me/ which is dissimilated to /na/ ~ /ne/ when the root contains a labial consonant. This same process is also evidenced in the Afroasiatic language Tashlhiyt Berber where there is a co-occurrence restriction on derived stems which can only contain one labial consonant, i.e. /b, f, m/. A derivational prefix containing /m/, such as the reflexive or agentive morpheme, will dissimilate from /m/ to /n/ when prefixed to a root that contains a labial consonant in any position (Boukous 1987; El Medlaoui 1995).²⁹

| | |
|--|---|
| <p>(12a) Reflexive prefix: m ~ n</p> <p>m-xazar ‘scowl’</p> <p>m-saggal ‘look for’</p> <p>n-fara ‘disentangle’</p> <p>n-kaddab ‘consider a liar’</p> | <p>(12b) Agentive prefix: am ~ an</p> <p>am-las ‘shear’</p> <p>am-zug ‘abscond’</p> <p>an-bur ‘stay celibate’</p> <p>an-azum ‘fast’</p> |
|--|---|

The dissimilative process that can apply across morphemes, however, is not seen in other Afroasiatic languages such as Arabic as Greenberg (1950:179) noted. A root such as *fth* ‘to open’ can have the nominal instrument prefix *m-* attached with no change on the labial quality of the consonants, therefore resulting in the form *mifta:h*

²⁸ Within a theoretical framework it is the association of a one-to-one mapping of the consonantal segments to a trilateral template that works from left to right, hence it is always the final consonant of a biliteral root that is associated to C2 and spreads to C3, therefore no two identical segments are found in positions C1 and C2, see McCarthy (1979).

²⁹ See also the discussion in Edzard (1992) for more on dissimilation across a morpheme boundary in Akkadian, Berber and Amharic. Further compatibility restrictions in Amharic are discussed in Bender & Fulass (1978).

‘key’. Subsequently, two labial consonants can be adjacent when they belong to separate morphemes. Akkadian and Berber are languages that apply the consonantal incompatibility rule to a higher order constituent, namely the word, rather than languages such as Arabic where it is restricted to the root.³⁰

3.2 Ancient Egyptian

Ancient Egyptian is classified as being an autonomous member of the Afroasiatic phylum and as such is positioned on its own sub-branch of Northern Afroasiatic. It is the longest continually attested language in the world and is fundamentally known through its writing system which appeared shortly before 3000 BCE and survived, in various stages, until the fifth century CE, although the spoken language was actively used for a further six centuries before being superseded by the Arabic language (Allen 2000). Ancient Egyptian is a dead language, however, Coptic which is its last spoken phase is still used as the liturgical language of the Christian Coptic church in Egypt.

Greenberg (1950b:179) addressed the issue of whether the incompatibility of consonants could be attributed to the Proto-Semitic period through a preliminary examination of Egyptian verbal roots (as Egyptian has such a long documented history), which are also formed by two or three consonants. Greenberg rested his investigation into this on certain series’ of consonants as the patterning of others was too obscure in Egyptian ‘because of the coalescence within Egyptian of consonants originally belonging to different and compatible series and sections’ (1950b:179). Overall, Greenberg was able to specifically outline the most fundamental restrictions. Further studies on consonantal compatibility restrictions in Egyptian (Peust 1999b; Takács 1996; Watson 1979; Roquet 1973; Rössler 1971; Petráček 1969) have contributed to Greenberg’s (1950b) Egyptian consonantal incompatibility claims.³¹

The main findings from these researchers are presented here, with an incompatibility chart taken from Peust (1999b:196). Although, Peust does not discuss the general principles that are behind these restrictions i.e. the restriction into root occurrence whereby there is a fundamental dispreference for identical first and second positional consonants etc. However, Peust’s (1999b) examination does detail how the data is counted.³² He goes on to state that ‘It is therefore to be assumed that the chart actually represents the consonantal incompatibilities as they were valid around the time of the late Old Kingdom. In the early Old Kingdom, not all of these incompatibility rules were already valid. From the Middle Kingdom on, Egyptian integrated a considerable number of loan words which did not conform with these rules, and consequently the system of compatibility restrictions was obscured.’ (1999:195).³³

Furthermore, the restrictions that Peust posits surely include the incompatibility of nominal forms as well as verbal (this is not explicitly stated but can be seen through his small use of data), whereas Greenberg and Watson kept to the analysis of only verbal forms. Consequently, I believe this can, at times, contradict the claims of incompatibility made by these scholars, as Greenberg outlined when looking at the

³⁰ See also Bender (1978) for dissimilation evidence in Tamazigt Berber.

³¹ The closest phonemic representations are given for the Egyptian consonantal inventory, as the actual phonetic forms are tentative.

³² See Peust (1999b:194-198; 297-299).

³³ The chronological division of the Old Kingdom is ca. 2650-2160 BCE and the Middle Kingdom ca. 2040-1785 BCE (Loprieno 1995:xiv).

incompatibility of Semitic roots ‘It is therefore striking that so many Semitic substantival roots have identical first and third consonants.’ (1950b:168).

(13) Peust’s (1999b:196) Egyptian consonantal incompatibility chart³⁴

| | r | b | f | m | p | w | h | q | g | d | h | š | h | t | k | ʕ | d | t | z | s |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| r | X | | | | | | | | | | | | | | | | | | | |
| b | * | X | | | | | | | | | | | | | | | | | | |
| f | | | * | X | | | | | | | | | | | | | | | | |
| m | | | * | * | X | | | | | | | | | | | | | | | |
| p | | | * | * | * | X | | | | | | | | | | | | | | |
| w | | | | | | X | | | | | | | | | | | | | | |
| h | | * | * | | | * | X | | | | | | | | | | | | | |
| q | | | | | * | * | ? | X | | | | | | | | | | | | |
| g | | | | | | | ? | * | X | | | | | | | | | | | |
| d | | | | | | | * | * | * | X | | | | | | | | | | |
| h | | | | | | | * | * | * | * | X | | | | | | | | | |
| š | | | | | | | * | * | * | * | * | X | | | | | | | | |
| h | | | * | | | | * | * | * | * | * | * | X | | | | | | | |
| h | | | | | | | * | * | * | * | * | * | * | X | | | | | | |
| t | | | | | | | * | * | * | * | * | * | * | * | X | | | | | |
| k | | | | | * | * | * | * | * | * | * | * | * | * | * | X | | | | |
| ʕ | | | | | | | | | | | | * | * | * | X | | | | | |
| d | | | | | | | | | | | | | * | * | * | X | | | | |
| t | | * | | | | | * | * | * | * | | | | * | * | X | | | | |
| z | | | | | | | * | * | * | * | | ? | * | * | * | X | | | | |
| s | | | | | | | | | | | * | | | | | | * | | | X |

Peust’s chart overviews the strong compatibility restrictions of pairs of consonants with an asterisk (*) and absolutely no occurrences with (x). His strong restriction means that these pairs of consonants are clearly disfavoured, although they may appear occasionally. I take the occasional appearance of these consonants to mean that they are nonadjacent, again, however, Peust does not indicate any positional variations on consonantal incompatibility. Further, Peust omits the three consonants transcribed as <ɰ>, <j> and <n> as he found they were not subject to strong restrictions (1999b:196).

Peust (1999b) does not discuss the general restrictions of these consonants such as articulatory sets or their positioning within a root therefore they will be discussed here supported by Greenberg’s (1950b) and Watson’s (1979) studies into verbal root consonantal compatibility restrictions.

As there are consonants that have been through internal developments, the articulatory divisions are discussed in-depth. I use the standard transcription (put in pointed brackets <>) along with their posited phonemic representation as put forward in Loprieno (1995:32), which is given for the Old Kingdom period (3000-2000 BCE) and Peust (1999b) for the Late Kingdom period (1300-700 BCE):

³⁴ Peust (1999b:196) uses the conventional transcription for his chart, which is not the same as the phonetic transcription. Further, Peust’s states that ‘It is therefore to be assumed that the chart actually represents the consonantal incompatibilities as they were valid around the time of the Old Kingdom.’ (1999b:195).

3.2.1 Labials

The labial series of consonants in Egyptian are:

$\langle b \rangle$ /b/, $\langle f \rangle$ /f/, $\langle m \rangle$ /m/, $\langle p \rangle$ /p/, ($\langle w \rangle$ /w/)

The co-occurrence restriction of consonants from the labial group in Egyptian is the most clear and rigorous of all the articulatory series. Although it is seen that the labials can combine freely with the labial glide /w/, Greenberg omitted the labial glide from his discussion because ‘w and y do not consistently pattern with any group of consonants. It has long been realized that the so-called weak verbs of Semitic, containing w and y in various positions, are ‘rationalizations’ by which older forms containing root *u* and *i* were incorporated into the dominant triconsonantal schema’. (1950b:163). Specifically applied to Egyptian this is an instantiation of the “law of Belova” (Takács 1996:355). The initial $\langle w \rangle$ or $\langle j \rangle$ when found in an Egyptian trilateral root are, in many cases, part of the original root of Proto-Afroasiatic with the internal root vocalism *-u- or *-i-, therefore, PAA $*C_1uC_2$ > Eg. wC_1C_2 . These initial glides have previously nearly always been treated as prefixes, and as Watson (1979:100) points out ‘affixal elements do not obey patterning’ (in this root-level co-occurrence restriction, Egyptian is similar to Arabic). Instances can subsequently be seen of the labial glide $\langle w \rangle$ /w/ patterning with other consonants from the labial series.

What is interesting from Peust’s chart (fig. 13) is that it shows that the labial glide $\langle w \rangle$ /w/ does have strong restrictions against it co-occurring with the velar stop $\langle k \rangle$ /k/ and the uvular (?) stop q /q/.³⁵ However, Watson (1979:105) states that $\langle w \rangle$ /w/ does not show any significant patterning in verbal roots and so dismisses any discussion of its co-occurrence restrictions from his paper. Although, when looking at Watson’s root distribution table (1979:101) for first and second root position, it can be seen that the labial glide $\langle w \rangle$ /w/ does not pattern with the velar $\langle k \rangle$ /k/ or the uvular (?) $\langle q \rangle$ /q/ either.³⁶ Furthermore, from Watson’s chart $\langle w \rangle$ /w/ is not seen to co-occur with $\langle p \rangle$ /p/ and $\langle f \rangle$ /f/, although this restriction is not evident from Peust’s chart (perhaps this is due to Peust analysing the nominal *and* verbal roots, so it can be assumed that /w/ patterns with /p/ and /f/ in nominal forms).

3.2.2 Coronal sonorants

The coronal sonorant series in Egyptian contains the consonants:

$\langle r \rangle$ /r/, $\langle n \rangle$ /n/³⁷

Contrary to Peust’s (1999b) findings, that $\langle n \rangle$ /n/ is not subject to strong restrictions, is the claim made by Greenberg (1950b:180) that ‘In Egyptian, verb roots with *r* and *n* in adjacent positions are rare.’ These two studies elicit differing results, again due to the grammatical nature of the data they analyse. Greenberg (1950b) specifically deals with verbal roots and not nominal, whereas Peust (1999b) analyses both. Watson (1979:104), who following Greenberg, only analyses the verbal roots gives a

³⁵ Loprieno (1995:33) gives the representation of this Egyptian phoneme as /q/ whereas Peust (1999b:107-110) posits the labio-velar /k^w/.

³⁶ This point is taken up again in the section on Meroitic.

³⁷ Etymological PAA *l is written variously in Old Egyptian as $\langle n \rangle$, $\langle r \rangle$ and $\langle ʒ \rangle$.

contradictory analysis to Greenberg's claim of this articulatory series and states that '[*r* and *n*]...are not as exclusive in regard to combining with each other.' Watson goes on to summarise this articulator series as '*n* and *r* seemingly ignore patterning altogether.' (1979:105). Due to the contradiction between Greenberg and Watson's claims on the coronal sonorants series, this would require a firmer investigation. Although on the surface, as with other Afroasiatic languages, it could be stated here that there is a gradient co-occurrence restriction involving the feature [+nasal] within the coronal sonorants that needs to be taken into consideration.

The articulatory set of coronals is further sub-divided in Egyptian as it is seen there are no co-occurrence restrictions of the stops patterning with the fricatives, although within these sets there are restrictions. This position is reflected in Semitic languages where the same co-occurrence is evident. Importantly there is a 'rule of transposition' that is exhibited in Semitic languages whereby the ordering of the consonants coronal stop + coronal fricative > coronal fricative + coronal stop.³⁸ However, Watson (1979:104) states this 'may have been observed in Egyptian but was not certainly so.'

3.2.3 Coronal stops

The following coronal stops are found in Late Egyptian:

<*d*> /d/, <*t*> /t/

The co-occurrence of consonants drawn from the coronal stop series is prohibited in Egyptian and Greenberg (1950b:180) outlined this as a straightforward case of incompatibility, 'There are no instances of Egyptian roots containing both *t* and *d*.' Although, Watson (1979:104) puts forward a hesitant note in regards to the coronal stops that 'while observation would indicate that the patterning found in Semitic seems to be likewise present in Egyptian the statistical evidence is too marginal to deny or support this observation with certainty.' Watson's uncertainty is due to the low frequency of roots containing these consonants, however, this does not belie the fact that no instances are found containing these consonants in the same root therefore their incompatibility should be confirmed.

3.2.4 Coronal fricatives

The class of coronal fricatives is:

<*s*> /s/, <*z*> /z/

The co-occurrence of these consonants is strongly disfavoured in Egyptian. Watson (1979:104) lists only two roots containing a co-occurrence of these consonants, but through such a low co-occurrence 'one may tentatively admit exclusive patterning to have been at work' (1979:104). Greenberg (1950b:180) also concludes that the co-occurrence of these consonants is 'very rare' and only cites one example known to him where they do co-occur. It is noted that in the Middle Egyptian stage of the language these two phonemes merged resulting in only /s/ (Allen 2000:16). It is seen

³⁸ This process can be seen in §1.1.3 for the Akkadian discussion (fig. 9) where this 'rule of transposition' allows the consonant ordering of coronals to be fricatives followed by stops but not the reverse order.

that two distinct graphemes were still used that came to represent the one phoneme /s/ by the Middle and Late Egyptian stages.

3.2.5 Dorsals³⁹

The dorsal series of consonants are:

<g> /g/, <k> /k/, <q> /q/, <h> /x/ ~ /χ/

In Watson's study (1979:103), there are absolutely no occurrences of this series of consonants co-occurring together in the same verbal root, and Greenberg notes 'I could discover no instances of Egyptian roots containing two different velars.' (1950b:179). Confusingly though, these two studies label these consonants as velar and post-velar. For Greenberg, the sign he transcribes as <x> is commonly transcribed as <h> and he terms this as a 'post-velar'. Watson gives the Egyptological transcription as <h>, although he follows Greenberg in also terming this sound a post-velar. Loprieno (1995:33) gives the representation of <h> as a uvular fricative /χ/. Although Egyptologists are undecided as to whether this sound is thought to represent a velar or uvular fricative, it can be positioned into the dorsal set due to its incompatibility with the other segments in this series.⁴⁰

The sign, transcribed as <q>, is thought to be representative of either a uvular stop/velar ejective/labio-velar. Loprieno transcribes <q> as a uvular stop /q/ (1995:33), whereas Greenberg (1950b) does not define the phonemic transcription of this sign and only posits the Egyptological transcription <q> (although Greenberg (1950b:180) terms this sound as a velar). Peust (1999b:110) gives the phonemic representation of this sign as a labio-velar /k^w/. Watson (1979) also only gives a transcription of this sign but for him it is represented as <k>.⁴¹ Allen (2000:16) states that Egyptian <q> is 'A kind of *k*, probably like Arabic and Hebrew *q* ... or with some kind of "emphasis," like *q* in some Ethiopic languages ...' Moreover, Greenberg (1950b:180) states that 'the Semitic rules concerning the non-occurrence of velars and post-velars finds its correspondence in Egyptian.' For clarity, therefore, it is proposed here that the Egyptian velars and 'post-velars' should be termed 'dorsal'. As the term, 'post-velar' implies the inclusion into this set of any other sound that is articulated further back than the velar place of articulation (such as the gutturals). This is in line with the Arabic categorisation. In Egyptian verbal roots, the co-occurrence restriction of the uvular stop/velar ejective/labio-velar <q> /q/ ~ /k'/ ~ /k^w/, the velar stops <g> /g/ and <k> /k/ or the velar/uvular fricative <h> /x/ ~ /χ/ with each other is upheld.⁴²

3.2.6 Gutturals

The guttural series of consonants are:

³⁹ The series of dorsals, in certain works, is termed as 'dorsal obstruent.' This takes into account the tentative representation of the sign <h>, which in some studies is positioned in the guttural series (Reintges 1994), although it does not occur with the other signs in the dorsal series. The guttural series in Egyptian is problematic for the investigation into dissimilation see §3.2.6.

⁴⁰ Cf. Peust (1999b:115-117) for an alternative view.

⁴¹ This transcription is more in line with the transliteration practise of the velar ejective in Ethiopic (Semitic) languages.

⁴² Although, Watson (1979:103) point out that this restriction is strong for positions I-II and II-III, but as in Arabic, it is weaker for the position I-III.

$\langle h \rangle /h/, \langle \dot{h} \rangle /h/, \langle \text{ʕ} \rangle /ʕ/, \langle ʕ \rangle /ʕ/ \sim /R/$

Watson (1979:102) describes these consonants as being laryngeals ($\langle ʕ \rangle$, $\langle h \rangle$) and pharyngeals ($\langle \dot{h} \rangle$, $\langle \text{ʕ} \rangle$), which ‘display a complex series of interreactions and are party to phonological rules, for the most part unformulated and little understood.’ Watson finds that these consonants ‘exhibit no degree of patterning whatsoever.’ (1979:102). Although Greenberg claims that the combination $\langle \dot{h}h \rangle$ is not found but $\langle ʕh \rangle$, $\langle ʕh \rangle$ and $\langle hʕ \rangle$ do occur (1950b:180).⁴³ He outlines that the combinations of $\langle ʕ \rangle$ with the other gutturals can be ‘understood as the development of *r* and *l*’ (1950b:180). It is evidenced that this phoneme, transcribed as $\langle ʕ \rangle$, frequently corresponds to Proto-Semitic **r* and **l*, hence the dual representation given in fig.14f.⁴⁴ Watson states that ‘Egyptian *ʕ* often represents etymological *r* and *l* as well as *ʕ*’ (1979:102). Furthermore he discusses the developments of the other sounds ‘*ʕ*, likewise, commonly derives from *r* and less frequently from *l* besides *ʕ* itself; and finally *h* may under certain conditions reflect an original *h*.’

Conclusively, Watson states that ‘For the time being therefore it must be confessed that no rules of patterning among laryngeals and pharyngeals in Egyptian are immediately apparent and that, in our present state of knowledge no definite conclusions can be drawn.’ (1979:102-103). However, Petráček (1969) finds that $\langle h \rangle$ shows incompatibility with $\langle \dot{h} \rangle$ and $\langle \text{ʕ} \rangle$. This is also seen from Peust’s chart in fig. 13. Interestingly, Rössler (1971) finds that $\langle \text{ʕ} \rangle$ shows restrictions with the coronal series $\langle d \rangle$, $\langle t \rangle$ and $\langle z \rangle$ (also seen in Peust’s chart).⁴⁵ As Watson pointed out, this series of Egyptian consonants demand further investigation.⁴⁶

3.2.7 Ancient Egyptian internal phonemic developments

It is evidenced that the series of consonants in fig. 14 have gone through internal developments; this is clearly seen with the analysis of their co-occurrence restrictions with certain articulatory sets.⁴⁷

(14) $\langle \text{ʕ} \rangle$, $\langle t \rangle$, $\langle d \rangle$, $\langle h \rangle$

The Egyptian sign transcribed as $\langle \text{ʕ} \rangle$ is proposed by Loprieno (1995:33) to have the phonemic value /ʕ/. He states (1995:34) that this phoneme, when palatalised, corresponds etymologically to Afroasiatic **x*.⁴⁸ This was Greenberg’s theory (1950b:181) although he was unable to support this with any etymologies. Watson (1979:103) shows that $\langle \text{ʕ} \rangle$ ‘does not seem to pattern as though it were a sibilant, and it must be suggested that *ʕ* behaves as though it were a (prepalatalised) post-velar.’ Although Watson does not discuss its exact phonological nature, he notes that in Old Kingdom writings there is ‘confusion between *h* and *ʕ*’ (1979:106). The dorsal nature of this sign is evidenced in Watson’s chart that shows this through the incompatibility

⁴³ Greenberg transliterates the conventional symbol $\langle ʕ \rangle$ as ?.

⁴⁴ See Loprieno (1995:33) for more on this association.

⁴⁵ Cf. Takács (1996:352-355) for more on dissimilation of Egyptian pharyngeals.

⁴⁶ Loprieno (2001:108) outlines that some of these consonants do not ‘exhibit a one-to-one correspondence with their Afroasiatic ancestor...but rather display a variety of correspondences contingent upon phonological contours or, possible, dialectal differences.’

⁴⁷ See also Satzinger (1997: 26-34) for more on the internal developments of the signs in fig. 14.

⁴⁸ ‘Which, as a rule, evolves to Eg. *h* = /ç/: *hmm*, *šmm* “to become hot”’. (Loprieno 1995:34).

of <š> with velars where their co-occurrence is ‘rare.’ From Watson’s analysis (1979:101), this co-occurrence restriction is validated and further <š> patterns frequently with other sibilants, where it has already been discussed that the sibilant series do not pattern with each other. Peust’s chart (fig.13) omits this sign from the compatibility analysis.

The two signs transcribed as <ṭ> and <ḏ>, are given by Loprieno (1995:33) with the phonemic representation of the palatals /tʃ/ and /dʒ/ respectively (1995:33).⁴⁹ However, Greenberg (1950b:180) discusses the fronting of an original <k> /k/ resulting in <ṭ>, and <ḏ> from a fronted <g> /g/. Watson terms these sounds as being ‘prepalatalised’ <ṭ> from <k> and <ḏ> from <g> (1979:103). Evidence for their prepalatalisation comes from their incompatibility with the consonants from the dorsal series. Watson’s chart shows that there are no co-occurrences of these two sounds with any consonants from the dorsal series. Greenberg (1950b:180) also sees the incompatibility of these sounds with the dorsal series, ‘It is striking therefore, that there are no verb roots in Egyptian containing both ṭ and a member of the velar stops...it also appears that ḏ does not occur in roots along with a velar stop.’⁵⁰

A further sign - <ḥ> is known to be subject to internal developments. Loprieno (1995:33) gives the phonemic transcription of this sign as /ç/ - a palatal fricative. Further, he states that this sound was also, along with <š>, the heir of Afroasiatic *x (Afroas. **xanam* > Eg. *ḥnmw* “[the ram-god] Khnum” (1995:35)). Watson (1979:103) states that this sound was ‘prepalatalised’. In Watson’s analysis, he finds no instances of roots containing both <ḥ> and <ḥ> (velar/uvular fricative). This co-occurrence restriction evidences the prepalatalised nature of this sound. Peust’s chart (fig. 13) also shows that this sound has strong restrictions against its occurrence with the dorsal series of consonants (<ḥ>, <k>, although <q> and <g> are questioned marked) and interestingly with the three other signs that are subject to internal ‘prepalatalised’ developments (<ṭ>, <ḏ> and <š>).

Greenberg’s (1950b:181) study concludes, ‘The general subject of the patterning of consonantal phonemes within the morphemes in Hamito-Semitic languages would seem to be a promising subject of investigation and one whose results must be kept in mind for their bearing on the historical analysis of this family of languages.’ Watson, in supporting the conclusions made in Greenberg’s ‘preliminary attempt’ is unequivocal in his conclusion: ‘... more important however is that the presence of this patterning in Egyptian helps locate Egyptian’s historical position within Hamito-Semitic [Afroasiatic] with slightly more precision than hitherto.’ (1979:105).

3.3 Non-Semitic Afroasiatic languages

Bender (1978) extended the consonantal compatibility restriction analysis to all the branches of Afroasiatic. Bender found ‘strongly positive results’ for Tamazigt (Berber), an autonomous member of the Northern branch, and the Cushitic languages Beja and Oromo.⁵¹ Further he found ‘More equivocal positive results are obtained for Hausa, Mubi, and Logone (Chadic), Awngi and Sidamo (Cushitic), Welamo

⁴⁹ Loprieno uses the American IPA symbols.

⁵⁰ See Vergote (1945: 64-67) for a discussion on the development of this, and on the interchange between <ḥ> and <ḥ>, also the replacement of the sign <ḥ> with <š> during the Graeco-Roman period.

⁵¹ Bender (1978:10) also finds that Proto-Indo-European verb roots (CVCVC) also show positive results. He asks the question that, as a side issue, whether this finding may ‘prove to be an important addition to the accumulating evidence of Afroasiatic-Indoeuropean commonality’.

(Omotic), Koma (Nilo-Saharan),⁵² and Proto-Indoeuropean (all verb roots). Negative results, equivocal or clearcut are obtained for Margi (Chadic), Kefa and Ari (Omotic), Kanuri and Masai (Nilo-Saharan), Proto-Bantu and Moro (Niger-Kordofanian).’ (1978:9).⁵³ Bender breaks down the consonantal restrictions into their articulatory classes such as labials, dentals (coronals) etc. and gives an overview of their positional incompatibility. Bender concludes that these results obtained show that ‘the co-occurrence restrictions are a good Afroasiatic isomorph, though it is seen that Omotic is the weak link, and Chadic is also on the weak side.’ (1978:9-10).⁵⁴

The outline given of the consonantal compatibility restrictions evident in these languages primarily shows that these restrictions are not just characteristic of the Semitic language family, but of further language families in the Afroasiatic phylum as a whole. Secondly, that the restrictions are gradient in being (i) positional (adjacency of positions I-II stronger than positions I-III etc), and importantly, (ii) articulatory, as the gradient restrictions always involve the coronal consonantal series.

3.4 Dissimilation as the OCP in Phonological Theory

The investigation into consonantal co-occurrence restrictions in Arabic led McCarthy (1986) to propose that this was an instantiation of the Obligatory Contour Principle (OCP) in phonology. McCarthy proposed that the total OCP, (initially proposed by Leben 1973 for tonal processes), is a principle of Universal Grammar which functions as an output filter on phonological rules, and applied to the consonant root tier:

- (15) Obligatory Contour Principle (McCarthy 1986:208)
At the melodic level, adjacent identical segments are prohibited.

This leads on from McCarthy’s (1979) original proposal that Arabic (and Semitic languages) have a consonantal root template, where vowels are inserted between the consonants to make forms according to a CV template. This formulation was couched within an autosegmental framework whereby the morphology of a verbal root was represented by separating the vowels and consonants of the word onto different autosegmental tiers. A repeated example from (2) is given again in (16):

- | | | | | |
|------------------|------------------|------------------|------------------|--------------------------|
| (16) Vowel tier: | a | a | a | /drs/ - ‘study’ |
| | | | | /daras-a/ - ‘he studied’ |
| template: | C ₁ v | C ₂ v | C ₃ v | |
| | | | | |
| Consonant tier: | d | r | s | |

The strongest positional co-occurrence restriction in a verbal root is the adjacent positions C₁ and C₂, subsequently, roots of the type /ddm/ are completely unattested.

⁵² Bender (1978:10) notes that the inclusion of Koma (Nilo-Saharan) is problematic but does not discuss this association further.

⁵³ In the plenary session of the conference where Bender (1978:19) presented his results, Hayward points out that these co-occurrence restrictions ‘are adhered to very strictly in ‘Afar [Cushitic]. In this language, however, such phenomena are not confined to verb roots alone, but are found in nominal roots also.’

⁵⁴ See Hayward (1990) for co-occurrence restrictions on Aari roots (Omotic).

However, this restriction is violated in roots for the adjacent positions C₂ and C₃, and therefore verbs are instanced of the forms *madad* /mdd/ etc, where these positions can contain identical consonants. McCarthy claimed that there was no real violation of the OCP as the trilateral roots with identical adjacent positions C₂ and C₃ are underlyingly a biliteral root form, such as /md/, with only two consonants. At the surface form, McCarthy argued, the rightmost consonant associates to the empty C position (of the trilateral template) as the association of consonants to the template proceeds in a left to right process.⁵⁵

$$(17) \quad \begin{array}{ccccccc} C & v & C & v & C & v & /md/ > [madad] \\ | & & \diagdown & & & & \\ m & & & & d & & \end{array}$$

Further, McCarthy argued that under certain morphological conditions the OCP blocked rules that would normally apply, such as the deletion of a segment when this segment is between two identical segments. McCarthy (1986: 220-221) uses data from ‘Afar (Cushitic) to show that a vowel fails to delete when the consonants on either side of it are identical (18a), although this process is expected in a certain context (18b). McCarthy refers to this process specifically as ‘antigemination’ (1986):⁵⁶

| | | | |
|-------|---------|---------|----------------|
| (18a) | miḍaḍí | *miḍḍí | ‘fruit’ |
| | sababá | *sabbá | ‘reason’ |
| | xarar-é | *xarr-é | ‘he burned’ |
| (18b) | xamíla | xaml-í | ‘swampgrass’ |
| | ḡagára | ḡagr-í | ‘scabies’ |
| | darágu | darg-í | ‘watered milk’ |

The issue of the consonant co-occurrence restriction among consonants from the same articulatory set was explained by McCarthy (1988) with the constraint of OCP-Place – ‘Adjacent identical place features are prohibited.’ This constraint, applying the OCP to individual place feature tiers, ruled out roots with homorganic consonants in any position. An example is that a hypothetical root such as */mbt/ is prohibited because of adjacent features on the labial tier would violate the OCP-Place constraint:

$$(19) \quad \begin{array}{l} \text{labial tier:} \quad [lab] \quad [lab] \quad \quad \quad /*mbt/ \\ \quad \quad \quad | \quad \quad | \\ \text{template:} \quad C \quad v \quad C \quad v \quad C \\ \quad \quad \quad \quad \quad \quad | \\ \quad \quad \quad \quad \quad \quad [cor] \end{array}$$

McCarthy (1988) further splits the coronals into two major classes for the feature [sonorant] in the OCP-Place constraint. He maintains that there has to be a distinction between the total OCP and the OCP-Place constraints as the total OCP is a stronger restriction as adjacent identical consonants are prohibited whereas roots with

⁵⁵ For a further analysis, see Yip (1988b).

⁵⁶ Cf. Counterexamples of vowel deletion rules that fail to be blocked between identical consonants in Odden (1988). However, McCarthy suggested (in foresight) that in these cases the OCP would have to be a parameter setting.

homorganic consonants do occur but are more rare. Pierrehumbert (1993) followed McCarthy's proposals but highlighted that the division of the coronals into their non-place features, specifically manner, meant that any non-place feature must be as potentially relevant to the strength of the OCP-Place constraint. This means that the gradiency of consonantal compatibility refers to maximal similarity. This being that identical consonants are maximally similar and therefore have the strongest co-occurrence restriction whereas homorganic consonants that differ in many features have weaker constraints on their co-occurrence. This gradiency can also be seen in the positional strength of adjacent consonants as opposed to the weaker constraint for non-adjacent consonants.⁵⁷

4 Meroitic Consonantal Compatibility Restrictions

The investigation into consonantal compatibility restrictions in Meroitic verb forms is given in this section. Due to the problems associated with any linguistic analysis of Meroitic, observational results are evidenced rather than statistical analyses given (such as those given in Greenberg (1950b), Watson (1979) and Bender (1978)).

4.1 Motivations for the analysis

It has long been assumed within the field of Meroitic studies that the sign for the vowel *e* (ϡ) also doubles as a zero-vowel indicator. This assumption was not based upon any direct evidence but through an analogous argument structure (Hintze 1974), initiated from a supposition made by Griffith (1916) when looking at loans between Coptic and Meroitic. I claimed (Rowan 2006) that the analysis of this sign being a zero-vowel indicator was erroneous as it is used to break up consonant sequences found in equivalent forms from other languages and therefore it is the epenthetic vowel. In showing that this was the correct representation of this sign, a further argument supporting the theory of this sign being a zero-vowel indicator put forward by Rilly (1999) had to be addressed.⁵⁸

In Rilly's (1999) paper, he supports the theory that the vowel sign ϡ - *e* is also used as a zero-vowel indicator with a combinatorial analysis. In this paper, Rilly states that sequences of $C_{\alpha}eC_{\alpha}$, where the consonants α = labials or α = velars, are never found.⁵⁹ Rilly puts this absence down to haplography in the Meroitic script, as it is believed that the language has a very high assimilation tendency,⁶⁰ and this is due to the vowel sign ϡ - *e* being rarely pronounced as '*l'absence de voyelle entre deux consonnes est notée par un signe translittéré e [ϡ]*' (1999b:104). Thus, for Rilly, when ϡ - *e* representing a zero-vowel is between two consonants that share a labial or velar place of articulation they will become adjacent and therefore assimilate, hence the absence of these written sequences in the texts.⁶¹ In conducting a preliminary analysis of Rilly's claim, I found that not only are the sequences $C_{\alpha}eC_{\alpha}$ not found but also that the combinations $C_{\alpha}aC_{\alpha}$, $C_{\alpha}iC_{\alpha}$ and $C_{\alpha}oC_{\alpha}$ are very rarely evidenced (where α = labial or

⁵⁷ For more on the phonological analysis of the OCP in consonantal incompatibility see Frisch *et al* (2004), Frisch & Zawaydeh (2001), Yip (1988a), Paradis & Prunet (1990) and Berkely (2000).

⁵⁸ The reader is referred to a critique of this association and a full investigation in Rowan (2006).

⁵⁹ '*Une étude faite sur le "lexique" cité montre que les séquences graphiques *bep, *bem, *mep, *mep, *peb, *pem ne sont jamais représentées*'. '*Le même phénomène s'observe pour les vélaires en contact: on ne trouve ni *hek, ni *keh*.' Rilly (1999b:105).

⁶⁰ Observed by Hintze (1979:65-67).

⁶¹ For a further argument to this point, see §5.3.1.

α = velar consonants). Primarily, this examination led me to claim (Rowan 2006) that the absence of the identical place sequences of consonants is not due to an assimilation process,⁶² but must be due to consonantal compatibility restrictions. Following Rilly, it is expected that the peripheral vowels of Meroitic (/a/, /i/, /u/) would be resistant to the assimilation of the consonants they separate, even if the weak medial vowel ($\text{ɛ} - e / \text{ə} /$) is not.

4.3 Limitations of the data

There are a number of reasons as to why any linguistic analysis of the Meroitic language is fraught with difficulties. Firstly, the corpus of known Meroitic inscriptions is very small and the material is very limited as the number of inscriptions that are catalogued and published only number to approximately 1,300 (Répertoire d'Épigraphie Méroïtique). A large majority of these inscriptions only consist of a few lines in length, being writings of graffiti, and on fragments of pottery (ostraca) and papyrus. Texts that are more extensive are evidenced on royal inscriptions, funerary inscriptions and offering tables, although as these follow a standard format they subsequently contain a very limited range of grammar and vocabulary. Only a few texts are known that contain lengthy inscriptions such as the inscription of Kharamadoye at Kalabsha (REM 0094), but still this text only reaches to approximately 34 lines in length. As a result, the known and surmised lexical and grammatical items of the Meroitic language are indeed very small. In addition to the associated problems of a small corpus hindering a linguistic analysis of Meroitic, there are also problems with the written language; many inscriptions are poorly executed and there is ambiguity in interpreting signs that are similar stylistically.⁶³ On a deeper language level, the language, even though not interpretable overall is understood to be agglutinative thereby making the discovery of grammatical and lexical morphological boundaries exceedingly tenuous and problematic.⁶⁴ Consequently, these limitations result in a statistically lower frequency of data in which to analyse, as opposed to thoroughly described languages such as Arabic and Ancient Egyptian.

4.4 Meroitic consonants

As with the discussion in §3 of consonantal compatibility restrictions in Afroasiatic, the Meroitic consonantal signs can be classified into the following articulatory sets. The standard transliteration of the signs are given in italics:

- | | |
|--------------------------------|--|
| (a) labials | $\text{ʌ} - b, \text{ɣ} - p, \text{ɟ} - m$ |
| (b) coronal sonorants [-nasal] | $\text{ɬ} - l, \text{ʋ} - r,$ |
| (c) coronal sonorants [+nasal] | $\text{ɮ} - n$ |
| (d) coronal stops | $\text{ɮ} - t, \text{ɮ} - d,$ |
| (e) coronal fricatives | $\text{ɟ} - s$ |
| (d) dorsals | $\text{ɟ} - k, \text{ɮ} - q, \text{ɟ} - h, \text{ɟ} - \underline{h}$ |

⁶² $C_\alpha e C_\alpha$ because e is a zero-vowel in these instances, or even the weak vowel schwa.

⁶³ Eg. $\text{ɮ} - t$ and $\text{ɬ} - l, \text{ɟ} - m, \text{ɟ} - \underline{h}$ and $\text{ɟ} - s$.

⁶⁴ Although, Meroitic grammatical morphemes are more understood than lexical items. For a main overview, cf. Griffith (1911; 1916), Hintze (1963; 1974; 1979), Hofmann (1981) and Meeks (1973).

(whether proper or common) and as such will not exhibit strong compatibility restrictions, as in the verbal forms.⁶⁷

(a) *mr̥or* /marura/

This word is highly likely to be a representation of a nominal form as Griffith (1912:68) gives the nominal ⲉⲛⲱ/ⲱⲓ – *mr̥orbe* with its plural form ⲛⲉⲓⲱ/ⲱⲓ – *mr̥orleb*.

(b) *kek* /kəka/

No associated meaning can be found for this form.

(c) *tne* /teten/

No associated meaning can be found for this form, although *-ne* is evidenced as a ‘particle’ used in many forms where Rilly (2005) believes it is a nominal derivational suffix.⁶⁸ Further, Hofmann (1981:104) gives *tne-lh* (although she uses Griffith’s transliteration for the coronal nasal sign), *-lh* is understood as an adjective meaning ‘great’ thereby making the stem word *tne* nominal.

(d) *dd* /deda/

A similar form is found in Griffith (1912:123) who lists it as ⲱⲓ/ⲛⲛ – *ddokr*, and states that it is a personal name.

(e) *iddne* /ideden/

No associated meaning can be found for this form, although see description of (c) above.

(f) *ssime/ssi/ssor/sesimə/, /sesi/, /sesura/*

Griffith (1911:119) lists these forms as sacerdotal titles along with another exceptional form *ssmri*, which he states is titular also. From Griffith’s analysis, it can be taken that these forms are also nominal.

(g) *attih* /atetiha/

This form is found in Griffith (1911:110) as ⲉⲛⲉⲓ – *attih*. In Griffith (1912:64), this form is found in the construction ⲉⲛⲉⲓ/ⲛⲉⲓⲉⲓ – *attih-mlo-li*. This construction breaks down into *mlo* which is known to have the associated meaning ‘good’ and *li* is the article or determiner, whereby this construction is a nominal phrase indicating that *attih* can be assumed to be a nominal form also.

(h) *kedd* /kədada/

No associated meanings found for this form.

(i) *tkk* /tekaka/

No associated meanings found for this form, although looking at the known/assumed grammatical particles (Meeks 1973), *-k(e)* is used as a verbal suffix, if this is the correct interpretation for this form, it is therefore morphologically complex with the

⁶⁷ The phonemic transcription given here follows the results of an analysis put forward in Rowan (2006) and therefore differs from traditional Meroitic phonemic transcription.

⁶⁸ See Rowan (2006) for the consideration of this morpheme functioning as a determinative.

verb stem being *tk* with the verbal suffix *tk-k*. This analysis would discount this form from the incompatibility exceptions, as the two identical consonants no longer belong to the same constituent.

(j) *kroro* /karuru/

Griffith (1911:120) gives this word with an Egyptian equivalent as *akrêre*, and being the possible title for ‘prince’ (1912:76). Griffith states this form is ‘evidently a superior qualification’ as ‘considering the position of persons having the epithet *akrêrê*, I am inclined to attribute to it the meaning “princely” (1912:55). Consequently, this item can be discounted, as it is a nominal form.

(k) *penn* /pənana/

No associated meaning can be found for this form.

(l) *snn* /senana/

Hintze (1963:28) lists this form as being nominal. Griffith (1911:119) gives $\text{𐎓𐎎𐎎} \text{ 𐎗𐎎} \text{ 𐎗𐎎} \text{ 𐎗𐎎}$ – *snnlitebkwi* “of Shanen’ deity (?) pl.’ indicating a place name.

(m) *kbb* /kababa/

This form is found in Griffith (1911:70) with the locative ‘particle’ *-te* suffixed *kbbte*.⁶⁹ This indicates that this form is likely to be a nominal item.

(n) *kmom* /kamuma/

No associated meaning can be found for this form.

(o) *wwike* /wawikə/

This is the only item that is defined as a verb by Hintze (1963:29). Griffith (1911:113) gives the form $\text{𐎗𐎗} \text{ 𐎗𐎗} \text{ 𐎗𐎗}$ – *wwikelo* and states that it occurs in descriptive phrases. However the form *wwi* is found as a proper noun in Meroitic

(p) *pipn/pipl* /pipana/, /pipala/

Griffith gives these two forms without speculating their associated meanings. Millet (2003:58) states that *p-* can be the ‘initial element of the predicate word...indicator of the optative mood’. If this can be applied to the above forms this means that the two identical consonants belong to separate constituents and therefore discounted.

(q) *hh* /haha/

This form is found in Griffith (1912:118) as $\text{𐎗𐎗} \text{ 𐎗𐎗}$ – *hhll*. He discusses that the written form *hh* is a ‘briefly’ written form of (𐎗) 𐎗 (𐎗) 𐎗 – *h(m)h(e)*. Therefore, the two identical consonants are not adjacent and this form can be discounted.

(r) *trri* /tarari/

No associated meanings can be found for this form.

(s) *bobt* /bubata/

No associated meanings can be found for this form.

⁶⁹ See Rowan (2006) for an alternative proposal on this locative morpheme as a locative determinative.

(t)*sseno* /sesnu/

Griffith (1911:71) gives this form as /𐎢𐎥𐎢𐎢 𐎢 – *sseno* as a personal name of a father, therefore discounting this item, as it is a nominal form.

In summary, only seven forms are instanced which show the adjacent identical consonantal compatibility restrictions violated where no associate meaning or lexical categorisation can be found. This is an extremely low occurrence of forms containing identical adjacent consonants and so the process of consonantal compatibility restrictions is assuredly upheld in Meroitic.

4.6.1 Adjacent homorganic forms

If there are strong restrictions against identical adjacent sequences of consonants in Meroitic then restrictions should be evidenced on adjacent homorganic sequences also, subsequently this restriction is also found. Only four forms were found in the corpus that contained adjacent homorganic sequences of consonants, i.e. consonants drawn from the same articulatory series namely the labial series. These being:

(a) *pmete* *pibr* *khene* *pbh*

The form *pmete* can be discounted as it contains the verbal stems as given in §4.5 fig. (a) and therefore must be a prefixed forms as the element *p-* is considered to be a verbal prefix. It is reiterated here again as Watson (1979:100) pointed out ‘affixal elements do not obey patterning.’⁷⁰

Hofmann (1981:203) and Abdalla (1979:158) discuss the form *bh* as being an ‘infixe’ and a plural form of the datival postposition. This suggests that there is no violation of compatibility restrictions as the form *pbh* contains the prefixed element *p-*.

The form *khene* is given in Griffith (1912:41) as ‘*khabkheñ* of the king’ and therefore shows to be part of a nominal form. However, no associated meaning could be found for the form *pibr* but this is the only instance of this form occurring the texts and the only adjacent homorganic sequence that cannot be lexically categorised.

4.7 Conclusion of the Meroitic analysis

Overall, it has been seen that of the known and assumed Meroitic verbal forms, none exhibit adjacent identical consonants or adjacent homorganic consonant sequences. In non-verbal forms (nominal), these restrictions are weakened, as with other Afroasiatic languages. The affixes do not obey patterning and so the consonantal compatibility restrictions in Meroitic are only subject to the root and not the word. Fundamentally, following Bender (1978:9) who stated that consonantal compatibility restrictions are a good Afroasiatic isomorph, it can be proposed from this analysis that the investigation into an affiliation of Meroitic with a related language should be focused upon Afroasiatic languages.

⁷⁰ The form *mpl* is erroneously given in Griffith’s word-list appendix (1912:68) as it appears in the Kharamadoye Inscription (REM0094) as *mkl*.

5 Old Nubian Consonantal Compatibility Analysis

The possibility of a link between Meroitic and Nubian, since Griffith's initial assumption, has for nearly a century now been continually proposed and then discounted only to resurface again (see §2 for discussion). I will show in this section that through a phonological consonantal compatibility analysis, Meroitic and Old Nubian show no parity. The analysis of Old Nubian (8th – 15th CE) is taken from a dictionary corpus (Browne 1996; 2002). This is the direct ancestor of the Nubian language spoken today in Sudan of what was the area of the Meroitic Kingdom.⁷¹

5.1 Old Nubian Phonemic Inventory

The consonant phonemes of Old Nubian are given here with their approximate phonological values and their orthographic representation in brackets (Browne 2002:15):

| | | | | |
|-----------------------|------|----------|------|------|
| a) ⁷² p(π) | t(τ) | d(Δ) | k(κ) | g(Γ) |
| f(Φ) | s(С) | ʃ(Ψ) | h(Ζ) | |
| | | dʒ(Ϝ) | | |
| m(М) | n(Ν) | ŋ(⌘) | ŋ(Γ) | |
| | l(λ) | | | |
| | r(Р) | | | |
| w(ωΥ) | | y(ι, ει) | | |

5.2 Old Nubian Verbal System

Browne (2002:45) states that 'Verbs in O.N are built upon stems which are either monosyllabic ... or polysyllabic (chiefly disyllabic); the latter also include compound stems.' Browne (2002:46) gives the following representation of these stems:⁷³

| | | |
|------------------|----------------|------------------------|
| (a) Monosyllabic | (b) Disyllabic | |
| V (ε)ι- | VVC | ειαρ- 'to know' |
| VC ακ- | VCV | αγει- 'to make' |
| VCC ανκ- | VCVC | αγορ- 'to forget' |
| CV Δι- | VCVCC | εσο(ν)ιτ- 'to release' |
| CVC Γαβ- | VCCVC | αρμс- 'to judge' |
| CVCC Γαλλ- | CVV | τεει- 'to hope' |
| | CVCV | Διε- 'to fight' |
| | CVCVC | σειεиΔ- 'to mock' |

⁷¹ 'Most closely akin to Nobiin [dialect] (also known as Mahas/Fadidja)' Browne (2002:1).

⁷² The phonemes β, ζ, θ and χ are omitted as they are only found in loans.

⁷³ A supralinear stroke above a sign indicates 'a consonant to be pronounced as if /i/ preceded' (Browne 2002:12). For more on this orthographic practice see Browne (2002).

| | | |
|--------|----------|-------------|
| CVCCV | ΚΟΥΡΚΟΥ- | ‘to think’ |
| CVCCVC | ΤΙΘΘΑΝ- | ‘to hinder’ |

(c) Trisyllabic

| | | |
|--------|-------------|---------------|
| VCVCV | ΑΘΑΓΕΙ- | ‘to be sweet’ |
| VCVCVC | Λ̄ΜΑΔ(ΕΙ)Θ- | ‘to hasten’ |
| VCCVVC | Κ̄ΚΟΕΛ- | ‘to thank’ |
| VCCVCV | ΑΦΦΑΓΕΙ- | ‘to fear’ |
| CVCVCV | ΜΟΥΔΟΥ(ΕΙ)- | ‘to lead’ |

(d) Compound verbal stems

Old Nubian compound verbal stems are made by compounding two separate verbal forms such as **ΜΑΔΘΟΥ**̄- ‘to tell lies’ which compounds the verbs **ΜΑΔΘ**- ‘lie’ + **ΟΥ**̄- ‘to say’.

(e) Reduplicated verbs

There exist several verbal forms in Old Nubian that are reduplicated verb stems, such as **ΚΩ-ΚΩ**- ‘to envy’ and **ΚΑC-ΚΑC**- ‘to draw (water)’.

5.3 Non-compatibility restrictions in Old Nubian Verbs

This section outlines an analysis of consonantal compatibility restrictions in Old Nubian verbs. The corpus is taken from Browne (1996) and was selected whereby the following verbal forms were omitted; (i) all monoconsonantal forms; (ii) compound verbal stems; (iii) reduplicated verbal stems and (iv) the Greek loan **ΠΙCΤΕΥ(ΕΙ)**- ‘to believe’. From the data in §5.2 of (a), (b) and (c), it is shown that verbal forms are of maximally four consonants, these are included in the analysis. Subsequently, the data below shows that out of a corpus of 262 verbal forms, a very high proportion, namely 98 verb forms (over a third of the corpus) are found with identical consonants:

(a) Verbs with identical consonants

| | | | |
|--------------------------|-------------------|----------------------|--------------------|
| ΟΚΚΑΡ- | ‘to attend to’ | ΘΙΑΛΙΓ̄Ρ- | ‘pay attention to’ |
| ΠΙΚΚ- | ‘to awake’ | ΚΑΚ-/ΟΥΝΝ- | ‘to bear’ |
| Κ̄ΜΜ- | ‘to beat’ | ΑΛΛ-/Τ̄ΚΚΑΡ- | ‘to bind’ |
| ΑΘΘ- | ‘to bite’ | ΚΕΙΚ- | ‘to blaspheme’ |
| ΑΡΡ-/ΕΝ(Ν)-/Ε̄ΚΚ- | ‘to bring’ | ΤΑΘΘ- | ‘to call’ |
| ΠΑΘ(Θ)- | ‘to cease’ | ΓΑΠΠ̄Ρ-/ΘΟΘ- | ‘to cede’ |
| Γ̄Π̄ΡΤ(̄Ρ)- | ‘to change’ | Ε̄ΚΚ(̄Ρ)- | ‘to comfort’ |
| ΚΙΡΙΓ̄Ρ- | ‘to complete’ | ΔΕΚΚΙΓ̄Ρ- | ‘to conceal’ |
| ΜΙΔΔ- | ‘to condemn’ | ΤΟΚ(Κ)- | ‘to cook’ |
| ΓΟΔΔ- | ‘to cut down’ | ΓΑΓΓ- | ‘to deny’ |
| CΟΥΚΚ- | ‘to descend’ | ΔΟΛΛ- | ‘to desire’ |
| ΔΑΠΠ̄Ρ- | ‘to destroy’ | Ε̄Ρ̄Ε̄Ρ̄Ρ- | ‘to devise’ |
| Ε̄ΚΚ- | ‘to direct’ | ΠΑΘ(Θ)-/ΤΟΜΤ- | ‘to divide’ |
| Δ̄ΜΜ- | ‘to draw (paint)’ | ΕΙΘΟΘΘΔΡ- | ‘to emulate’ |
| Τ̄ΟΥΛΛ- | ‘to endure’ | ΠΑΘΘΑΡ- | ‘to enquire’ |
| Κ̄ΟΥΘΘ(̄Ρ)- | ‘to enter’ | ΚΟΘΘ- | ‘to establish’ |
| Τ̄ΟΡΠΑΡ- | ‘to farm’ | ΑΦΦΑΓΕΙ- | ‘to fear’ |
| Γ̄Π̄Π- | ‘to fix’ | ΠΑΡΡ- | ‘to fly’ |
| Ε̄ΡΡ- | ‘to follow’ | ΑΠ(Π)-/ΚΑΡΡ- | ‘to grasp’ |

| | | | |
|-------------------|-----------------|-------------|--------------------|
| Γ̄CC̄P̄- | ‘to hallow’ | ΟΛ(λ)- | ‘to hang’ |
| ΤΙC̄C̄AN- | ‘to hinder’ | ΚΑΡP- | ‘to hold’ |
| Π̄ΛΛΙΓ̄Π̄- | ‘to illumine’ | ΟΚ̄Κ̄Δ- | ‘commit injustice’ |
| Ε̄Κ̄Κ- | ‘to instruct’ | ΠΑΣ(σ)- | ‘to investigate’ |
| ΠΕΨΨ(P̄)- | ‘to judge’ | Κ̄Μ̄Μ- | ‘to knock upon’ |
| Ε̄Κ̄Κ- | ‘to lead’ | ΚΟΥΛΛ- | ‘to learn’ |
| Ε̄ΔΕΔ- | ‘to look in’ | Ε̄Κ̄Κ- | ‘to move’ |
| Ε̄C̄C̄P̄- | ‘to obey’ | C̄ŌC̄- | ‘to offer’ |
| Γ̄ΑΛΛ-/ΚΑΚ-/ΠΟΚΚ- | ‘to open’ | Δ̄Μ̄Μ- | ‘to paint’ |
| Δ̄ΑΠΠ- | ‘to perish’ | C̄ΙΛΕΛ(P̄)- | ‘to pray’ |
| C̄ŌΥC̄P̄- | ‘to proceed’ | ŌΥΓΓ- | ‘to proclaim’ |
| ŌΥΝΝ- | ‘to produce’ | Ε̄Κ̄ΚΔΔP̄- | ‘to prophecy’ |
| Μ̄ŌΥΚΚ- | ‘to rage’ | ΕΝ(Ν)- | ‘to raise’ |
| Λ̄ΔΔ- | ‘to make ready’ | ΕΦΦ-/ΓΑΔΔ- | ‘to rejoice’ |
| Π̄ΛΛΙΓ̄Π̄- | ‘to reveal’ | ΠΑΣC̄- | ‘to rise (sun)’ |
| ΠΑΣ(ψ)/-ΠΑΣ(σ)- | ‘to separate’ | ΑΚΔΑΚ- | ‘to set up’ |
| ΤŌΥΦΦ- | ‘to spit’ | ΜΕC̄C̄- | ‘to stand’ |
| ΚΑΚΚΙΓ̄P̄- | ‘to strengthen’ | ΤŌC̄(σ)- | ‘to strike’ |
| ΕΦΦ- | ‘to suffer’ | ΑΡP- | ‘to take’ |
| ŌΥΛΛ- | ‘to teach’ | ΤΑΠΠΑΡ- | ‘to touch’ |
| ΠΑΝΝ- | ‘to trouble’ | ΜΑΛΛ(Ε)- | ‘to turn’ |
| ΕΙΜΜΟΥΡ- (?) | ‘to understand’ | ΔŌΥΚΚ- | ‘to uproot’ |
| ΠΑΡP- | ‘to whirl’ | ΚΑC̄(C̄)- | ‘to wipe away’ |
| ΓΕΡ(P̄)- | ‘to work’ | ΔŌΥΚ(Κ)- | ‘to worship’ |
| ΔŌΥΚΚ- | ‘to yoke’ | | |

This data shows that there are no consonantal compatibility restrictions evident in Old Nubian verbal forms due to the extremely high proportion of verbs containing identical consonants, further, out of these 98 verbs, 91 verbs show adjacent identical consonants.

The data in (b) shows a further 24 verb forms that contain homorganic consonants: κ/Γ/Γ - /k/, /g/, /ŋ/; λ/Ρ - /l/, /r/; μ/Π/Φ - /m/, /p/, /f/; Δ/Τ - /d/, /t/:

(b) Verbs with homorganic consonants

| | | | |
|-------------|----------------|-----------|-----------------|
| ΚΕΤΓP̄- | ‘to care for’ | ΚOΓP̄- | ‘to cleanse’ |
| ΚΙΡΙΓP̄- | ‘to complete’ | ΔΕΚΚΙΓP̄- | ‘to conceal’ |
| ΓΟΚΟΡ- | ‘to marvel at’ | ΓΟΚ- | ‘to omit’ |
| ΓΟΚ- | ‘to pass away’ | ΚOΓP̄- | ‘to purify’ |
| ΒΑΓΓ- | ‘to trample’ | ΠΕΛΙΡ- | ‘to admit’ |
| C̄ΚΕΛ(ΑΡ)- | ‘to beseech’ | ΛΙΓP̄- | ‘to consider’ |
| ŌΥΛΓ(P̄)- | ‘to hear’ | Π̄ΛΛΙΓP̄- | ‘to illumine’ |
| C̄ΙΛΕΛ(P̄)- | ‘to pray’ | ΠΑΔΕΙΦ- | ‘to transgress’ |
| ΔŌΥΤ- | ‘to adorn’ | ΚΑΔΙΤ- | ‘to broadcast’ |
| ΤC̄Δ(Ε)- | ‘to encounter’ | ΔΑΤ- (?) | ‘to enter’ |
| ΤŌΥΔ- | ‘to hunt’ | ΚΑΔΙΤ- | ‘to scatter’ |

In comparison with the analysis put forward in §4 of Meroitic, these two languages show strongly different results as to compatibility restrictions; Meroitic upholds

consonantal compatibility restrictions whereas Old Nubian does not. This is further evidence towards these two languages showing no affiliation.

5.4 Geminate in Meroitic

The Old Nubian verbal forms with strictly adjacent identical consonants e.g. **𐎎𐎎𐎎**-/midd-/ ‘to condemn’, could be analysed as geminate forms. However, this high representation of ‘geminate’ in Old Nubian poses a problem for a link with the Meroitic language. Hintze (1974:74) made the observation that ‘... all Meroitic letters denote syllables, not only *te*, *to*, etc. This means that doubling of consonants is not expressed in writing; e.g. *-li* may be /-li/ or /-lli/, but *rr* is never /rr/ but /rar(a)/.’ Hintze’s proposal refers to the system of Meroitic writing where all consonant signs such as ω *r* /ra/ are realised with an inherent unmarked ‘a’ vowel, therefore the sequence $\omega\omega$ *rr* is disyllabic in being phonemically /rara/. Subsequently, Meroitic does not notate geminate forms. If Meroitic is the ancestor of Old Nubian, and Old Nubian evidences such a high proportion of geminates represented in its verbal forms, then why was the Meroitic system that was apparently devised to notate a zero-vowel position between two consonants not used to notate these geminates in Meroitic, if in fact Old Nubian is a descendant of Meroitic?

To clarify this point, as has already been discussed (§4.1), the assumption followed in the field of Meroitic research has posited an ambiguous usage for the vowel sign \mathfrak{S} *e*, where this sign is believed to have a dual representation in notating a vowel and a zero-vowel. This assumption is built upon a supposition made by Griffith (1916:120) and specifically followed through Hintze’s statement ‘Consonant + *e* has a double value: /Ce/ or /C/ (consonant without vowel)’ (1974:74). If this dual representation of this vowel sign is correct, and Old Nubian is a descendent of Meroitic, then why were geminates not represented in Meroitic even though it was possible to do so with the vowel sign \mathfrak{S} *e* functioning as a zero-vowel marker in these cases?⁷⁴ For example, a geminate such as /mm/ could be written as $\mathfrak{S}\mathfrak{S}$ *mem* where the vowel \mathfrak{S} *e* is a zero-vowel indicator in these forms. And as Rilly’s paper (1999) has shown, sequences of identical labial or velar consonants separated by the vowel sign *e* are absent from the Meroitic texts.⁷⁵ Why would the Meroites not use this system for specifically geminate sequences that would have been vastly represented in the language if we assume that Meroitic is the ancestor of Old Nubian?

A further case in point is that from the Meroitic data in §4.3, that discusses the few instances found of identical consonants (nominal forms), are mainly all separated by a vowel, whereas the vastly represented instances of Old Nubian identical sequences are not.

To claim that these differences could be the result of a diachronic process of either assimilation or reduplication of consonants (depending upon which process took place) between Meroitic and Old Nubian is far too tenuous to put forward. The corpus

⁷⁴ The syllable based script Linear B coped with consonant clusters by ‘syllable telescoping’ (DeFrancis 1989:252) or nuclear copying (the form *tri* is written as *ti + ri*, showing a dummy vowel in the first syllable), as there was no specific sign for a zero-vowel position. Arabic shows a zero-vowel position with the use of the diacritic *shadda* sign. In Arabic, this sign is used to indicate geminate consonant sequences. In comparison, since the Meroites seemingly had at their disposal a sign whose function could represent this zero-vowel position, why was it not used for geminate sequences?

⁷⁵ Remembering that Rilly (1999; 2005) puts this down to haplography rather than the claim made here that it is a case of consonantal compatibility restrictions.

of Meroitic Late texts can be dated to circa 5th century CE⁷⁶ whereas the Old Nubian corpus extends from the 8th century CE (Browne 2002). The texts of Old Nubian and Meroitic are only distanced by a few hundred years. Diachronically this small length of time would allow us to see the relatedness of these languages if indeed they were, although the attempts to position Meroitic as an ancestor of Old Nubian have always resulted in disappointment for those who have chosen to pursue this line of investigation.

I put forward that considering these points and the comparison of the consonantal compatibility restrictions evident in Meroitic but not in Old Nubian, is evidence towards the claim that the two languages are not related and the Nubian link hypothesis must be abandoned.

6 The absence of ‘peculiarly Semitic consonants’ in Meroitic

This section is not an exhaustive account of the discussion into the phonemic values of the Meroitic signs, but is intended to give a brief overview to show that the omission of certain phonemes in the Meroitic inventory does not dismiss an association of Meroitic within the Afroasiatic phylum.⁷⁷

In his first understanding of the phonemic values of the Meroitic signs, Griffith stated that ‘Absence of the peculiarly Semitic consonants and a general simplicity in the sounds of the language seem certain.’ (1911:22). Griffith is referring here to ‘peculiarly Semitic consonants’ as the emphatic series, also evidenced in Ancient Egyptian (see §3.1 and §3.2 for the phonemic inventories of Arabic, and other Semitic languages, and Ancient Egyptian). This absence of emphatic consonants was problematic to Meinhof (1921/22:3) and Zhylarz’s (1930:421) proposals that Meroitic was a Hamito-Semitic (Afroasiatic) language, and so their analyses of the phonemic values of the Meroitic signs gave emphatic representations to a number of these signs in their inventories.

The Afroasiatic language phylum has been revised since the time of Meinhof and Zhylarz with so much more solid linguistic research. This means that the Semitic languages should not be consistently taken as the representative language group of Afroasiatic as there are varying differences between the branches and sub-branches of this language phylum.

For example, the Afroasiatic Cushitic language Beja (which is in close proximity to Meroitic) does not have emphatics within its phonemic inventory, but this singular criterion does not dismiss the relatedness of Beja within Afroasiatic:

(a) Beja Inventory (Hudson 1964: 20-22; 1974:112):

| | | | | | |
|---|------|----|---|---|----------------|
| b | d | ḍ | j | g | g ^w |
| | t | ṭ | | k | k ^w |
| f | s | | ʃ | | |
| m | n | | | | |
| w | r, l | | y | | ʔ, h |

⁷⁶ Cf. Rilly (2004b), Griffith (1911), Hintze (1959) and Hofmann (1991) for analyses of Meroitic palaeographic dating tables.

⁷⁷ For a fuller account into this discussion, see Rowan (forthc.). For an alternative discussion of the phonemic values of Meroitic see Rilly (2005).

In Beja, only loan words from Arabic contain the phonemes /z, x, y/. In fact, without considering regular sound changes affecting the Meroitic phonemic inventory, as must be the case since the 1,500-year gap between the written texts and any related language yet to be discovered, researchers are on very unstable ground who only use the matching of inventories to dictate their lines of inquiry. It is also the case that Griffith's observation that Meroitic does not possess emphatic 'Semitic' consonants which has also contributed to the dismissal of Afroasiatic languages as a valid line of research.

7 Conclusion

Crucially, this investigation highlights that within the field of Meroitic research many assumptions that have been taken as factual have to be re-examined, deconstructed and verified. The case in point is the investigation into an affiliation with a related language, which has consistently focused upon Nilo-Saharan languages with no fundamental results. Hintze's (1955) refutation of Zhylarz's (1930) data was interpreted as refuting the overall premise, further Griffith's (1911) statement that there are no 'Semitic' consonants in Meroitic has led researchers to conclude that if there are no 'Semitic' consonants in Meroitic then Meroitic is not an Afroasiatic language. This paper has contributed to this line of research by specifically outlining that there is no strong evidence against Meroitic not being a member of Afroasiatic, and that on the contrary, the investigation into consonantal compatibility restrictions shows a strong possibility for its inclusion, as this phonological process is a distinctive trait amongst Afroasiatic languages. This paper does not make any claims as to the likeliest individual candidate for relatedness with Meroitic, but hopes to redirect this research with promising results.

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